

# **Let the digital euro circulate: introducing a retail CBDC in the Eurozone with unlimited holdings by users**

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## **Abstract**

The European Central Bank anticipates including a holding limit of about €3,000 per user within the potential design of its 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 EU law and while maintaining banks as credit intermediaries in the Eurozone financial system.

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## 1 Introduction

The European Central Bank (“ECB”) is assessing the viability and the design of a potential retail central bank digital currency (“CBDC”) for the Eurozone, the digital euro.<sup>2</sup> In its *Report on a digital euro* published in October 2020,<sup>3</sup> the ECB outlined principles and requirements that it expects to incorporate into the design of the digital euro. One requirement limits the digital euro to being a means of payment (“MoP”) and not “a form of investment” used to hold a large quantum of money. This could entail “limiting the quantity of digital euro that users can hold and/or transact”.<sup>4</sup> The ECB has mooted a limit of €3,000 held by any user (the “holding limit”).<sup>5</sup>

The ECB purportedly intends the introduction of the digital euro to maintain public access to central bank money (“CeBM”) as cash usage declines.<sup>6</sup> But digital euro would not merely offer the digital equivalent of euro banknotes and coins currently in circulation (“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 CeBM. Yet the holding limit may receive less scrutiny than those other design questions that the ECB has reserved in its report for further deliberation.

The concerns that motivate applying the holding limit fall under 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 (“AML/CFT”). Secondly, the digital euro could reduce deposits held at Eurozone banks, which could both lead to 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.

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<sup>2</sup> The project is currently in a 24-month “investigation phase”; see European Central Bank, ‘Eurosystème launches digital euro project’ (14 July 2021).

<sup>3</sup> European Central Bank, ‘Report on a Digital Euro’ (October 2020).

<sup>4</sup> *ibid*, Requirement R8, pp.16-18.

<sup>5</sup> Fabio Panetta, ‘Interview with Financial Times’ (*European Central Bank*, 20 June 2021)

<<https://www.ecb.europa.eu/press/inter/date/2021/html/ecb.in210620~c8acf4bc2b.en.html>> accessed 11 May 2022.

<sup>6</sup> Fabio Panetta, ‘The ECB’s Case for Central Bank Digital Currencies’, *Financial Times* (18 November 2021) <<https://www.ft.com/content/5e588cea-c218-4867-aeb7-e16e198ccd9a>> accessed 21 June 2022.

The holding limit would serve as a blunt instrument towards AML/CFT. Meanwhile there are models devised that offer payment anonymity in compliance with AML/CFT regulations. Regulators would, however, have to countenance that lower-value CBDC transactions remain anonymous – as already occurs for some cash and electronic money (“e-money”) transactions – to offer CBDC as an anonymous eMoP: 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 ECB 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 €1 trillion of leakage from Eurozone banks’ balance sheets.

Importantly, a dynamic analysis of how the ECB and the Eurozone national central banks (“NCBs”) (together, the “Eurosysteem”), banks, depositors, borrowers and other parties can react to the availability of digital euro demonstrates that the holding limit would be ill-founded. Banks would retain the profit incentive to continue to lend. Banks can adjust the terms of their relationship with depositors and borrowers and adjust their funding model. Parties may increase reliance on the capital markets to facilitate credit intermediation and bank funding – which would be consistent with the Capital Markets Union ambitions of the EU. The Eurosystem may be required to embrace its refinancing operations remaining 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, bank runs would pose a greater threat or access to credit would be threatened. The real concern for the ECB should not be how to stop the public 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 2 provides a literature review. Section 3 sets out considerations relating to the design of CBDCs. Section 4 analyses the legal basis for the digital euro and the limitations that EU law imposes on its potential design. Section 5 assesses the feared incompatibility of an anonymous MoP with AML/CFT regulations. Section 6 assesses the prospect of digital euro triggering disintermediation of banks. Section 7 briefly considers the potentially wider purpose of the digital euro for the Eurozone. Section 8 concludes.

## 2 Literature Review

The compatibility of the digital euro with the provisions of the Treaties has been previously assessed.<sup>7</sup> Legal uncertainties have been highlighted.<sup>8</sup> This paper contributes to the literature considering the legal basis for the digital euro.

The optimal design of CBDCs has been widely discussed.<sup>9</sup> Many have modelled the impact of CBDCs on banks, albeit based on differing assumptions that make their findings not directly comparable.<sup>10</sup> The potential impact of CBDCs on the financial system has been

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<sup>7</sup> Benjamin Geva and others, 'The E-Banknote as a "Banknote": A Monetary Law Interpreted' (2021) 41 *Oxford Journal of Legal Studies* 1119; Seraina Grunewald and others, 'Digital Euro and ECB Powers' (2021) 58 *Common Market Law Review* 1029; Corinne Zellweger-Gutknecht and others, 'Digital Euro, Monetary Objects, and Price Stability: A Legal Analysis' (2021) 7 *Journal of Financial Regulation* 284.

<sup>8</sup> Hossein Nabilou, 'Testing the Waters of the Rubicon: The European Central Bank and Central Bank Digital Currencies' (2020) 21 *Journal of Banking Regulation* 299; Peter Wierds and Harro Boven, 'Central Bank Digital Currency - Objectives, Preconditions and Design Choices' (2020) 20–01 *De Nederlandsche Bank: Occasional Studies*.

<sup>9</sup> Itai Agur and others, 'Designing Central Bank Digital Currencies' [2021] *Journal of Monetary Economics*; Sarah Allen and others, 'Design Choices for Central Bank Digital Currency: Policy and Technical Considerations' [2020]; Bank for International Settlements, 'Central Bank Digital Currencies: Foundational Principles and Core Features' (2020); Michael Bordo and Andrew Levin, 'Central Bank Digital Currency and the Future of Monetary Policy' (National Bureau of Economic Research August 2017); Michael Kumhof and Clare Noone, 'Central Bank Digital Currencies - Design Principles and Balance Sheet Implications' [2018] *Bank of England: Staff Working Paper*; Jiaqi Li, 'Predicting the Demand for Central Bank Digital Currency: A Structural Analysis with Survey Data' [2021] *Bank of Canada: Staff Working Paper*; Tommaso Mancini-Griffoli and others, 'Casting Light on Central Bank Digital Currencies' (2018) 2018 *IMF Staff Discussion Notes*.

<sup>10</sup> David Andolfatto, 'Assessing the Impact of Central Bank Digital Currency on Private Banks' (2021) 131 *The Economic Journal* 525; John Barrdear and Michael Kumhof, 'The Macroeconomics of Central Bank Issued Digital Currencies' [2016]; Markus K Brunnermeier and Dirk Niepelt, 'On the Equivalence of Private and Public Money' (2019) 106 *Journal of Monetary Economics* 27; Jonathan Chiu and others, 'Bank Market Power and Central Bank Digital Currency: Theory and Quantitative Assessment' [2019] *Bank of Canada: Staff Working Paper*; Jesús Fernández-Villaverde and others, 'Central Bank Digital Currency: Central Banking for All?' [2020] *National Bureau of Economic Research*; Todd Keister and Daniel Sanches, 'Should Central Banks Issue Digital Currency?' [2019] *Federal Reserve Bank of Philadelphia: Working Papers*; Young Sik Kim and Ohik Kwon, 'Central Bank Digital Currency, Credit Supply, and Financial Stability' [2022] *Journal of Money, Credit and Banking*; Stephen Williamson, 'Central Bank Digital Currency: Welfare and Policy Implications' [2019] 2019 *Meeting Papers*; Stephen D Williamson, 'Central Bank Digital Currency and Flight to Safety' [2021] *Journal of Economic Dynamics and Control* 104146.

surveyed.<sup>11</sup> 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 CBDCs: the Bank of Amsterdam and other public deposit banks that began in Europe in the 17th century;<sup>12</sup> the US postal banks;<sup>13</sup> the Bank of Canada assuming banknote-issuing privileges;<sup>14</sup> the 2007 bank run on British bank Northern Rock;<sup>15</sup> and proto-CBDCs in Finland and Ecuador.<sup>16</sup> These inform the findings from modelling and theoretical assumptions to form a realistic assessment of the likely impact of the digital euro and the holding limit.

### 3 Design Options for CBDCs

CBDC is a fiat currency issued by a central bank in digital form in place of, or as a complement to, physical currency.<sup>17</sup> The ECB wishes to offer a digital alternative to cash in

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<sup>11</sup> Bank for International Settlements, 'Central Bank Digital Currencies: Financial Stability Implications' (September 2021); Ulrich Bindseil, 'Tiered CBDC and the Financial System' (Working Paper Series, European Central Bank January 2020); Ulrich Bindseil, 'Central Bank Digital Currency: Financial System Implications and Control' (2019) 48 *International Journal of Political Economy* 303.

<sup>12</sup> Jon Frost and others, 'An Early Stablecoin? The Bank of Amsterdam and the Governance of Money' [2020] BIS Working Papers; Isabel Schnabel and Hyun Song Shin, 'Money and Trust: Lessons from the 1620s for Money in the Digital Age' [2018] BIS Working Papers.

<sup>13</sup> Steven Sprick Schuster and others, 'An Empirical History of the United States Postal Savings System' [2019] National Bureau of Economic Research: Working Papers.

<sup>14</sup> Anna Grodecka-Messi, 'Private Bank Money vs Central Bank Money: A Historical Lesson for CBDC Introduction' [2019] Lund University Publications: Working Papers.

<sup>15</sup> Hyun Song Shin, 'Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis' (2009) 23 *The Journal of Economic Perspectives* 101.

<sup>16</sup> Andrés Arauz and others, 'Dinero Electrónico: The Rise and Fall of Ecuador's Central Bank Digital Currency' (2021) 2 *Latin American Journal of Central Banking* 100030; Aleksí Grym, 'Lessons Learned from the World's First CBDC' [2020] *BoF Economics Review*.

<sup>17</sup> Allen and others (n 9); Eswar Prasad, 'Central Banking in a Digital Age: Stock-Taking and Preliminary Thoughts' [2018]. There are numerous definitions offered for CBDC, though some only reflect that author's proposed form of CBDC; see e.g. Bank for International Settlements, 'Central bank digital currencies' (n 9); Bank for International Settlements, 'Central Bank Digital Currencies' (March 2018); Grym (n 16); Aleksí Grym and others, 'Central Bank Digital Currency' [2017] *BoF Economics Review*; Kumhof and Noone (n 9); Mancini-Griffoli and others (n 9).

the Eurozone.<sup>18</sup> The decline in cash usage reflects greater use of commercial bank money (“CoBM”) held in deposits<sup>19</sup> as a store of value and a MoP.<sup>20</sup> There is also concern that increasing adoption of crypto-assets by the public could reach a scale that undercuts monetary policy transmission.<sup>21</sup> This is despite the history of the Bank of Amsterdam indicating that stablecoins are not a sustainable alternative to CeBM and such concerns are overblown.<sup>22</sup> Central banks are investigating adoption of their own digital currency as a

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<sup>18</sup> There are “wholesale CBDC” projects examining cross-border, cross-currency or securities payment settlement among wholesale users; see e.g. Bank for International Settlements, ‘Project Jura: Cross-Border Settlement Using Wholesale CBDC’ (*BIS Innovation hub - Projects*, 2022) <<https://www.bis.org/about/bisih/topics/cbdc/jura.htm>> accessed 21 June 2022; Banque de France, ‘The Banque de France Has Successfully Completed the First Tranche of Its Experimentation Programme in Central Bank Digital Currency’ (*Banque de France*, 16 December 2021) <<https://www.banque-france.fr/en/communique-de-presse/banque-de-france-has-successfully-completed-first-tranche-its-experimentation-programme-central-bank>> accessed 21 June 2022.

<sup>19</sup> 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 [2009] OJ L 267/7 (the e-Money Directive, “eMD”).

