Title: **Can the Digital Euro be made attractive to all key stakeholders?**

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On the motivation of all Key Stakeholders for CBDC and creating a viable Ecosystem, not just for Central Banks, with special emphasis on the commercial (dis-)incentives for retail banks in the retail Digital Euro

This is the un-sanitised, longer, more explicit, more up to date version of the article published in Journal of Digital Banking Volume 9 Number 3, 10 January 2025 by Henry Stewart Publications

Sample pre-publication feedbacks received:

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> "A thorough (and quite amusing) look at what the ECB needs to do to make a success of the digital euro"
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Keywords: Central Bank Digital Currency (CBDC), Digital Euro (D€), Payments Ecosystem, Stakeholder Motivation, Offline Payments, Finance Innovation, Digital Finance Policy, Financial Inclusion

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Biography

Dr Michael Salmony is a globally recognised expert in digital and financial services, specialising in Payments, Open Finance/PSD2, FinTech, Digital Identity, e-Invoicing/SCF, AI for Financial Services and Electronic Money/CBDC. With a deep focus on strategic business innovations, he advises major international banks, industry associations, regulators, and finance bodies across the globe. He has significantly influenced the future of financial services through his advisory roles in many key decision making bodies (e.g. European Commission/ECB/European Parliament in Europe, and central banks from Japan to Uruguay and Kazakhstan).

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A frequent keynote speaker, he is a respected voice in international media, including the Financial Times, Harvard Business Manager, and The Economist. He has published much own original work in top-level academic and industry journals which has been translated into over ten languages and is cited in hundreds of publications around the world. He also teaches at Oxford Business School and other leading universities worldwide, where his work on AI in Fintech, Open Finance and Digital Currencies is highly regarded. He is a Freeman of the Worshipful Company of International Bankers, Freeman of the City of London and a Fellow of the Royal Society for Arts, Manufactures and Commerce (FRSA).

He holds a degree from the University of Cambridge and is married, with two children.

Abstract

This paper explores the challenges and opportunities related to the adoption of Central Bank Digital Currencies (CBDCs), with a particular focus on the Digital Euro. It critically examines the motivations behind the introduction of the Digital Euro, addressing the often unclear problems it is intended to solve. The article emphasizes the necessity of motivating key stakeholders, especially commercial banks, consumers, and merchants, to support and use the Digital Euro. It argues that simply mandating adoption is insufficient for success; instead, intrinsic motivation and clear business cases for each stakeholder group are essential. The paper also highlights the potential risks and unintended consequences of the Digital Euro, particularly regarding its impact on commercial banks and the broader economy. Additionally, the article proposes that an offline CBDC, resembling a modern form of cash, might offer a viable path forward,

providing benefits such as increased financial inclusion and enhanced privacy. Ultimately, the reader can expect to gain insights into the complexities of CBDC adoption, the strategic considerations for different stakeholders, and the potential models for making the Digital Euro a success.

Introduction

We assume the reader is familiar with broad discussions around CBDC and the Digital Euro. Background on these may be read up elsewhere[1] [2] [3] [4] [5] [6] [7] [8] [9] [10].

Amongst the many CBDC-related papers, presentations, articles on technology[11], specific aspects like privacy[12] [13], etc. we here want to focus on two key areas that seem very much underserved in the current discussion:

- What problem is CBDC/D€ trying to solve?
- How to motivate key stakeholders (especially commercial banks, consumers and merchants) to support/use CBDC? (with a special focus on the Digital Euro of ECB since this is one of world's leading initiatives in this area)

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[1] BIS Committee on Payments and Market Infrastructures, "Central bank digital currencies", March 2018, https://www.bis.org/cpmi/publ/d174.pdf

[2] Morten Bech and Rodney Garrat, BIS Quarterly Review, "Central Bank Cryptocurrencies" with the famous "Money Flower Taxonomy" as Graph 3 on page 60, 17th September 2017, https://www.bis.org/publ/qtrpdf/r_qt1709f.htm

[3] "Digital Currencies and the Future of Money", Yamaoka, H. (2022) in: Heckel, M., Waldenberger, F. (eds) "The Future of Financial Systems in the Digital Age." Perspectives in Law, Business and Innovation. Springer, Singapore. https://doi.org/10.1007/978-981-16-7830-1_4

[4] Raphael Auer, Jon Frost, Leonardo Gambacorta, Cyril Monnet, Tara Rice and Hyun Song Shin, BIS Working Paper No 976, "Central bank digital currencies: motives, economic implications and the research frontier", Monetary and Economic Department, 4th November 2021, https://www.bis.org/publ/work976.pdf

[5] https://www.elibrary.imf.org/search?q1=cbdc for an extensive library of research papers on CBDC by the IMF

[6] EACHA, „Central Bank Digital Currencies in Europe", May 2022, https://www.eacha.org/form_download.php?doc=CBDCs%20in%20Europe%20%E2%80%93%20EACHA%20whitepaper%20-%20May%202022

[7] European Parliament ECON Committee, „The Future of Money", December 2019, https://www.europarl.europa.eu/RegData/etudes/STUD/2019/642364/IPOL_STU(2019)642364_EN.pdf

[8] BIS Annual Economic Report, „The Future Monetary System", 21st June 2022, https://www.bis.org/publ/arpdf/ar2022e3.htm

[9] https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=CBDC+central+bank+digital+currency+-blockchain&btnG= for more academic papers

[10] ECB, "Digital Euro", https://www.ecb.europa.eu/euro/digital_euro/html/index.en.html

[11] Raphael Auer and Rainer Boehme, "The technology of retail central bank digital currency", BIS Quarterly Review, March 2020, https://www.bis.org/publ/qtrpdf/r_qt2003j.htm

[12] ECB/Eurosystem/Eurogroup, "Digital Euro Privacy Options", 4th April 2020, https://www.ecb.europa.eu/euro/digital_euro/timeline/profuse/shared/pdf/ecb.degov220404_privacy.en.pdf

[13] "Making the digital euro truly private", 13th June 2024, Maarten Daman, https://www.ecb.europa.eu/press/blog/date/2024/html/ecb.blog240613~47c255bdd4.en.html

Although massive state investments are already taking place (e.g. over €1bn Tender for D€ providers[14]), we believe it is essential to clarify the above points before going further and before the European Parliament passes the law and the ECB governing council makes its final Go/No Go decision on the realization phase[15].

What problem is CBDC/D€ trying to solve ?

