VOLUME 8 ISSUE 1 ARTICLES & ESSAYS

UNIVERSITY OF BOLOGNA LAW REVIEW

https://doi.org/10.6092/issn.2531-6133/16907

Received: 30 September 2022 | Accepted: 20 Oct. 2022 | Published: 8 May 2023

Let the Digital Euro Circulate: Introducing a Retail C.B.D.C. in the Eurozone With Unlimited Holdings by Users

MARK WARREN

Mark Warren is currently a PhD/SJD candidate in Legal Studies at Central European University, Vienna(Austria). He recently concluded studying the LLM Law & Finance at the University of Amsterdam (the Netherlands), graduating cum laude. As a solicitor qualified in English law, he has previously worked in international corporate law firms in London, Hong Kong, Hamburg and Amsterdam, where he specialised in finance transactions.
This paper was originally written as a master's thesis for the LLM Law & Finance course at the University of Amsterdam (the Netherlands) submitted in June 2022. Thanks to my supervisor Hossein Nabilou and fellow student Jules Vos, participants at the 2022 annual conference of the Italian Society of Law and Economics (14-16 December 2022 at LUMSA University, Italy) and two anonymous referees for their comments and suggestions.

@ warren_mark@phd.ceu.edu
0009-0009-2822-7905

ABSTRACT

The European Central Bank (E.C.B.) anticipates including a holding limit of about €3,000 per user within the design of its potential retail central bank digital currency for the Eurozone, the digital euro. This is principally motivated by concerns regarding compliance with regulations related to anti-money laundering and countering the financing of terrorism and the disintermediation of banks as credit intermediaries. This paper argues that these concerns are unwarranted, and, in any case, the holding limit would not be an effective solution to these concerns. The digital euro could be introduced with unlimited holdings by individual users in conformity with E.U. law and while maintaining banks as credit intermediaries in the Eurozone financial system.

KEYWORDS

Central Bank Digital Currency; Digital Euro; Disintermediation; Money; Banking

TABLE OF CONTENTS

Introduction . . . 3
1. Literature Review . . . 5
2. Design Options for C.B.D.C.s . . . 7
3. The Legal Basis for Digital Euro . . . 10
3.1. Legal Basis Under the Treaties . . . 10
3.2. Legal Influence on the Potential Design . . . 14
3.3. Further Grounds for Challenge . . . 16
3.4. Amendment of the Treaties . . . 18
3.5. Legal Implementation . . . 18
3.6. Bringing Legal Actions . . . 19
4. Anonymity: Benefit or Burden? . . . 20
4.1. The Importance of Anonymity . . . 20
4.2. Could Anonymity be Acceptable? . . . 23
5. Disintermediation of Banks . . . 25
5.1. Commercial Bank Money . . . 25
5.2. Migration from Deposits . . . 27
5.3. Adjustments by Banks . . . 28
5.4. Adoption by Retail Depositors . . . 32
5.5. Bank Runs . . . 34
5.6. Central Bank Refinancing Operations . . . 35
6. The Purpose of Digital Euro . . . 39
6.1. Payment System Autonomy . . . 39
6.2. The Future of Money . . . 40
Conclusion . . . 41

INTRODUCTION

The European Central Bank (E.C.B.) is assessing the viability and the design of a potential retail Central Bank Digital Currency [hereinafter C.B.D.C.] for the Eurozone, the digital euro.[1] In its *Report on a digital euro* published in October 2020,[2] the E.C.B. outlined principles and requirements which are to be incorporated in the design of the digital euro. One requirement limits the digital euro to being a means of payment [hereinafter M.o.P.] and not "a form of investment" used to hold a large sum of money. This could entail "limiting the quantity of digital euro that users can hold and/or transact".[3] The E.C.B. has mooted a limit of €3,000 held by any user (the "holding limit").[4]

The E.C.B. purportedly intends for the introduction of the digital euro to maintain public access to Central Bank Money [hereinafter Ce.B.M.] as cash usage declines.[5] But the digital euro would not merely offer the digital equivalent of euro banknotes and coins currently in circulation [hereinafter digital cash] if its features materially diverge from physical cash. The holding limit is such a divergence. It denies users the discretion to hold all their money in this form of Ce.B.M. Yet the holding limit may receive less scrutiny than the other design questions that the E.C.B. has reserved in its report for further deliberation.

The concerns that motivate applying the holding limit rest on two bases. Firstly, the digital euro could facilitate financial transactions linked to criminal activity and be inconsistent with regulations related to anti-money laundering and countering the financing of terrorism [hereinafter A.M.L./C.F.T.]. Secondly, the digital euro could reduce deposits held at Eurozone banks which could lead to both disintermediation of banks as credit intermediaries and financial instability. This paper considers these concerns and finds them to be unwarranted. Furthermore, the holding limit does little to address these concerns while doing much to undermine the utility of the digital euro to its potential users.

The holding limit would serve as a blunt instrument towards A.M.L./C.F.T. Meanwhile, there are other models devised that offer payment anonymity in compliance

[1] The project is currently in a twenty-four-month "investigation phase"; *see* European Central Bank, *Eurosystem Launches Digital Euro Project*, (July 14, 2021), https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210714 d99198ea23.en.html.

[2] European Central Bank, REPORT ON DIGITAL EURO (2020), https://www.ecb.europa.eu/pub/pdf/other/ Report _on_a_digital_euro 4d7268b458.en.pdf.

[3] *Id.* at 16–18; *see* Requirement R8.

[4] *See* Fabio Panetta, *Interview with Financial Times*, European Central Bank (June 20, 2021), https://www.ecb.europa.eu/press/inter/date/2021/html/ecb.in210620 c8acf4bc2b.en.html.

[5] *See* Fabio Panetta, *The ECB's Case for Central Bank Digital Currencies*, Financial Times (Nov. 18, 2021), https://www.ft.com/content/5e588cea-c218-4867-aeb7-e16e198ccd9a.

with A.M.L./C.F.T. regulations. Regulators would, however, have to countenance that lower-value C.B.D.C. transactions remain anonymous – as already occurs for some cash and electronic money [hereinafter e-money] transactions – to offer C.B.D.C. as an anonymous electronic means of payment [hereinafter e.M.o.P.]: digital cash.

This paper finds that the Treaties already provide for the issuance of digital euro, provided the design reflects a cash-like instrument. This restricts the ability of the E.C.B. to design a novel instrument that dissuades depositors from withdrawing their deposits in favour of digital euro – within the political constraint that an amendment of the Treaties to implement the digital euro is unlikely. The holding limit is not an effective alternative, however. It would tolerate about one trillion euros of leakage from Eurozone banks' balance sheets.

Importantly, a dynamic analysis of how the E.C.B. and the Eurozone national central banks [hereinafter N.C.B.s] (together, the "Eurosystem"), banks, depositors, borrowers and other parties may react to the availability of digital euro would demonstrate that the holding limit is ill-founded. The potential for further profit would continue to incentivise banks to lend. Banks can adjust the terms of their relationship with depositors and borrowers, as well as their funding model. Parties may increase reliance on the capital markets to facilitate credit intermediation and bank funding, which would be consistent with the E.U.'s Capital Markets Union ambitions. The Eurosystem may be required to embrace its refinancing operations remaining as an important potential source of bank funding that backstops bank liquidity. Nevertheless, there is no indication that banks would be unable to operate in a digital euro environment, that bank runs would pose a greater threat nor the access to credit would be threatened. The real concern for the E.C.B. should not be how to stop the public from holding too much digital euro but, rather, convincing the public to hold digital euro at all.

The remainder of this paper is organised as follows. Section 1 provides a literature review. Section 2 sets out considerations relating to the design of C.B.D.C.s Section 3 analyses the legal basis for the digital euro and the limitations that E.U. law imposes on its potential design. Section 4 assesses the feared incompatibility of an anonymous M.o.P. with A.M.L./C.F.T. regulations. Section 5 assesses the prospect of the digital euro triggering the disintermediation of banks. Section 6 briefly considers the potentially wider purpose of the digital euro for the Eurozone. Finally, the last Section concludes.

1. LITERATURE REVIEW

The compatibility of the digital euro with the provisions of the Treaties has been previously assessed.[6] Legal uncertainties have been highlighted.[7] This paper contributes to the literature considering the legal basis for the digital euro.

The optimal design of C.B.D.C.s has been widely discussed.[8] Many have modelled the impact of C.B.D.C.s on banks, albeit based on differing assumptions that make their findings only partially comparable.[9] The potential impact of C.B.D.C.s on the financial

[6] *See* Benjamin Geva, Seraina Neva Grünewald & Corinne Zellweger-Gutknecht, *The e-Banknote as a "Banknote": A Monetary Law Interpreted*, 41 Oxford Journal of Legal Studies 1119 (2021); Seraina Neva Grünewald, Corinne Zellweger-Gutknecht & Benjamin Geva, *Digital Euro and ECB Powers*, 58 Common Market Law Review 1029 (2021); Corinne Zellweger-Gutknecht, Benjamin Geva & Seraina Neva Grünewald, *Digital Euro, Monetary Objects, and Price Stability: A Legal Analysis*, 7 Journal of Financial Regulation 284 (2021).

[7] *See, e.g.*, Hossein Nabilou, *Testing the Waters of the Rubicon: the European Central Bank and Central Bank digital currencies*, 21 Journal of Banking Regulation 299 (2020); Peter Wierts & Harro Boven, *Central Bank Digital Currency - Objectives, Preconditions and Design Choices*, 20–01 De Nederlandsche Bank: Occasional Studies (2020), https://www.dnb.nl/media/c3qgn4lk/202004_nr-_1_-2020-_-_central_bank_digital_currency_-_objectives-_preconditions_and_design_choices.pdf.

[8] *See, e.g.*, Itai Agur, Anil Ari & Giovanni Dell'Ariccia, *Designing Central Bank Digital Currencies*, 125 Journal of Monetary Economics 62 (2021); Sarah Allen et al., Design Choices for Central Bank Digital Currency: Policy and Technical Considerations (2020), http://prasad.dyson.cornell.edu/doc/Design_Choices_for_CBDC_Final.pdf; Bank for International Settlements, Central Bank Digital Currencies: Foundational Principles and Core Feature, (2020), https://www.bis.org/publ/othp33.pdf; Michael Bordo & Andrew Levin, *Central Bank Digital Currency and the Future of Monetary Policy* (National Bureau of Economic Research Economics Working Paper 23711,2017), http://www.nber.org/papers/w23711.pdf; Michael Kumhof & Clare Noone, *Central Bank Digital Currencies - Design Principles and Balance Sheet Implications* (Bank of England, Staff Working Paper, 2018), https://www.ssrn.com/abstract=3180713; Jiaqi Li, *Predicting the Demand for Central Bank Digital Currency: A Structural Analysis with Survey Data* (Bank of Canada, Staff Working Paper, 2021), https://www.bankofcanada.ca/2021/12/staff-working-paper-2021-65/; Tommaso Mancini-Griffoli et al., *Casting Light on Central Bank Digital Currencies*, 8 IMF Staff Discussion Notes 1 (2018) https://elibrary.imf.org/view/journals/006/2018/008/006.2018.issue-008-en.xml.

[9] *See, e.g.*, David Andolfatto, *Assessing the Impact of Central Bank Digital Currency on Private Banks*, 131 The Economic Journal 525 (2021); John Barrdear & Michael Kumhof, *The Macroeconomics of Central Bank Issued Digital Currencies* (S.s.r.n. Electronic Journal, Working Paper No. 605, 2016), https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2016/the-macroeconomics-of-central-bank-issued-digital-currencies.pdf?la=en&hash=341B602838707E5D6FC26884588C912A721B1DC1; Markus K. Brunnermeier & Dirk Niepelt, *On the Equivalence of Private and Public Money*, 106 Journal of Monetary Economics 27 (2019); Jonathan Chiu et al., *Bank Market Power and Central Bank Digital Currency: Theory and Quantitative Assessment* (Bank of Canada, Staff Working Paper, 2019-20, 2019), https://www.bankofcanada.ca/wp-content/uploads/2019/05/swp2019-20.pdf; Jesús Fernández-Villaverde et al., *Central Bank Digital Currency: Central banking for all?* (National Bureau of Economic Research, Working Paper 26753, 2020), http://www.nber.org/papers/w26753; Todd Keister & Daniel Sanches, *Should Central Banks Issue Digital Currency?* (Federal Reserve Bank of Philadelphia, Working Paper 19-26, 2019), https://www.philadelphiafed.org/-/media/frbp/assets/working-papers/2019/wp19-26.pdf; Young Sik Kim & Ohik Kwon, *Central Bank Digital Currency, Credit Supply, and Financial Stability*, Journal of Money, Credit and Banking (2022), https://doi.org/10.1111/jmcb.12913; Stephen Williamson, *Central Bank Digital Currency: Welfare and Policy Implications* (Society for Economic Dynamics, Meeting Papers 386, 2019) [hereinafter Williamson, *Welfare and Policy Implications*], https://ideas.repec.org/p/red/sed019/386.html; Stephen D. Williamson, *Central Bank Digital Currency and Flight to Safety*, 142 Journal of Economic Dynamics and Control 104-146 (2021) [hereinafter Williamson, *Flight to safety*].

system has been surveyed.[10] This paper reconciles their conclusions with the Eurozone financial system and the legal limitations to the potential design of the digital euro.

This paper considers historical examples that should inform expectations on the impact of C.B.D.C.s: the Bank of Amsterdam and other European public deposit banks that began in the seventeenth century;[11] the U.S. postal banks;[12] the Bank of Canada assuming banknote-issuing privileges;[13] the 2007 bank run on British bank Northern Rock;[14] and proto-C.B.D.C.s in Finland and Ecuador.[15] These examples facilitate a more realistic assessment of the likely impact of the digital euro and the holding limit, rather than relying solely on economic models and theoretical assumptions.

[10] *See, e.g.*, Bank for International Settlements, Central Bank Digital Currencies: Financial Stability Implications (2021), https://www.bis.org/publ/othp42_fin_stab.pdf; Ulrich Bindseil, *Tiered C.B.D.C. and the Financial System* (European Central Bank, Working Paper Series, 2020) [hereinafter Bindseil, *Tiered C.B.D.C*], https://data.europa.eu/doi/10.2866/134524; Ulrich Bindseil, *Central Bank Digital Currency: Financial System Implications and Control,* 48 Int'l. J. Pol. Econ. 303 (2019) [hereinafter Bindseil, *Central Bank Digital Currency*].

[11] *See* Jon Frost, Hyun Song Shin & Peter Wierts, *An Early Stablecoin? The Bank of Amsterdam and the Governance of Money* (Bank for International Settlements, BIS Working Papers No. 902, 2020), https://www.bis.org/publ/work902.htm; Isabel Schnabel & Hyun Song Shin, *Money and Trust: Lessons from the 1620s for Money in the Digital Age* (Bank for International Settlements, BIS Working Papers No. 698, 2018), https://www.bis.org/publ/work698.pdf.

[12] Steven Sprick Schuster, Matthew Jaremski & Elisabeth Ruth Perlman, *An Empirical History of the United States Postal Savings System* (National Bureau of Economic Research Working Papers No. 25812, 2019), http://www.nber.org/papers/w25812.

[13] Anna Grodecka-Messi, *Private Bank Money vs Central Bank Money: A Historical Lesson for C.B.D.C. Introduction* (Lund University Publications, Working Papers, 2019), https://lup.lub.lu.se/record/f4ae004e-5cbc-4551-9563-0d497589fe3e.

[14] Hyun Song Shin, *Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis*, 23 J. Econ. Persp., 101 no. 1 (2009).