<sup>20</sup> See e.g. The Netherlands; see De Nederlandsche Bank, ‘DNB Study: Cash Must Remain Accessible and Available’ (17 December 2020) <<https://www.dnb.nl/en/actueel/dnb/older-bulletins/dnbulletin-2020/dnb-study-cash-must-remain-accessible-and-available/>> accessed 21 June 2022; Jurgen Spaander, ‘The role and future of cash’ (2020) 18–2 *De Nederlandsche Bank: Occasional Studies* This has been a long-term trend; see Hanna Jyrkönen, ‘Less Cash on the Counter: Forecasting Finnish Payment Preferences’ [2004] Bank of Finland: Discussion Papers; Tanai Khiaonarong and David Humphrey, ‘Cash Use Across Countries and the Demand for Central Bank Digital Currency’ (2019) 2019 IMF Working Papers. See also Sweden; see Niklas Arvidsson and others, ‘Cashless Society: When Will Merchants Stop Accepting Cash in Sweden - A Research Model’ in Stefan Feuerriegel and Dirk Neumann (eds), *Enterprise Applications, Markets and Services in the Finance Industry*, vol 276 (8th International Workshop, FinanceCom 2016 Frankfurt, Germany, December 8, 2016 Revised Papers, Springer International Publishing 2017); Wharton School, ‘Going Cashless: What Can We Learn from Sweden’s Experience?’ (*Knowledge at Wharton*, 31 August 2018) <<https://knowledge.wharton.upenn.edu/article/going-cashless-can-learn-swedens-experience/>> accessed 21 June 2022.

<sup>21</sup> Hossein Nabilou and André Prüm, ‘Central Banks and Regulation of Cryptocurrencies’ (2020) 39 *Review of Banking and Financial Law* 1003.

<sup>22</sup> See Frost and others (n 12). 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*, 31 January 2022)

regulated, state-backed alternative.<sup>23</sup> Digital euro would be the Eurozone's CBDC, offering CeBM that serves as an eMoP in the Eurozone.<sup>24</sup>

Many aspects of the design of CBDC remain open to consideration<sup>25</sup> and entail trade-offs against other MoPs.<sup>26</sup> The design may represent digital cash or adopt additional features (and reject features from physical cash). Numerous central banks have been investigating the design choices.<sup>27</sup> There is some consensus, including under the auspices of the Bank for International Settlements<sup>28</sup> and the Group of 7.<sup>29</sup> Trends have emerged among CBDCs already in circulation or undergoing pilot projects.<sup>30</sup> But the ECB continues to experiment

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<<https://www.prnewswire.com/news-releases/statement-by-diem-ceo-stuart-levey-on-the-sale-of-the-diem-groups-assets-to-silvergate-301471997.html>> accessed 21 June 2022.

<sup>23</sup> See Bank for International Settlements, 'Central bank digital currencies' (n 9); Bank for International Settlements, 'Central bank digital currencies' (n 17) See also the UK; see Bank of England, 'Bank of England Statement on Central Bank Digital Currency' (19 April 2021)

<<https://www.bankofengland.co.uk/news/2021/april/bank-of-england-statement-on-central-bank-digital-currency>> accessed 21 June 2022. See also the US; see Board of Governors of the Federal Reserve System, 'Money and Payments: The U.S. Dollar in the Age of Digital Transformation' (January 2022). But concerns remain regarding implementation of CBDCs; see Andrew Bailey, 'Bank of England Governor Andrew Bailey on the Future of Cryptocurrencies and Stablecoins' (Brookings Institution, 3 September 2020)

<[https://www.brookings.edu/wp-content/uploads/2020/09/es\\_20200903\\_england\\_bailey\\_transcript.pdf](https://www.brookings.edu/wp-content/uploads/2020/09/es_20200903_england_bailey_transcript.pdf)>; Ansgar Belke and Edoardo Beretta, 'From Cash to Central Bank Digital Currencies and Cryptocurrencies: A Balancing Act between Modernity and Monetary Stability' (2020) 47 *Journal of Economic Studies* 911.

<sup>24</sup> European Central Bank, 'Report on a digital euro' (n 3), Core Principle P2, pp.49-51.

<sup>25</sup> See Allen and others (n 9); Bindseil, 'Tiered CBDC and the financial system' (n 11); Bindseil, 'Central Bank Digital Currency' (n 11); Wouter Bossu and others, 'Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations' [2020] IMF Working Papers; Grym and others (n 17).

<sup>26</sup> See Wierds and Boven (n 8); Paul Wong and Jesse Leigh Maniff, 'Comparing Means of Payment: What Role for a Central Bank Digital Currency?' [2020] FEDS Notes.

<sup>27</sup> For surveys of central bank activity, see Codruta Boar and others, 'Impending Arrival: A Sequel to the Survey on Central Banking Digital Currency' (BIS Papers, Bank for International Settlements January 2020); Mancini-Griffoli and others (n 9); Prasad (n 17).

<sup>28</sup> Bank for International Settlements, 'Central bank digital currencies' (n 9).

<sup>29</sup> G7, 'G7 Finance Ministers and Central Bank Governors' Statement on Central Bank Digital Currencies (CBDCs) and Digital Payments – 13 October 2021' (G7 - United Kingdom 2021, 13 October 2021); G7, 'Public Policy Principles for Retail Central Bank Digital Currencies (CBDCs)' (13 October 2021).

<sup>30</sup> e.g. (i) Sand Dollar in the Bahamas; see Central Bank of The Bahamas, 'Annual Report & Statement of Accounts, 2021' (5 May 2022); Central Bank of The Bahamas, 'Annual Report & Statement of Accounts, 2020'



and has yet to determine the likely design of the digital euro.<sup>31</sup> The principles and requirements published by the ECB indicate that the digital euro would involve a two-tier system<sup>32</sup> – the Eurosystem operates a centralised ledger with private sector intermediaries responsible for user supervision and access – but most features remain undecided.<sup>33</sup>

The final proposed design of the digital euro will affect how widely digital euro is adopted by potential users and the legal and economic analysis of its impact on the Eurozone.<sup>34</sup> Nonetheless, the digital euro can be analysed for the purposes of this paper despite this uncertainty.

## **4 The Legal Basis for Digital Euro**

### **4.1 Legal Basis under the Treaties**

The Treaty on the Functioning of the European Union (the “TFEU”)<sup>35</sup> and the Statute of the European System of Central Banks and of the European Central Bank (the “ESCB Statute”)<sup>36</sup> entrusts the Eurosystem with responsibility for Eurozone monetary policy within the

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(5 May 2021); (ii) e-CNY in China; see People’s Bank of China, ‘Progress of Research & Development of E-CNY in China’ (July 2021); (iii) DCash in the Eastern Caribbean; see Eastern Caribbean Central Bank, ‘What You Should Know | ECCB Digital EC Currency Pilot’ (2022) <<https://www.eccb-centralbank.org/p/what-you-should-know-1>> accessed 21 June 2022; (iv) eNaira in Nigeria; see Central Bank of Nigeria, ‘Design Paper for the eNaira’ (23 October 2021); and (v) e-krona in Sweden; see Sveriges Riksbank, ‘E-Krona Pilot Phase 2’ (April 2022); Sveriges Riksbank, ‘E-Krona Pilot Phase 1’ (April 2021); Sveriges Riksbank, ‘The Riksbank’s e-Krona Project, Report 2’ (October 2018); Sveriges Riksbank, ‘The Riksbank’s e-Krona Project, Report 1’ (September 2017). These are non-interest-bearing cash-like instruments, held in CBDC wallets and managed by authorised intermediaries in a two-tier system.

<sup>31</sup> e.g. Transacting CBDC with hardware as a bearer instrument; see Deutsche Bundesbank, ‘Eurosystem Experimentation Regarding a Digital Euro - Research Workstream on Hardware Bearer Instrument’ (July 2021).

<sup>32</sup> European Central Bank, ‘Report on a digital euro’ (n 3), pp.36-44.

<sup>33</sup> Although the ECB confirmed the technical feasibility of the holding limit; see European Central Bank, ‘Digital Euro Experimentation Scope and Key Learnings’ (14 July 2021).

<sup>34</sup> Kumhof and Noone (n 9); Mancini-Griffoli and others (n 9).

<sup>35</sup> Consolidated Version of the Treaty on the Functioning of the European Union [2012] OJ C 326/1.

<sup>36</sup> 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 [2016] OJ C 202/230.

Economic and Monetary Union (“EMU”).<sup>37</sup> The responsibilities of the Eurosystem, which lacks legal personality, are coordinated by the ECB<sup>38</sup> and implemented by the ECB with the relevant NCBs.<sup>39</sup> The digital euro project is, therefore, an Eurosystem project coordinated by the ECB.

The principles of conferral, subsidiarity and proportionality in the Treaty on European Union (the “TEU”)<sup>40</sup> determine whether the introduction of the digital euro is an *intra vires* act of the Eurosystem.<sup>41</sup> Subsidiarity is not applicable due to Eurozone monetary policy being an exclusive Union competence.<sup>42</sup> It is not feasible to evaluate proportionality without a concrete proposal. This paper, therefore, principally considers whether the Treaties confer the power for the EU (represented by the Eurosystem) to introduce the digital euro.

The legal basis for the digital euro lies in the ECB having “the exclusive right to authorise the issue of euro banknotes within the Union” and the Eurosystem having the power to “issue such notes”.<sup>43</sup> Digital euro that would operate as a digital equivalent of cash constitutes money.<sup>44</sup> It would serve the three functions of money: medium of exchange, store of value and unit of account. This status is bolstered by digital euro being backed by the state and the central bank and (one would hope) its wide acceptance as a MoP.<sup>45</sup> However, there is no EU law definition of “banknotes”. Irrespective of the drafters of the Treaties only contemplating

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<sup>37</sup> The Treaties refer to the European System of Central Banks (the “ESCB”), consisting of the ECB and the EU NCBs (see TFEU, article 127; ESCB Statute, article 1). However, non-Eurozone Member States and their NCBs are exempt from Eurozone decision-making (see TFEU, article 139; ESCB Statute, article 42).

<sup>38</sup> TFEU, article 132(1); ESCB Statute, article 9.2.

<sup>39</sup> ESCB Statute, article 12.1. On the Eurosystem, see Christos V Gortsos, *European Central Banking Law: The Role of the European Central Bank and National Central Banks under European Law* (Springer International Publishing 2020), chapters 5.1 and 6.2, Michael Ioannidis, ‘The European Central Bank’ in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020), Bernd Krauskopf and 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’ (2009) 46 *Common Market Law Review* 1143.

<sup>40</sup> Consolidated Version of the Treaty on European Union [2012] OJ C 326/13.

<sup>41</sup> *ibid*, article 5.

<sup>42</sup> TFEU, article 3(1)(c).

<sup>43</sup> *ibid*, article 128(1); ESCB Statute, article 16. On issuance of banknotes and coins, see Gortsos (n 39), chapter 7.3.

<sup>44</sup> Geva and others (n 7).

<sup>45</sup> Charles Proctor, *Mann on the Legal Aspect of Money* (Seventh Edition, Oxford University Press 2012).

paper banknotes, the Treaties provide no limitation on the medium of the banknote.<sup>46</sup> The concept can, therefore, be extended to the digital form.<sup>47</sup> The Eurosystem is capable of issuing two digital currencies given their distinguishable forms: 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.<sup>48</sup> 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 historic role of nation-states in minting coins and that rationale is not applicable to CBDC.<sup>49</sup> It is then consistent with the Treaties to consider non-minted euro currency to fall within the “banknote” concept under TFEU Article 128(1).<sup>50</sup> Digital euro would be the digital form of the euro “banknote” in accordance with TFEU 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 TFEU Article 128(1).<sup>51</sup> The ECB has indicated the same conclusion.<sup>52</sup> It would be problematic for 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.<sup>53</sup> A balance should be remunerated by the payment of additional money, not the variation of the nominal value of the instruments held. Similarly, certain features may require a Treaty amendment if they go beyond existing Eurosystem tools<sup>54</sup> or are tantamount to taxation, such as negative interest charged on digital euro holdings.<sup>55</sup>

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<sup>46</sup> c.f. Bossu and others (n 25) takes a restrictive interpretation that the word “banknotes” only denotes physical banknotes.

<sup>47</sup> Geva and others (n 7); Grunewald and others (n 7); Wierts and Boven (n 8); Zellweger-Gutknecht and others (n 7).

<sup>48</sup> TFEU, article 128(2).

<sup>49</sup> Grunewald and others (n 7); Zellweger-Gutknecht and others (n 7).

<sup>50</sup> Geva and others (n 7); Grunewald and others (n 7); Zellweger-Gutknecht and others (n 7).

<sup>51</sup> Grunewald and others (n 7); Nabilou (n 8); Wierts and Boven (n 8); Zellweger-Gutknecht and others (n 7).

<sup>52</sup> European Central Bank, ‘Report on a digital euro’ (n 3), pp.24-25.