Amazingly, this area is still very woolly. ECB has stated five motivations why a Digital Euro is deemed necessary (see Fig 1), other members of the Eurosystem come up with yet more (e.g. Bundesbank board member suggesting that CBDC could be used for distributing child benefit payments or paying for parcel delivery[16]), BIS initially

[14] https://www.ecb.europa.eu/paym/intro/news/html/ecb.mipnews240103_1.en.html
[15] https://www.bundesbank.de/en/tasks/topics/digital-euro-eurosystem-moves-to-the-next-phase-912766 & https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr231018~111a014ae7.en.html
[16] At a 2024 Government (Bundestag) hearing https://www.bundestag.de/dokumente/textarchiv/2024/kw08-pa-finanzen-digitaler-euro-988934, the German Bundesbank was asked to state a plausible reason for the introduction of the Digital Euro. The response by board member Burkhard was: "to allow the state to pay Child Support directly to citizens" https://www.bundestag.de/dokumente/textarchiv/2024/kw08-pa-finanzen-digitaler-euro-988934. In another context https://www.bundesbank.de/de/presse/interviews/-der-digitale-euro-bietet-grosse-chancen-auch-fuer-banken--931674 he suggested that deliveries can be paid for when the parcel arrives. In the UK a novel application proposed for CBDC is to "Pay for Vehicle Tax".
Paying child support, paying for parcels, paying vehicle tax are, of course, entirely possible (and done) without CBDC.
Another ex-Board member of Bundesbank believes that "The new thing with Digital Money is that money can be paid automatically", i.e. one needs Blockchain, Smart Contracts and Programmability so that auto-parts are paid for when they are inserted. These so-called programmable "smart contracts" (which are neither smart – they are just coded rules – nor are they contracts, since of no legal value, as they need to be held in parallel in paper form for use in a court of law) are not needed e.g. for any of the often cited M2M/IoT use cases. Today a "principal" (a person or legal entity) can instruct an entity on their behalf (e.g. to pay for a machine part installed in a factory, for groceries delivered to a smart fridge) under existing Agency Law. This same ex-Board member (now academic) also believes that the Digital Euro's "main purpose is to solve the shortage-of-labour crisis", quotes from 9th October 2024 at https://www.ecb.europa.eu/press/intro/news/html/ecb.mipnews240805.en.html
It is clear that the (more significant) B2B "programmable" payments (such as pay-on-delivery, pay-on-insertion-of-machine-part, etc) have been implemented in many industries (e.g. auto) since Kanban/Just-in-time-manufacturing took hold decades ago, more recently also with Industry 4.0. Again, no need for a new form of programmable money (called "internal programmability" in the IMF's paper "Programmability in Payment and Settlement", by X. Lavayssière & Nicolas Zhang, 16th August 2024, https://www.imf.org/en/Publications/WP/Issues/2024/08/15/Programmability-in-Payment-and-Settlement-553493) – classical "external programmability" (where payments are triggered through APIs) are more than sufficient to realise all scenarios including automated and atomic transactions. CLS atomically settles both sides of the global 3 million FX transactions per day for 20 years with no problem https://en.wikipedia.org/wiki/CLS_Group, airline seats are booked and paid for in one atomic transaction without problem, etc. If one finds there is a situation where there is no programmability, no automation, it is not for technology reasons and no need for a CBDC (or Blockchain/DLT).
The D€ will support external programmability (APIs) and, rightly, no internal programmability. However the ECB is now beginning to muddy the waters by inviting partners on "Conditional Payments", 31st October 2024, "Call for expression of interest in innovation partnerships for the digital euro", https://www.ecb.europa.eu/press/intro/news/html/ecb.mipnews241031.en.html

mentioned 6 reasons[17], globally ca 40 reasons have now been stated (see Fig 2). This sounds like a solution looking for a problem.

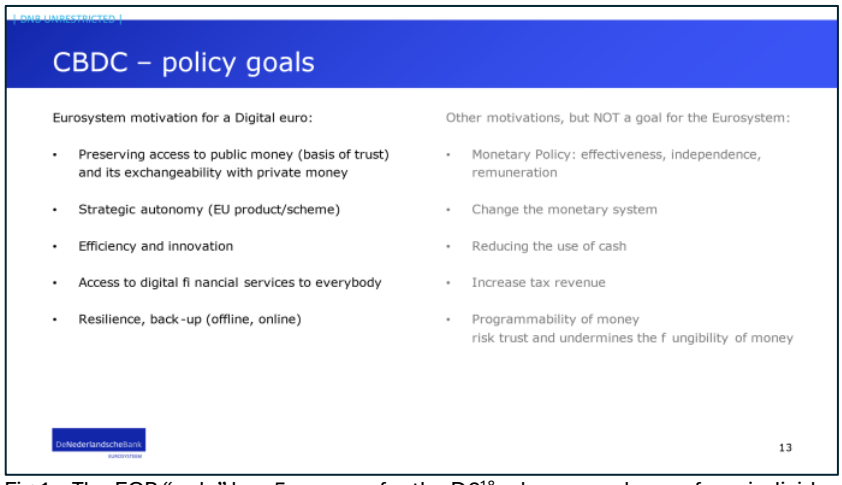

Fig 1 – The ECB "only" has 5 reasons for the D€[18], plus several more from individual Eurosystem members[16]

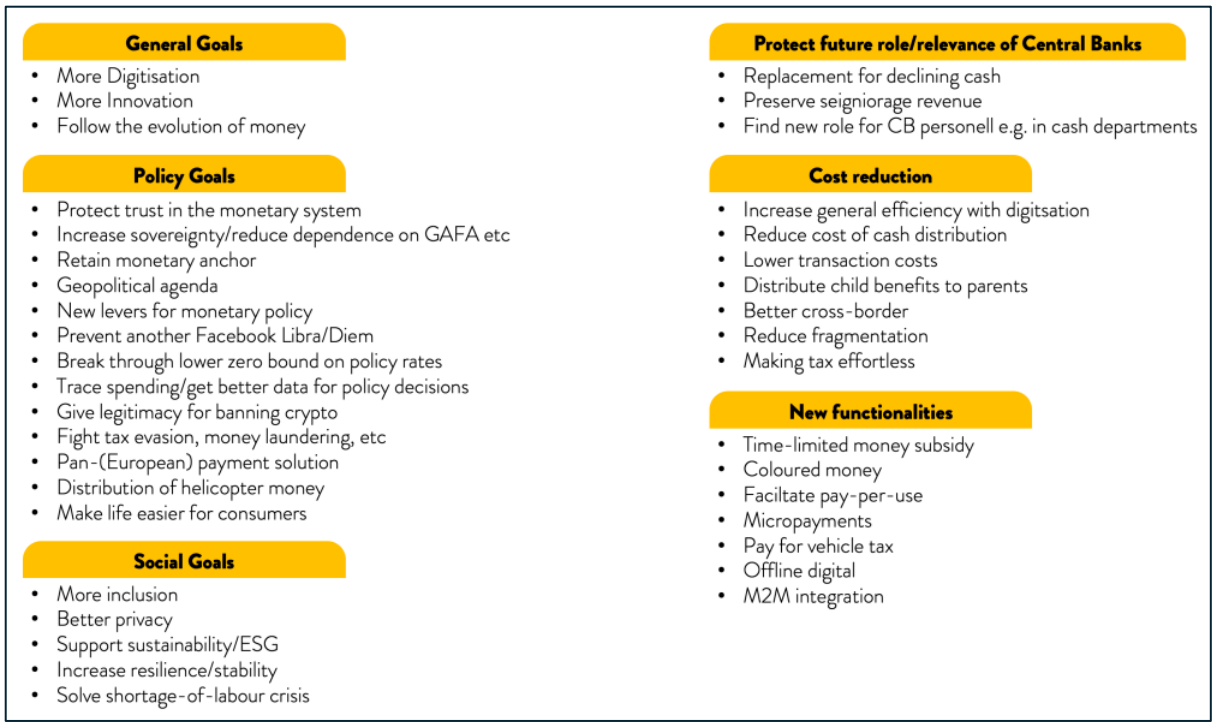

Fig 2 – (Too) many reasons being put forward where CBDC is supposed to be the solution[19] [20]
(N.B. there may appear to be duplicates, indeed some topics are closely related, but each has a distinct goal/is unique)

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[17] Anneke Kosse and Ilaria Mattei, IS Monetary and Economic Department, "Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies", Graph 4 on p 7, May 2022, https://www.bis.org/publ/bppdf/bispap125.pdf

[18] Jurgen Spaanderman, De Nederlandsche Bank (Dutch National Bank), "The Role of Public Money", 12 September 2023, CBDC Conference Istanbul

[19] M. Salmony, Summary Report on Central Banks at CBDC Conference Istanbul 2023, https://fintechistanbul.org/en/2023/09/25/central-banks-rethinking-cbdc/

[20] Maybe a common motivation to all central banks' endeavours here can be found in Nobel Prize winner James Buchanan's "Public Choice" theory that "government bureaucrats seek to expand their remit, power and Prestige", in "Readings in Public Choice and Constitutional Political Economy", Springer, 2008

One can see that the Eurosystem is struggling to identify which problems are being solved with the Digital Euro. We believe that instead one needs a clear, narrow focus on what real problem CBDC is really going to solve[21]. Trying to solve many things at once will likely mean that nothing is solved. In particular, we need focus on something that is not already being well served by existing means.