[15] Andrés Arauz et al., *Dinero Electrónico: The Rise and Fall of Ecuador's Central Bank Digital Currency*, 2 Latin Am. J. Cent. Banking 100030 (2021).

2. DESIGN OPTIONS FOR C.B.D.C.S

A C.B.D.C. is a fiat currency issued by a central bank in digital form in place of, or as a complement to, physical currency.[16] The E.C.B. wishes to offer a digital alternative to cash in the Eurozone.[17] The decline in cash usage reflects the greater use of commercial bank money [hereinafter Co.B.M.], which is held in deposits[18] as a store of value and a M.o.P.[19] There is also a concern that the increasing adoption of crypto-assets by the public could reach a scale that undercuts monetary policy transmission.[20] This is despite the history of the Bank of Amsterdam indicating that stablecoins are not a sustainable alternative to Ce.B.M. and that such concerns are overblown.[21] Central banks are investigating the adoption of their own digital currency as a regulated, state-backed

[16] Allen et al., *supra* note 8; Eswar Prasad, *Central Banking in a Digital Age: Stock-Taking and Preliminary Thoughts* (Hutchins Center on Fiscal & Monetary Policy at Brookings, Working Papers, 2018), http://prasad.dyson.cornell.edu/doc/CentralBankingDigitalAge_Brookings.April18.pdf. There are numerous definitions offered for C.B.D.C., though some only reflect that author's proposed form of C.B.D.C.; see e.g. Bank for International Settlements, *supra* note 8; Bank for International Settlements, Central Bank Digital Currencies (2018), https://www.bis.org/cpmi/publ/d174.htm; Aleksi Grym et al., *Central Bank Digital Currency*, 5 BoF Economics Review (2017) (Fi.)., https://helda.helsinki.fi/bof/bitstream/handle/123456789/14952/BoFER_5_2017.pdf; Kumhof & Noone, *supra* note 8; Mancini-Griffoli et al., *supra* note 8.

[17] There are "wholesale C.B.D.C." projects examining cross-border, cross-currency or securities payment settlement among wholesale users; *see,* e.g., *Project Jura: Cross-Border Settlement Using Wholesale CBDC*, *BIS Innovation Hub*, Projects, BANK FOR INTERNATIONAL SETTLEMENTS (2022), https://www.bis.org/about/bisih/topics/cbdc/jura.htm (last visited Jun 21, 2022); *The Banque de France has Successfully Completed the First Tranche of its Experimentation Programme in Central Bank Digital Currency*, Banque de France (Dec. 16, 2021), https://www.banque-france.fr/en/communique-de-presse/banque-de-france-has-successfully-completed-first-tranche-its-experimentation-programme-central-bank.

[18] Certain institutions also issue e-money; see Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC, OJ L 267 7 (2009), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02009L0110-20180113 (the e-Money Directive).

[19] *See,* e.g., The Netherlands; *see DNB Study: Cash Must Remain Accessible and Available*, De Nederlandsche Bank (Dec. 17, 2020) (Neth.), https://www.dnb.nl/en/actueel/dnb/older-bulletins/dnbulletin-2020/dnb-study-cash-must-remain-accessible-and-available/; Jurgen Spaanderman, *The Role and Future of Cash*, 18–2 De Nederlandsche Bank: Occasional Studies 12 (2020) (Neth.)., https://www.dnb.nl/media/d5lnf32j/web_129212_os_toekomst_contant_geld_eng.pdf. This has been a long-term trend; see Hanna Jyrkönen, *Less Cash on the Counter: Forecasting Finnish Payment Preferences* (Bank of Finland, Discussion Papers No. 27, 2004) (Fi.)., http://hdl.handle.net/10419/211994; Tanai Khiaonarong & David Humphrey, *Cash Use Across Countries and the Demand for Central Bank Digital Currency* (International Monetary Fund, IMF Working Papers, 2019), https://www.elibrary.imf.org/configurable/content/journals$002f001$002f2019$002f046$002f001.2019.issue-046-en.xml. See also Sweden; *see* Niklas Arvidsson et al., *Cashless Society: When Will Merchants Stop Accepting Cash in Sweden. A Research Model, in* ENTERPRISE APPLICATIONS, MARKETS AND SERVICES IN THE FINANCE INDUSTRY 105-13 (Stefan Feuerriegel & Dirk Neumann eds., 2017).

[20] *See* Hossein Nabilou & André Prüm, *Central Banks and Regulation of Cryptocurrencies*, 39 REVIEW OF BANKING AND FINANCIAL LAW 1003 (2020).

[21] *See* Frost et al., *supra* note 11. Proposed stablecoin Diem (originally Libra) has already been abandoned by its promoter, Meta (formerly Facebook); see Diem Association, *Statement by Diem CEO Stuart Levey on the Sale of the Diem Group's Assets to Silvergate*, PR Newswire (Jan. 31, 2022), https://www.prnewswire.com/news-releases/statement-by-diem-ceo-stuart-levey-on-the-sale-of-the-diem-groups-assets-to-silvergate-301471997.html.

alternative.[22] The digital euro would be the Eurozone's C.B.D.C. offering Ce.B.M. that serves as an e.M.o.P. in the Eurozone.[23]

Many aspects of the design of C.B.D.C. remain open to consideration[24] and entail trade-offs against other M.o.P.s.[25] The design may represent digital cash or adopt additional features (and reject features of physical cash). Numerous central banks have been investigating the design choices.[26] There is some consensus, including under the auspices of the Bank for International Settlements[27] and the Group of 7.[28]

[22] *See* Bank for International Settlements, *supra* note 8; Bank for International Settlements, *supra* note 17. See also the U.K.; *see* Bank of England, *Bank of England Statement on Central Bank Digital Currency* (Apr. 19, 2021) (U.K.), https://www.bankofengland.co.uk/news/2021/april/bank-of-england-statement-on-central-bank-digital-currency. See also the U.S.; see Fed. Rsrv. Sys., Money and Payments: The U.S. Dollar in the Age of Digital Transformation (2022), https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf. But concerns remain regarding implementation of c.b.d.c.s; see Andrew Bailey, *Bank of England Governor Andrew Bailey on the future of cryptocurrencies and stablecoins* (Sept. 3, 2020) (UK)., https://www.brookings.edu/wp-content/uploads/2020/09/es_20200903_england_bailey_transcript.pdf; Ansgar Belke & Edoardo Beretta, *From Cash to Central Bank Digital Currencies and Cryptocurrencies: A Balancing Act Between Modernity and Monetary Stability*, 47 J. Econ. Stud. 911 (2020).

[23] European Central Bank, *supra* note 2, at 49–51; see Core Principle P2.

[24] *See* Allen et al., *supra* note 8; Bindseil, *Tiered C.B.D.C*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10; Wouter Bossu et al., *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations* (International Monetary Fund, IMF Working Papers No. 2020/254, 2020), https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827; Grym et al., *supra* note 16.

[25] *See* Wierts & Boven, *supra* note 7; Paul Wong & Jesse L. Maniff, *Comparing Means of Payment: What Role for a Central Bank Digital Currency?*, FEDS Notes (Aug. 13, 2020), https://federalreserve.gov/econres/notes/feds-notes/comparing-means-of-payment-what-role-for-a-central-bank-digital-currency-20200813.htm.

[26] For surveys of central bank activity, see Codruta Boar, Henry Holden & Amber Wadsworth, *Impending arrival: a sequel to the survey on central banking digital currency*, 107 BIS PAPERS 1 (2020), https://www.bis.org/publ/bppdf/bispap107.pdf; Mancini-Griffoli et al., *supra* note 8; Prasad, *supra* note 16.

[27] Bank for International Settlements, *supra* note 8.

[28] G7, *G7 Finance Ministers and Central Bank Governors' Statement on Central Bank Digital Currencies (C.B.D.C.s) and Digital Payments – 13 October 2021*, (Oct. 13, 2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025234/FINAL_G7_Statement_on_Digital_Payments_13.10.21.pdf;
G7, *Public Policy Principles for Retail Central Bank Digital Currencies (C.B.D.C.s)*, (2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025235/G7_Public_Policy_Principles_for_Retail_CBDC_FINAL.pdf.

Trends have emerged among C.B.D.C.s that are already in circulation or are undergoing pilot projects.[29] But the E.C.B. continues to experiment and has yet to determine the likely design of the digital euro.[30] The principles and requirements published by the E.C.B. indicate that the digital euro would involve a two-tier system[31] – the Eurosystem operates a centralised ledger with private sector intermediaries responsible for user supervision and access – but most features remain undecided.[32]

The final proposed design of the digital euro will affect how widely it is adopted by potential users, as well as the legal and economic analysis of its impact on the Eurozone.[33] Nonetheless, the digital euro can be analysed for the purposes of this paper despite this uncertainty.

[29] See Sand Dollar in the Bahamas; see Central Bank of The Bahamas, *Annual Report & Statement of Accounts, 2020*, (Apr. 26, 2021), https://www.centralbankbahamas.com/viewPDF/documents/2021-05-05-14-14-43-2020-CBOB-Annual-Report.pdf; Central Bank of The Bahamas, *Annual Report & Statement of Accounts, 2021*, (Apr. 25, 2022), https://www.centralbankbahamas.com/viewPDF/documents/2022-05-05-11-51-31-CBOB-2021-Annual-Report-and-Financial-Statements.pdf. See e-C.N.Y. in China; see People's Bank of China, *Progress of Research & Development of E-C.N.Y. in China*, (July, 2021) (China)., http://www.pbc.gov.cn/en/3688110/3688172/4157443/4293696/2021071614584691871.pdf. See DCash in the Eastern Caribbean; see Eastern Caribbean Central Bank, *What You Should Know | E.C.C.B. Digital E.C. Currency Pilot*, (2022), https://www.eccb-centralbank.org/p/what-you-should-know-1 (last visited Jun 21, 2022). See eNaira in Nigeria; see Central Bank of Nigeria, *Design Paper for the eNaira*, (2021), https://enaira.com/download/eNaira_Design_Paper.pdf (last visited Feb 11, 2022). See e-krona in Sweden; *see* Sveriges Riksbank, *E-krona pilot phase 1*, (Apr. 2021) [hereinafter Riksbank, *Phase 1*], https://www.riksbank.se/globalassets/media/rapporter/e-krona/2021/e-krona-pilot-phase-1.pdf; Sveriges Riksbank, *E-krona pilot phase 2*, (Apr. 2022) (Swed.) [hereinafter Riksbank, *Phase 2*], https://www.riksbank.se/globalassets/media/rapporter/e-krona/2022/e-krona-pilot-phase-2.pdf (last visited Jun 6, 2022); Sveriges Riksbank, *The Riksbank's e-krona project, Report 1*, (Sep. 2017) (Swed.). [hereinafter Riksbank, *Report 1*], https://www.riksbank.se/globalassets/media/rapporter/e-krona/2017/rapport_ekrona_uppdaterad_170920_eng.pdf; Sveriges Riksbank, *The Riksbank's e-krona project, Report 2*, (Oct. 2018) (Swed.). [hereinafter Riksbank, *Report 2*], https://www.riksbank.se/globalassets/media/rapporter/e-krona/2018/the-riksbanks-e-krona-project-report-2.pdf. These are non-interest-bearing cash-like instruments, held in C.B.D.C. wallets and managed by authorised intermediaries in a two-tier system.

[30] E.g. Transacting C.B.D.C. with hardware as a bearer instrument; see Deutsche Bundesbank, *Eurosystem Experimentation Regarding a Digital Euro - Research Workstream on Hardware Bearer Instrument*, (2021) (Ger.)., https://www.ecb.europa.eu/paym/digital_euro/investigation/profuse/shared/files/deexp/ecb.deexp211011_2.en.pdf.

[31] European Central Bank, *supra* note 2, at 36–44.

[32] Although the E.C.B. confirmed the technical feasibility of the holding limit; *see* European Central Bank, *Digital Euro Experimentation Scope and Key Learnings*, (2021), https://www.ecb.europa.eu/pub/pdf/other/ecb.digitaleuroscopekeylearnings202107 564d89045e.en.pdf.

[33] Kumhof & Noone, *supra* note 8; Mancini-Griffoli et al., *supra* note 8.

3. THE LEGAL BASIS FOR DIGITAL EURO

3.1. LEGAL BASIS UNDER THE TREATIES

The Treaty on the Functioning of the European Union [hereinafter T.F.E.U.][34] and the Statute of the European System of Central Banks and of the European Central Bank [hereinafter E.S.C.B. Statute][35] entrust the Eurosystem with the responsibility for Eurozone monetary policy within the Economic and Monetary Union [hereinafter E.M.U.].[36] The responsibilities of the Eurosystem, which lacks legal personality, are coordinated by the E.C.B.[37] and implemented by the E.C.B. with the relevant N.C.B.s.[38] The digital euro project is, therefore, an Eurosystem project coordinated by the E.C.B.

The principles of conferral, subsidiarity and proportionality in the Treaty on European Union [hereinafter T.E.U.][39] determine whether the introduction of the digital euro is an *intra vires* act of the Eurosystem.[40] Subsidiarity is not applicable due to Eurozone monetary policy being an exclusive Union competence.[41] It is not feasible to evaluate proportionality without a concrete proposal. This paper, therefore, principally considers whether the Treaties confer the power on the E.U. (represented by the Eurosystem) to introduce the digital euro.

The legal basis for the digital euro lies in the E.C.B. having "the exclusive right to authorise the issue of euro banknotes within the Union" and the Eurosystem having the power to "issue such notes".[42] Digital euro that would operate as a digital equivalent of

[34] Consolidated Version of the Treaty on the Functioning of the European Union art. 15, May 9, 2008, 2008 O.J. (C 115) 47 [hereinafter TFEU], https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12016E/TXT&qid=1640690125551&from=EN.

[35] Consolidated Version of the Treaty on the Functioning of the European Union: Protocol (No. 4) on the Statute of the European System of Central Banks and of the European Central Bank, OJ C 202 230 (2016), https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12016M/PRO/04&qid=1661254745758&from=EN.

[36] The Treaties refer to the European System of Central Banks [hereinafter E.S.C.B.], consisting of the E.C.B. and the E.U. N.C.B.S; *see* TFEU, *supra* note 34, at 127; TFEU Protocol No. 4, *supra* note 35, at 1. However, non-Eurozone Member States and their N.C.B.s are exempt from Eurozone decision-making; *see* TFEU, *supra* note 34, at 139; TFEU Protocol No. 4, *supra* note 35, at 42.

[37] TFEU, *supra* note 34, at 132(1); TFEU Protocol No. 4, *supra* note 35, at 9.2.

[38] TFEU Protocol No. 4, *supra* note 35, at 12.1. On the Eurosystem, see Christos V. Gortsos, *The European Central Bank*, *in* THE E.U.LAW OF ECONOMIC AND MONETARY UNION (Fabian Amtenbrink, Christoph Hermann & René Repasi eds., 2020); Michael Ioannidis, *The European Central Bank*, *in* THE E.U.LAW OF ECONOMIC AND MONETARY UNION (Fabian Amtenbrink, Christoph Hermann & René Repasi eds., 2020); Bernd Krauskopf & Christine Steven, *The Institutional Framework of the European System of Central Banks: Legal Issues in the Practice of the First Ten Years of its Existence*, 46 COM. MAR. L. REV. 1143 (2009).

[39] Consolidated Version of the Treaty on European Union, OJ C 326 13 (2012), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12008M/TXT&from=EN.

[40] *Id.* at 5.

[41] TFEU, *supra* note 34, at 3(1)(c).