<sup>53</sup> Bossu and others (n 25); Geva and others (n 7).

<sup>54</sup> Nabilou (n 8).

<sup>55</sup> Grunewald and others (n 7); Zellweger-Gutknecht and others (n 7).

The Eurosystem is empowered under the Treaties to “provide facilities ... to ensure efficient and sound clearing and payment systems”.<sup>56</sup> This provides the legal basis for the Eurosystem to institute a digital euro payment system.<sup>57</sup> The Eurosystem has used this legal basis to drive integration towards a single Eurozone payments system:<sup>58</sup> the euro payment system (“TARGET2”), the euro payment area (“SEPA”), payment settlement of securities transactions (T2S), instant payment settlement (“TIPS”) and regulation of card interchange fees.<sup>59</sup> There are limits to the scope of this legal basis.<sup>60</sup> Nonetheless, a digital euro payment system relates to money and comfortably falls within scope.

A more spurious argument would be that ESCB Statute Article 22 acts as a legal basis for issuing digital euro. This would construe the digital euro as a facility that allows payments to function in the absence of cash.<sup>61</sup> Cryptocurrencies, such as Bitcoin, are sometimes perceived in this dual role as both money and payment system.<sup>62</sup> The regulatory role of the Eurosystem includes acting as a “catalyst” for advancing Eurozone payment systems.<sup>63</sup> Nonetheless, this is not a suitable basis in which to ground the issuance of digital euro, provided digital euro represents money. Paper banknotes do not legally constitute a subset of a Eurosystem payment facility, especially when TFEU Article 128(1) offers an explicit legal basis for the issuance of CeBM. CBDC should not be legally construed in such manner either.

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<sup>56</sup> ESCB Statute, article 22.

<sup>57</sup> Wierds and Boven (n 8).

<sup>58</sup> Phoebus L Athanassiou, ‘Payment Systems’ in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020); René Smits, ‘The Changing Payments Landscape of Europe: Issues of Regulation and Competition’ (2008) 27 *Yearbook of European Law* 405; Ivan Parać Vukomanović, ‘New Services Offered within the Remit of Target2 - How Do They Correspond with TFEU and Central Bank Tasks?’ (2019) 3 *EU and Comparative Law Issues and Challenges Series* 1048.

<sup>59</sup> Regulation (EU) 2015/751 of the European Parliament and of the Council of 29 April 2015 on interchange fees for card-based payment transactions [2015] OJ L 123/1.

<sup>60</sup> 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 (ECB)* [2015] ECLI:EU:T:2015:133.

<sup>61</sup> Nabilou (n 8).

<sup>62</sup> Mary Donnelly, ‘Payments in the Digital Market: Evaluating the Contribution of Payment Services Directive II’ (2016) 32 *Computer Law & Security Review* 827.

<sup>63</sup> Athanassiou (n 58); Vukomanović (n 58).

If the digital euro were to take a more exotic form, those formulations of the digital euro would require an alternative legal basis to TFEU Article 128(1). ESCB Statute Article 22 could become relevant as a legal basis if its primary role is settling 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. ESCB 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.<sup>64</sup> Such an interpretation of the term “other market participants” is unconvincing, especially when read within the context of ESCB Statute Chapter IV.<sup>65</sup> ESCB Statute Article 20 allows the ECB 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.<sup>66</sup> These provisions, therefore, represent a problematic basis on which to issue a purported digital currency.<sup>67</sup> The ECB cites TFEU Article 127(2) and ESCB 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”.<sup>68</sup>

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

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<sup>64</sup> This design has been mooted in literature; see e.g. Robert Hockett, ‘America’s Digital Sputnik Moment’, *The Hill* (12 May 2020) <<https://thehill.com/opinion/technology/497427-americas-digital-sputnik-moment>> accessed 21 June 2022; George Selgin, ‘Central Bank Digital Currency as a Potential Source of Financial Instability’ (2021) 41 *Cato Journal* 333.

<sup>65</sup> Wierdsma and Boven (n 8).

<sup>66</sup> *ibid.*

<sup>67</sup> Annelieke Mooij, ‘Central Bank Digital Currency: A Brief Analysis of Legal Issues Concerning the Introduction of Central Bank Digital Currencies’ (2021) 41 *Bankieri* 13; Zellweger-Gutknecht and others (n 7).

<sup>68</sup> European Central Bank, ‘Report on a digital euro’ (n 3), p.24.

objectives”.<sup>69</sup> The Eurosystem’s primary objective to “maintain price stability”<sup>70</sup> and its enumerated tasks<sup>71</sup> are relevant to that assessment. Maintaining the euro as a stable currency that is readily available to households and businesses offers a public benefit<sup>72</sup> and is necessary for effective transmission of monetary policy.<sup>73</sup> These 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 (“CJEU”) may be decisive to – and a contentious aspect of – its proportionality assessment.<sup>74</sup> The CJEU has generally afforded broad discretion to the ECB when reviewing monetary policy decisions,<sup>75</sup> due to the technical nature of its policy choices and the need to undertake forecasts and complex assessments.<sup>76</sup> The ECB’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 CBDC is so fundamental an action to undertake that it may provoke more robust judicial scrutiny than other ECB acts.<sup>77</sup>

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<sup>69</sup> Case C-493/17 *Proceedings brought by Heinrich Weiss and Others* [2018] ECLI:EU:C:2018:1000, paragraph 72. See also Case C-62/14 *Peter Gauweiler and Others v Deutscher Bundestag* [2015] ECLI:EU:C:2015:400, paragraph 67.

<sup>70</sup> TFEU, article 127(1); ESCB Statute, article 2. See European Central Bank, ‘Two per Cent Inflation Target’ (11 October 2021) <<https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html>> accessed 21 June 2022.

<sup>71</sup> TFEU, article 127(2); ESCB Statute, article 3. This includes monetary policy and “the smooth operation of payment systems”.

<sup>72</sup> Grunewald and others (n 7); Zellweger-Gutknecht and others (n 7). 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?’ (2021) 41 *Cato Journal*.

<sup>73</sup> Athanassiou (n 58); Zellweger-Gutknecht and others (n 7). See Joined Cases C-422/19 and C-423/19 *Johannes Dietrich and Norbert Häring v Hessischer Rundfunk* [2021] ECLI:EU:C:2021:63, paragraphs 37-39, 43.

<sup>74</sup> On the role of courts in EMU policy, see Daniel Sarmiento and Moritz Hartmann, ‘European Monetary Union and the Courts’ in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020).

<sup>75</sup> Nabilou (n 8).

<sup>76</sup> *Gauweiler* (n 69), paragraphs 68-69, 74-75.

<sup>77</sup> Nabilou (n 8).

## 4.2 Legal Influence on the Potential Design

In line with the existing payment system, the NCBs are expected to function as the Eurosystem's intermediaries and be responsible for management of the digital euro in their Member State. This is consistent with the decentralised mandate of the Eurosystem under the Treaties: tasks are allocated between the ECB and relevant NCBs.<sup>78</sup> This reflects how euro banknotes are currently issued and allows seigniorage to continue to be apportioned within the Eurosystem.<sup>79</sup> This also resembles TARGET2, which operates as a single system but is structured as a combination of the NCBs' payment systems.<sup>80</sup>

The EU regulates the provision of payment services under the Second Payment Services Directive ("PSD2").<sup>81</sup> Those parties wishing to function as a payment service provider ("PSPs") for digital euro can expect to be subject to the same rights and obligations.<sup>82</sup> However, access to the NCBs in the existing payment system is limited to those parties accepted as participants to TARGET2. The NCB terms and conditions of TARGET2 essentially limit participant status to the ECB, NCBs and credit institutions, although the Eurosystem has discretion in determining eligibility.<sup>83</sup> 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 PSPs.

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<sup>78</sup> ESCB Statute, article 12.1. See Krauskopf and Steven (n 39); Julian Langner, 'ESCB/Eurosystem/National Central Banks' in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020).

<sup>79</sup> The ECB and each Eurozone NCB are entitled to the value of a predetermined percentage of euro banknotes in circulation; see Decision of the European Central Bank of 13 December 2010 on the issue of euro banknotes (recast) (ECB/2010/29) [2011] OJ L 35/26. See Langner (n 78).

<sup>80</sup> Vukomanović (n 58).

<sup>81</sup> 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 [2015] OJ L 337/35. See Benjamin Geva, 'Payment Transactions under the E.U. Second Payment Services Directive - An Outsider's View' (2019) 54 *Texas International Law Journal* 211 and Gabriella Gimigliano and Marta Božina Beroš, 'Introduction to the Payment Services Directive II: A Commentary' in *The Payment Services Directive II* (Edward Elgar Publishing 2021).

<sup>82</sup> European Central Bank, 'Report on a digital euro' (n 3), p.42.

<sup>83</sup> Guideline of the European Central Bank of 5 December 2012 on a Trans-European Automated Real-time Gross Settlement Express Transfer system (TARGET2) (ECB/2012/27) [2013] OJ L 30/1. For the ECB terms and conditions of TARGET2, see also Decision of the European Central Bank of 24 July 2007 concerning the terms and conditions of TARGET2-ECB (ECB/2007/7) [2007] OJ L 237/71.

The ECB expects the digital euro system to comply with AML/CFT requirements that apply to the financial system.<sup>84</sup> The Fourth Anti-Money Laundering Directive (“AMLD”)<sup>85</sup> would remain relevant to designing the digital euro payment system and the operational requirements for intermediaries. This includes subjecting “obliged entities”<sup>86</sup> to customer due diligence requirements (“CDD”) that apply upon establishing a business relationship and when encountering large-value payments.<sup>87</sup> Derogations exist for low-value e-money transactions.<sup>88</sup>

The Charter of Fundamental Rights (the “Charter”)<sup>89</sup> provides the right to privacy.<sup>90</sup> This is a factor to be considered in the design of the digital euro system<sup>91</sup>. 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.<sup>92</sup> As is apparent from existing AML/CFT legislation, privacy is not an absolute right.

However, the EU recognises that everyone has the right to protection of personal data.<sup>93</sup> This would impose GDPR data protection standards on those parties processing data

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<sup>84</sup> European Central Bank, ‘Report on a digital euro’ (n 3), Requirement 10, p.27. Other central banks expect the same of their potential CBDCs; see Bank for International Settlements, ‘Central bank digital currencies’ (n 9).

<sup>85</sup> 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 [2015] OJ L 141/73.

<sup>86</sup> See *ibid*, article 2(1).

<sup>87</sup> 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 (*ibid*, article 11) – or such lower threshold set by that Member State (AMLD, article 5).

<sup>88</sup> Anonymous prepaid payment cards are exempt from certain CDD if they store up to €150 and transactions are up to €50 (AMLD, article 12).

<sup>89</sup> Charter of Fundamental Rights of the European Union [2012] OJ C 326/391.

<sup>90</sup> *ibid*, article 7.

<sup>91</sup> Zellweger-Gutknecht and others (n 7).

<sup>92</sup> Charter, article 52(1).

<sup>93</sup> TFEU, article 16(1); Charter, article 8. This is supplemented by 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 [2016] OJ L 119/1 (the General Data Protection Regulation, “GDPR”) and 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



within the digital euro system.<sup>94</sup> Such standards for PSPs and the Eurosystem have already been determined in the existing payment system.<sup>95</sup>

### 4.3 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”.<sup>96</sup> This principle is arguably contravened if the digital euro leads to money migrating from banks to central banks and a greater role for central banks in credit intermediation.<sup>97</sup>

This argument is unconvincing. The existing refinancing operations regime entails Eurosystem funding to stimulate private sector lending by Eurozone banks.<sup>98</sup> This practice is considered *intra vires*. The consequences of greater reliance on refinancing operations should merely factor into the ECB determination as to the merits of the policy and any proportionality assessment by the CJEU. Furthermore, the existing banking system is itself a compromise from free competition. Banks as financial intermediaries are exempt from asset segregation rules and rely upon deposit insurance to reassure depositors.<sup>99</sup> Banks as PSPs have preferential access to the payment system.<sup>100</sup> A private banking market would continue to function alongside CBDC but under different (perhaps less favourable) monetary conditions.<sup>101</sup> This would not equate to there no longer being an “open market economy”.

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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.

<sup>94</sup> Allen and others (n 9).

<sup>95</sup> Nikita Divissenko, ‘Title IV “Rights and Obligations in Relation to the Provision and Use of Payment Services”, Chapter 4 ‘Data Protection‘ (Art. 94)’ in *The Payment Services Directive II* (Edward Elgar Publishing 2021).