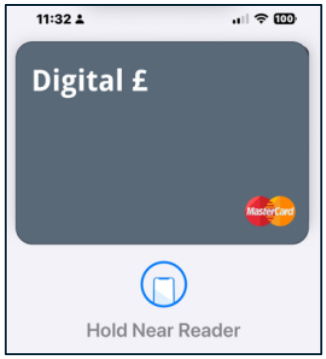
One of the top reasons regularly (and rightly) stated in Europe is the goal of "Strategic autonomy" (i.e. becoming more independent of US card schemes, PayPal, the GAFA). However, experience from India shows how a government-driven, mandated, new payment scheme may actually *increase* dependence upon Apple, Google, Facebook/Meta, Amazon Pay, Walmart's PhonePe etc., as the following finding in India shows:

> "UPI is dominated by Walmart's PhonePe and Google Pay with a combined market share of 83% - a *de facto* duopoly, leaving the national PayTM – which was supposed to assure sovereignty – far behind" [22] [140]

Thus, even when the reason/problem-to-be-solved is very valid and laudable, one must beware of unintended consequences and be sure that the problem is really being solved and not exacerbated. A new, efficient infrastructure may actually allow foreign players to glide even more seamlessly across the area.

UPI was driven by real problems to be solved (enable access to the digital economy for the non-banked, reduce the flow of dark money) and has achieved these so successfully[23] that it (together with PIX) has become a role model for central banks globally and a shining example of how private/public partnerships can work. However, the mark about sovereignty was sadly missed.

The proposals in Europe also do not inspire confidence in this area (see Fig 3):



[21] Maybe one could define one or two clear Objectives (e.g. „Assure access to safe, central bank money in times of crisis") towards which one steers the project, all other topics being ancilliary/optional Benefits

[22] „Payment service provision in times of accelerated market and regulatory change: The case of India", by Bartelt, Hommel, Patel, Ali. Published in Journal of Payment Strategy & Systems Vol 17, No 3, pp271-290 and see also https://techcrunch.com/2024/05/09/india-weighs-delaying-caps-on-upi-market-share-in-win-for-phonepe-google-pay/ on how the state is trying to solve this problem (with little success)

[23] "India achieves financial inclusion target in six years" (reached 80% - 41 years earlier than originally anticipated), 8th September 2023, https://www.finextra.com/newsarticle/42915/india-achieves-financial-inclusion-target-in-six-years---g20

Fig 3 – Mockup[24] of future real use of Digital Pound integrated in Apple's iPhone Wallet in a Mastercard payments card … is this what "sovereignty" from US giants will look like ?

The ECB often presents the macroeconomic argument of the need to preserve the "'monetary anchor' role of central bank money" as the main motivation for introducing the D€. However, the very reputable economist Prof. Bofinger[25] comes to the conclusion that "there is no need for a retail D€ as a monetary anchor", "in sum the arguments of the ECB for the monetary anchor role are not very convincing" and "we do not see macroeconomic issues that call for the introduction of D€". The author also enumerates several reasons why the D€ will actually *stifle* innovation and competitiveness vis-à-vis private providers, contrary to its stated objective.
We will not go through examining further "reasons" for the D€ here.

Table 1: Contribution of the e-Yuan to People's Bank of China (PBoC) objectives

Objectives	Contribution	
	Doubtful or limited	Possible
Stated objectives		
Efficiency of central bank payment systems	X	
Backup of retail payment system	X	
Supporting financial inclusion		X
Other possible objectives		
Mass surveillance		X
Internationalisation of the currency	X	
Reining in the Big Techs		X
Substituting the private sector in the supply of money		X
Supporting public finances		X

Fig 4 – Other geographies will have their own reasons for introducing CBDC. China is mooted[26] to be deploying the e-Yuan for "Mass surveillance", "reining in the Big Techs"/"substituting the private sector in the supply of money" (addressing local BigTechs such as Ant Financial[27]) and "internationalization of the currency" (see discussion on Inclusion/Developing Nations towards the end of this paper)

As a second stage - if there does turn out to be a convincing reason for the massive investment, upheaval, state intervention - then one should look to see how to make CBDC work. For this there need to be incentives for *all* key market participants. It must not only be for the benefit of the central bank. Banks need to support, customers need to understand and merchants need to see an advantage – otherwise the project will fail.

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[24] https://marvelapp.com/prototype/1ae4544j/screen/94039082 as proposed by University of Manchester, September 2024
[25] "The Digital Euro and Central Bank Digital Currencies: Beware of Taking-Off Too Early", Research Project for the Hans-Böckler Stiftung, Julius-Maximilians-University Würzburg, Prof. Dr P. Bofinger, August 2024, https://www.imk-boeckler.de/de/faust-detail.htm?sync_id=HBS-008939
[26] "Who Needs an e-Yuan?", Christian Pfister and Nicolas de Seze, in Digital Euro Association, 1st December 2023, https://blog.digital-euro-association.de/who-needs-an-e-yuan
[27] "China's fintech giant Ant Financial reined in by politics", Mercator Institute of China Studies, 12th November 2020, https://merics.org/en/comment/chinas-fintech-giant-ant-financial-reined-politics

If only one part of the ecosystem is not intrinsically motived, this initiative can not succeed.

Just making the D€ *mandatory* for banks (to distribute) and for merchants (to accept) will not ensure successful adoption – as we have seen with countless examples in the past (e.g. PSD2) - we need *intrinsic motivation and business cases*.

View of the customer

Explaining to the man in the street why he should have a "Deutsche Bank Euro" and also a "Central Bank Euro" in his mobile banking app seems difficult enough (Fig 5):