[42] *Id.* at 128(1); TFEU Protocol No. 4, *supra* note 35, at 16. On issuance of banknotes and coins, see Gortsos, *supra* note 38, at 7.3.

cash constitutes money.[43] It would serve the three functions of money: medium of exchange, store of value and unit of account. This status is bolstered by the digital euro being backed by the state and the central bank and (one would hope) its wide acceptance as a M.o.P.[44] However, there is no E.U. law definition of "banknotes". Irrespective of the drafters of the Treaties only contemplating paper banknotes, the Treaties provide no limitation on the medium of the banknote.[45] The concept can, therefore, be extended to the digital form.[46] The Eurosystem is capable of issuing two digital currencies given their distinguishable forms: the digital euro would be a general-purpose currency; reserves are intended for interbank payment settlement.

The Treaties do, however, distinguish between banknotes and coins. Issuance of coins is reserved for Member States.[47] No distinction between banknotes and coins can exist in digital currency other than any iconography used but the visual representation of the digital euro carries no legal significance. This provision originates from the historical role of nation-states in minting coins, and that rationale is not applicable to C.B.D.C.[48] It is then consistent with the Treaties to consider non-minted euro currency as falling within the "banknote" concept under the T.F.E.U. Article 128(1).[49] The digital euro would be the digital form of the euro "banknote" in accordance with the T.F.E.U. Article 128(1).

There are limitations to what can constitute money and banknotes when designing the digital euro. As features are incorporated that go further than being a digital manifestation of existing paper banknotes, it becomes increasingly unlikely that such digital euro falls within the T.F.E.U. Article 128(1).[50] The E.C.B. has indicated the same conclusion.[51] It would be problematic for the digital euro to have a variable value, whether for remuneration or monetary policy, or be programmable to restrict its use. A banknote is a negotiable instrument with a fixed nominal value.[52] A balance should be remunerated with additional money, not the variation of the nominal value of the instruments held. Similarly, certain features may require a Treaty amendment if they go

[43] Geva et al., *supra* note 6.
[44] Charles Proctor, Mann on the Legal Aspect of Money (7th ed. 2012).
[45] Cf. A restrictive interpretation could take the word "banknotes" to only denote physical banknotes; see Bossu et al., *supra* note 24.
[46] Geva et al., *supra* note 6; Grunewald et al., *supra* note 6; Wierts & Boven, *supra* note 7; Zellweger-Gutknecht et al., *supra* note 6.
[47] TFEU, *supra* note 34, at 128(2).
[48] Grunewald et al., *supra* note 6; Zellweger-Gutknecht et al., *supra* note 6.
[49] Geva et al., *supra* note 6; Grunewald et al., *supra* note 6; Zellweger-Gutknecht et al., *supra* note 6.
[50] Grunewald et al., *supra* note 6; Nabilou, *supra* note 7; Wierts & Boven, *supra* note 7; Zellweger-Gutknecht et al., *supra* note 6.
[51] European Central Bank, *supra* note 2, at 24–25.
[52] Bossu et al., *supra* note 24; Geva et al., *supra* note 6.

beyond existing Eurosystem tools,[53] or are tantamount to taxation such as negative interest charged on digital euro holdings.[54]

The Eurosystem is empowered under the Treaties to "provide facilities . . . to ensure efficient and sound clearing and payment systems".[55] This provides the legal basis for the Eurosystem to institute a digital euro payment system.[56] The Eurosystem has used this legal basis to drive integration towards a single Eurozone payments system[57]: the euro payment system [hereinafter T.A.R.G.E.T.2.], the euro payment area [hereinafter S.E.P.A.], payment settlement of securities transactions [T.2.S.], instant payment settlement [T.I.P.S.] and regulation of card interchange fees.[58] There are limits to the scope of this legal basis.[59] Nonetheless, a digital euro payment system relates to money and comfortably falls within the scope.

A more spurious argument would be that the E.S.C.B. Statute Article 22 acts as a legal basis for issuing the digital euro. This would construe the digital euro as a facility that allows payments to function in the absence of cash.[60] Cryptocurrencies, such as Bitcoin, are sometimes perceived in this dual role as both money and payment systems.[61] The regulatory role of the Eurosystem includes acting as a "catalyst" for advancing the Eurozone payment system.[62] Nonetheless, this is not a suitable basis on which to ground the issuance of the digital euro, provided digital euro represents money. Paper banknotes do not legally constitute a subset of a Eurosystem payment facility, especially when the T.F.E.U. Article 128(1) offers an explicit legal basis for the issuance of Ce.B.M. C.B.D.C. should not be legally construed in such a manner either.

If the digital euro were to take a more exotic form, those formulations of the digital euro would require an alternative legal basis to the T.F.E.U. Article 128(1). The E.S.C.B. Statute Article 22 could become relevant as a legal basis if its primary role was to

[53] Nabilou, *supra* note 7.
[54] Grunewald et al., *supra* note 6; Zellweger-Gutknecht et al., *supra* note 6.
[55] TFEU Protocol No. 4, *supra* note 35, at 22.
[56] Wierts & Boven, *supra* note 7.
[57] Phoebus L. Athanassiou, *Payment Systems*, *in* The EU Law of Economic and Monetary Union (2020); René Smits, *The Changing Payments Landscape of Europe: Issues of Regulation and Competition*, 27 Yearbook of European Law 405 (2008); Ivan Parać Vukomanović, *New Services Offered within the Remit of Target2 - How Do They Correspond with TFEU and Central Bank Tasks?*, 3 EU and Comparative Law Issues and Challenges Series 1048 (2019).
[58] Regulation (E.U.) 2015/751 of the European Parliament and of the Council of 29 April 2015 on interchange fees for card-based payment transactions, OJ L 123 1 (2015), http://data.europa.eu/eli/reg/2015/751/oj/eng.
[59] This is an inappropriate basis for regulation of central counterparties in derivatives clearing; *see* Case T-496/11, United Kingdom of Great Britain and Northern Ireland v. European Central Bank (E.C.B.), ECLI:EU:T:2015:133 (March 4, 2015), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62011TJ0496&from=en.
[60] Nabilou, *supra* note 7.
[61] Mary Donnelly, *Payments in the Digital Market: Evaluating the Contribution of Payment Services Directive II*, 32 Comput. L. & Sec. Rev. 827 (2016).
[62] Athanassiou, *supra* note 57; Vukomanović, *supra* note 57.

settle payments. For example, the instrument may be used merely as a temporary asset to digitally transmit payments between parties. However, the digital euro would be closer to a market infrastructure tool than currency in such circumstances. The E.S.C.B. Statute Article 17 allows the Eurosystem to open bank accounts for "credit institutions, public entities and other market participants". This could be interpreted broadly to allow the public to open bank accounts with the Eurosystem that would hold digital euro balances.[63] Such an interpretation of the term "other market participants" is unconvincing, especially when read within the context of the E.S.C.B. Statute Chapter IV.[64] In the E.S.C.B. Statute, Article 20 allows the E.C.B. to "decide upon the use of such other operational methods of monetary control as it sees fit". But this would be inappropriate to introduce a measure as significant as a currency that is otherwise lacking a basis under the Treaties.[65] These provisions, therefore, represent a problematic basis on which to issue a purported digital currency.[66] The E.C.B. cites the T.F.E.U. Article 127(2) and the E.S.C.B. Statute Articles 17, 20 or 22 as potential legal bases only if digital euro takes the form of "variants for limited uses, devoid of general legal tender status".[67]

The validity of the digital euro as conceived by the Eurosystem may rest on an assessment of its proportionality: such act "should be suitable for attaining the legitimate objectives pursued by the legislation at issue and should not go beyond what is necessary to achieve those objectives".[68] The Eurosystem's primary objective to "maintain price stability"[69] and its enumerated tasks[70] are relevant to that assessment. Maintaining the euro as a stable currency that is readily available to households and businesses offers a public benefit[71] and is necessary for the effective transmission of monetary policy.[72] These

[63] This design has been mooted in literature; *see,* e.g., George Selgin, *Central Bank Digital Currency as Potential Source of Financial Instability*, 41 CATO J. 333 (2021).
[64] Wierts & Boven, *supra* note 7.
[65] *Id.*
[66] Annelieke Mooij, *Central Bank Digital Currency: A Brief Analysis of Legal Issues Concerning the Introduction of Central Bank Digital Currencies*, BANKIERI, Oct. 2021, at 13. Zellweger-Gutknecht et al., *supra* note 6.
[67] European Central Bank, *supra* note 2, at 24.
[68] Case C-493/17, Proceedings brought by Heinrich Weiss and Others, ECLI:EU:C:2018:1000, 72 (Dec. 11, 2018), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62017CJ0493&from=en. *See* also Case C-62/14, Peter Gauweiler v Deutscher Bundestag, ECLI:EU:C:2015:400, 67 (June 16, 2015), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62014CJ0062&from=en.
[69] European Union, *supra* note 34, at 127(1); European Union, *supra* note 35, at 2. *See* European Central Bank, *Two per Cent Inflation Target*, https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html (last visited June 21, 2022).
[70] European Union, *supra* note 34, at 127(2); European Union, *supra* note 35, at 3. This includes monetary policy and "the smooth operation of payment systems".
[71] Grunewald et al, *supra* note 6; Zellweger-Gutknecht et al., *supra* note 6. Although the term "public good" is often used to describe this benefit, the criteria for that economics term are not necessarily satisfied; *see* Lawrence H. White, *Should the State or the Market Provide Digital Currency?* CATO 237 (2021).
[72] Athanassiou, *supra* note 57; Zellweger-Gutknecht et al., *supra* note 6. *See* Cases C-422/19 and C-423/19, Johannes Dietrich and Norbert Häring v Hessischer Rundfunk, ECLI:EU:C:2021:63, 37–39, 43 (January 26, 2021), https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:62019CJ0422.

considerations may support a determination that the digital euro is a necessary measure to achieve the Eurosystem's obligations.

The standard of review applied by the Court of Justice of the European Union [hereinafter C.J.E.U.] may be decisive for – and a contentious aspect of – its proportionality assessment.[73] The C.J.E.U. has generally afforded broad discretion to the E.C.B. when reviewing monetary policy decisions,[74] due to the technical nature of its policy choices and the need to undertake forecasts and complex assessments.[75] The E.C.B.'s proportionality determination when introducing the digital euro would again be grounded in complex economic assessments and may receive similar deference. However, the introduction of a C.B.D.C. is such a fundamental undertaking that it may provoke more robust judicial scrutiny than other E.C.B. acts.[76]

3.2. LEGAL INFLUENCE ON THE POTENTIAL DESIGN

In line with the existing payment system, the N.C.B.s are expected to function as the Eurosystem's intermediaries and be responsible for the management of the digital euro in their Member States. This is consistent with the decentralised mandate of the Eurosystem under the Treaties: tasks are allocated between the E.C.B. and relevant N.C.B.s.[77] This reflects how euro banknotes are currently issued and allows seigniorage to continue to be apportioned within the Eurosystem.[78] This also resembles T.A.R.G.E.T.2, which operates as a single system but is structured as a combination of the N.C.B.s' payment systems.[79]

[73] On the role of courts in E.M.U. policy, *see* Daniel Sarmiento & Moritz Hartmann, *European Monetary Union and the Courts*, *in* The EU Law of Economic and Monetary Union, May 2020, at 526.
[74] Nabilou, *supra* note 7.
[75] *See* Peter Gauweiler and Others v Deutscher Bundestag, ECLI:EU:C:2015:400, 68-69, 74-75 (June 16, 2015).
[76] Nabilou, *supra* note 7.
[77] European Union, *supra* note 35, at 12.1. *See* Krauskopf & Steven, *supra* note 38; Julian Langner, *ESCB/Eurosystem/National Central Banks*, *in* The EU Law of Economic and Monetary Union, May 2020, at 389.
[78] The E.C.B. and each Eurozone N.C.B. are entitled to the value of a predetermined percentage of euro banknotes in circulation; *see* European Central Bank, *Decision of the European Central Bank of 13 December 2010 on the Issue of Euro Banknotes (recast) (ECB/2010/29)*, Official Journal of the European Union, Feb.9, 2011, at 26, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02010D0029(01)-20200201&rid=9 *See* also Langner, *supra* note 77.
[79] Vukomanović, *supra* note 57.

The E.U. regulates the provision of payment services under the Second Payment Services Directive [hereinafter P.S.D.2].[80] The parties wishing to function as a payment service provider [hereinafter P.S.P.s] for digital euro can expect to be subject to the same rights and obligations.[81] However, access to the N.C.B.s in the existing payment system is limited to those parties accepted as participants to T.A.R.G.E.T.2. The N.C.B. terms and conditions of T.A.R.G.E.T.2 essentially limit participant status to the E.C.B., N.C.B.s and credit institutions - although the Eurosystem has discretion in determining eligibility.[82] A similar approach to the digital euro system would maintain non-banks relying on banks to access the payment system and function as digital euro P.S.P.s.

The E.C.B. expects the digital euro system to comply with A.M.L./C.F.T. requirements that apply to the financial system.[83] The Fourth Anti-Money Laundering Directive [hereinafter A.M.L.D.][84] would remain relevant to designing the digital euro payment system and the operational requirements for intermediaries. This includes subjecting "obliged entities"[85] to customer due diligence requirements [hereinafter C.D.D.] that apply upon establishing a business relationship and when encountering large-value payments.[86] Derogations exist for low-value e-money transactions.[87]

---

[80] European Union, *Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on Payment Services in the Internal Market, Amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and Repealing Directive 2007/64/EC*, Official Journal of the European Union, Dec.12, 2015, at 35, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02015L2366-20151223&from=EN. *See* Benjamin Geva, *Payment Transactions under the E.U. Second Payment Services Directive - An Outsider's View*, 54 Texas International Law Journal, Dec. 11, 2018, at 211; Gabriella Gimigliano & Marta Božina Beroš, *Introduction to the Payment Services Directive II: A Commentary*, *in* The Payment Services Directive II, Dec.14, 2021, at 2.

[81] European Central Bank, *supra* note 2, at 42.

[82] European Central Bank, *Guideline of the European Central Bank of 5 December 2012 on a Trans-European Automated Real-time Gross Settlement Express Transfer system (TARGET2) (recast) (ECB/2012/27)*, Official Journal of the European Union, Jan. 30, 2013, at 1, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02012O0027-20211121&from=EN For the E.C.B. terms and conditions of T.A.R.G.E.T.2, *see* also European Central Bank, *Decision of the European Central Bank of 24 July 2007 concerning the terms and conditions of TARGET2-ECB (ECB/2007/7)*, Official Journal of the European Union, Sep. 8, 2007, at 71, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02007D0007-20211121&from=EN.

[83] European Central Bank, *supra* note 2, at 27; *see* Requirement 10. Other central banks expect the same of their potential C.B.D.C.s; *see* Bank for International Settlements, *supra* note 8.

[84] European Union, *Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing, Amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC*, Official Journal of the European Union, June 5, 2015, at 73 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02015L0849-20210630.

[85] *See Id.* at 2 (1).

[86] This includes any occasional transaction worth €15,000 or more, occasional transfer of funds for more than €1,000 or cash payment for goods for €10,000 or more (*see* A.M.L.D. Article 11) – or such lower threshold set by that Member State (*see* A.M.L.D. Article 5).

[87] Anonymous prepaid payment cards are exempt from certain C.D.D. if they store up to €150 and transactions are up to €50 (*see* A.M.L.D. Article 12).

The Charter of Fundamental Rights [hereinafter the Charter][88] provides the right to privacy.[89] This is a factor to be considered in the design of the digital euro system.[90] But this does not imply that users should expect a right to anonymity. Charter rights can be restricted by laws that are proportionate to achieving an objective of public interest.[91] As is apparent from existing A.M.L./C.F.T. legislation, privacy is not an absolute right.