<sup>96</sup> TFEU, article 127(1); ESCB Statute, article 2.

<sup>97</sup> Grunewald and others (n 7); Nabilou (n 8); Nabilou and Prüm (n 21).

<sup>98</sup> See Section 6.6. See also Jens van ’t Klooster, ‘Technocratic Keynesianism: A Paradigm Shift without Legislative Change’ [2021] *New Political Economy*; Jens van ’t Klooster and 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’ (2020) 25 *New Political Economy* 865.

<sup>99</sup> Hossein Nabilou, ‘The Law and Macroeconomics of Custody and Asset Segregation Rules: Defining the Perimeters of Crypto-Banking’ [2022] *SSRN Electronic Journal*.

<sup>100</sup> Charles M Kahn and William Roberds, ‘Why Pay? An Introduction to Payments Economics’ (2009) 18 *Journal of Financial Intermediation* 1.

<sup>101</sup> See Section 6.3.

Finally, it is questionable whether TFEU Article 127(1) by itself constitutes grounds to invalidate an otherwise *intra vires* act.<sup>102</sup>

The Charter protects the “freedom to conduct a business”.<sup>103</sup> A challenge could be brought by those whose business is purportedly harmed by the presence of the digital euro, such as commercial banks.<sup>104</sup>

It is doubtful that the digital euro would contravene this freedom. CJEU caselaw has borne out that the test would be whether the digital euro would “prevent the exercise of banking activities”.<sup>105</sup> If banks are permitted to operate but their business model becomes financially untenable, that is not a concern for the Charter. Furthermore, given the digital euro would be grounded in EU legislation, it could be justified as proportionate to its intended objectives.<sup>106</sup>

#### **4.4 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 TFEU and/or the ESCB Statute would be necessary.<sup>107</sup> There is currently a lack of political enthusiasm for reopening the Treaties under the ordinary revision procedure.<sup>108</sup> Simplified revision procedures are available but

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<sup>102</sup> Advocate-General Cruz Villalón referred to TFEU 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* [2015] ECLI:EU:C:2015:7, Opinion of AG Cruz Villalón, paragraph 126.

<sup>103</sup> Charter, article 16.

<sup>104</sup> Grunewald and others (n 7).

<sup>105</sup> Case C-686/18 *OC e.a and Others v Banca d’Italia and Others* [2020] ECLI:EU:C:2020:567, paragraph 89. See also Case C-540/16 *UAB ‘Spika’ and Others v Žuvininkystės tarnyba prie Lietuvos Respublikos žemės ūkio ministerijos* [2018] ECLI:EU:C:2018:565, paragraph 38.

<sup>106</sup> Charter, article 52(1).

<sup>107</sup> EU Member States and the CJEU bound themselves to complying with the revision procedures under the Treaties; see Reijer Passchier and Maarten Stremler, ‘Unconstitutional Constitutional Amendments in European Union Law: Considering the Existence of Substantive Constraints on Treaty Revision’ (2016) 5 *Cambridge Journal of International and Comparative Law* 337. See also Case 43-75 *Gabriella Defrenne v Societe anonyme belge de navigation aeriennne Sabena* [1976] ECR 455, paragraph 58; Case C-370/12 *Thomas Pringle v Government of Ireland and Others* [2012] ECLI:EU:C:2012:756, paragraph 36.

<sup>108</sup> TEU, article 48(2).

problematic.<sup>109</sup> 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.<sup>110</sup> The ECB is, therefore, likely to pursue a form of the digital euro that avoids amendment of the Treaties. This paper assumes that the legal basis for digital euro is limited to the existing provisions of the Treaties.

#### 4.5 Legal Implementation

In implementing the digital euro, the EU will have to enact a legal package that establishes the currency's requirements, mandates actions by certain institutions and amends existing legislation where appropriate.<sup>111</sup> For example, PSD2 and eMD govern the convertibility of money between cash, deposits and e-money and should be updated to address digital euro and requirements for digital euro PSPs.<sup>112</sup> Furthermore, each Member State must reconcile the digital euro with its national law in relation to private law, bankruptcy law and administrative law. EU 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 by the European Parliament and the Council.<sup>113</sup> The ECB anticipates using this approach,<sup>114</sup> which was taken for the introduction of the euro. Legislation would otherwise have to follow the ordinary legislative process.<sup>115</sup>

The ECB 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<sup>116</sup> and can propose

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<sup>109</sup> TFEU Part Three (TFEU Articles 26-197) may be amended by Council decision (see *ibid*, article 48(6)). ESCB Statute Article 22 may be amended by legislation from the European Parliament and the Council (see ESCB Statute, article 40(1)).

<sup>110</sup> Steve Peers, ‘The Future of EU Treaty Amendments’ (2012) 31 *Yearbook of European Law* 17; Lucia Serena Rossi, ‘A New Revision of the EU Treaties After Lisbon?’ in *The EU After Lisbon: Amending or Coping with the Existing Treaties?* (Springer International Publishing 2014).

<sup>111</sup> Panetta (n 5).

<sup>112</sup> N Vandezande, ‘Between Bitcoins and Mobile Payments: Will the European Commission’s New Proposal Provide More Legal Certainty?’ (2014) 22 *International Journal of Law and Information Technology* 295.

<sup>113</sup> Gortsos (n 39); Grunewald and others (n 7). See TFEU, article 133.

<sup>114</sup> European Central Bank, ‘Report on a digital euro’ (n 3), p.24.

<sup>115</sup> On the role of the EU legislative bodies in EMU policy, see Fabian Amtenbrink and others (eds), *The EU Law of Economic and Monetary Union* (Oxford University Press 2020), chapters 16-18.

<sup>116</sup> TFEU, articles 127(4), 133.

legislation by delivering recommendations.<sup>117</sup> The ECB 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;<sup>118</sup> and “such measures as are necessary” to carry out its tasks.<sup>119</sup> The ECB can also bring legal action against any NCB that fails to fulfil its legal obligations.<sup>120</sup>

#### 4.6 Bringing Legal Actions

Any ECB acts and EU legislation regarding the digital euro would be subject to judicial review by the CJEU.<sup>121</sup> 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.<sup>122</sup> Standing to challenge EU measures is only available where the measure directly concerns the private applicant<sup>123</sup> and not simply because measures of general application impact that applicant.<sup>124</sup>

However, in practice, private applicants in some Member States have indirect recourse to the CJEU by bringing a claim in national court that is referred to the CJEU for a preliminary ruling (pursuant to TFEU Article 267) as to whether the relevant EU act is *ultra vires*. The CJEU has accepted such preliminary references as admissible despite evidently being a device by applicants to circumvent the *Plaumann* test.<sup>125</sup> National courts, such as the Bundesverfassungsgericht (German Federal Constitutional Court), may then add a further

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<sup>117</sup> *ibid*, article 132(1); ESCB Statute, article 34.1.

<sup>118</sup> TFEU, article 132(1); ESCB Statute, article 34.1.

<sup>119</sup> TFEU, article 282(4).

<sup>120</sup> ESCB Statute, article 35.6.

<sup>121</sup> TFEU, article 263; ESCB Statute, article 35.1.

<sup>122</sup> Case 25/62 *Plaumann & Co v Commission of the European Economic Community* [1963] ECR 95.

<sup>123</sup> See e.g. Case T-323/16 *Banco Cooperativo Español, SA v Single Resolution Board* [2019] ECLI:EU:T:2019:822; Case T-365/16 *Portigon AG v Single Resolution Board* [2019] ECLI:EU:T:2019:824; Joined Cases T-377/16, T-645/16 and T-809/16 *Hypo Vorarlberg Bank v Single Resolution Board* [2019] ECLI:EU:T:2019:823.

<sup>124</sup> Case T-492/12 *Von Storch and Others v European Central Bank* [2013] ECLI:EU:T:2013:702; confirmed on appeal, Case C-64/14 P *Von Storch and Others v European Central Bank* [2015] ECLI:EU:C:2015:300.

<sup>125</sup> Sarmiento and Hartmann (n 74). See *Pringle* (n 107), paragraphs 38-44; *Gauweiler* (n 69), paragraphs 18-31; *Weiss* (n 69), paragraphs 17-26.

check on how cavalier the EU – including the CJEU – may be in its interpretation of the Treaties.<sup>126</sup> The EU can, therefore, reasonably expect a legal challenge to arise. When considering its proposed design of the digital euro, the ECB may have to pre-empt those legal arguments likely to be raised.

## **5 Anonymity: Benefit or Burden?**

### **5.1 The Importance of Anonymity**

Cash is a bearer instrument that settles payment instantly and anonymously. CoBM transactions leave an electronic record that can be scrutinised by the PSP and the legal authorities. Some users are motivated to transact using cash because of its anonymity.<sup>127</sup> There are negative consequences to the anonymity of cash, however. It can facilitate crime, including tax evasion and corruption, which carries huge social costs.<sup>128</sup>

Some activities that are illegal or considered immoral are not necessarily socially harmful, however, and cash is beneficial by facilitating such transactions.<sup>129</sup> This distinction is important in countries governed by totalitarian regimes where political opposition can constitute illegal activity.<sup>130</sup> Access to an anonymous MoP is critical to transacting outside of state surveillance and avoiding seizure of assets.<sup>131</sup> Although EU Member States are committed to democratic principles,<sup>132</sup> 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 CBDC availability.

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<sup>126</sup> See *Proceedings brought by Heinrich Weiss and Others*, Bundesverfassungsgericht, 5 May 2020, BVerfG2 BvR 859/15, 2 BvR 1651/15, 2 BvR 2006/15, 2 BvR 980/16, paragraphs 111, 116, 133, 142-143; triggering Commission infringement proceedings INFR(2021)2114.

<sup>127</sup> Emanuele Borgonovo and others, ‘Privacy and Money: It Matters’ [2019] SSRN Electronic Journal; Charles M Kahn and others, ‘Money Is Privacy’ (2005) 46 *International Economic Review* 377.

<sup>128</sup> Kenneth Rogoff, ‘The Curse of Cash’ [2019] *The Milken Institute Review: A Journal of Economic Policy*.

<sup>129</sup> White (n 72).

<sup>130</sup> Nabilou (n 8).

<sup>131</sup> ‘Is Bitcoin for Real? With Joe Weisenthal’ directed by Chris Hayes (Podcast, Why Is This Happening? The Chris Hayes Podcast, MSNBC 27 April 2021) <<https://why-is-this-happening-with-chris-hayes.simplecast.com/episodes/joe-weisenthal-zN5ly8kv>>.

<sup>132</sup> Charter, Preamble.

Although the EU intends to subject crypto-assets to stricter regulation,<sup>133</sup> crypto-asset transactions and their intermediaries currently receive less AML/CFT scrutiny than CoBM transactions. The onus has instead been placed on regulated entities that transfer money to crypto-asset intermediaries (i.e. PSPs) or have credit exposure to crypto-assets (e.g. banks).<sup>134</sup>

However, the prospect of crypto-assets as an anonymous eMoP widely facilitating criminal activity is overstated. Crypto-assets are not widely adopted by the public.<sup>135</sup> Deterrents include their uncertain legal status, lack of trusted intermediaries,<sup>136</sup> high transaction fees, slow payment processing, unstable values<sup>137</sup> and limited practicality for “real economy” transactions.<sup>138</sup> Importantly, crypto-assets are not necessarily anonymous. Bitcoin and Ethereum are pseudonymous and users have been traceable,<sup>139</sup> while Monero and Zcash purport to be anonymous but this has been questioned.<sup>140</sup> Crypto-asset transactions offer greater privacy than the banking system and make transactions harder to trace, but that does not equate to anonymity.

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<sup>133</sup> 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] COM/2020/593.

<sup>134</sup> Nabilou (n 8).

<sup>135</sup> 10% 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*, 25 April 2022) <<https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220425~6436006db0.en.html>> accessed 21 June 2022.

<sup>136</sup> 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 [2011] OJ L 304/64 (the Consumer Rights Directive) and PSD2, does not apply; see Donnelly (n 62).

<sup>137</sup> 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* (11 May 2022) <<https://www.ft.com/content/48d82c7a-495f-4d5e-a87a-a56bea58e760>> accessed 12 May 2022.