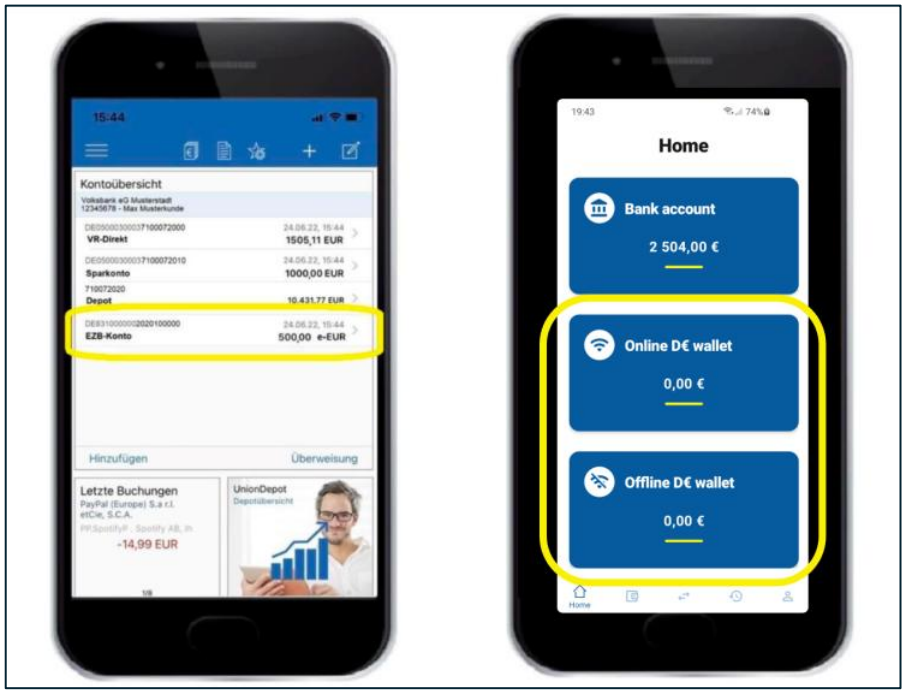

Fig 5 – Sample mockups[28] [29] of future mobile banking apps – showing accounts in Euro, Digital Euro, Offline Digital Euro … will consumers understand this!?

Customers are already quite happy with the current state, can transfer money digitally/electronically instantly easily to/from any account in Europe, etc. – there seems no immediate value-add for a consumer[30] (or business). Customers also get interest on

[28] Nicolai Krüger, IU International University of Applied Sciences, "Towards Acceptance Criteria for a Digital Euro", July 2023, https://www.researchgate.net/publication/372551011_Towards_Acceptance_Criteria_for_a_Digital_Euro/link/64be30858de7ed28babed0ea/download

[29] The Payers, "Worldline delives a front-end prototype for the digital euro", 30 May 2023, https://thepaypers.com/cryptocurrencies/worldline-delivers-a-front-end-prototype-for-the-digital-euro--1262832

[30] Andrew Buckley, Vasileios Karountzos, Markos Zachariadis. "Paths to success for a Digital Pound: A research note on (GenZ) consumer attitudes to adoption", June 2024, University of Manchester Alliance Business School, https://click.convertkit-mail2.com/n4uvk95k83avh8zer05u6h7ooxwgghl/l2heh6u327n45mhg/aHR0cHM6Ly9kaWdpdGFscG91bmRmb3VuZGF0aW9uLmNvbS9hdHRpdHVkZXMtdG8tZGlnaXRhbC1wb3VuZC11bmRlci10aGUtbWljcm9zY29wZS8=

the current money and have no limits on how much they can hold – unlike CBDC which is limited[31] [32] and will likely bear no interest[33]. So, the Digital Euro actually seems to be an inferiour proposition[34] to customers' current state.

Given the above concerns, there is currently much speculation whether the D€ will be a big flop, a success, or a huge success. It is clear that adoption should ideally be in the "Goldilocks Zone"[35]: not too little[36] (otherwise all investments are for nothing, central banks incur reputational risk), nor too big (to avoid crowding out private initiatives, to avoid bank runs).

Arguments for high adoption of D€		Counter-Arguments which would lead to low adoption of D€
- D€ is 100% **secure** (state backed)		- Deposits already secured to 100k€
- D€ is a **private** as possible (within the limits that it is online)		- In practice consumers care more about convenience than privacy (see global success of AndroidPay) - Consumers more likely to care about D€ yielding no interest - Privacy not cast in stone but may be changed with one stroke of the legislative pen ("slippery slope")
- D€ holdings will be **limited**, hence reducing risks of money laundering, terror financing and bank runs. Stability of the financial system and not funding criminals is in everybodys' interests.		- Limit not cast in stone but may be increased/removed with one stroke of the legislative pen ("slippery slope") - Even with current 3000€ limit, the average European can keep/move *all* his monthly incomes in D€ - hence banks not motivated to support – hence banks will not encourage consumers to use D€
- D€ is an attractive modern **digital** form of cash	"Goldilocks" Zone (ideal adoption)	- People already have Euros digitally in their existing bank accounts, can move them digitally, can spend them digitally – no value-add seen - Indeed having several electronic Euro balances (in commercial bank account, D€, offline D€) will likely be very confusing - Concerns in population about reduction/fear of abolishment/ access to cash (see Sweden: elderly, crime, handicapped, ...) if only digital payments available
- D€ provides a **pan-European** means of payment		- Consumers can already pay across the world (not only Europe) using Mastercard, Revolut, etc
- D€ promotes **innovation, competition, new solutions**		- Consumers are already overwhelmed by the number of (new) solutions; payments is already one of the most innovative, competitive domains of the economy
- D€ increases **sovereignty** versus foreign providers		- Sovereignty is not a concern for consumers (until Trump turns the off the tap, until Apple hikes its fees)
Consequences of too high adoption/too much Success: disruption to banking system (state organised "Bank run"), increased shift to state-run (vs private) infrastructure, scope creep of ECB mandate, ...	**Consequences of ideal adoption:** Balanced roles between state and private sector, stability of financial system (no bank runs), advantages to all stakeholders in the ecosystem, ...	**Consequences of too low adoption/Failure/Flop:** waste of investment, distraction of management time, broken promises, reduced trust in Eurosystem, ...

Table 1 - Many arguments on all sides in which direction D€ consumer adoption might go – will we reach the golden middle?

[31] Barbara Meller and Oscar Soons, "Know your (holding) limits: CBDC, financial stability and central bank reliance", ECB Occasional Paper Series No 326, (undated), https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op326~d5c223d9b4.en.pdf

[32] In a delicious piece of irony, an internal "sovereignty" battle between EU politicians and the ECB is erupting on who should control the limits, Politico, 29th October 2024, "Digital euro sparks sovereignty battle between EU governments and ECB", https://www.politico.eu/article/digital-euro-sparks-sovereignty-battle-eu-governments-ecb-monetary-tool-banking/

[33] European Commission, "Frequently asked questions on the digital euro and the legal tender of cash", https://finance.ec.europa.eu/digital-finance/digital-euro/frequently-asked-questions-digital-euro-and-legal-tender-cash_en

[34] The use of the D€ may also be inferior e.g. regarding consumer protection (no chargebacks according to current legislative proposals proposing instant, irrvecoable finality)

[35] Huw van Steenis, Financial Times, "Five Hurdles to mint a CBDC", https://www.ft.com/content/82317357-65d1-478b-97e2-4145a94d7333

[36] Luca Nocciola and Alejandro Zamora-Pérez, "Transactional Demand for Central Bank Digital Currency", ECB, https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2926~a61b033b8b.en.pdf?266450c65d931a228c9c914537495e58

In order to gain some more clarity, the Eurosystem[37] and others[38] have recently launched a spate of consumer surveys to determine support. However, asking the consumer notoriously leads nowhere[39] and asking a loaded question will not yield any answer that one can rely on[40].

[37] "Discussion Paper: CBDC and banks - Disintermediating fast and slow", Bidder, Jackson, Rottner, Deutsche Bundesbank, No 15/2024, https://www.bundesbank.de/resource/blob/931090/be2be8b2c5324245e4147d6306689312/mL/2024-04-29-dkp-15-data.pdf

[38] "Valuing safety and privacy in retail central bank digital currency", Fairweather, Fiebig, Gorajek, et al, Reserve Bank of Australia, 2 April 2024 https://apo.org.au/node/326359

[39] ECB, "Eurosystem report on the public consultation on a digital euro", April 2021, https://www.ecb.europa.eu/pub/pdf/other/Eurosystem_report_on_the_public_consultation_on_a_digital_eu ro~539fa8cd8d.en.pdf

[40] As advertising-guru David Ogilvy famously said "Consumers don't think how they feel. They don't say what they think, and they don't do what they say."