However, the E.U. recognises that everyone has the right to the protection of personal data.[92] This would impose General Data Protection Regulation [hereinafter G.D.P.R.] standards on those parties processing data within the digital euro system.[93] Such standards for P.S.P.s and the Eurosystem have already been determined in the existing payment system.[94]

3.3. FURTHER GROUNDS FOR CHALLENGE

The Eurosystem is required to act in accordance with the principle of "an open market economy with free competition" and "favouring an efficient allocation of resources".[95] This principle is arguably contravened if the digital euro leads to money migrating from banks to central banks and a greater role of central banks in credit intermediation.[96]

This argument is unconvincing. The existing refinancing operations regime entails the Eurosystem's funding stimulating private sector lending by Eurozone banks.[97] This practice is considered *intra vires*. The consequences of greater reliance on

[88] Charter of Fundamental Rights of the European Union, Oct. 26, 2012, 2012 OJ (C 326/391), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012P/TXT.

[89] *Id.* at 7.

[90] Zellweger-Gutknecht et al., *supra* note 6.

[91] European Union, *supra* note 88, at 52 (1).

[92] European Union, *supra* note 34, at 16(1); European Union, *supra* note 88, at 8. This is supplemented by European Union, *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)*, 2016 OJ (L 119) 1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504. (the G.D.P.R.); European Union, *Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC*, 2018 OJ (L 295) 39, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1725&from=EN.

[93] Allen et al., *supra* note 8.

[94] Nikita Divissenko, *Title IV "Rights and Obligations in Relation to the Provision and Use of Payment Services", Chapter 4 "Data Protection" (Art, 94),* The Payment Services Directive II, Dec.14, 2021, at 179 (Gabriella Gimigliano & Marta Božina Beroš eds., 2021).

[95] European Union, *supra* note 34, at 127 (1); European Union, *supra* note 35, at 2.

[96] Grunewald et al., *supra* note 6; Nabilou, *supra* note 7; Nabilou & Prüm, *supra* note 20.

[97] *See* section 5.6. *See also* Jens van 't Klooster, *Technocratic Keynesianism: A Paradigm Shift Without Legislative Change*, New Political Economy, 2022, at 771. Jens van 't Klooster & Clément Fontan, *The Myth of Market Neutrality: A Comparative Study of the European Central Bank's and the Swiss National Bank's Corporate Security Purchases*, New Political Economy, 865 (2020).

refinancing operations should merely factor into the E.C.B. determination of the merits of the policy and any proportionality assessment by the C.J.E.U. Furthermore, the existing banking system is itself a compromise of free competition. Banks as financial intermediaries are exempt from asset segregation rules and rely upon deposit insurance to reassure depositors.[98] Banks as P.S.P.s have preferential access to the payment system.[99] A private banking market would continue to function alongside C.B.D.C. but under different (perhaps less favourable) monetary conditions.[100] This would not amount to there no longer being an "open market economy." Finally, it is questionable whether the T.F.E.U. Article 127(1) itself constitutes a ground to invalidate an otherwise *intra vires* act.[101]

The Charter protects the "freedom to conduct a business".[102] A challenge could be brought by those whose business is purportedly harmed by the presence of the digital euro, such as commercial banks.[103]

Nevertheless it is doubtful that the digital euro would contravene this freedom. C.J.E.U. case law has borne out that the test would be whether the digital euro would "prevent the exercise of banking activities".[104] If banks are permitted to operate, but their business model becomes financially untenable, that is not a concern for the Charter. Furthermore, given that the digital euro would be grounded in E.U. legislation, it could be justified as proportionate to its intended objectives.[105]

[98] Hossein Nabilou, *The Law and Macroeconomics of Custody and Asset Segregation Rules: Defining the Perimeters of Crypto-banking*, SSRN Electronic Journal (March 30, 2022).

[99] Charles M. Kahn & William Roberds, *Why pay? An Introduction to Payments Economics*, Journal of Financial Intermediation, 1 (2009).

[100] *See* Section 5.3.

[101] Advocate-General Cruz Villalón referred to the T.F.E.U. Article 119, which uses the same phrase, as a "general and thus ambiguous" Article; *see* Case C-62/14, Peter Gauweiler and Others v Deutscher Bundestag, ECLI:EU:C:2015:7, 126 (Jan. 14, 2015), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62014CC0062&from=en.

[102] European Union, *supra* note 88, at 16.

[103] Grunewald et al., *supra* note 6.

[104] Case C-686/18, OC and Others v Banca d'Italia and Others, ECLI:EU:C:2020:567, 89 (July 16, 2020), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62018CJ0686&qid=1647625337000&from=EN.
See also Case C-540/16 UAB 'Spika' and Others v Žuvininkystės tarnyba prie Lietuvos Respublikos žemės ūkio ministerijos, ECLI:EU:C:2018:565, 38 (July 12, 2018), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62016CJ0540&from=EN.

[105] European Union, *supra* note 88, at 52 (1).

3.4. AMENDMENT OF THE TREATIES

If it is determined that the desired design of the digital euro falls outside the existing legal bases under the Treaties, amendment of the T.F.E.U. and/or the E.S.C.B Statute would be necessary.[106] There is currently a lack of political enthusiasm for reopening the Treaties under the ordinary revision procedure.[107] Simplified revision procedures are available but problematic.[108] Certain relevant Treaty provisions fall outside their scope. Purporting to merely clarify an existing Union competence may be accused of attempting an *ultra vires* increase in Union competences.[109] The E.C.B. is, therefore, likely to pursue a form of the digital euro that avoids amendment of the Treaties. This paper assumes that the legal basis of the digital euro is limited to the existing provisions of the Treaties.

3.5. LEGAL IMPLEMENTATION

In implementing the digital euro, the E.U. will have to enact a legal package that establishes the currency's requirements, mandates actions by certain institutions and amends existing legislation where appropriate.[110] For example, P.S.D.2 and the e-Money Directive [e-M.D.] govern the convertibility of money between cash, deposits and e-money and should be updated to address the digital euro and the requirements of digital euro P.S.P.s.[111] Furthermore, each Member State must reconcile the digital euro with its national law in relation to private law, bankruptcy law and administrative law. E.U. legislation may facilitate harmonisation but cannot codify a one-size-fits-all solution.

Regulations and directives necessary to implement the digital euro constitute "measures necessary for the use of the euro as the single currency" and so can be agreed

[106] E.U. Member States and the C.J.E.U. bound themselves to complying with the revision procedures under the Treaties; *see* Reijer Passchier & Maarten Stremler, *Unconstitutional Constitutional Amendments in European Union Law: Considering the Existence of Substantive Constraints on Treaty Revision*, 5 Cambridge Journal of International and Comparative Law 337 (2016). *See* also Case 43-75, Gabriella Defrenne v. Societe anonyme belge de navigation aerienne Sabena, ECR 455, 58 (April 8, 1976), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A61975CJ0043&qid=1647459461544; Case C-370/12, Thomas Pringle v Government of Ireland and Others, ECLI:EU:C:2012:756, 36 (Nov. 27, 2012), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62012CJ0370&from=en.

[107] European Union, *supra* note 39, at 48(2).

[108] T.F.E.U. Part Three (T.F.E.U. Articles 26-197) may be amended by Council decision (*see* T.E.U. Article 48 (6)). E.S.C.B. Statute Article 22 may be amended by legislation from the European Parliament and the Council (*see* E.S.C.B. Statute Article 40 (1)).

[109] Steve Peers, *The Future of EU Treaty Amendments*, 31 Yearbook of European Law 17 (2012); Lucia Serena Rossi, *A New Revision of the EU Treaties After Lisbon?*, *in* The EU After Lisbon: Amending or Coping with the Existing Treaties? 3 (2014).

[110] Panetta, *supra* note 5.

[111] N. Vandezande, *Between Bitcoins and Mobile Payments: Will the European Commission's New Proposal Provide more Legal Certainty?*, 22 International Journal of Law and Information Technology, 295 (2014).

upon by the European Parliament and the Council.[112] The E.C.B. anticipates using this approach,[113] which was taken for the introduction of the euro. The legislation would otherwise have to follow the ordinary legislative process.[114]

The E.C.B. would play a key role in steering the legislative process related to the digital euro. It has the right to be consulted regarding proposed legislation[115] and can propose legislation by delivering recommendations.[116] The E.C.B. can determine the technical implementation of the digital euro by issuing: decisions with its desired policies; opinions that declare its legal interpretation as to how the Eurosystem may operate; regulations of the payment and settlement system;[117] and "such measures as are necessary" to carry out its tasks.[118] The E.C.B. can also bring legal action against any N.C.B. that fails to fulfil its legal obligations.[119]

3.6. BRINGING LEGAL ACTIONS

Any E.C.B. acts and E.U. legislation regarding the digital euro would be subject to judicial review by the C.J.E.U.[120] Member States, the European Parliament, the Council and the Commission would have standing to seek judicial review. Under the so-called *Plaumann* test, private applicants, such as individuals and companies, have limited access to judicial review.[121] Standing to challenge E.U. measures is only available where the measure directly concerns the private applicant[122] and not simply because measures of general application impact that applicant.[123]

---

[112] European Union, *supra* note 34, at 133. *See* Gortsos, *supra* note 38; Grunewald et al., *supra* note 6.
[113] European Central Bank, *supra* note 2, at 24.
[114] On the role of the E.U. legislative bodies in E.M.U. policy, *see* The EU Law of Economic and Monetary Union 16 - 18 (Fabian Amtenbrink et al. eds., 2020).
[115] European Union, *supra* note 34, at 127 (4), 133.
[116] *Id.* at 132 (1); European Union, *supra* note 35, at 34.1.
[117] TFEU, *supra* note 34, at 132(1); TFEU Protocol(NO 4), *supra* note, 35 at 34.1.
[118] TFEU, *supra* note 34, at 282(4).
[119] TFEU PROTOCOL (NO 4), *supra* note 35, at 35.6.
[120] TFEU, *supra* note 34 at 263; TFEU PROTOCOL (NO 4), *supra* note 35, at 35.1.
[121] Case 25/62 Plaumann & Co. v. Commission of the European Economic Community, ECR 95 (1963), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61962CJ0025&from=en.
[122] *See, e.g.*, T-323/16 Banco Cooperativo Español, SA v. Single Resolution Board, ECLI:EU:T:2019:822 (2019), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62016TJ0323&qid=1647383168981&from=EN; T-365/16 Portigon AG v. Single Resolution Board, ECLI:EU:T:2019:824 (2019), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62016TJ0365&qid=1647383168981&from=EN; T-377/16, T-645/16 and T-809/16 Hypo Vorarlberg Bank v. Single Resolution Board, ECLI:EU:T:2019:823 (2019), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62016TJ0377&qid=1647383168981&from=EN.
[123] T-492/12 Von Storch and Others v. European Central Bank, ECLI:EU:T:2013:702 (2013), https://curia.europa.eu/juris/document/document.jsf?text=&docid=146461&pageIndex=0&doclang=DE&mode=req&dir=&occ=first&part=1&cid=2738293; confirmed on appeal, C-64/14 P Von Storch and Others v. European Central Bank, ECLI:EU:C:2015:300 (2015), https://eur-lex.europa.eu/legal-content/DE/TXT/HTML/?uri=CELEX:62014CO0064&from=en.

However, in practice, private applicants in some Member States have indirect recourse to the C.J.E.U. by bringing a claim in national court that is referred to the C.J.E.U. for a preliminary ruling (pursuant to the T.F.E.U. Article 267) as to whether the relevant E.U. act is *ultra vires*. The C.J.E.U. has accepted such preliminary references as admissible despite evidently being a device by applicants to circumvent the *Plaumann* test.[124] National courts, such as the *Bundesverfassungsgericht* (German Federal Constitutional Court), may then add a further check on how cavalier the E.U. – including the C.J.E.U. – may be in its interpretation of the Treaties.[125] The E.U. can, therefore, reasonably expect a legal challenge to arise. When considering its proposed design of the digital euro, the E.C.B. may have to pre-empt those legal arguments likely to be raised.

4. ANONYMITY: BENEFIT OR BURDEN?

4.1. THE IMPORTANCE OF ANONYMITY

Cash is a bearer instrument that settles payment instantly and anonymously. Co.B.M. transactions leave an electronic record that can be scrutinised by the P.S.P. and the legal authorities. Some users are motivated to transact using cash because of its anonymity.[126] However, there are negative consequences to the anonymity of cash. It can facilitate crime, including tax evasion and corruption, which carries huge social costs.[127]

Some activities that are illegal or considered immoral are not necessarily socially harmful, however, and cash is beneficial in facilitating such transactions.[128] This distinction is important in countries governed by totalitarian regimes where political opposition can constitute illegal activity.[129] Access to an anonymous M.o.P. is critical to

[124] Sarmiento & Hartmann, *supra* note 73. *See* C-370/12 Thomas Pringle v Government of Ireland and Others, ECLI:EU:C:2012:756, 36 (2012); *See* C-370/12 Thomas Pringle v Government of Ireland and Others, ECLI:EU:C:2012:756, 38-44 (2012); C-62/14 Peter Gauweiler and Others v Deutscher Bundestag, ECLI:EU:C:2015:400, 18-31 (2015); C-493/17 Proceedings brought by Heinrich Weiss and Others, ECLI:EU:C:2018:1000, 17-26 (2018).

[125] *See* Proceedings brought by Heinrich Weiss and Others, BVerfG, 2 BvR 859/15, 2 BvR 1651/15, 2 BvR 2006/15, 2 BvR 980/16 111, 116, 133, 142–143, 5 May, 2020, https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/EN/2020/05/rs20200505_2bvr085915en.html. This judgement triggered European Commission infringement proceedings INFR(2021)2114.

[126] *See* Emanuele Borgonovo et al., *Privacy and Money: It Matters*, SSRN Electronic J. (2019); Charles M. Khan et al., *Money is Privacy*, 46 Int'l Econ. Rev. 377 (2005).

[127] *See* Kenneth Rogoff, *The Curse of Cash*, The Milken Institute Review: A Journal of Economic Policy (Jan. 2019), https://www.milkenreview.org/articles/the-curse-of-cash?IssueID=31 (last visited Dec. 28, 2021).

[128] White, *supra* note 71.

[129] Nabilou, *supra* note 7.

transacting outside of state surveillance and avoiding seizure of assets.[130] Although E.U. Member States are committed to democratic principles,[131] the digital euro can only be durable if its design guards against potential misuse upon democratic backsliding in any Eurozone Member State. The public would be especially vulnerable if cash availability were to eventually be phased out due to C.B.D.C. availability.

Although the E.U. intends to subject crypto-assets to stricter regulation,[132] crypto-asset transactions and their intermediaries currently receive less A.M.L./C.F.T. scrutiny than Co.B.M. transactions. The onus has instead been placed on regulated entities that transfer money to crypto-asset intermediaries (i.e., P.S.P.s) or have credit exposure to crypto-assets (e.g., banks).[133]

However, the prospect of crypto-assets as an anonymous e.M.o.P. widely facilitating criminal activity is overstated. Crypto-assets are not widely adopted by the public.[134] Deterrents include their uncertain legal status, lack of trusted intermediaries,[135] high transaction fees, slow payment processing, unstable values[136] and limited practicality for "real economy" transactions.[137] Importantly, crypto-assets are not necessarily anonymous. Bitcoin and Ethereum are pseudonymous and users have been traceable.[138] Monero and Zcash purport to be anonymous, although this has been

[130] Chris Hayes, *Is Bitcoin for Real? with Joe Weisenthal*, https://why-is-this-happening-with-chris-hayes.simplecast.com/episodes/joe-weisenthal-zN5ly8kv.

[131] TFEU, *supra* note 34, at Preamble.