<sup>138</sup> c.f. For use cases for crypto-assets, see Joe Weisenthal, ‘There’s a New Vision for Crypto, and It’s Wildly Different From Bitcoin’ (*Bloomberg Quint*, 7 June 2021) <<https://www.bloombergquint.com/business/bitcoin-btc-vs-ethereum-eth-and-defi-there-s-a-big-difference>> accessed 21 June 2022; e.g. if crypto-assets are only held briefly to execute payment, volatile values are less detrimental.

<sup>139</sup> See e.g. ‘How The Government Tied One Couple to Billions in Stolen Bitcoin’ directed by Wall Street Journal (Podcast, The Journal, 15 February 2022) <<https://www.wsj.com/podcasts/the-journal/how-the-government-tied-one-couple-to-billions-in-stolen-bitcoin/ad579c04-a43b-4a95-8872-7665da330135>> accessed 1 March 2022.

<sup>140</sup> Allen and others (n 9); Prasad (n 17).

Demand for many crypto-assets instead derives from speculation that its value will grow, or yield can be earned via “decentralised finance” – it is not serving as a MoP. This makes it puzzling that the ECB suggests that CBDC could function as a substitute eMoP that attracts crypto-asset users in the Eurozone.<sup>141</sup> Stablecoins are also desired to facilitate crypto-asset transactions.<sup>142</sup> Withdrawal into digital euro would have to be available on crypto-asset exchanges and cheaper than stablecoins to attract users.

The ECB intends to maintain cash availability alongside digital euro.<sup>143</sup> Despite cash usage declining in the Eurozone, cash will not necessarily become redundant. Many Eurozone consumers and merchants continue to use cash despite its expense and physical limitations,<sup>144</sup> the availability of eMoPs and EU regulation of card interchange fees.<sup>145</sup> The anticipated demise of cash failed to materialise upon the emergence of e-money.<sup>146</sup> Users are not necessarily prepared to completely dematerialise their money.<sup>147</sup> Where digital euro fails to suitably substitute cash, certain users will continue to use cash.<sup>148</sup> Cash remains in circulation irrespective of alternative MoPs because it can offer transaction privacy.<sup>149</sup> Some users

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<sup>141</sup> Fabio Panetta, ‘Designing a Digital Euro for the Retail Payments Landscape of Tomorrow’ (*European Central Bank*, 18 November 2021)

<<https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211118~b36013b7c5.en.html>> accessed 8 December 2021.

<sup>142</sup> Sirio Aramonte and others, ‘DeFi Risks and the Decentralisation Illusion’ [2021] *BIS Quarterly Review*.

<sup>143</sup> European Central Bank, ‘Report on a digital euro’ (n 3), p.20. The ECB has reaffirmed the importance of maintaining cash availability despite the prevalence of eMoPs; see e.g. Opinion of the European Central Bank of 30 December 2019 on limitations to cash payments [2019] CON/2019/46, paragraph 2.7; Opinion of the European Central Bank of 25 May 2020 on cash limitations concerning postal payments and anti-money laundering measures [2020] CON/2020/17, paragraph 2.1.6.

<sup>144</sup> See Khiaonarong and Humphrey (n 20); Mancini-Griffoli and others (n 9); Williamson, ‘Central Bank Digital Currency: Welfare and Policy Implications’ (n 10); Williamson, ‘Central bank digital currency and flight to safety’ (n 10).

<sup>145</sup> Regulation (EU) 2015/751.

<sup>146</sup> Grym (n 16).

<sup>147</sup> Belke and Beretta (n 23).

<sup>148</sup> Borgonovo and others (n 127); Grym and others (n 17). See Deutsche Bundesbank, ‘What Do Households in Germany Think about the Digital Euro? First Results from Surveys and Interviews’ (Monthly Report, October 2021).

<sup>149</sup> Kahn and others (n 127).

prioritise privacy, whether from the state, their PSP or their counterparty.<sup>150</sup> Privacy was the most important design feature among respondents to the ECB’s digital euro consultation.<sup>151</sup> It is apparent that some users prioritise other features.<sup>152</sup> Nonetheless, the absence of anonymity may make digital euro undesirable to some users.<sup>153</sup>

## 5.2 Could Anonymity be Acceptable?

AML/CFT 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 from using cash for criminal activity.<sup>154</sup> Designing the digital euro as digital cash would combine the anonymity of cash with the ease of electronic payments.<sup>155</sup> But it could encourage illicit payments. This raises concerns whether such a design is consistent with the objectives and the requirements of AML/CFT regulations.

The Eurosystem requires the design of the digital euro to be consistent with AML/CFT requirements and digital euro PSPs are subject to AML/CFT regulations.<sup>156</sup> However, although the public does not have a right to anonymous CBDC,<sup>157</sup> designing the digital euro with features that reduces its utility as a MoP must be weighed against the AML/CFT risks from issuing an anonymous MoP with unlimited holdings.

The holding limit is a design feature intended to assist AML/CFT. Preventing users anonymously holding a substantial quantum 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 CBDC wallet and an alternative

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<sup>150</sup> *ibid.*

<sup>151</sup> European Central Bank, ‘Eurosystem Report on the Public Consultation on a Digital Euro’ (April 2021). This is likely due to 47% of respondents originating from Germany. Germany maintains relatively high cash usage, partly due to privacy; see Deutsche Bundesbank (n 148).

<sup>152</sup> e.g. Avant card in Finland offered anonymous e-money yet most consumers preferred debit cards for equivalent transactions; see Grym (n 16).

<sup>153</sup> Li (n 9) estimates that, in Canada, low anonymity compared to full anonymity could reduce CBDC demand by 6-10%.

<sup>154</sup> See Section 4.2.

<sup>155</sup> Such “e-cash” was predicted by Milton Friedman; see National Taxpayers Union Foundation, Interview with Milton Friedman, ‘Milton Friedman Full Interview on Anti-Trust and Tech’ (YouTube, 1999).

<sup>156</sup> See Section 4.2.

<sup>157</sup> See Section 4.2.



MoP, upon which transaction data would likely be recorded in the banking system. If a CBDC wallet must be linked to a personal bank account to automatically transfer any excess holdings,<sup>158</sup> the user 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 CBDC payments within an AML/CFT-compliant system and without the holding limit.<sup>159</sup> This would entail 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.<sup>160</sup> If a proposed payment exceeds a given higher-value threshold, it would be subjected to CDD in accordance with AMLD. A two-tier system would be used for AML/CFT supervision. The viability of this model is, of course, subject to the technical feasibility of building such a payment system.<sup>161</sup> Nonetheless, this demonstrates *prima facie* that a design of the digital euro is conceivable that can offer users anonymous holdings and transactions while subjecting higher-value payments to the same level of scrutiny as currently applies to cash transactions under AMLD. In such circumstances, the holding limit is an unnecessary measure to address AML/CFT concerns.<sup>162</sup>

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<sup>158</sup> European Central Bank, ‘Digital euro experimentation scope and key learnings’ (n 33).

<sup>159</sup> David Chaum and others, ‘How to Issue a Central Bank Digital Currency’ [2021] SNB Working Papers; Jonas Gross and others, ‘Designing a Central Bank Digital Currency with Support for Cash-Like Privacy’ [2021] SSRN Electronic Journal. For related discussions, see also ‘Will Central Bank Digital Currencies Enable Anonymous Payments?’ directed by Digital Euro Association (Podcast, Digital Euro Podcast, 3 November 2021) <<https://home.digital-euro-association.de/podcast>>; ‘Digital Euro with Alexander Bechtel from Deutsche Bank’ directed by Dr Karl-Michael Henneking and Simon Schaber (Podcast, All Things Digital Assets, Untitled Investment Expertise 24 May 2021) <<https://uie360.podbean.com/page/2/>>.

<sup>160</sup> Allen and others (n 9).

<sup>161</sup> The ECB queries whether any digital transaction would be truly untraceable; see European Central Bank, ‘Digital euro experimentation scope and key learnings’ (n 33). Evidence obtained through illegal interception of transaction data could be declared inadmissible under national law as a safeguard; see Case C-310/16 *Criminal proceedings against Petar Dzivev and Others* [2019] ECLI:EU:C:2019:30, paragraph 36; Case C-419/14 *WebMindLicenses kft v Nemzeti Adó- és Vámhivatal Kiemelt Adó- és Vám Főigazgatóság* [2015] ECLI:EU:C:2015:832, paragraphs 71,73. This paper proceeds under the assumption that anonymity is technically feasible.

<sup>162</sup> An anonymous CBDC wallet tied to a device may see users voluntarily restrict digital euro holdings due to fear of theft or loss; see Chaum and others (n 159).

The ECB is contemplating limited functionality for anonymous digital euro payments.<sup>163</sup> Legislators and regulators would need to tolerate that an anonymous CBDC surrenders oversight of certain data that is currently available for CoBM. 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. PSPs may be largely unaffected if they deprioritise *ex ante* screening of lower-value transactions, whether in digital euro or CoBM, given the volume of transactions and lower AML/CFT risk involved. The difficulty lies in denying *ex post* review of transactions to 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 CDD 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 MoP, money laundering merely shifts to alternative methods, including clandestine schemes.<sup>164</sup> It remains cumbersome to launder vast sums of money in lower-value transactions. This is why exceptions exist for lower-value card payments.<sup>165</sup> Anonymous lower-value transactions in digital euro would be consistent. However, the ECB has only mooted €70 or €100 as a threshold.<sup>166</sup> 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

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<sup>163</sup> European Central Bank, ‘Report on a digital euro’ (n 3), pp.27-28. The ESCB developed a proof of concept involving “anonymity vouchers”; see European Central Bank, ‘Exploring Anonymity in Central Bank Digital Currencies’ (In Focus, December 2019). The Eurosystem is experimenting with privacy options; see European Central Bank, ‘The Eurosystem’s Analysis of Privacy-Enhancing Techniques in Central Bank Digital Currencies’ (14 April 2021).

<sup>164</sup> e.g. Money laundering using marketplaces within computer games for downloadable content; see Mark Warren and Karel Nihom, ‘Online Video Gaming: Yet Another Front in the Perpetual Battle against Money Laundering’ (*SportingLinks / Linklaters*, 17 April 2020) <<https://www.linklaters.com/en/insights/blogs/sportinglinks/2020/april/online-video-gaming-yet-another-front-in-the-perpetual-battle-against-money-laundering>> accessed 21 June 2022.

<sup>165</sup> See Section 4.2. 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*, 25 January 2020) <<https://davidgerard.co.uk/blockchain/2020/01/25/avant-card-a-central-bank-digital-currency-from-1990s-finland/>> accessed 21 June 2022. Avant was capable of being used for online payments; see Grym (n 16).

<sup>166</sup> Panetta (n 5).

anonymity and the presence of the holding limit should not be predetermined features of the design of the digital euro in pursuit of AML/CFT objectives.

## **6 Disintermediation of Banks**

### **6.1 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.<sup>167</sup> But those funds are not merely redeployed towards lending. Banks can create CoBM to lend to borrowers, which immediately represents newly-created deposits in the borrower's bank account.<sup>168</sup>

Banks are disciplined when creating money, however. Firstly, banks are required to settle depositor withdrawals with CeBM (i.e. cash or reserves).<sup>169</sup> A bank will run out of CeBM if it creates money that is deposited with other banks – and may have to increase its deposit interest rate to incentivise depositors to maintain deposits with that bank. Secondly, created money must be lent towards profitable investments.<sup>170</sup> 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 CoBM 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 CeBM outflows – on a stable basis – allows banks to reduce the proportion of their assets that need

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<sup>167</sup> Nabilou (n 99); 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' (2014) 36 *International Review of Financial Analysis* 71.

<sup>168</sup> Michael McLeay and others, 'Money Creation in the Modern Economy' (Quarterly Bulletin, Bank of England 2014). Money creation by Eurozone banks has been substantiated; see Matteo Deleidi and Giuseppe Fontana, 'Money Creation in the Eurozone: An Empirical Assessment of the Endogenous and the Exogenous Money Theories' (2019) 31 *Review of Political Economy* 559.

<sup>169</sup> McLeay and others (n 168); George Selgin, 'Central Banks as Sources of Financial Instability' (2010) 14 *Independent Review* 485.