On the perils of asking consumers

Apple did not ask consumers if they wanted an iPod – one could not image what that is at the time. Asking the man in the street whether he wants a Central Bank Digital Currency will similarly not yield any useful result.

However, organisations, often those desperate to try and find a justification for developing a "solution" that they want to push anyway, do keep trying to ask the customer. Even the ECB already once failed with their previous Digital Euro consumer survey on privacy[41]

It is well understood in the literature[42] that what consumers *say* is not necessarily what they *do* (see privacy, ecology, voting surveys, etc.). Hence basing business decisions on the results of consumer surveys is as good as building a house on quicksand.

Finally, as is the case here, presenting a "loaded" question will, of course, not yield any representative result. What you get out of consumer survey very much depends on how you phrase the question.

The question posed by the Bundesbank/Eurosystem was:
"Assume there are credible news casting doubts on the stability of the banking sector. A banking crisis could emerge which could impact your bank. You may suddenly not be able to withdraw your money, access cash or make transfers.
Now imagine there is a Digital Euro as an alternative which can be redeemed in cash and used to make transfers.
Would you transfer your bank money to Digital Euro?"

(author's summary/translation)

Clearly the response was very favourable.

If the question had been:
"Assume that the state wants to spend billions of your taxpayers' money on creating a new Euro, that will compete with the existing Euro and with existing solutions (like your bankcard, like coming EPI), that has the potential for state surveillance of all your previously private cash transactions.
Do you think this is a good idea?"

Then likely the response may have been a little different…

[41] In the ECB CBDC survey [39] it turned out that the self-selecting sample who responded was mainly German males working in the IT industry – not a representative result, as was later acknowledged by the ECB itself

[42] The "say-do gap" described in https://www.gethorizon.net/blog/why-actions-speak-louder-than-words-navigating-the-say-do-gap-in-consumer-research
Or, to quote anthropologist Margaret Mead: "What people say, what people do, and what they say they do are entirely different things"

Despite all of the above, there may, however, be a way that maybe consumers may still actually adopt the D€. One way to highly motivate adoption is to distribute state subsidies and transfer payments to consumers (e.g. child support, pandemic support, climate subsidies) only via the D€ wallet, enforcing this method. Since citizens will not want to leave government money behind, they will adopt the D€ Wallet.

Despite the fact that the D€ has no value to consumers (indeed is confusing), is inferior to existing Euro another adoption solution may lie with the merchants. Maybe merchants will convince users to adopt this new means of paying/new currency, if they find the fees lower[43] [44], the dependence on PayPal, Apple/Google Pay and US card schemes reduced, the irreversible finality valuable and because they can accept Euros cross-border[45] [46] more easily. Merchants will in any case most likely be forced by regulation to accept the D€ as legal tender[47], so these advantages may permit them to recoup their investments. Merchants have been successful in steering consumers to payment methods they find attractive[48].

[43] Back-of-an-envelope ball-park estimate: 30€ is typical ticket size at POS, debit card interchange is capped at 0.2%, hence CBDC transactions must be cheaper than 6 cents to be attractive to merchants … and instant payments are typcially free … a hard barrier for CBDC to limbo under. However, since ECB does not need to adhere to market conditions, it could simply set its fees to 0.1% (i.e. half of the regulated debit card fee), or to a simple fixed fee (e.g. 1 cent - which would be even more liked by the merchants).
[44] However, even if the fees are lower - either because of the above or simply because there are no scheme fees in the D€ - this does not necessarily mean that the system will result in the cheaper payment solution becoming dominant, see "Gresham's law of payments", Address to the Australasian Institute of Banking and Finance Industry Forum, Sydney, 23 March 2005, Reserve Bank of Australia Bulletin, April 2005 https://www.rba.gov.au/publications/bulletin/2005/apr/pdf/bu-0405-2.pdf (which shows that incentives to banks and customers can make them promote the most expensive means of payment)
[45] ca 30% of Eurozone consumers buy online in another Euro country (typically using PayPal or US card schemes) according to "The Digital Economy and Society Index" DESI https://digital-strategy.ec.europa.eu/en/policies/desi
[46] 50-60% of Eurozone tourists come from another Eurozone country (and hence buy at POS using cash or US card schemes) according to "The European Travel Commission" https://etc-corporate.org/uploads/2024/07/ETC-Quarterly-Report-Q2-2024_Public.pdf
[47] For an exploration of the regulatory complexities/inconsistencies and partical consequences of "legal tender" (e.g. German shops already often have signs that "200€ are not accepted" – despite cash being legal tender … will restaurant be able to put up signs "D€ not accepted here"?), see Godschalk, Krüger, Seitz, "Der digitale Euro aus Sicht des Verbrauchers, des Handels und der Industrie", p11-12, August 2024, https://www.bvr.de/p.nsf/0/7160B794CDFC5A78C1258B70004F8D17/$file/Studie%20zu%20D%E2%82%AC%20aus%20Sicht%20von%20Handel%20und%20Verbrauchern%20DE.pdf
[48] See how, in the pre-PSD2 days, the Conrad merchant convinced even many of the - normally super privacy-sensitive - Germans to adopt "Sofort" payment where they share their private bank credentials across the internet, because it was better for the merchant

View of Banks[49]

An even more difficult – and even more critical - question is how to convince the commercial retail banks to support CBDC. They will need to spend billions[50] [51] just to comply with the legal obligations, as they are being asked to do all the consumer-facing work (onboarding, KYC, hotline support, issue online and offline digital wallets, handle disputes/refunds, … see Fig 6) and will likely not be adequately remunerated for the effort, investment and risk[52].

(i)	Opening a digital euro account, onboarding and "Know Your Customer"
(ii)	Closing a digital euro account and offboarding end users
(iii)	Payment instrument management (provision and maintenance)
(iv)	Linking the digital euro account to a payment account
(v)	User life cycle management processes
(vi)	Funding (manual and automated)
(vii)	Reverse waterfall
(viii)	Defunding (manual and automated)
(ix)	Waterfall
(x)	Transaction initiation (one-off transactions)
(xi)	Authentication
(xii)	Payment confirmation/rejection notification
(xiii)	Refunds
(xiv)	Dispute/exception management

Fig 6 – Core services to be performed by banks[53] – without direct remuneration

[49] Formally we should be addressing all PSPs (i.e. including non-bank PSPs such as Wise, PPRO, Worldline, etc) but we focus here on banks as being likely to carry the major burden and impacting the D€ success the most

[50] The ESBG estimates the costs to be "1-2 billion euro on the Eurosystem side and a similar total amount on the Member State's side … with a large part of the investment required on the acceptance aquiring side" in "A Digital Euro: what does it mean for savings and retail Banks?", European Savings and Retail Banking Group, March 2023, https://www.wsbi-esbg.org/wp-content/uploads/2023/03/ESBG-paper-on-a-digital-euro-what-it-means-for-savings-and-retail-banks.pdf

[51] The German Savings Bank Group estimates hundreds of millions of Euros to be spent on D€ for their own sector in "Unser Wettbewerber sollte nicht die EZB sein", Markus Montz Interview with Joachim Schmalzl, c't 8/2024, p128, https://www.heise.de/select/ct/2024/8/2407310593875204397