[132] *See Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937*, (2020), https://eur-lex.europa.eu/resource.html?uri=cellar:f69f89bb-fe54-11ea-b44f-01aa75ed71a1.0001.02/DOC_1&format=PDF.

[133] Nabilou, *supra* note 7.

[134] Ten percent of Europeans were invested in crypto-assets in 2021; *see* Fabio Panetta, *For a few cryptos more: the Wild West of crypto finance*, European Central Bank (2022), https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220425 6436006db0.en.html (last visited Jun 21, 2022).

[135] Consumer protection legislation, such as *Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council*, OJ L 304 64 (2011), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011L0083 (the Consumer Rights Directive) and P.S.D.2, does not apply. *See* Donnelly, *supra* note 61.

[136] Stablecoins are at risk of a run and breaking their peg; e.g., TerraUSD; *see* Scott Chipolina, *Terra crisis fans regulatory concerns over $180bn stablecoin market*, Financial Times, May 11, 2022, https://www.ft.com/content/48d82c7a-495f-4d5e-a87a-a56bea58e760 (last visited May 12, 2022).

[137] *Cf.* For use cases for crypto-assets, *see* Joe Weisenthal, *There's a New Vision for Crypto, and It's Wildly Different From Bitcoin*, BloombergQuint (2021), https://www.bloombergquint.com/business/bitcoin-btc-vs-ethereum-eth-and-defi-there-s-a-big-difference (last visited Jun 21, 2022). *E.g.*, If crypto-assets are only held briefly to execute payment, volatile values are less detrimental.

[138] *See, e.g.*, Wall Street Journal, *How The Government Tied One Couple to Billions in Stolen Bitcoin*, https://www.wsj.com/podcasts/the-journal/how-the-government-tied-one-couple-to-billions-in-stolen-bitcoin/ad579c04-a43b-4a95-8872-7665da330135 (last visited Mar 1, 2022).

questioned.[139] Crypto-asset transactions offer greater privacy than the banking system and make transactions harder to trace, but that does not equate to anonymity.

Demand for many crypto-assets instead derives from speculation that their value will grow or yield can be earned via "decentralised finance". They do not serve as a M.o.P. This makes it puzzling that the E.C.B. suggests that C.B.D.C. could function as a substitute e.M.o.P. that attracts crypto-asset users in the Eurozone.[140] Stablecoins are also desired to facilitate crypto-asset transactions.[141] Withdrawal into digital euro would have to be available on crypto-asset exchanges and cheaper than stablecoins in order to attract users.

The E.C.B. intends to maintain cash availability alongside the digital euro.[142] Despite cash usage declining in the Eurozone, cash will not necessarily become redundant. Many Eurozone consumers and merchants continue to use cash despite its expenses and physical limitations,[143] the availability of e.M.o.P.s and E.U. regulation of card interchange fees.[144] The anticipated demise of cash failed to materialise upon the emergence of e-money.[145] Users are not necessarily prepared to completely dematerialise their money.[146] Where digital euro fails to substitute cash suitably, certain users will continue to use cash.[147] Cash remains in circulation irrespective of alternative M.o.P.s because it can offer transaction privacy.[148] Some users prioritise privacy, whether from the state, their P.S.P. or their counterparty.[149] Privacy was the most important design feature among respondents to the E.C.B.'s digital euro consultation.[150]

[139] Allen et al., *supra* note 8; Prasad, *supra* note 16.

[140] Fabio Panetta, *Designing a digital euro for the retail payments landscape of tomorrow*, European Central Bank (2021), https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211118 b36013b7c5.en.html (last visited Dec 8, 2021).

[141] *See* Sirio Aramonte, Wenqian Huang & Andreas Schrimpf, *DeFi risks and the decentralisation illusion*, BIS Quarterly Review (2021), https://www.bis.org/publ/qtrpdf/r_qt2112b.htm.

[142] European Central Bank, *supra* note 2, at 20. The E.C.B. has reaffirmed the importance of maintaining cash availability despite the prevalence of eM.o.P.s; *see,* e.g., *Opinion of the European Central Bank of 30 December 2019 on limitations to cash payments*, 2.7 (2019), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019AB0046&from=EN; *Opinion of the European Central Bank of 25 May 2020 on cash limitations concerning postal payments and anti-money laundering measures*, 2.1.6 (2020), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020AB0017&qid=1606682444372&from=EN.

[143] *See* Khiaonarong & Humphrey, *supra* note 19; Mancini-Griffoli et al., *supra* note 8; Williamson, *Welfare and Policy Implications*, *supra* note 9; Williamson, *Flight to Safety*, *supra* note 9.

[144] Regulation (E.U.) 2015/751, *supra* note 58.

[145] Grym et al., *supra* note 16.

[146] Belke & Beretta, *supra* note 22.

[147] Borgonovo et al., *supra* note 126; Grym et al., *supra* note 16. *See*, *What do Households in Germany Think About the Digital Euro? First Results from Surveys and Interviews*, Deutsche Bundesbank (2021), https://www.bundesbank.de/resource/blob/879312/807018037068359550e1d89a5dc366fe/mL/2021-10-digitaler-euro-private-haushalte-data.pdf.

[148] Kahn et al., *supra* note 126.

[149] *Id.*

[150] European Central Bank, *Eurosystem Report on the Public Consultation on a Digital Euro* (2021), https://www.ecb.europa.eu/pub/pdf/other/Eurosystem_report_on_the_public_consultation_on_a_digital_euro 539fa8cd8d.en.pdf. This is likely due to forty-seven percent of respondents originating from Germany. Germany maintains relatively high cash usage, partly due to privacy; *see* Deutsche Bundesbank, *supra* note 147.

It is apparent that some users prioritise other features.[151] Nonetheless, the absence of anonymity may make the digital euro undesirable to some users.[152]

4.2. COULD ANONYMITY BE ACCEPTABLE?

A.M.L./C.F.T. regulations have not altered the anonymity of cash. Such regulations make it more difficult to transact in cash for higher-value transactions and increase the legal peril of using cash for criminal activity.[153] Designing the digital euro as digital cash would combine the anonymity of cash with the ease of electronic payments.[154] But it could also encourage illicit payments. This raises concerns as to whether such a design is consistent with the objectives and the requirements of A.M.L./C.F.T. regulations.

The Eurosystem requires the design of the digital euro to be consistent with A.M.L./C.F.T. requirements, and digital euro P.S.P.s are subject to A.M.L./C.F.T. regulations.[155] However, although the public does not have a right to anonymous C.B.D.C.,[156] designing the digital euro with features that reduce its utility as a M.o.P. must be weighed against the A.M.L./C.F.T. risks from issuing an anonymous M.o.P. with unlimited holdings.

The holding limit is a design feature intended to assist A.M.L./C.F.T. Preventing users from anonymously holding a substantial amount of money hampers money laundering. However, it would undermine any anonymity purportedly included in the design of the digital euro. It increases the frequency of transferring money between a C.B.D.C. wallet and an alternative M.o.P., where the transaction data would likely be recorded in the banking system. If a C.B.D.C. wallet must be linked to a personal bank account to automatically transfer any excess holdings,[157] the users cannot maintain an anonymous user identity. At best, it would represent the digital equivalent of withdrawing cash at a cash machine to pay for certain transactions anonymously. This would mask the user's spending activities but leave a record of their withdrawals.

Yet potential designs have been developed that could allow for anonymous C.B.D.C. payments within an A.M.L./C.F.T.-compliant system and without the holding

[151] *E.g.*, Avant Card in Finland offered anonymous e-money yet most consumers preferred debit cards for equivalent transactions; *see* Grym et al., *supra* note 16.
[152] *See* Li, *supra* note 8. Li estimates that, in Canada, low anonymity compared to full anonymity could reduce C.B.D.C. demand by six - ten percent.
[153] *See* Section 3.2.
[154] Such "e-cash" was predicted by Milton Friedman; *see* Milton Friedman, *Milton Friedman Full Interview on Anti-Trust and Tech*, (1999), https://www.youtube.com/watch?v=mlwxdyLnMXM (last visited Jun. 21, 2022).
[155] *See* Section 3.2.
[156] *See id.*
[157] European Central Bank, *supra* note 32.

limit.[158] This would entail the use of "zero-knowledge proof" or "blind signature" technology that can verify the pre-conditions for a valid payment instruction and execute payment without storing user data.[159] If a proposed payment exceeds a given higher-value threshold, it would be subjected to C.D.D. in accordance with A.M.L.D. A two-tier system would be used for A.M.L./C.F.T. supervision. The viability of this model is, of course, subject to the technical feasibility of building such a payment system.[160] Nonetheless, this demonstrates *prima facie* that a design of the digital euro is conceivable and offers users anonymous holdings and transactions while subjecting higher-value payments to the same level of scrutiny as currently applies to cash transactions under A.M.L.D. In such circumstances, the holding limit is an unnecessary measure to address A.M.L./C.F.T. concerns.[161]

The E.C.B. is contemplating limited functionality for anonymous digital euro payments.[162] Legislators and regulators would thus need to tolerate an anonymous C.B.D.C. that surrenders oversight of certain data that is currently available for Co.B.M. There would be no oversight of how much digital euro is held by any user – being as anonymous as their cash holdings. Lower-value transactions would be completely anonymous – which would comprise most payments made by retail users. P.S.P.s may be largely unaffected if they deprioritise *ex-ante* screening of lower-value transactions, whether in digital euro or Co.B.M., given the volume of transactions and lower A.M.L./C.F.T. risk involved. The difficulty lies in denying *ex-post* review of transactions to

[158] *See* David Chaum, Christian Grothoff & Thomas Moser, *How to Issue a Central Bank Digital Currency* (Swiss National Bank, SNB Working Papers, 2021), https://www.snb.ch/n/mmr/reference/working_paper_2021_03/source/working_paper_2021_03.n.pdf; Jonas Gross et al., *Designing a Central Bank Digital Currency with Support for Cash-Like Privacy*, SSRN Electronic Journal (2021), https://www.ssrn.com/abstract=3891121 (last visited May 8, 2022). For related discussions, *see* also Digital Euro Association, *Will Central Bank Digital Currencies Enable Anonymous Payments?*, Digital Euro Association,https://home.digital-euro-association.de/podcast; Alexander Bechtel*, Digital Euro with Alexander Bechtel from Deutsche Bank*, All Things Digital Assets, https://uie360.podbean.com/page/2/ (downloaded using PodBean).

[159] Allen et al., *supra* note 8.

[160] The E.C.B. queries whether any digital transaction would be truly untraceable; *see* European Central Bank, *supra* note 32. Evidence obtained through illegal interception of transaction data could be declared inadmissible under national law as a safeguard; *see* C-310/16, Criminal proceedings against Petar Dzivev and Others, ECLI:EU:C:2019:30, ¶ 36 (2019); C-419/14, WebMindLicenses kft v. Nemzeti Adó- és Vámhivatal Kiemelt Adó- és Vám Főigazgatóság, ECLI:EU:C:2015:832, ¶¶ 71, 73 (2015). This paper proceeds under the assumption that anonymity is technically feasible.

[161] An anonymous C.B.D.C. wallet tied to a device may see users voluntarily restrict digital euro holdings due to fear of theft or loss; *see* Chaum et al., *supra* note 158.

[162] European Central Bank, *supra* note 2, at 27–28. The E.S.C.B. developed a proof of concept involving "anonymity vouchers"; *see* European Central Bank, *Exploring Anonymity in Central Bank Digital Currencies*, (2019), https://www.ecb.europa.eu/paym/intro/publications/pdf/ecb.mipinfocus191217.en.pdf.
The Eurosystem is experimenting with privacy options; *see* European Central Bank, *The Eurosystem's Analysis of Privacy-Enhancing Techniques in Central Bank Digital Currencies*, (2021), https://www.ecb.europa.eu/pub/pdf/annex/ecb.sp210414_1_annex 43eee6196e.en.pdf?ed992ba1ebc6915f12bf5d57013ae54.

legal authorities because transaction data would not be stored. This already occurs with cash transactions but would have to be accepted for digital euro transactions.

The value of the C.D.D. threshold would become the contentious figure in the debate. The reality is that money laundering is unavoidable in our liberal society. As restrictions are applied to a given M.o.P., money laundering merely shifts to alternative methods, including clandestine schemes.[163] It remains cumbersome to launder vast sums of money in lower-value transactions. This is why exceptions exist for lower-value card payments.[164] Anonymous lower-value transactions in digital euro would be consistent. However, the E.C.B. has only mooted €70 or €100 as a threshold.[165] A threshold that is too low removes the anonymity of digital euro in practice. A policy debate is merited here. But it is apparent that the absence of anonymity and the presence of the holding limit should not be predetermined features of the design of the digital euro in pursuit of A.M.L./C.F.T. objectives.

5. DISINTERMEDIATION OF BANKS

5.1. COMMERCIAL BANK MONEY

The role of deposits in money creation and credit intermediation explains why banks are fundamental to the Eurozone payment system. Banks are partly funded by depositors. Banks are uniquely entitled to hold those deposits for their own account rather than segregating depositors' funds.[166] But those funds are not merely redeployed towards lending. Banks can create Co.B.M. to lend to borrowers, which immediately represents newly-created deposits in the borrower's bank account.[167]

[163] *E.g.*, money laundering using marketplaces within computer games for downloadable content; *see* Mark Warren & Karel Nihom, *Online Video Gaming: yet Another Front in the Perpetual Battle Against Money Laundering*, Linklaters (2020), https://www.linklaters.com/en/insights/blogs/sportinglinks/2020/april/online-video-gaming-yet-another-front-in-the-perpetual-battle-against-money-laundering (last visited Jun. 21, 2022).

[164] *See* Section 3.2.; *e.g.*, Avant Card in Finland allowed anonymous payments up to 2000 markka, equal to €336 (€461 in 2020 money); *see* David Gerard , *Avant Card — a Central Bank Digital Currency From 1990s Finland*, Attack of the 50 Foot Blockchain (2020), https://davidgerard.co.uk/blockchain/2020/01/25/avant-card-a-central-bank-digital-currency-from-1990s-finland/ (last visited Jun. 21, 2022). Avant Cards were capable of being used for online payments; *see* Grym et al., *supra* note 16.

[165] Panetta, *supra* note 5.

[166] Nabilou, *supra* note 98; *see also* Richard A. Werner, *How do Banks Create Money, and why can Other Firms not do the Same? An Explanation for the Coexistence of Lending and Deposit-Taking*, 36 International Review of Financial Analysis 71 (2014).

[167] *See* Michael McLeay, Amar Radia & Ryland Thomas, *Money Creation in the Modern Economy*, (2014), https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2014/money-creation-in-the-modern-economy.pdf?la=en. Money creation by Eurozone banks has been substantiated by empirical research; *see* Matteo Deleidi & Giuseppe Fontana, *Money Creation in the Eurozone: An Empirical Assessment of the Endogenous and the Exogenous Money Theories*, 31 Review of Political Economy 559 (2019).

Banks are disciplined when creating money, however. Firstly, banks are required to settle depositor withdrawals with Ce.B.M. (i.e., cash or reserves).[168] A bank will run out of Ce.B.M. if it creates money that is deposited with other banks. In such circumstances, that bank may have to increase its deposit interest rate to incentivise depositors to maintain deposits with that bank. Secondly, created money must be lent to profitable investments.[169] A bank cannot afford to pay its deposit interest rate without earning a higher yield on its lending. Ultimately the bank's balance sheet will need to balance, among other things, depositors' claims recorded as liabilities against loans (receivables) recorded as assets.