<sup>170</sup> James Tobin, 'Commercial Banks as Creators of Money' [1963] Cowles Foundation Discussion Paper.

to be held in CeBM. Banks can instead deploy their funding towards less liquid and higher-yielding lending rather than maintaining lower-yielding CeBM and government bonds to meet CeBM outflows.<sup>171</sup> 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.<sup>172</sup> 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 MoP.<sup>173</sup>

The introduction of digital euro would alter this equilibrium in the business model for Eurozone banks. CBDC offers users an alternative eMoP to CoBM. Replacing deposits with wholesale market funding is (typically) more expensive and less stable for the bank.<sup>174</sup> This reverses the current virtuous circle in banks' funding that depends upon substitution from CeBM to CoBM.<sup>175</sup> It is feared that this would reduce bank lending and consequently economic output.<sup>176</sup>

## 6.2 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”, however, by offering a safe location to store cash, banking services and an eMoP. Depositors will explicitly or subconsciously compare their deposit options based on an aggregate yield that combines monetary yield and convenience yield.<sup>177</sup> The design of the digital euro will

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<sup>171</sup> Lock-in of long-term capital allows for long-term investment that generally yields higher returns for the project and its investors; see Giuseppe Dari-Mattiacci and others, ‘The Emergence of the Corporate Form’ (2017) 33 *The Journal of Law, Economics, and Organization* 193.

<sup>172</sup> The primary function of public deposit banks in Europe historically was to provide a payment and clearing system offering CoBM as a MoP; see Schnabel and Shin (n 12).

<sup>173</sup> Kahn and Roberds (n 100).

<sup>174</sup> Barrdear and Kumhof (n 10). c.f. Swedish banks receive a lower proportion of their funding from deposits than Eurozone banks; see Sveriges Riksbank, ‘The Riksbank’s e-krona project, Report 2’ (n 30).

<sup>175</sup> Bindseil, ‘Tiered CBDC and the financial system’ (n 11).

<sup>176</sup> Agur and others (n 9); Bank for International Settlements, ‘Central bank digital currencies’ (n 9). For a survey of studies on the potential impact, see Bank for International Settlements, ‘Central bank digital currencies: financial stability implications’ (n 11).

<sup>177</sup> Kumhof and Noone (n 9).

determine whether its aggregate yield surpasses deposits and triggers migration from deposits to CBDC.

A possible solution is to offer a variable remuneration rate for digital euro that can be adjusted to avoid CBDC supplanting deposits.<sup>178</sup> If deposits offer a negligible monetary yield, digital euro could require a negative remuneration rate.<sup>179</sup> Variable remuneration or a negative interest rate on holdings may be problematic to adopt in conformity with the Treaties.<sup>180</sup> PSPs could charge service fees instead,<sup>181</sup> but this conflicts with the expectation that digital euro would be free to access.<sup>182</sup>

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.<sup>183</sup> A €3,000 holding limit would still tolerate the Eurozone banking system losing around €1 trillion in funding.<sup>184</sup> 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.<sup>185</sup> The holding limit would not impede those whose deposits are typically around or below the threshold. High-earning depositors that spend large sums in each month may find digital euro to be an inconvenient MoP.<sup>186</sup> The holding limit would, therefore, be a

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<sup>178</sup> Barrdear and Kumhof (n 10); Keister and Sanches (n 10); Kumhof and Noone (n 9).

<sup>179</sup> Agur and others (n 9). Alternatively, a “refresh fee” could be charged intermittently on holdings; see Chaum and others (n 159).

<sup>180</sup> See Section 4.1.

<sup>181</sup> Bordo and Levin (n 9).

<sup>182</sup> European Central Bank, ‘Report on a digital euro’ (n 3), Requirement 2, p.19. However, cash machine withdrawal fees are charged and so it is conceivable that PSPs charge fees to access digital euro.

<sup>183</sup> ‘Money, Money, Money!’ directed by Bruegel (Podcast, The Sound of Economics, 30 April 2021) <<https://www.bruegel.org/2021/04/money-money-money/>>.

<sup>184</sup> Adrian Croft, ‘A Digital Euro Would Be “crypto Kryptonite” for Fintechs and a Threat to Banks, a Critical New Report Warns’, *Fortune* (13 March 2021) <<https://fortune.com/2021/03/13/digital-euro-fintech-banking-cryptocurrency-european-central-bank/>> accessed 8 December 2021.

<sup>185</sup> See Eurostat, ‘Mean and Median Income by Household Type - EU-SILC and ECHP Surveys’ (*Eurostat - Data Explorer*, 29 April 2022) <[https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc\\_di04](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04)> accessed 21 June 2022.

<sup>186</sup> See Deutsche Bundesbank (n 148).

blunt instrument to achieve the objective of deterring substitution from deposits to digital euro.<sup>187</sup>

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.<sup>188</sup> Banks can adjust to the introduction of CBDC. It is necessary to consider the likely responses and counter-responses by relevant stakeholders.

### 6.3 Adjustments by Banks

Banks can improve the aggregate yield that they offer to depositors compared to digital euro: (i) increase monetary yield of deposits; (ii) increase convenience yield of deposits; and/or (iii) reduce aggregate yield of digital euro.<sup>189</sup>

Banks can incentivise deposits by increasing their deposit interest rate.<sup>190</sup> Reducing the service fee charged to depositors is an alternative, though perhaps less salient, means to increase the monetary yield. The immediate consequence is to increase funding costs and reduce profit margins for that bank.<sup>191</sup>

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<sup>187</sup> Unless the holding limit would be personalised for each user based on their personal circumstances, which is not being proposed.

<sup>188</sup> FA Hayek, 'Economics and Knowledge' (1937) 4 *Economica* 33.

<sup>189</sup> Although this Section focuses on retail on-demand deposits, the principles apply to all depositors.

<sup>190</sup> Chiu and others (n 10). This is anticipated by Sveriges Riksbank; see Sveriges Riksbank, 'The Riksbank's e-krona project, Report 2' (n 30); Sveriges Riksbank, 'The Riksbank's e-krona project, Report 1' (n 30). US 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 and others (n 13).

<sup>191</sup> First-movers will likely prompt competitors to match their deposit interest rate to deter depositors switching bank; see Ching-Wai (Jeremy) Chiu and John Hill, 'The Rate Elasticity of Retail Deposits in the United Kingdom: A Macroeconomic Investigation' [2015] Bank of England: Staff Working Paper. In oligopolistic markets, banks may currently pay a deposit interest rate below what would have been required in a competitive market; see Chiu and others (n 10); Robin Greenwood and others, '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>> accessed 30 December 2021; Grunewald and others (n 7). Such excess profits do not merit protection.

A proportion of bank profits derive from the seigniorage that they generate when creating CoBM by lending. Higher deposit interest rates due to CBDC would increase the cost of money creation and reduce seigniorage.<sup>192</sup> However, seigniorage for banks is not a privilege that the Eurosystem should be interested in protecting.<sup>193</sup> Central banks have historically curtailed seigniorage generated by banks issuing their own banknotes.<sup>194</sup> CBDC would simply erode bank seigniorage in digital money.<sup>195</sup>

Banks and their bankers are profit-seeking and generally lend when they expect an investment to be profitable for themselves.<sup>196</sup> 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.<sup>197</sup> 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 CoBM, in a competitive market, a bank should arise willing to lend. CBDC would merely reduce 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.<sup>198</sup> Banks may reduce branch locations and cut operating costs.<sup>199</sup> Banks may hold the pricing power to increase their lending interest rate charged to borrowers.<sup>200</sup>

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<sup>192</sup> If banks reduce their lending, this also reduces seigniorage. On the impact of CBDC on seigniorage, see Bank for International Settlements, ‘Central bank digital currencies’ (n 17).

<sup>193</sup> Brunnermeier and Niepelt (n 10); Nicholas Gruen, ‘Central Banks Get Serious On Digital Currencies’, *Financial Times* (12 May 2021) <<https://www.ft.com/content/faa29abd-aa2e-479b-9706-79ee16be9e35>> accessed 8 December 2021.

<sup>194</sup> e.g. Canada; see Grodecka-Messi (n 14).

<sup>195</sup> The Eurosystem would generate such seigniorage instead.

<sup>196</sup> Hyman P Minsky, ‘The Financial Instability Hypothesis’ [1992].

<sup>197</sup> Tobin (n 170).

<sup>198</sup> Andolfatto (n 10); Chiu and others (n 10).

<sup>199</sup> Grodecka-Messi (n 14).

<sup>200</sup> Mancini-Griffoli and others (n 9).

It is often assumed that an increase in lending interest rates will reduce the quantum of bank lending.<sup>201</sup> 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,<sup>202</sup> 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, EU policy is currently seeking to encourage use of the capital markets and reduce reliance on banks for credit intermediation by promoting the Capital Markets Union.<sup>203</sup> Thirdly, new entrants may be willing to enter the banking market if there is an opportunity to profitably undercut the incumbents.<sup>204</sup> 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 financing of speculative projects and asset price bubbles.<sup>205</sup> If an increase in borrowing costs dissuades speculative investments and unproductive projects, this would be beneficial to both the bank and the economy.<sup>206</sup> Moreover, the additional monetary yield received by depositors may stimulate the economy and offset the economic impact from any decline in bank lending.<sup>207</sup>

Banks have continually increased the convenience yield offered on deposits to outcompete cash as a MoP. However, this may be a challenging strategy to adopt for CBDC.

Deposits cannot be safer than CBDC. It is difficult to materially (and observably) reduce the risk of bank failure. Banks would have to be willing to segregate services between

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<sup>201</sup> Keister and Sanches (n 10); Kim and Kwon (n 10).

<sup>202</sup> This may also be indirect if deposit interest rates impact money market rates.

<sup>203</sup> 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 [2020] COM/2020/590. Capital markets may already offer lower lending interest rates, but larger arrangement costs make smaller capital markets financings not cost-effective.

<sup>204</sup> 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 EU passporting rights allow an EU bank to open a branch in another Member State.

<sup>205</sup> Minsky (n 196).

<sup>206</sup> Keister and Sanches (n 10).

<sup>207</sup> Agur and others (n 9).



depositors and CBDC users to generate a convenience yield spread between deposits and CBDC.<sup>208</sup> But banks would have to consider the trade-off from losing potential customers for on-selling of financial products.

If banks are offering their own CoBM payment system alongside the digital euro, banks are able to both improve the appeal of deposits and undermine the appeal of 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.<sup>209</sup> 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 by guaranteeing fair access to PSPs.<sup>210</sup> Regulation is likely to be necessary to delineate the conflict of interest between banks as PSPs of and competitors to digital euro.

The EU, 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 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.<sup>211</sup>

The impact of 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 differences between local

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<sup>208</sup> Bindseil, 'Tiered CBDC and the financial system' (n 11); Bindseil, 'Central Bank Digital Currency' (n 11).

<sup>209</sup> e.g. In Finland; see Hanna Jyrkönen and Heli Paunonen, 'Card, Internet and Mobile Payments in Finland' [2003] Bank of Finland: Discussion Papers.

<sup>210</sup> PSD2, articles 35-36.

<sup>211</sup> e.g. In Ecuador, banks were hostile to the Dinero Electrónico; see Arauz and others (n 16); in Finland, banks developed their own financial technology (debit cards) that made Avant cards redundant; see Jyrkönen and Paunonen (n 209).

banking markets and ease of access to capital markets and foreign banking markets. There will not necessarily be a uniform Eurozone outcome triggered by the digital euro.<sup>212</sup>

#### 6.4 Adoption by Retail Depositors

The decline of CeBM in the Eurozone is a consequence of concerted public policy that has driven CoBM to being considered as practically equivalent to CeBM.<sup>213</sup> Governments increasingly require payment to be made in CoBM despite cash being legal tender.<sup>214</sup> Yet digital euro is desired to maintain the anchoring role of CeBM in the financial system, which may be lost if cash ceases to be available to redeem CoBM.<sup>215</sup> Digital euro only serves this purpose if it is adopted by potential users, but the digital euro is being designed to be less attractive than deposits and avoid disruption to 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 CBDC users.<sup>216</sup> As an eMoP, CBDC constitutes a substitute for CoBM.<sup>217</sup> Better understanding of consumer payment preferences is required to anticipate

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<sup>212</sup> Agent-based modelling exists on the impact of introducing a CBDC system; see ‘Agent-Based Simulation of CBDC’ directed by Digital Euro Association (Podcast, Digital Euro Podcast, 8 December 2021) <<https://home.digital-euro-association.de/podcast>>.