[52] The current legal proposal[76] states "payment accounts with basic features … should apply with digital euro services provided for free" (to consumers) and the ECB Executive Board https://www.ecb.europa.eu/press/key/date/2024/html/ecb.sp240417~23a5e6045e.en.pdf?9563 66a53249ccb681d79ea7f8bb3878 confirmed that "Digital euro distribution would be carried out exclusively by payment service providers (PSPs)" i.e. banks do all the work without direct compensation (except maybe via interchange fees)

[53] Prof. Dr. Peter Bofinger, Chair for Monetary Policy and International Economics at the Department of Economics at the University of Würzburg, "The Digital Euro: An anchor of stability or a gigantic flop?" at CBDC Conference, Istanbul, 12 September 2023

Instead banks face serious commercial risks:

> ”CBDC launches involve meaningful risks for the existing banking and payments landscape, whether via payment cannibalisation, flight of commercial bank deposits to a ‘risk-free’ CBDC alternative or exceptional pressure on prices and costs of existing payment systems” … “The combined effect on interest (through deposit substitution) and transaction fees (erosion of payments volumes) could quickly reach billions of Euros”[54]

Fortunately for banks, merchants cannot hold digital euro balances; these are converted — upon receipt — directly into commercial bank money[55]. However to quantify the effect of consumer holdings, we note that the 3000€ limit for D€ currently in discussion would allow the average European to keep their net monthly salary *entirely* in the CBDC wallet[56]. Also since the state-backed D€ is 100% safe[57], people may also move their *savings*[58] away from commercial bank deposits to CBDC. Thus CBDC may significantly reduce bank liquidity. The European Commission has published a most revealing report[59] on how the banks – especially smaller banks, the backbone of Europe’s economy – will be impacted negatively through this effect (see Fig 6).

All of the above is predicated on the assumption that there will be holding limit. Prominent figures[60] [61], however, argue “the case for *unlimited* holdings of digital euros”. Since holding limits, even if implemented initially, are not set in stone but can be adjusted (or entirely removed) with one fell stroke of the legislative pen (see also Table

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[54] Olivier Denecker et al, McKinsey, in Journal of Payment Strategy & Systems Vol 17, No 1, p26ff, April 2023, „Central bank digital currencies: An active role for commercial banks”

[55] However, if large merchants hold offline D€ wallets at each checkout, also to accept payments from offline D€ cards, they could circumvent the total holding limit significantly

[56] The average net monthly income per capita in Europe is 2,450€ (see https://data.worldbank.org/indicator/NY.ADJ.NNTY.PC.CD?locations=EU) and even the wealthy Germans earn less than 3000€ net per month on average (see https://www.destatis.de/EN/Themes/Labour/Earnings/Branch-Occupation/_node.html)

[57] Although European bank balances – where people get interest - are already guaranteed in the EU up to 100.000€ through the Deposit Guarantee Schemes Directive (DGSD) and up to $250.000 in the US under the Federal Deposit Insurance Corporation (FDIC) insurance system. Thus a bank run to CBDC with its much lower limit, no interest and poorer protection (e.g. no chargeback) seems unlikely. As [25] notes, “With deposit insurance bank deposits are as safe as central bank money”, and “it would be a dangerous strategy if the ECB tried to sell the D€ with the argument that bank deposits are not 100% safe”.

[58] Germans have ca 6000€ per capita according to https://www.statista.com/statistics/1221225/savings-per-capita-in-the-european-union-by-country/ thus even the wealthy Germans could move half their savings into CBDC. In times of crisis, with low interest rates, this may be an attractive proposition.

[59] “Bank profitability and central bank digital currency - JRC Working Papers in Economics and Finance”, Bellia, Calès, European Commission, 6/2023, https://publications.jrc.ec.europa.eu/repository/handle/JRC133796

[60] Christian Hofmann, “Digital Euro: An assessment of the first two progress reports – the case for unlimited holdings of digital euros”, in-depth analysis requested by the European Parliament’s ECON Committee, April 2023, https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/741511/IPOL_IDA(2023)741511_EN.pdf

[61] See also other prominent voices such as Cyril Monnet, Dirk Niepelt, Seraina Grünewald, etc. all arguing to introduce the D€ without limit

1), this slippery slope means potentially unlimited risks on banks' balance sheets and liquidity.