Cheques, cards and bank transfers are premised upon two parties settling payment using Co.B.M. and without recourse to cash. If a bank holds a substantial proportion of bank accounts in the local economy, once reserves payable between banks are netted-off against each other, it requires smaller outflows of reserves between banks. Such a reduction in Ce.B.M. outflows – on a stable basis – allows banks to reduce the proportion of their assets that need to be held in Ce.B.M. Banks can instead deploy their funding towards less liquid and higher-yielding lending rather than maintaining lower-yielding Ce.B.M. and government bonds to meet Ce.B.M. outflows. The long-term lock-in of capital allows for long-term investment that generally yields higher returns for the project and its investors.[170] The intensity of this maturity transformation is critical to maximising its net interest margin. It is, therefore, no coincidence that banks are integral to the payment system and enhance payment technology.[171] There is a financial incentive for banks to convince depositors to minimise their withdrawals. Deposits become more appealing than cash as deposits become more convenient as a M.o.P.[172]

The introduction of the digital euro would alter this equilibrium in the business model for Eurozone banks. C.B.D.C. offers users an alternative e.M.o.P. to Co.B.M. Replacing deposits with wholesale market funding is (typically) more expensive and less stable for the bank.[173] This reverses the current virtuous circle in banks' funding that

[168] McLeay, Radia & Thomas, *supra* note 167; *see also* George Selgin, *Central Banks as Sources of Financial Instability*, 14 Independent Review 485 (2010).
[169] *See* James Tobin, *Commercial Banks as Creators of Money*, Cowles Foundation Discussion Paper (1963), https://cowles.yale.edu/sites/default/files/files/pub/d01/d0159.pdf (last visited Dec. 30, 2021).
[170] *See* Giuseppe Dari-Mattiacci et al., *The Emergence of the Corporate Form,* 33 J.L. Econ. & Org. 193 (2017).
[171] The primary function of public deposit banks in Europe historically was to provide a payment and clearing system offering Co.B.M. as a M.o.P.; *see* Schnabel & Shin, *supra* note 11.
[172] Kahn & Roberds, *supra* note 99.
[173] Barrdear & Kumhof, *supra* note 9. C.f. Swedish banks receive a lower proportion of their funding from deposits than Eurozone banks; *see* Sveriges Riksbank, *supra* note 29.

depends upon substitution from Ce.B.M. to Co.B.M.[174] It is feared that this would reduce bank lending and consequently economic output.[175]

5.2. MIGRATION FROM DEPOSITS

Depositors receive a negligible or negative "monetary yield" for their on-demand deposits held with (lent to) their bank. Deposits typically yield a zero (or negligible) deposit interest rate and incur a service fee to maintain a bank account. Banks offer a "convenience yield" by providing a safe location to store cash, banking services and an eM.o.P.. Depositors will intentionally or subconsciously compare their deposit options based on an aggregate yield combining monetary yield and convenience yield.[176] The design of the digital euro will determine whether its aggregate yield surpasses deposits and triggers migration from deposits to C.B.D.C.

A possible solution is to offer a variable remuneration rate for digital euro that can be adjusted to avoid C.B.D.C. supplanting deposits.[177] If deposits offer a negligible monetary yield, the digital euro could require a negative remuneration rate.[178] Variable remuneration or a negative interest rate on holdings may be problematic to adopt in conformity with the Treaties.[179] P.S.P.s could charge service fees instead,[180] but this conflicts with the expectation that the digital euro would be free to access.[181]

Another possible solution is the holding limit. Users would respond by continuing to hold most of their money as deposits. However, if a reduction in deposits is the problem, the holding limit is only a marginally effective solution.[182]

[174] Bindseil, *supra* note 10.
[175] Agur et al., *supra* note 8; Bank for International Settlements, *supra* note 16. For a survey of studies on the potential impact, see Bank for International Settlements, *supra* note 10.
[176] Kumhof & Noone, *supra* note 8.
[177] Barrdear & Kumhof, *supra* note 9; Keister &Sanches, *supra* note 9; Kumhof & Noone, *supra* note 8.
[178] Agur et al., *supra* note 8. Alternatively, a "refresh fee" could be charged intermittently on holdings; *see* Chaum et al., *supra* note 158.
[179] *See* Section 3.1.
[180] Bordo & Levin, *supra* note 8.
[181] European Central Bank, *supra* note 2, at 19; *see* Requirement 2. However, cash machine withdrawal fees are charged and so it is conceivable that P.S.P.s charge fees to access digital euro.
[182] The Sound of Economics, *Money, Money, Money!*, Bruegel, (Apr. 29, 2021) https://www.bruegel.org/2021/04/money-money-money/.

A €3,000 holding limit would still tolerate the Eurozone banking system losing around one trillion euros in funding.[183] Furthermore, the impact of the holding limit on user behaviour will significantly differ depending on income, deposits and spending habits. This includes divergence in median income between Eurozone Member States.[184] The holding limit would not impede those whose deposits are typically around or below the threshold. High-earning depositors that spend large sums each month may find digital euro to be an inconvenient M.o.P.[185] The holding limit would, therefore, be a blunt instrument to achieve the objective of deterring substitution from deposits to digital euro.[186]

However, it both ignores the realities of human behaviour and the dynamism of the capitalist market system to assume that the digital euro will simply lead to a mass migration from deposits. The price mechanism is a dynamic process that is not captured by examining a static equilibrium measured on *ceteris paribus* principles.[187] Banks can adjust to the introduction of C.B.D.C. It is necessary to consider the likely responses and counter-responses by relevant stakeholders.

5.3. ADJUSTMENTS BY BANKS

Banks can improve the aggregate yield that they offer to depositors compared to digital euro: (i) by increasing monetary yield of deposits; (ii) by increasing convenience yield of deposits; and/or (iii) by reducing aggregate yield of digital euro.[188]

Banks can incentivise deposits by increasing their deposit interest rate.[189] Reducing the service fee charged to depositors is an alternative, though perhaps a less salient, means to increase the monetary yield. The immediate consequence is to increase funding costs and reduce profit margins for that bank.[190] In any oligopolistic banking

[183] Adrian Croft, *A digital euro would be "crypto kryptonite" for fintechs and a threat to banks, a critical new report warns*, Fortune, (Mar. 13, 2021), https://fortune.com/2021/03/13/digital-euro-fintech-banking-cryptourrency-european-central-bank/ (last visited Dec. 8, 2021).

[184] *See* Eurostat, *Mean and Median Income by Household Type - EU-SILC and ECHP surveys*, Eurostat - Data Explorer (2022), https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04.

[185] *See* Deutsche Bundesbank, *supra* note 147.

[186] Unless the holding limit would be personalised for each user based on their personal circumstances, which is not being proposed.

[187] F. A. von Hayek, *Economics and Knowledge*, 4 Economica 33 (1937).

[188] Although this Section focuses on retail on-demand deposits, the same principles apply to all depositors.

[189] Chiu et al., *supra* note 9. This is anticipated by Sveriges Riksbank; see Sveriges Riksbank, *supra* note 29. U.S. postal banks saw their inflows and outflows shift substantially as their deposit interest rate exceeded (1930s and 1940s) then underperformed (late 1940s and 1950s) market rates; *see* Schuster, Jaremski, and Perlman, *supra* note 12.

[190] First-movers will likely prompt competitors to match their deposit interest rate to deter depositors switching bank; *see* Ching-Wai (Jeremy) Chiu & John Hill, *The Rate Elasticity of Retail Deposits in the United Kingdom: A Macroeconomic Investigation* (Bank of England, Staff Working Paper No. 540, 2015), http://www.ssrn.com/abstract=2641028.

markets, where banks may currently pay a deposit interest rate below what would have been required in a competitive market,[191] such excess profits do not merit protection from the impact of C.B.D.C.

A proportion of bank profits derive from the seigniorage that they generate when creating Co.B.M. by lending. Higher deposit interest rates due to C.B.D.C. would increase the cost of money creation and reduce seigniorage. If banks reduce their lending, this also reduces seigniorage.[192] However, seigniorage for banks is not a privilege that the Eurosystem should be interested in protecting.[193] Central banks have historically curtailed seigniorage generated by banks issuing their own banknotes.[194] C.B.D.C. would simply erode bank seigniorage in digital money.[195]

Banks and their bankers are profit-seeking and generally lend when they expect an investment to be profitable for themselves.[196] In principle, lending is profitable for a bank when the interest charged to borrowers exceeds the interest paid on its funding (e.g., deposits) – positive net interest margin. Therefore, lending remains worthwhile for a bank provided the cost of deposits remains below the rate at which the bank can lend to borrowers.[197] Regulatory capital and liquidity requirements complicate how a bank can expand its profitable lending. Shareholder expectations regarding the rate of return on equity may make less-profitable lending unattractive for a particular bank. Nonetheless, while bank lending is profitable and any bank can obtain profit by simply creating Co.B.M., in a competitive market, a bank should emerge willing to lend. C.B.D.C. would merely reduce the net interest margin.

Yet further adjustments could see banks maintain their profitability. A higher deposit interest rate that retains existing depositors and leads to inflows from other sources could increase deposits and reduce funding costs.[198] Banks may reduce branch locations and cut operating costs.[199] They may even hold the pricing power to increase their lending interest rate charged to borrowers.[200]

[191] Chiu et al., *supra* note 9; Robin Greenwood, Samuel G. Hanson & Jeremy C. Stein, *The Federal Reserve's Balance Sheet as a Financial-Stability Tool,* Jackson Hole Economic Symposium Conference Proceedings (2016) https://www.hbs.edu/faculty/Pages/item.aspx?num=52330; Grunewald et al., *supra* note 6.
[192] On the impact of C.B.D.C. on seigniorage, *see* Bank for International Settlements, *supra* note 17.
[193] Brunnermeier & Niepelt, *supra* note 9; Nicholas Gruen, *Central Banks Get Serious On Digital Currencies*, Financial Times, (May 12, 2021) https://www.ft.com/content/faa29abd-aa2e-479b-9706-79ee16be9e35.
[194] E.g. Canada; *see* Grodecka-Messi, *supra* note 13.
[195] The Eurosystem would generate such seigniorage instead.
[196] Hyman P. Minsky, *The Financial Instability Hypothesis* (Levy Economics Institute, Working Paper No. 74, 1992), http://hdl.handle.net/10419/186760.
[197] Tobin, *supra* note 169.
[198] Andolfatto, *supra* note 9; Chiu et al., *supra* note 9.
[199] Grodecka-Messi, *supra* note 13.
[200] Mancini-Griffoli et al., *supra* note 8.

It is often assumed that an increase in lending interest rates will reduce the quantum of bank lending.[201] This simple assessment of supply and demand may underestimate a financial system containing competing financiers and flexible funding sources. Firstly, it neglects that a borrower will also be a depositor. If a borrower is receiving additional income due to the higher deposit rate,[202] it has additional funds to finance higher borrowing costs – leaving that borrower in essentially the same net position. Secondly, borrowers can seek alternative sources of funding, which may discipline banks to resist increasing their lending interest rate. Indeed, E.U. policy is currently seeking to encourage the use of the capital markets and reduce reliance on banks for credit intermediation by promoting the Capital Markets Union.[203] Thirdly, new entrants may be willing to enter the banking market if there is an opportunity to undercut the incumbents profitably.[204] The banking sector may maintain its credit intermediation even as incumbent banks reduce their lending.

Furthermore, not all bank disintermediation has the same economic impact. Easy credit conditions encourage the financing of speculative projects and asset price bubbles.[205] If an increase in borrowing costs dissuades speculative investments and unproductive projects, this would be beneficial to both the bank and the economy.[206] Moreover, the additional monetary yield received by depositors may stimulate the economy and offset the economic impact of any decline in bank lending.[207]

Banks have continually increased the convenience yield offered on deposits to outcompete cash as a M.o.P. However, this may be a challenging strategy to adopt for C.B.D.C. Deposits cannot be safer than C.B.D.C. It is difficult to materially (and observably) reduce the risk of bank failure. Banks would have to be willing to segregate services between depositors and C.B.D.C. users to generate a convenience yield spread

[201] Keister & Sanches, *supra* note 9; Kim & Kwon, *supra* note 9.

[202] This may also be indirect if deposit interest rates impact money market rates.

[203] *See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Capital Markets Union for people and businesses - new action plan*, European Commission (2020) 590 final (Nov. 24, 2020). https://eur-lex.europa.eu/resource.html?uri=cellar:61042990-fe46-11ea-b44f-01aa75ed71a1.0001.02/DOC_1&format=PDF. Although capital markets may already offer lower lending interest rates, larger arrangement costs (and other non-monetary burdens) mean that smaller capital markets financings are typically not worthwhile for borrowers compared to obtaining bank financing. If bank financing incurs higher servicing costs, this reduces the disincentive to obtaining capital markets funding.

[204] Although there are high barriers to entry to becoming a licensed bank, investors may acquire a smaller bank then provide capital to expand its balance sheet and E.U. passporting rights allow an E.U. bank to open a branch in another Member State.

[205] Minsky, *supra* note 196.

[206] Keister & Sanches, *supra* note 9.

[207] Agur et al., *supra* note 8.

between deposits and C.B.D.C.[208] But the banks would also have to consider the trade-off of losing potential customers for the on-selling of financial products.

If banks are offering their own Co.B.M. payment systems alongside the digital euro, they are able to both improve the appeal of deposits and undermine the appeal of the digital euro. The latter approach would avoid incurring the additional expense to increase the aggregate yield of deposits. Banks can tailor the fees charged for certain services to incentivise depositors to adopt certain behaviour.[209] Banks may cross the line into abusing such measures as a defensive and anti-competitive tactic. Legislators combated banks potentially abusing their dominant position as gatekeepers to the existing payment system. In response, P.S.P.s have been guaranteed fair access to the payment system.[210] Regulation is likely to be necessary to delineate the conflict of interest between banks as P.S.P.s of and competitors to the digital euro.

The E.U., however, faces the practical difficulty that it must conciliate the banks or construct a digital euro system that can function without their participation. Banks hold significant power over the transition process to the digital euro due to reliance on banks in both the existing payment system and the two-tier digital euro system. Their resistance could be terminal for digital euro ever reaching mass adoption.[211]

The impact of the digital euro on bank intermediation and the Eurozone economy should, therefore, be viewed as an aggregation of heterogeneous micro-level adjustments by banks, depositors and borrowers. These differences will be shaped by the differences between local banking markets and the ease of access to capital markets and foreign banking markets. There will not necessarily be a uniform Eurozone outcome triggered by the digital euro.[212]

[208] Bindseil, *Tiered C.B.D.C.*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10.

[209] E.g. In Finland; *see* Hanna Jyrkönen & Heli Paunonen, *Card, Internet and Mobile Payments in Finland*, (Bank of Finland, Discussion Papers, 2003) (Fin.)., https://helda.helsinki.fi/bof/bitstream/handle/123456789/7955/107277.pdf.

[210] European Union, *supra* note 80, at 35–36.

[211] E.g., In Ecuador, banks were hostile to the Dinero Electrónico; *see* Arauz, Garratt, and Ramos F., *supra* note 15. In Finland, banks developed their own financial technology (i.e., debit cards) that made Avant Cards redundant; *see* Jyrkönen & Paunonen, *supra* note 209.

[212] Agent-based modelling exists on the impact of introducing a C.B.D.C. system; *see* Digital Euro Association, *Agent-Based Simulation of CBDC*, https://home.digital-euro-association.de/podcast.

5.4. ADOPTION BY RETAIL DEPOSITORS

The decline of Ce.B.M. in the Eurozone is a consequence of a concerted public policy that has driven Co.B.M. to being considered as practically equivalent to Ce.B.M.[213] Governments increasingly require payment to be made in Co.B.M. despite cash being legal tender.[214] Yet the digital euro is desired to maintain the anchoring role of Ce.B.M. in the financial system, which may be lost if cash ceases to be available to redeem Co.B.M.[215] The digital euro only serves this purpose if it is adopted by potential users, but it is being designed to be less attractive than deposits and to avoid disruption of the banking sector. The holding limit represents a symptom of this incoherence in the digital euro project.