<sup>213</sup> This was intensified by the COVID-19 pandemic. PSPs were encouraged to increase contactless card payment limits to the legal maximum of €50; see European Banking Authority, ‘Statement on Consumer and Payment Issues in Light of COVID19’ (25 March 2020). See also 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 [2018] OJ L 69/23, article 11.

<sup>214</sup> Robert Freitag, ‘Euro As Legal Tender (and Banknotes)’ in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020). See *Hessischer Rundfunk* (n 73).

<sup>215</sup> Wierts and Boven (n 8). See also Fabio Panetta, ‘Central Bank Digital Currencies: A Monetary Anchor for Digital Innovation’ (*European Central Bank*, 5 November 2021) <<https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211105~08781cb638.en.html>> accessed 8 December 2021; Panetta, ‘Designing a digital euro for the retail payments landscape of tomorrow’ (n 141); Panetta, ‘The ECB’s case for central bank digital currencies’ (n 6).

<sup>216</sup> The ECB has acknowledged this possibility; see Panetta, ‘Designing a digital euro for the retail payments landscape of tomorrow’ (n 141); Panetta, ‘Central bank digital currencies: a monetary anchor for digital innovation’ (n 215).

<sup>217</sup> Kumhof and Noone (n 9).

their response to CBDC.<sup>218</sup> But there is no apparent reason for a Eurozone retail depositor to adopt the digital euro as their MoP in place of CoBM.<sup>219</sup> The layperson depositor perceives no financial risk due to deposit insurance<sup>220</sup> and no difference between CoBM and CeBM.<sup>221</sup> The Eurozone already offers advanced payment infrastructure.

Although users can be expected to use the MoP that offers the best net benefit to them,<sup>222</sup> the reality is that people are unlikely to adopt a new MoP simply because it is marginally better than their existing MoP.<sup>223</sup> There is an inconvenience to undertaking the transition. There is a network effect that requires a critical mass of users for a MoP to take hold.<sup>224</sup> First-mover advantage takes precedence.<sup>225</sup> But CoBM 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 MoPs already exist.<sup>226</sup> Digital euro may only ever reach a circulation similar to the cash currently in circulation.<sup>227</sup> That may suffice to maintain a CeBM anchor, but the digital euro would remain vulnerable to being swept aside upon further advances in CoBM payment technology. Such an outcome is already foreshadowed by the failure of the Dinero Electrónico in

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<sup>218</sup> Francesca Carapella and Jean Flemming, 'Central Bank Digital Currency: A Literature Review' [2020] FEDS Notes.

<sup>219</sup> 'Should the ECB Issue a Digital Euro?' directed by Digital Euro Association (Podcast, Digital Euro Podcast, 2 September 2021) <<https://home.digital-euro-association.de/podcast/en>> accessed 14 February 2022; Mancini-Griffoli and others (n 9).

<sup>220</sup> e.g. Deposit insurance for US postal banks predated commercial banks and postal banks became obsolete once all banks benefitted from deposit insurance; see Schuster and others (n 13).

<sup>221</sup> See Bank of England, 'Responses to the Bank of England's March 2020 Discussion Paper on CBDC' (7 June 2021); Deutsche Bundesbank (n 148).

<sup>222</sup> Mancini-Griffoli and others (n 9).

<sup>223</sup> 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 (n 16).

<sup>224</sup> Mikael Stenkula, 'Carl Menger and the Network Theory of Money' (2003) 10 *European Journal of the History of Economic Thought* 587. e.g. Avant card in Finland suffered from expensive transition costs for merchants and lack of merchant take-up; see Grym (n 16); Jyrkönen and Paunonen (n 209).

<sup>225</sup> Agur and others (n 9); Khiaonarong and Humphrey (n 20).

<sup>226</sup> Grodecka-Messi (n 14).

<sup>227</sup> Agur and others (n 9).

Ecuador<sup>228</sup> and the Avant card in Finland,<sup>229</sup> which failed to gain a critical mass of users and were eventually discontinued.

## 6.5 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 CBDC is available instead of cash.<sup>230</sup> The digital euro may then create instability in the Eurozone banking system by this run dynamic.<sup>231</sup>

The presence of 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<sup>232</sup> and bank resolution tools. Depositors holding uninsured deposits have every reason to run.<sup>233</sup> 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.<sup>234</sup> 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

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<sup>228</sup> Arauz and others (n 16).

<sup>229</sup> Gerard (n 165); Grym (n 16).

<sup>230</sup> Bank for International Settlements, ‘Central bank digital currencies’ (n 9).

<sup>231</sup> Kim and Kwon (n 10); Nabilou (n 8).

<sup>232</sup> Douglas W Diamond and Philip H Dybvig, ‘Bank Runs, Deposit Insurance, and Liquidity’ (1983) 91 *Journal of Political Economy* 401. See Directive 2014/49/EU of the European Parliament and of the Council of 16 April 2014 on deposit guarantee schemes (recast) [2014] OJ L 173/149. 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 (EDIS) is implemented; see 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] COM/2015/0586.

<sup>233</sup> e.g. UK deposit insurance only protected 90% 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 (n 15).

<sup>234</sup> Douglas W Diamond and Raghuram G Rajan, ‘Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking’ (2001) 109 *Journal of Political Economy* 287; Williamson, ‘Central bank digital currency and flight to safety’ (n 10).

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.<sup>235</sup> Internet banking and mobile banking facilitates money transfers remotely. Digital euro is merely another potential substitute rather than opening the floodgates. Its status as risk-free CeBM may attract depositors as the path of least resistance.<sup>236</sup> But it is possible to open an account with a bank, an e-money institution or an investment broker within minutes online.<sup>237</sup> Meanwhile, a real-time gross settlement (RTGS) system for digital euro may face settlement delays comparable to traditional designated-time net settlement (DTNS) systems during a bank panic,<sup>238</sup> especially if the failing bank lacks sufficient digital euro to instantly satisfy withdrawal requests.

Even upon a systemic banking crisis involving mass withdrawals to 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 digital euro is restricted by the holding limit, it is foreseeable that depositors sell their deposits below par and digital euro obtains a *market* value above its *nominal* value.<sup>239</sup> Someone who has headroom in their CBDC wallet may be willing to hold digital euro for someone else in return for a fee.<sup>240</sup> Digital euro losing its par value with physical euro would certainly not constitute stability in the money markets.

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<sup>235</sup> Kumhof and Noone (n 9); Mancini-Griffoli and others (n 9). e.g. Retail depositor withdrawals in the run on Northern Rock were more substantial from non-branch retail deposits; see Shin (n 15).

<sup>236</sup> Kumhof and Noone (n 9).

<sup>237</sup> 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 CBDC and the financial system' (n 11); Bindseil, 'Central Bank Digital Currency' (n 11).

<sup>238</sup> On payment settlement, see Athanassiou (n 58); Andrew Dent and Will Dison, 'The Bank of England's Real-Time Gross Settlement Infrastructure' (Quarterly Bulletin, Bank of England 2012); Kahn and Roberds (n 100).

<sup>239</sup> 'LIVE Episode! To CBDC or Not to CBDC, What Was the Question?' directed by Pål Krogdahl and Ville Sointu (Podcast, Fintech Daydreaming, 6 November 2020) <<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, 'The Riksbank's e-krona project, Report 2' (n 30).

<sup>240</sup> e.g. In the US, deposit brokers facilitate deposit insurance protection for depositors holding more than the \$250,000 limit; see IntraFi Network Deposits, 'How IntraFi Network Deposits Works' (2022) <<https://www.intrafinetworkdeposits.com/how-it-works/>> accessed 21 June 2022.

## 6.6 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,<sup>241</sup> the EU increasingly recognises the usefulness of securitisation.<sup>242</sup> 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.<sup>243</sup> Nonetheless, if market liquidity reaches a stage where market counterparties are unwilling to lend on realistic terms, the central bank is the next avenue for liquidity.

Migration by depositors from deposits to CBDC results in a bank's funding moving to the central bank. Both require corresponding changes to their assets or liabilities (or equity) to balance their balance sheet. This is particularly pressing if there are sudden withdrawals, where obtaining funding from the private sector is impractical.<sup>244</sup> Deposit interest rates suffer a lag before stimulating deposits.<sup>245</sup> An equilibrium can be maintained if new CBDC inflows to the central bank are recycled to fund the deposit outflows from the bank.<sup>246</sup> 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,<sup>247</sup> given market participants do not necessarily substitute between all classes of securities.<sup>248</sup>

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<sup>241</sup> See Gerard Kastelein, 'Securitization in the Capital Markets Union: One Step Forward, Two Steps Back' in *Capital Markets Union in Europe* (Oxford University Press 2018).

<sup>242</sup> Synthetic ("on-balance-sheet") securitisations have become eligible for "STS" securitisations; see Regulation (EU) 2021/557.

<sup>243</sup> Michael Woodford, 'Financial Intermediation and Macroeconomic Analysis' (2010) 24 *The Journal of Economic Perspectives* 21.

<sup>244</sup> Sveriges Riksbank anticipates providing stopgap funding upon sudden withdrawals to CBDC; see Sveriges Riksbank, 'The Riksbank's e-krona project, Report 2' (n 30).

<sup>245</sup> Chiu and Hill (n 191).

<sup>246</sup> Barrdear and Kumhof (n 10); Brunnermeier and Niepelt (n 10); Kim and Kwon (n 10); White (n 72). e.g. US 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 and others (n 13).

<sup>247</sup> Williamson, 'Central Bank Digital Currency: Welfare and Policy Implications' (n 10).

<sup>248</sup> Vasco Cúrdia and Michael Woodford, 'The Central-Bank Balance Sheet as an Instrument of Monetary Policy' (2011) 58 *Journal of Monetary Economics* 54.

The Eurosystem operates refinancing operations that provide short-term funding to banks secured against securities or loans as collateral.<sup>249</sup> This has expanded since the financial crisis to targeted longer-term refinancing operations (“TLTROs”) that provide multi-year funding to banks to incentivise lending to the real economy.<sup>250</sup> 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. The Eurosystem is already empowered under the Treaties to conduct refinancing operations.<sup>251</sup> Although TLTROs were purported to be temporary and exceptional, TLTROs 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.<sup>252</sup> Given its role as supervisory authority for Eurozone banks within the Single Supervisory Mechanism,<sup>253</sup> the ECB has a further interest beyond its “price stability” mandate in stabilising Eurozone banks.<sup>254</sup> 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.

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<sup>249</sup> These offer overnight, one-week and three-month funding; see European Central Bank, ‘Open Market Operations’ (2022) <<https://www.ecb.europa.eu/mopo/implement/omo/html/index.en.html>> accessed 21 June 2022.

<sup>250</sup> European Central Bank, ‘ECB announces new pandemic emergency longer-term refinancing operations’ (30 April 2020); European Central Bank, ‘ECB extends pandemic emergency longer-term refinancing operations’ (10 December 2020). This was supplemented during the COVID-19 pandemic with pandemic emergency longer-term refinancing operations (PELTROs).

<sup>251</sup> ESCB Statute, article 18.

<sup>252</sup> The ECB wants to avoid such a role but has not ruled it out; see European Central Bank, ‘Report on a digital euro’ (n 3), pp.18-19. c.f. 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’ (2019) 31 *Review of Political Economy* 582. Central bank funding can counter overreliance on short-term wholesale funding; see Greenwood and others (n 191).

<sup>253</sup> See Ohler Christoph, ‘Banking Supervision’ in *The EU Law of Economic and Monetary Union* (Oxford University Press 2020).

<sup>254</sup> Nabilou and Prüm (n 21). This would be under separate decision-making between its monetary policy and supervision functions; see 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) [2014] OJ L 300/57.

Central banks function as lender of last resort (“LOLR”) 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.<sup>255</sup> The central bank is the only potential counterparty able to lever up its balance sheet and outlast a panic<sup>256</sup> and is not incentivised to run.<sup>257</sup> Therefore, if a bank’s depositors run to digital euro, the ECB and the relevant NCB would function as LOLR.

Digital euro may serve to make LOLR funding more efficient. Whereas cash withdrawals suffer from a delay in observing outflows,<sup>258</sup> the central bank can provide CBDC instantly to the bank to meet withdrawals.<sup>259</sup> Indeed the central bank’s ability to respond rapidly could conceivably provide reassurance that deters bank runs.<sup>260</sup> Yet if a bank run materialised, CBDC minimises disruption to economic activity by offering an eMoP to replace deposits, whereas cash may interfere with consumer transaction patterns.<sup>261</sup> The LOLR’s willingness to lend could also signal to the market that a bank’s loan portfolio remains valuable.<sup>262</sup>

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.<sup>263</sup> TLTROs entail banks making

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<sup>255</sup> Williamson, ‘Central bank digital currency and flight to safety’ (n 10).