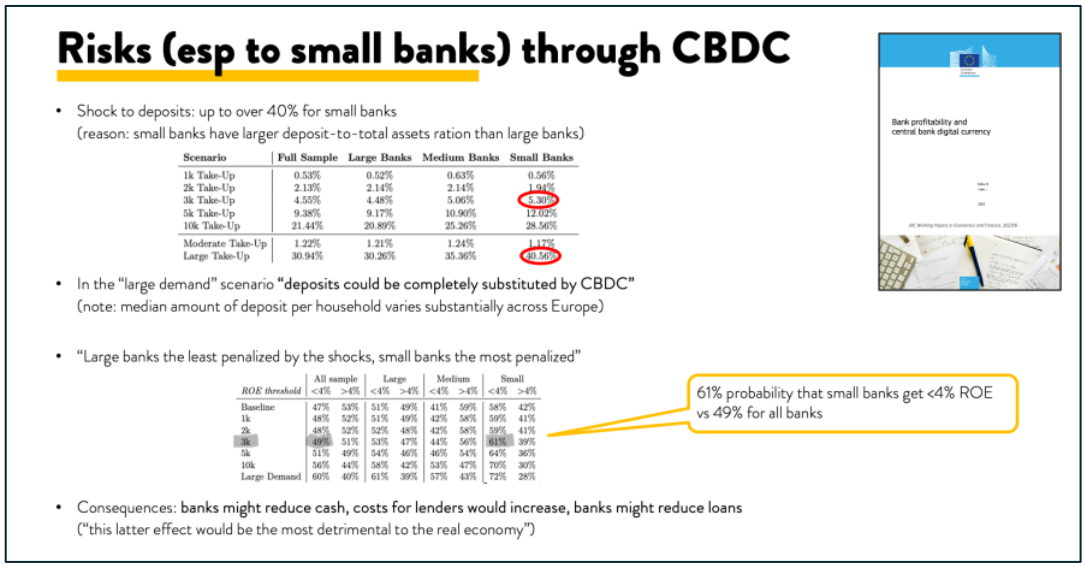


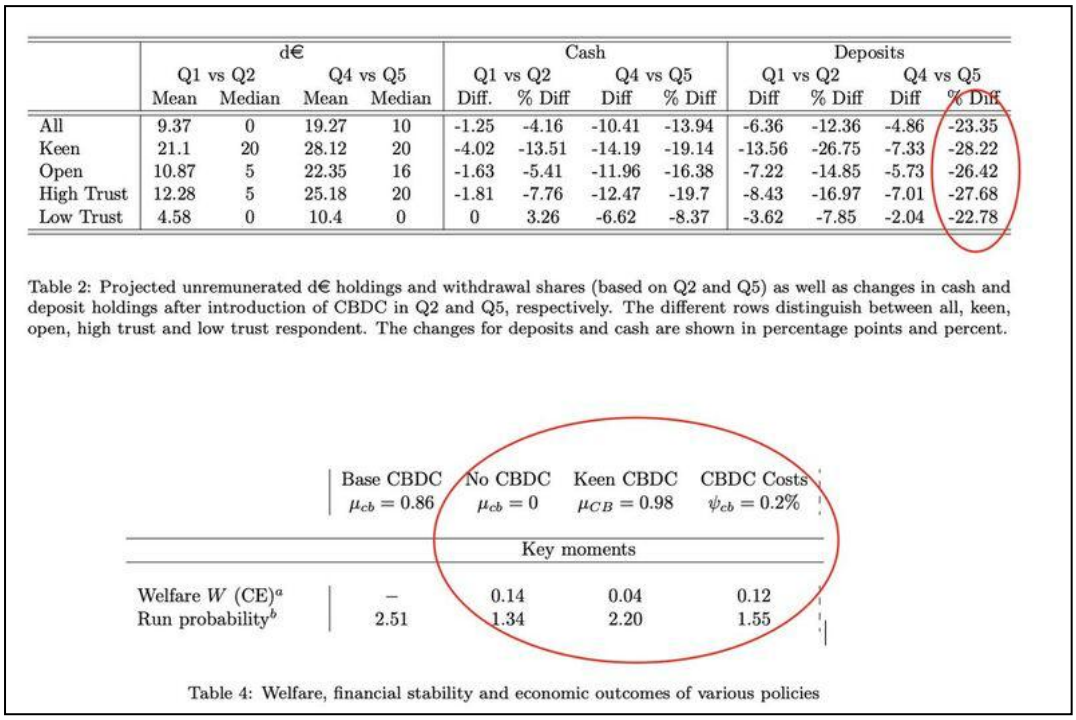
Fig 7 – Shock to banks through D€[62] with particularly deleterious effects on small banks and the economy[63]

Reducing the banks' liquidity reduces their ability to lend, impacting their core business. This they will not take lightly[64]. The consequences are "banks might reduce cash, costs for lenders would increase, banks might reduce loans ("this latter effect would be the most detrimental to the real economy")" – as the EC report itself states. Thus, the initial proposition for banks is not good and the consequences for the economy dire (Fig 8):

[62] https://www.linkedin.com/posts/activity-7151499739992080384-ZKlG

[63] as warned in the context of "A simple microeconomic model for the analysis of Vollgeld" by Profs. Bofinger and Haas, June 2018 https://www.econstor.eu/bitstream/10419/179674/1/1024071626.pdf this "will damage especially those banks, which are largely dependent on their credit business. These are mainly regional banks or cooperative banks like Raiffeisenbank. These small-scale banks have a stabilizing influence on the economy and are vital for sustainable growth, as they lend predominantly to households and small and medium-sized enterprises. Germany avoided major asset bubbles as the banking sector consists mainly of these small banks."

[64] As indicated my many also by many prominent non-bank voices such as Grünewald, Monnet, Niepelt saying that "without a sound business model, there is no incentive for PSPs to support the (mandatory) issuance of the digital euro"



	d€				Cash				Deposits			
	Q1 vs Q2		Q4 vs Q5		Q1 vs Q2		Q4 vs Q5		Q1 vs Q2		Q4 vs Q5	
	Mean	Median	Mean	Median	Diff.	% Diff	Diff	% Diff	Diff	% Diff	Diff	% Diff
All	9.37	0	19.27	10	-1.25	-4.16	-10.41	-13.94	-6.36	-12.36	-4.86	-23.35
Keen	21.1	20	28.12	20	-4.02	-13.51	-14.19	-19.14	-13.56	-26.75	-7.33	-28.22
Open	10.87	5	22.35	16	-1.63	-5.41	-11.96	-16.38	-7.22	-14.85	-5.73	-26.42
High Trust	12.28	5	25.18	20	-1.81	-7.76	-12.47	-19.7	-8.43	-16.97	-7.01	-27.68
Low Trust	4.58	0	10.4	0	0	3.26	-6.62	-8.37	-3.62	-7.85	-2.04	-22.78

Table 2: Projected unremunerated d€ holdings and withdrawal shares (based on Q2 and Q5) as well as changes in cash and deposit holdings after introduction of CBDC in Q2 and Q5, respectively. The different rows distinguish between all, keen, open, high trust and low trust respondent. The changes for deposits and cash are shown in percentage points and percent.

	Base CBDC $\mu_{cb} = 0.86$	No CBDC $\mu_{cb} = 0$	Keen CBDC $\mu_{CB} = 0.98$	CBDC Costs $\psi_{cb} = 0.2\%$
	Key moments			
Welfare W (CE)[a]	–	0.14	0.04	0.12
Run probability[b]	2.51	1.34	2.20	1.55

Table 4: Welfare, financial stability and economic outcomes of various policies

Fig 8 – CBDC reduces welfare, increases probability of bank runs, and can have massive negative impacts on bank deposits[65] – is this how to motivate banks?

Banks not only have a financial impact, but also a strategic one. The financial impact may be manageable (e.g. German Savings Banks reported a profit in 2023 of 17bn€, so should be able to shoulder the necessary 0.2bn€ for CBDC), but the management capacity and IT-resources are scarce and limited ("we will not be able to do anything else for 2-3 years")[66]. This will severely inhibit other innovation/customer-facing developments – whilst GAFAs continue to evolve at high speed[67]. Finally, the banks are also faced with duplicate investments/costs/management efforts for their own market-driven pan-European payment solution (EPI) and for the regulatory-driven pan-European[68] payment solution (Digital Euro)[69]. Thus, this unhelpful confrontation of central bank and commercial bank policies will likely mean that both sides will lose.

[65] https://www.linkedin.com/posts/activity-7200431881534812160-R8EU & https://lnkd.in/eU7nhdQb

[66] "So teuer wird der digital Euro für die Sparkassen", Elisabeth Atzler, Handelsblatt, 8th July 2024, https://www.handelsblatt.com/finanzen/banken-versicherungen/banken/digitalwaehrung-so-teuer-wird-der-digitale-euro-fuer-die-sparkassen/100048495.html

[67] „The Growing Influence of BigTech Companies in Payments and Financial Services", Edgar Dunn, 3rd October 2023, https://www.edgardunn.com/articles/the-growing-influence-of-bigtech-companies-in-payments-and-financial-services

[68] Actually, the D€ is "only" a pan-Euro solution – it excludes those 8 of the 27 (especially Nordic and Eastern) European countries that have retained their own currencies – thus the D€ is not pan-European

[69] In other areas where the EU aims to improve its sovereignty, the state subsidises that industry heavily (e.g. Agriculture (387bn€ 2021-2027), Space (15bn€ 2021-2027 for Galileo etc.), Quantum (1bn€ 2018-2028), Chips (43bn€), Fusion (6bn€), Cloud (7.5bn€), AI, Batteries, … not to mention Defence, Security, etc). In payments, by contrast, the state sets up a competing initiative – thus effectively giving *negative* subsidy to industry efforts (like EPI) that aim to increase European autonomy. The state politically clearly cannot subsidise Banks (as they do farmers) but support for the service providers, the merchants, the scheme would surely be appropriate for such a key strategic topic as payments.

Hence, the Central Banks would be well advised not to adopt a hostile stance towards commercial banks[70] but instead to embrace a public/private partnership model[71] where all sides benefit. This is also called for in a recent paper by the European Parliament

> "… banks today manage most retail payments and settle them on their deposit accounts; in the new situation, they would compete with the ECB (the D€ would be an alternative to a bank deposit) … This generates potentially adverse incentives and *warrants a well-designed compensation structure for the services provided by banks*. The ECB reports give no information on this."[72]
>
> (author's italics)

Fortunately for banks, people may actually not hold onto much D€ at all. The wallet could be a "pass-through" device (just topped up as needed on the fly[73] like a PayPal wallet[74] – with only small amount remaining in the wallet once it has gone through transit) – in that case the liquidity reduction issue will go away. But the costs to the banks remain. Hence, we at least need to seriously look at revenue opportunities for commercial banks to balance the costs they will have for providing and running the D€ infrastructure.