Concern for the banking sector underestimates that the greater difficulty may be convincing depositors to become C.B.D.C. users.[216] As an e.M.o.P., C.B.D.C. constitutes a substitute for Co.B.M.[217] Better understanding of consumer payment preferences is required to anticipate their response to C.B.D.C.[218] But there is no apparent reason for a Eurozone retail depositor to adopt the digital euro as their M.o.P. in place of Co.B.M.[219] The layperson depositor perceives no financial risk due to deposit insurance[220] and no difference between Co.B.M. and Ce.B.M.[221] The Eurozone already offers advanced payment infrastructure.

---

[213] This was intensified by the COVID-19 pandemic. P.S.P.s were encouraged to increase contactless card payment limits to the legal maximum of fifty euros; *see* European Banking Authority, *Statement on Consumer and Payment Issues in Light of COVID19*, (2020), https://www.eba.europa.eu/sites/default/documents/files/document_library/News%20and%20Press/Press%20Room/Press%20Releases/2020/EBA%20provides%20clarity%20to%20banks%20and%20consumers%20on%20the%20application%20of%20the%20prudential%20framework%20in%20light%20of%20COVID19%20measures/Statement%20on%20consumer%20protection%20and%20payments%20in%20the%20COVID19%20crisis.pdf (last visited Mar 15, 2022). *See also* European Union, *Commission Delegated Regulation (EU) 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication*, OJ L 69 23 11 (2018), http://data.europa.eu/eli/reg_del/2018/389/oj/eng.

[214] Robert Freitag, *Euro As Legal Tender (and Banknotes)*, *in* The EU Law of Economic and Monetary Union (Fabian Amtenbrink, Christoph Hermann & René Repasi eds., 2020).

[215] Wierts & Boven, *supra* note 7. *See* also Fabio Panetta, *Central Bank Digital Currencies: a Monetary Anchor for Digital Innovation*, European Central Bank (2021), https://www.ecb.europa.eu//press/key/date/2021/html/ecb.sp211105 08781cb638.en.html (last visited Dec 8, 2021); Panetta, *supra* note 140; Panetta, *supra* note 5.

[216] The E.C.B. has acknowledged this possibility; *see* Panetta, *supra* note 140; Panetta, *supra* note 215.

[217] Kumhof & Noone, *supra* note 8.

[218] Francesca Carapella & Jean Flemming, *Central Bank Digital Currency: A Literature Review*, Feds Note (Nov. 2020).

[219] Digital Euro Association, *Should the ECB Issue a Digital Euro?*, https://home.digital-euro-association.de/podcast/en (last visited Feb 14, 2022); Mancini-Griffoli et al., *supra* note 8.

[220] E.g., Deposit insurance for U.S. postal banks predated commercial banks and postal banks became obsolete once all banks benefitted from deposit insurance; *see* Schuster et al., *supra* note 12.

[221] *See* Bank of England, *Responses to the Bank of England's March 2020 Discussion Paper on CBDC*, (Bank of England, Discussion Paper, 2021), https://www.bankofengland.co.uk/paper/2021/responses-to-the-bank-of-englands-march-2020-discussion-paper-on-cbdc (last visited Dec 27, 2021); Deutsche Bundesbank, *supra* note 147.

Although users can be expected to use the M.o.P. that offers the best net benefit to them,[222] the reality is that people are unlikely to adopt a new M.o.P. simply because it is marginally better than their existing M.o.P.[223] It would pose an inconvenience to undertake the transition. There is a network effect that requires a critical mass of users for a M.o.P. to take hold.[224] First-mover advantage takes precedence.[225] But Co.B.M. is the first-mover, and bifurcating money between deposits and digital euro produces inconvenience for a retail user without any apparent benefit.

Any change in user behaviour is likely to be gradual as many alternative M.o.P.s already exist.[226] The digital euro may only ever reach a circulation similar to that of the cash currently in circulation.[227] That may suffice to maintain a Ce.B.M. anchor, but the digital euro would remain vulnerable to being swept aside upon further advances in Co.B.M. payment technology. Such an outcome is already foreshadowed by the failure of the Dinero Electrónico in Ecuador[228] and the Avant Card in Finland,[229] where both failed to gain a critical mass of users and were eventually discontinued.

[222] Mancini-Griffoli et al., *supra* note 8.
[223] *E.g.* Avant Card in Finland offered more advanced payment technology, microchips rather than magnetic stripes, but this was not salient with consumers; *see* Grym et al., *supra* note 16.
[224] Mikael Stenkula, *Carl Menger and the Network Theory of Money*, 10 European Journal of the History of Economic Thought 587 (2003). E.g. Avant Card in Finland suffered from expensive transition costs for merchants and a lack of merchant take-up; *see* Grym et al., *supra* note 16; Jyrkönen & Paunonen, *supra* note 209.
[225] Agur et al., *supra* note 8; Khiaonarong & Humphrey, *supra* note 19.
[226] Grodecka-Messi, *supra* note 13.
[227] Agur et al., *supra* note 8.
[228] Arauz et al., *supra* note 15.
[229] Gerard, *supra* note 164; Grym et al., *supra* note 16.

5.5. BANK RUNS

A bank run arises when depositors fear that their bank will be unable to satisfy withdrawals – whether because it is failing or suffering from a self-fulfilling panic. There is concern that depositors will be more likely to run and will run at an exceptionally faster rate once C.B.D.C. is available instead of cash.[230] The digital euro may then create instability in the Eurozone banking system through this run dynamic.[231]

The presence of the digital euro does not materially alter the run dynamic. Bank failure would likely be an insufficient catalyst to run from retail deposits to digital euro due to deposit insurance[232] and bank resolution tools. Depositors holding uninsured deposits have every reason to run.[233] Uninsured creditors are always subject to the risk of bank failure and would anticipate where they could run, whether investment assets or money market instruments.

If a depositor fears financial loss, a depositor will run.[234] The physical inconvenience of cash has traditionally functioned as a barrier to a run. Such barriers are merely a palliative, not a cure. If depositors wish to run, the question is "how" and not "if". A depositor run to cash is now an antiquated image that does not portray bank runs in the 21st century. Depositors already have the means to run from their bank swiftly using technology and without queuing outside of their bank.[235] Internet banking and mobile banking facilitate money transfers remotely. The digital euro is merely another potential substitute rather than opening the floodgates. Its status as risk-free Ce.B.M. may attract depositors as the path of least resistance.[236] But it is possible to open an account with a bank, an e-money institution or an investment broker within minutes

[230] Bank for International Settlements, *supra* note 17.
[231] Kim & Kwon, *supra* note 9; Nabilou, *supra* note 7.
[232] Douglas W. Diamond & Philip H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, 91 J. Pol. Econ. 401 (1983). See European Union, *Directive 2014/49/EU of the European Parliament and of the Council of 16 April 2014 on deposit guarantee schemes (recast)*, OJ L 173 149 (2014), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014L0049-20140702&from=EN. Deposit insurance protects deposits up to €100,000 per bank and payment is (currently) assured within ten working days. Runs may arise if the Member State is unable to cover any shortfall in the scheme's funds. This concern would be reduced if the European Deposit Insurance Scheme (E.D.I.S.) is implemented; *see* European Union, *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 806/2014 in order to establish a European Deposit Insurance Scheme*, (2015), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015PC0586&from=EN.
[233] *E.g.*, U.K. deposit insurance only protected ninety percent of deposits up to £35,000 at the time of the run on Northern Rock; all depositors feared financial loss and had reason to run; *see* Shin, *supra* note 14.
[234] Douglas W. Diamond & Raghuram G. Rajan, *Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking*, 109 J. Pol. Econ. 287 (2001). Williamson, *supra* note 9.
[235] Kumhof & Noone, *supra* note 8; Mancini-Griffoli et al., *supra* note 8. *E.g.*, Retail depositor withdrawals in the run on Northern Rock were more substantial from non-branch retail deposits than branch retail deposits; *see* Shin, *supra* note 14.
[236] Kumhof & Noone, *supra* note 8.

online.[237] Meanwhile, a real-time gross settlement [R.T.G.S.] system for the digital euro may face settlement delays comparable to those of traditional designated-time net settlement [D.T.N.S.] systems during a bank panic.[238] This is especially a concern if the failing bank lacks sufficient digital euro to satisfy withdrawal requests instantly.

Even upon a systemic banking crisis involving mass withdrawals to the digital euro, the holding limit would be problematic. Necessity is likely to inspire creativity. Secondary markets develop to allow liquidity to those seeking to dispose of assets. When deposits are worth less than their nominal value, cash is unavailable and the digital euro is restricted by the holding limit, it is foreseeable that depositors will sell their deposits below par and the digital euro will obtain a *market* value above its *nominal* value.[239] Someone who has headroom in their C.B.D.C. wallet may be willing to hold digital euro for someone else in return for a fee.[240] The digital euro losing its par value with physical euro would certainly not constitute stability in the money markets.

5.6. CENTRAL BANK REFINANCING OPERATIONS

If a bank is solvent with a quality loan portfolio but requires liquidity, the bank remains creditworthy to raise funding from wholesale markets. Securitisation and covered bonds allow banks to release liquidity from illiquid loans. Despite its hostility to securitisation in the aftermath of the financial crisis,[241] the E.U. increasingly recognises the usefulness of securitisation.[242] Information asymmetry is a challenge in accurately valuing a bank's loan portfolio. There are frictions when relying upon the capital markets for funding that deposit funding does not typically encounter.[243] It should also be acknowledged

[237] Eurozone deposits that left weaker banks during the financial crisis and the sovereign debt crisis were most commonly transferred to stronger banks, not non-banks or cash; *see* Bindseil, *Tiered C.B.D.C.*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10.

[238] On payment settlement, *see* Athanassiou, *supra* note 57; Andrew Dent & Will Dison, *The Bank of England's Real-Time Gross Settlement Infrastructure*, (2012); Kahn & Roberds, *supra* note 99.

[239] Pål Krogdahl & Ville Sointu, *LIVE Episode! To CBDC or not to CBDC, What Was the Question?*, https://anchor.fm/fintech-daydreaming/episodes/LIVE-episode–To-CBDC-or-not-to-CBDC–what-was-the-question-em2j8q. Sveriges Riksbank raises this concern; *see* Sveriges Riksbank, *supra* note 29, at 2.

[240] *E.g.*, In the United States, deposit brokers facilitate deposit insurance protection for depositors holding more than the $250,000 limit; *see* IntraFi Network Deposits, *How IntraFi Network Deposits Works*, https://www.intrafinetworkdeposits.com/how-it-works/ (last visited Jun 21, 2022).

[241] *See* Gerard Kastelein, *Securitization in the Capital Markets Union: One Step Forward, Two Steps Back, in* Capital Markets Union in Europe 464 (Danny Bush et al. eds., 2018).

[242] Synthetic ("on-balance-sheet") securitisations have become eligible for "S.T.S." securitisations; *see* European Union, *Regulation (EU) 2021/557 of the European Parliament and of the Council of 31 March 2021 amending Regulation (EU) 2017/2402 Laying down a General Framework for Securitisation and Creating a Specific Framework for Simple, Transparent and Standardised Securitisation to Help the Recovery from the COVID-19 crisis*, OJ L 116 1 (2021). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0557&from=EN.

[243] Michael Woodford, *Financial Intermediation and Macroeconomic Analysis,* 24 J. Econ. PersPs.,2010, at 21, 44.

that liquidity in the financial markets is procyclical and may be unavailable when banks are most under stress from depositor withdrawals.[244] Nonetheless, if market liquidity reaches a stage where market counterparties are unwilling to lend on realistic terms, the central bank will be the next avenue for liquidity.

Migration by depositors from deposits to C.B.D.C. results in a bank's funding moving to the central bank. Both require corresponding changes to their assets or liabilities (or equity) in order to balance their balance sheet. This is particularly pressing if there are sudden withdrawals where obtaining funding from the private sector is impractical.[245] Deposit interest rates suffer a lag before stimulating deposits.[246] An equilibrium can be maintained if new C.B.D.C. inflows to the central bank are recycled to fund the deposit outflows from the bank.[247] The bank would not have to liquidate its loan assets to fund withdrawals. The central bank would not need to redeploy its surplus funding towards buying large quantities of certain bonds, which could distort the market for those securities,[248] given that market participants do not necessarily substitute between all classes of securities.[249]

The Eurosystem operates refinancing operations that provide short-term funding to banks secured against securities or loans as collateral.[250] These operations have expanded since the financial crisis to targeted longer-term refinancing operations [hereinafter T.L.T.R.O.s] that provide multi-year funding to banks to incentivise lending to the real economy.[251] The fundamental objective remains constant providing funding to banks to maintain liquidity flowing from banks into the Eurozone economy.

Expanding the use of refinancing operations to balance out movements from deposits to digital euro would, therefore, be both ground-breaking and unexceptional.

---

[244] Edoardo D. Martino, *Regulating Stablecoins as Private Money between Liquidity and Safety. The Case of the EU "Market in Crypto Asset" (MiCA) Regulation*, (Amsterdam Law School, Research Paper No. 2022-2027, 2022; Amsterdam Center for Law and Economics, Working Paper No. 22-07, 2022), https://ssrn.com/abstract=4203885 (last visited Jan 4, 2023).

[245] Sveriges Riksbank anticipates providing stopgap funding upon sudden withdrawals to C.B.D.C.; *see* Sveriges Riksbank, *supra* note 29, at 2.

[246] Chiu & Hill, *supra* note 190.

[247] Barrdear and Kumhof, *supra* note 9; Brunnermeier & Niepelt, *supra* note 9; Kim & Kwon, *supra* note 9; White, *supra* note 71. *E.g.*, U.S. postal banks lent their deposits to local banks prepared to pay their lending interest rate before applying any surplus towards buying government bonds; *see* Schuster et al., *supra* note 12.

[248] Williamson, *supra* note 9.

[249] Vasco Cúrdia & Michael Woodford, *The Central-bank Balance Sheet as an Instrument of Monetary Policy,* 58 J. Monetary Econ. 54 (2011).

[250] These offer overnight, one-week and three-month funding; *see* European Central Bank, *Open Market Operations*, https://www.ecb.europa.eu/mopo/implement/omo/html/index.en.html (last visited Jun 21, 2022).

[251] European Central Bank, *ECB Extends Pandemic Emergency Longer-Term Refinancing Operations*, (2020), https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr201210 8acfa5026f.en.html (last visited May 11, 2022). This was supplemented during the COVID-19 pandemic with pandemic emergency longer-term refinancing operations [P.E.L.T.R.O.s].

The Eurosystem is already empowered under the Treaties to conduct refinancing operations.[252] Although T.L.T.R.O.s were purported to be temporary and exceptional, T.L.T.R.O.s remain a source of bank funding. This policy would grasp the nettle and acknowledge the permanence of the Eurosystem's role in maintaining liquidity in the Eurozone banking system.[253] Given its role as supervisory authority for Eurozone banks within the Single Supervisory Mechanism,[254] the E.C.B. has a further interest beyond its "price stability" mandate in stabilising Eurozone banks.[255] The Eurosystem would then need to remain willing to expand its balance sheet when liquidity is required by banks in response to demand for digital euro.

Central banks function as lenders of last resort [hereinafter L.O.L.R.] to provide emergency liquidity to solvent banks. This avoids a "fire sale" by the bank to raise cash that turns illiquidity into balance sheet insolvency. This principle dates back to Walter Bagehot's *Lombard Street* (1873). Providing liquidity in such circumstances is what central banks are supposed to do.[256] The central bank is the only potential counterparty able to lever up its balance sheet and outlast a panic,[257]and is not incentivised to run.[258] Therefore, if a bank's depositors run to digital euro, the E.C.B. and the relevant N.C.B. would function as L.O.L.R.