<sup>256</sup> Frost and others (n 12).

<sup>257</sup> Brunnermeier and Niepelt (n 10).

<sup>258</sup> *ibid.*

<sup>259</sup> Mancini-Griffoli and others (n 9).

<sup>260</sup> Brunnermeier and Niepelt (n 10); Kumhof and Noone (n 9). See also Diamond and Dybvig (n 232).

<sup>261</sup> Williamson, ‘Central bank digital currency and flight to safety’ (n 10).

<sup>262</sup> e.g. Public deposit banks in Europe promoted stability by vouching for the quality of deposited metal coins then issuing CoBM that was trusted as a MoP; see Schnabel and Shin (n 12).

<sup>263</sup> Bank for International Settlements, ‘Central bank digital currencies’ (n 17); Bank of England, ‘Central Bank Digital Currency: Opportunities, Challenges and Design’ (Discussion Paper, March 2020); Bindseil, ‘Tiered CBDC and the financial system’ (n 11); Bindseil, ‘Central Bank Digital Currency’ (n 11).



lending decisions and then sourcing funding from the Eurosystem.<sup>264</sup> The quantum of central bank funding does not necessarily alter that outcome. Mechanisms, such as auctions, can determine supply and cost of credit in line with market and specific-party demand.<sup>265</sup> Securities, such as securitisation and covered bonds, allow the capital markets to remain responsible for price discovery<sup>266</sup> before the central bank provides its liquidity via secondary market purchases<sup>267</sup> or repo financing collateralised by such securities.<sup>268</sup>

The ECB will have to determine collateral criteria that protects the relevant NCB against the risk of financial loss from the funding that it provides.<sup>269</sup> This includes the type and quality of eligible assets, the overcollateralisation required and the quantum it is willing to lend.<sup>270</sup> The ECB and the CJEU have recognised it is inherent in the central bank's operations that it faces potential losses from such activities.<sup>271</sup> The banking sector can share that financial burden if the Eurosystem could recover losses from deposit insurance schemes.<sup>272</sup> But the Eurozone Member States will have to consider to what extent they will be prepared to recapitalise a NCB that suffers losses.<sup>273</sup>

## **7 The Purpose of Digital Euro**

### **7.1 Payment System Autonomy**

Payment system autonomy is increasingly recognised as a matter of national security. The US dominates the international payment system. Visa and Mastercard dominate card payments. In response, China developed UnionPay as an international alternative and Russia developed

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<sup>264</sup> e.g. US postal banks' deposits were applied to fund commercial banks without determining their lending decisions; see Schuster and others (n 13).

<sup>265</sup> White (n 72).

<sup>266</sup> Central banks remain competent to price loan portfolios during market stress.

<sup>267</sup> The ECB has adopted this approach for its bond-buying programmes with CJEU approval; see *Weiss* (n 69), paragraphs 113-128.

<sup>268</sup> Grym and others (n 17); Woodford (n 243).

<sup>269</sup> The Eurosystem must lend against "adequate collateral" (see ESCB Statute, article 18.1).

<sup>270</sup> Bank of England, 'Central Bank Digital Currency: Opportunities, challenges and design' (n 263); Bindseil, 'Tiered CBDC and the financial system' (n 11); Bindseil, 'Central Bank Digital Currency' (n 11).

<sup>271</sup> *Gauweiler* (n 69), paragraphs 125-127.

<sup>272</sup> Kim and Kwon (n 10).

<sup>273</sup> Brunnermeier and Niepelt (n 10). This could be mitigated by shorter-term maturity for central bank lending; see Greenwood and others (n 191).

its own national payment system.<sup>274</sup> EU payment system autonomy is restrained by relying substantially on non-EU companies.<sup>275</sup> There are national payment initiatives to process card and online payments via the banking system. The ECB desires a European card or online payment system<sup>276</sup> and has endorsed European banks forming the European Payments Initiative in pursuit of that goal.<sup>277</sup>

The shift in US policy on Iranian financial sanctions in 2018 and the difficulties that it created for EU financial institutions highlighted the precariousness of EU dependence of US payment intermediation.<sup>278</sup> There remains the tail risk that any future breakdown in US-EU relations destabilises EU payment systems.<sup>279</sup> It would be politically sensitive – and may trigger state aid disputes at the World Trade Organization – if the EU promoted a European champion to force US companies out of the EU payments market. As a new payment system without incumbents, the digital euro system offers a trojan horse for this strategy. Its use of

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<sup>274</sup> Siddharth Venkataramakrishnan and others, ‘Russia Reaps Reward of Domestic Payment System after Visa and Mastercard Withdraw’, *Financial Times* (20 April 2022) <<https://www.ft.com/content/0bdef21b-426e-4e98-9a25-998c9bad500c>> accessed 11 May 2022. See also Bank of Russia, ‘National Payment System’ (4 May 2022) <<https://www.cbr.ru/eng/psystem/>> accessed 21 June 2022.

<sup>275</sup> Panetta, ‘Designing a digital euro for the retail payments landscape of tomorrow’ (n 141); Panetta, ‘Central bank digital currencies: a monetary anchor for digital innovation’ (n 215). Dependence on Visa and Mastercard is a long-running concern for the EU; see Smits (n 58). There is also Google and Apple in mobile payments and PayPal in online payments.

<sup>276</sup> European Central Bank, ‘Card Payments in Europe: Current Landscape and Future Prospects : A Eurosystem Perspective.’ (April 2019); European Central Bank, ‘Note by the ECB for the Economic and Financial Affairs Council’ (December 2019).

<sup>277</sup> European Central Bank, ‘ECB welcomes initiative to launch new European payment solution’ (2 July 2020); European Payments Initiative, ‘Major Eurozone Banks Start the Implementation Phase of a New Unified Payment Scheme and Solution, the European Payment Initiative (EPI)’ (2 July 2020) <<https://www.epicompany.eu/major-eurozone-banks-start-implementation-phase-unified-payment-scheme-solution-european-payment-initiative-epi/>> accessed 21 June 2022. This would use the SEPA Instant Credit Transfer (SCT Inst) system.

<sup>278</sup> EU persons are subject to anti-boycotting legislation in relation to US sanctions on Iran; see 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 [1996] OJ L 309/1.

<sup>279</sup> However, most EU Member States are members of the North Atlantic Treaty Organisation (NATO) alongside the US, which includes their commitment to collective self-defence.

CeBM and integration with the Eurosystem could justify requiring PSPs to be EU-person-controlled entities for national security reasons.<sup>280</sup>

This may serve the long-term economic interests of the EU, but political reasons prevent this argument being emphasised by the EU. 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.

## 7.2 The Future of Money

The digital euro offers numerous potential use cases,<sup>281</sup> including as a monetary policy tool,<sup>282</sup> although these may lie outside the competence of the Eurosystem under the Treaties.<sup>283</sup> However, the digital euro could simply represent the next step in the evolution of CeBM: from metal to paper to digital. CBDC threatens to disrupt incumbents. But this is inherent in the economic change that sustains the capitalist system.<sup>284</sup> The state has historically supplanted privately-issued money.<sup>285</sup> The holding limit would artificially prevent digital euro fully utilising the benefits of digitalisation. There should be caution against any Luddite attempt to restrain technological progress in CeBM.

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<sup>280</sup> ‘The Future of Payments in the Euro Area’ directed by Digital Euro Association (Podcast, Digital Euro Podcast, 16 February 2022) <<https://home.digital-euro-association.de/podcast>>; ‘LIVE episode! To CBDC or not to CBDC, what was the question?’ (n 239). e.g. An undertaking must be more than 50% owned and controlled by EU nationals or Member States to operate an airline in the EU; see 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) [2008] OJ L 293/3, article 4(f).

<sup>281</sup> These include sourcing macroeconomic data; “smart contracts” and programmable money; and distributing “helicopter money” from government; see Allen and others (n 9). Some wish to limit digital euro to novel use cases that avoid competing with the existing payment system; see ‘Will central bank digital currencies enable anonymous payments?’ (n 159); ‘ABI’s Spunta Project’ directed by Digital Euro Association (Podcast, Digital Euro Podcast, 13 October 2021) <<https://home.digital-euro-association.de/podcast>> accessed 1 March 2022.

<sup>282</sup> A negative CBDC remuneration rate could be applied to stimulate economic activity; see Allen and others (n 9); Bindseil, ‘Tiered CBDC and the financial system’ (n 11); Bindseil, ‘Central Bank Digital Currency’ (n 11); Bordo and Levin (n 9). This would be subject to the political limitations of negative rates; see Kumhof and Noone (n 9).

<sup>283</sup> See Section 4.1.

<sup>284</sup> Joseph Alois Schumpeter, *Capitalism, Socialism and Democracy* (Third (Harper Perennial Modern Thought) Edition, Allen and Unwin 1976).

<sup>285</sup> e.g. The Bank of Amsterdam; see Frost and others (n 12); banknotes in Canada; see Grodecka-Messi (n 14). See also Bindseil, ‘Central Bank Digital Currency’ (n 11).

If the eventual outcome of CBDC is a state monopoly on money, banks would compete using their acumen as credit intermediaries and PSPs, not their ability to create CoBM. There is an inherent instability within banks that has not been solved.<sup>286</sup> Removing money creation from the banks may offer a solution.<sup>287</sup> If banks would no longer be essential to providing on-demand deposits, they would not require an implicit state guarantee.<sup>288</sup> Banks could conceivably operate akin to investment funds.<sup>289</sup> 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 CoBM in the economy.

## 8 Conclusion

The potential design of the digital euro is entangled in contradictions in EU and ECB policy. Retail deposits are protected by deposit insurance and made indispensable to payment settlement, yet cash must be supplemented by CBDC. The public should adopt digital euro, yet banks must be protected by deterring users from holding digital euro. The Capital Markets Union should wean borrowers from reliance on banks for credit intermediation, yet 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

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<sup>286</sup> See Mervyn King, ‘Banking: From Bagehot to Basel, and Back Again’ (Second Bagehot Lecture, Buttonwood Gathering, New York City, 25 October 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 and Dybvig (n 232); Diamond and Rajan (n 234).

<sup>287</sup> This is not to discount that “free banking” without a central bank may be a more stable model; see ‘George Selgin on the Future of CBDC, Fed Accounts, and Stablecoins’ directed by David Beckworth (Podcast, Macro Musings with David Beckworth, Mercatus Center at George Mason University 24 January 2022) <<https://macromusings.libsyn.com/george-selgin-on-the-future-of-cbdc-fed-accounts-and-stablecoins>> accessed 1 March 2022; Milton Friedman and Anna J Schwartz, ‘Has Government Any Role in Money?’ (1986) 17 *Journal of Monetary Economics* 37; Selgin (n 169). Milton Friedman’s “k-percent rule” proposal for regulating the money supply may also be implementable in a CBDC-only monetary system; see Brunnermeier and Niepelt (n 10).

<sup>288</sup> ‘CBDC, Synthetic CBDC and Stablecoins’ directed by Digital Euro Association (Podcast, Digital Euro Podcast, 30 March 2022) <<https://home.digital-euro-association.de/podcast>>; Nabilou (n 8).

<sup>289</sup> ‘Money, money, money!’ (n 183). See also Martin Wolf, ‘Cryptocurrencies Are Not the New Monetary System We Need’, *Financial Times* (5 July 2022) <<https://www.ft.com/content/f2faeec9-6d42-4d78-9c68-1f59795789a7>> accessed 6 July 2022.

Eurozone banks, there is a dearth of use cases to motivate potential users to bifurcate their money between their bank account and their CBDC wallet. The ECB is at danger of the digital euro falling victim to the Avant-isation of its CBDC.

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 CBDC 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 AML/CFT regulations. (The challenge may be the technological feasibility of anonymous payments.) The holding limit would needlessly inhibit a CBDC wallet functioning anonymously.

Although banking may emerge as a less profitable enterprise in a digital euro environment, this should not impede profitable lending towards 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. The 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 the larger scale currently being employed under TLTROs 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 CBDC. These adjustments, therefore, require preparation and contingency planning but the digital euro would undermine neither price stability nor financial stability.

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