The digital euro may serve to make L.O.L.R. funding more efficient. Whereas cash withdrawals suffer from a delay in observing outflows,[259] the central bank can provide C.B.D.C. instantly to the bank to meet withdrawals.[260] Indeed the central bank's ability to respond rapidly could conceivably provide reassurance that deters bank runs.[261] Yet if a bank run materialised, C.B.D.C. minimises disruption to economic activity by offering an e.M.o.P. to replace deposits, whereas cash may interfere with consumer transaction

[252] European Union, *supra* note 35, at 18.

[253] The E.C.B. wants to avoid such a role but has not ruled it out; *see* European Central Bank, *supra* note 2, at 18–19. *Cf.* Central banks should accept an evolution in their monetary policy tools rather than reverting back to their pre-crisis framework; *see* Cristiano Boaventura Duarte, *Alternative Monetary Targets, Instruments and Future Monetary Policy Frameworks*, 31 Rev. Pol. Econ. 582 (2019). Central bank funding can counter overreliance on short-term wholesale funding; *see* Greenwood et al., *supra* note 191.

[254] *See* Ohler Christoph, *Banking Supervision*, *in* The EU Law of Economic and Monetary Union (2020).

[255] Nabilou & Prüm, *supra* note 20. This would be under separate decision-making between its monetary policy and supervision functions; *see* European Central Bank, *Decision of the European Central Bank of 17 September 2014 on the Implementation of Separation Between the Monetary Policy and Supervision Functions of the European Central Bank (ECB/2014/39)*, 57 (2014), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0039(01)&from=EN.

[256] Williamson, *supra* note 9.

[257] Frost et al., *supra* note 11.

[258] Brunnermeier & Niepelt, *supra* note 9.

[259] *Id.*

[260] Mancini-Griffoli et al., *supra* note 8.

[261] Brunnermeier & Niepelt, *supra* note 9; Kumhof and Noone, *supra* note 8. *See* also Diamond & Dybvig, *supra* note 232.

patterns.[262] The L.O.L.R.'s willingness to lend could also signal to the market that a bank's loan portfolio remains valuable.[263]

There will, however, be various aspects to the design of the digital euro refinancing operations to be carefully considered. The Eurosystem must avoid becoming so central to credit intermediation that it determines the cost of credit rather than the private markets.[264] T.L.T.R.O.s entail banks making lending decisions and then sourcing funding from the Eurosystem.[265] The quantum of central bank funding does not necessarily alter that outcome. Mechanisms, such as auctions, can determine the supply and cost of credit in line with market and specific-party demand.[266] Securities, such as securitisation and covered bonds, allow the capital markets to remain responsible for price discovery,[267] before the central bank provides its liquidity via secondary market purchases[268] or repo financing collateralised by such securities.[269]

The E.C.B. will have to determine collateral criteria that protect the relevant N.C.B. against the risk of financial loss from the funding that it provides.[270] This includes the type and quality of eligible assets, the overcollateralisation required and the quantum it is willing to lend.[271] The E.C.B. and the C.J.E.U. have recognised it is inherent to the central bank's operations to face potential losses from such activities.[272] The banking sector can share that financial burden if the Eurosystem could recover losses from deposit insurance schemes.[273] But the Eurozone Member States will have to consider to what extent they will be prepared to recapitalise a N.C.B. that suffers losses.[274]

[262] Williamson, *supra* note 9.
[263] For example, public deposit banks in Europe promoted stability by vouching for the quality of deposited metal coins then issuing Co.B.M. that was trusted as a M.o.P.; *see* Schnabel & Shin, *supra* note 11.
[264] Bank for International Settlements, *supra* note 17; Bank of England, *Central Bank Digital Currency: Opportunities, Challenges and Design*, (2020), https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf; Bindseil, *Tiered C.B.D.C.*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10.
[265] *E.g.*, U.S. postal banks' deposits were applied to fund commercial banks without determining their lending decisions; *see* Schuster et al., *supra* note 12.
[266] White, *supra* note 71.
[267] Central banks remain competent to price loan portfolios themselves during market stress.
[268] The E.C.B. has adopted this approach for its bond-buying programmes with C.J.E.U. approval; *see* C-493/17 Proceedings brought by Heinrich Weiss and Others, ECLI:EU:C:2018:1000, 113-28 (2018).
[269] Grym et al., *supra* note 16; Woodford, *supra* note 243.
[270] The Eurosystem must lend against "adequate collateral" (*see* E.S.C.B. Statute Article 18.1).
[271] Bank of England, *supra* note 263; Bindseil, *Tiered C.B.D.C.*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10.
[272] Gauweiler and Others v Deutscher Bundestag, ECLI:EU:C:2015:400, 125-27 (2015).
[273] Kim & Kwon, *supra* note 9.
[274] Brunnermeier & Niepelt, *supra* note 9. This could be mitigated by shorter-term maturity for central bank lending; *see* Greenwood et al., *supra* note 191.

6. THE PURPOSE OF DIGITAL EURO

6.1. PAYMENT SYSTEM AUTONOMY

Payment system autonomy is increasingly recognised as a matter of national security. The U.S. dominates the international payment system. Visa and Mastercard dominate card payments. In response, China developed UnionPay as an international alternative and Russia developed its own national payment system.[275] E.U. payment system autonomy is restrained by relying substantially on non-E.U. companies.[276] There are national payment initiatives to process card and online payments via the banking system. The E.C.B. desires a European card or online payment system[277] and has endorsed[278] European banks forming the European Payments Initiative in pursuit of that goal.[279]

The shift in U.S. policy on Iranian financial sanctions in 2018 and the difficulties that it created for E.U. financial institutions highlighted the precariousness of E.U. dependence on U.S. payment intermediation.[280] There remains the tail risk that any future breakdown in U.S.-E.U. relations destabilises E.U. payment systems.[281] It would be politically sensitive – and may trigger state aid disputes at the World Trade Organization – if the E.U. promoted a European champion to force U.S. companies out of the E.U. payments market. As a new payment system without incumbents, the digital euro system offers a trojan horse for this strategy. Its use of Ce.B.M. and integration with the

[275] Siddharth Venkataramakrishnan, Polina Ivanova & Imani Moise, *Russia Reaps Reward of Domestic Payment System After Visa and Mastercard Withdraw,* Fin. Times (Apr. 20, 2022), https://www.ft.com/content/0bdef21b-426e-4e98-9a25-998c9bad500c (last visited May 11, 2022). Bank of Russia, *National Payment System*, (Dec. 2022), https://www.cbr.ru/eng/psystem/ (last visited Jun. 21, 2022).

[276] Panetta, *supra* note 140; Panetta, *supra* note 215. Dependence on Visa and Mastercard is a long-running concern for the E.U.; *see* Smits, *supra* note 57. There is also Google and Apple in mobile payments and PayPal in online payments.

[277] European Central Bank, *Card Payments in Europe: Current Landscape and Future Prospects: a Eurosystem Perspective,* (2019), https://data.europa.eu/doi/10.2866/75461 (last visited May 11, 2022); European Central Bank, Innovation and its Impact on the European Retail Payment Landscape (2019), https://www.ecb.europa.eu/pub/pdf/other/ecb.other191204 f6a84c14a7.en.pdf.

[278] European Central Bank, *ECB welcomes initiative to launch new European payment solution*, (2020), https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200702 214c52c76b.en.html (last visited May 11, 2022).

[279] *See* European Payments Initiative, *Major Eurozone Banks Start the Implementation Phase of a New Unified Payment Scheme and Solution, the European Payment Initiative (EPI)*, (2020), https://www.epicompany.eu/major-eurozone-banks-start-implementation-phase-unified-payment-scheme-solution-european-payment-initiative-epi/ (last visited Jun 21, 2022). The European Payments Initiative would use the S.E.P.A. Instant Credit Transfer (S.C.T. Inst) system to execute payments.

[280] E.U. persons are subject to anti-boycotting legislation in relation to U.S. sanctions on Iran; *see* European Union, *Council Regulation (EC) No 2271/96 of 22 November 1996 protecting against the effects of the extra-territorial application of legislation adopted by a third country, and actions based thereon or resulting therefrom*, OJ L 309 1 (1996), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01996R2271-20180807&from=EN.

[281] However, most E.U. Member States are members of the North Atlantic Treaty Organisation [N.A.T.O.] alongside the United States, which includes their commitment to collective self-defence.

Eurosystem could justify requiring P.S.P.s to be E.U.-person-controlled entities for national security reasons.[282]

This may serve the long-term economic interests of the E.U., but political reasons prevent this argument from being emphasised by the E.U. The economic ramifications of payment system autonomy are worthy of further research that goes beyond the scope of this paper. Payment system autonomy could offer the most convincing rationale for the digital euro.

6.2. THE FUTURE OF MONEY

The digital euro offers numerous potential use cases,[283] including as a monetary policy tool,[284] although these may lie outside the competence of the Eurosystem under the Treaties.[285] However, the digital euro could simply represent the next step in the evolution of Ce.B.M.: from metal to paper to digital. C.B.D.C. threatens to disrupt incumbents. But this is inherent in the economic change that sustains the capitalist system.[286] The state has historically supplanted privately-issued money.[287] The holding limit would artificially prevent the digital euro from fully utilising the benefits of digitalisation. There should be caution exercised against any Luddite attempt to restrain technological progress in Ce.B.M.

If the eventual outcome of C.B.D.C. is a state monopoly on money, banks would compete using their acumen as credit intermediaries and P.S.P.s - not their ability to create Co.B.M. There is an inherent instability within banks that has not been solved.[288]

---

[282] Digital Euro Association, *The Future of Payments in the Euro Area*, https://home.digital-euro-association.de/podcast; Krogdahl & Sointu, *supra* note 239. *E.g.*, An undertaking must be more than fifty percent owned and controlled by E.U. nationals or Member States to operate an airline in the E.U.; *see* European Union, *Regulation (EC) No 1008/2008 of the European Parliament and of the Council of 24 September 2008 on common rules for the operation of air services in the Community (Recast)*, OJ L 293 3 4(f) (2008), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02008R1008-20201218&from=EN.

[283] These include sourcing macroeconomic data; "smart contracts" and programmable money; and distributing "helicopter money" from government; *see* Allen et al., *supra* note 8. Some wish to limit digital euro to novel use cases that avoid competing with the existing payment system; *see* e.g. Digital Euro Association, *supra* note 158; Digital Euro Association, *ABI's Spunta Project*, https://home.digital-euro-association.de/podcast (last visited Mar 1, 2022).

[284] A negative C.B.D.C. remuneration rate could be applied to stimulate economic activity; *see* Allen et al., *supra* note 8; Bindseil, *Tiered C.B.D.C.*, *supra* note 10; Bindseil, *Central Bank Digital Currency*, *supra* note 10; Bordo &Levin, *supra* note 8. This would be subject to the political limitations of negative rates; *see* Kumhof & Noone, *supra* note 8.

[285] *See* Section 3.1.

[286] Joseph Alois Schumpeter, Capitalism, Socialism & Democracy (George Allen & Unwin eds., 5th ed. 1976).

[287] *E.g.*, The Bank of Amsterdam; *see* Frost et al., *supra* note 11. *E.g.*, Banknotes in Canada; *see* Grodecka-Messi, *supra* note 13. *See* also Bindseil, *supra* note 11.

[288] *See* Mervyn King, *Banking: From Bagehot to Basel, and Back Again* (2010), https://www.bankofengland.co.uk/-/media/boe/files/speech/2010/banking-from-bagehot-to-basel-and-back-again-speech-by-mervyn-king.pdf?la=en. *C.f.* There are efficiency gains from maturity transformation and bonding mechanisms favouring depositors; *see* Diamond & Dybvig, *supra* note 232; Diamond & Rajan, *supra* note 234.

Removing money creation from the banks may offer a solution.[289] If banks would no longer be essential to providing on-demand deposits, they would not require an implicit state guarantee.[290] Banks could conceivably operate akin to investment funds.[291] The digital euro could be the harbinger of the end of banking as we know it – if proponents are willing to fundamentally reconsider the role of banks and Co.B.M. in the economy.

CONCLUSION

The potential design of the digital euro is entangled in contradictions in E.U. and E.C.B. policy. Retail deposits are protected by deposit insurance and made indispensable to payment settlement, yet cash must be supplemented by C.B.D.C. The public should adopt the digital euro, yet banks must be protected through deterring users from holding digital euro. The Capital Markets Union should wean borrowers from reliance on banks for credit intermediation, but the digital euro should not undermine banks as credit intermediaries. The holding limit is a symptom of these contradictions. Despite concerns that the digital euro will overwhelm Eurozone banks, there is a dearth of use cases to motivate potential users to bifurcate their money between their bank account and their C.B.D.C. wallet. The E.C.B. is at danger of the digital euro falling victim to the Avant-isation of its C.B.D.C.

A design for the digital euro that restricts or deters users from holding substantial amounts of digital euro is at risk of being followed despite both overstated concerns and an ineffectual proposed solution. A user-identified or pseudonymous C.B.D.C. wallet would repel potential users who prioritise anonymity. Yet the concept of digital cash – an anonymous, electronic means of payment – could be designed in a manner compatible with A.M.L./C.F.T. regulations. The challenge may be the technological feasibility of anonymous payments. The holding limit would needlessly inhibit a C.B.D.C. wallet functioning anonymously.

[289] This is not to discount that "free banking" without a central bank may be a more stable model; *see* David Beckworth, *George Selgin on the Future of CBDC, Fed Accounts, and Stablecoins*, https://macromusings.libsyn.com/george-selgin-on-the-future-of-cbdc-fed-accounts-and-stablecoins (last visited Mar 1, 2022); Milton Friedman & Anna J. Schwartz, *Has Government any Role in Money?*, 17 Journal of Monetary Economics 37 (1986); Selgin, *supra* note 168. Milton Friedman's "k-percent rule" proposal for regulating the money supply may also be implementable in a C.B.D.C.-only monetary system; *see* Brunnermeier & Niepelt, *supra* note 9.

[290] Digital Euro Association, *CBDC, Synthetic CBDC and Stablecoins*, https://home.digital-euro-association.de/podcast; Nabilou, *supra* note 7.

[291] Bruegel, *supra* note 182.Martin Wolf, *Cryptocurrencies Are Not the New Monetary System We Need,* Fin. Times (July 5, 2022), https://www.ft.com/content/f2faeec9-6d42-4d78-9c68-1f59795789a7 (last visited July 6, 2022).

Although banking may emerge as a less profitable enterprise in a digital euro environment, this should not impede profitable lending to productive projects. The holding limit only offers a cap on outflows from Eurozone banks - not a solution to outflows from deposits to digital euro. Rather, the Eurozone banking system can adjust to the presence of the digital euro. Banks can incentivise depositors to maintain their deposits. Borrowers may absorb any increased cost of credit. Capital markets and cross-border banking services offer alternative sources of credit. Securitisation and covered bonds offer an alternative means for banks to unlock liquidity from their illiquid loan portfolios. The Eurosystem would also have to be prepared to potentially maintain their refinancing operations at a larger scale than what is currently being employed under T.L.T.R.O.s - if banks require additional liquidity. The threat of the digital euro bank run does not alter this conclusion. The Eurosystem will have to grapple with electronic bank runs in the 21st century irrespective of the presence of C.B.D.C. These adjustments, therefore, require preparation and contingency planning, but the digital euro would undermine neither price stability nor financial stability.