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[70] See, for example, quotes from [37]: "A widely available CBDC would serve as a close — or, in the case of an interest-bearing CBDC, near-perfect — substitute for commercial bank money", "evidence … suggests there is substantial demand for CBDC, with that demand likely to lead to substitution away from other forms of money … especially out of bank deposits.", „Eine Disintermediation führt dazu, dass ein Bankensystem, das anfällig für Runs ist, schrumpft. Dies bringt positive Wohlfahrtseffekte mit sich." (i.e. reducing share of banking system in the economy would increase welfare for citizens) are clearly confrontational/anti-bank

[71] Pinar Ozcan and Kerem Gurses, The Oxford Handbook of Entrepreneurship and Collaboration, 2019, "Collaborative Market Making: The Critical Role of Dyadic and Multipartner Alliances in the Formation of New Markets", https://scholar.google.com/citations?view_op=view_citation&hl=en&user=b-tTbT8AAAAJ&citation_for_view=b-tTbT8AAAAJ:_FxGoFyzp5QC

[72] Ignazio Angeloni, Economic Governance and EMU Scrutiny Unit (EGOV), Directorate-General for Internal Policies, "Digital Euro: When in doubt, abstain (but be prepared)", https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/741507/IPOL_IDA(2023)741507_EN.pdf, April 2023

[73] Maybe using automated (reverse) waterfall mechanisms for funding/defunding

[74] Sadly, PayPal does not disclose how much money is transferred through PayPal in Europe and how much float is held in European PayPal wallets. However we estimate that only a small fraction of the value of consumer's payments stays in the wallet – most is topped up on the fly from a bank account/card. An analysis of the E-Money statistics for Luxembourg indeed reveals that of the total annual payment volume, an average of approx. 4% remains in the PayPal account as credit balance – the rest is passed through. This will mean reduced liquidity drain through CBDC for Banks, but higher numbers of transactions (incl. (reverse-)waterfalls at client and merchant) for each transaction. Many thanks to Hugo Godschalk for this analysis based on the latest data of 2021.

Revenue opportunities for banks in CBDC/D€

Here we present a model on potential transaction revenues from CBDC for banks[75], based upon current understanding of legislation.

Article 17 of the proposed Digital Euro Regulation[76] states that the potential fees charged by the digital euro intermediaries (that is to say, credit institutions, payment institutions and e-money institutions) may not exceed the lesser of (i) the fees charged by comparable means of payment (including debit card and instant payments) or (ii) the costs incurred in the distribution of the digital euro plus a margin. These fees would include two components: merchant service rates (equivalent to current MSR applied to digital means of payment) and inter-PSP fees, which would replicate the current model that applies to fees.

The expected low volume of the digital euro in its first year will mean a higher unit cost, so it is likely that the lowest of both ceilings will be that of comparable digital means of payment, leading to two alternative scenarios:

a) Keeping the same fee as with other existing payment methods: this will enable a higher margin for intermediaries, compensating investments
b) Reducing the fees, making the digital euro more appealing for merchants than other payment methods, and thus cannibalizing revenues from intermediaries' issued payment methods (debit cards or instant payment mobile solutions)

The latter scenario will be very damaging for the banking industry since they have invested large amounts of money in developing proprietary instant payment solutions at both at entity level or industry level (e.g. Bizum in Spain, EPI in Europe), which could be easily cannibalized by a cheaper and more complete solution (including online and offline use cases for P2P and POS) that merchants would foster.

On the positive side, it has been suggested that there are potential opportunities for banks to generate revenue from value-added services around D€, since this explicitly permitted by the proposed legislation. However, we do struggle to see which, if any, of these so-called value-added services customers will really need and pay for (see Fig 9).

[75] Maria Saenz de Buruaga Azcargorta, Monitor Deloitte, "Fee models for the CBDCs: the Digital Euro", at Digital Euro Conference 2023, 29th February 2024, Frankfurt, https://bgwbpj.clicks.mlsend.com/tb/c/eyJ2Ijoie1wiYVwiOjc2NzE5MyxcImxcIjoxMjcxODQyMDA4MDY2OTYyOTgsXCJyXCI6MTI3MTg0MjA0NjgzMjgyMDcxfSIsInMiOiJlMjUyZmI4NmZiNDJiMWYxIn0

[76] "Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the establishment of the digital euro", https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023PC0369

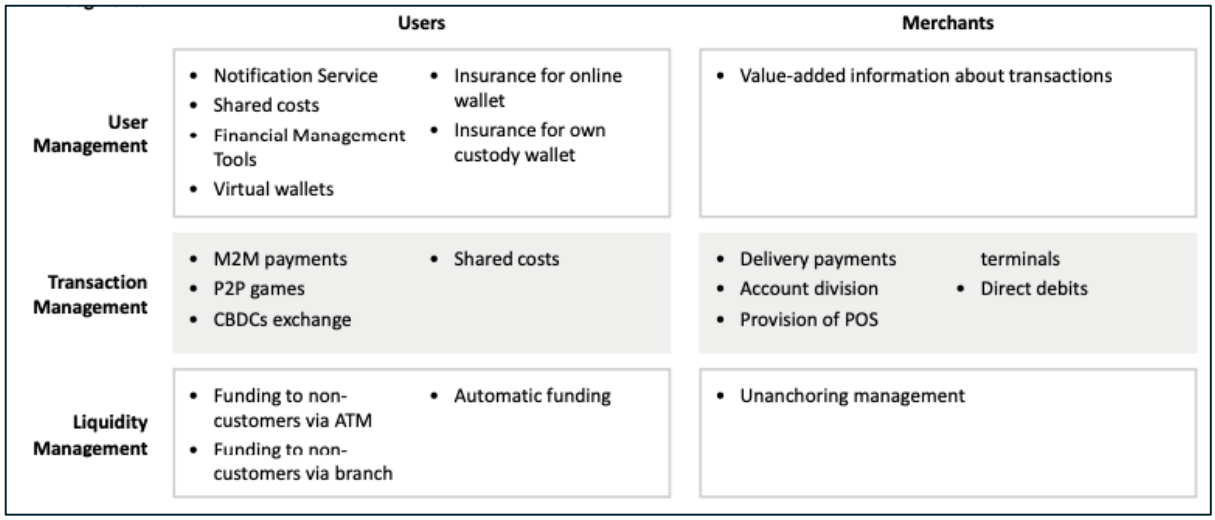

Fig 9 – Potential "value-added" services for D€ to user groups[75] – are these monetisable for banks ? Are there other/better VAS ?

Offline CBDC – the answer?

We see that there is some unclarity on what problem the Digital Euro may actually, really be solving and some significant concerns how to convince customers to use it and how to build a commercial model attractive for banks to distribute it. However, an attractive and viable way forward may actually be found in one particular sub-domain of the retail CBDC.

A clue to this valuable sub-domain can be found in "Central-bank digital currencies: proceed with caution"[77] where it is noted that:

- "Token-based CBDC would compete with private providers of digital payments (such as international credit card companies, PayPal and Alipay)" *which is surely the aim of the ECB*
- whereas account based CBDCs "would compete with traditional bank accounts" *which is surely not the remit of the ECB and should not be their goal*.

Thus, we will further examine offline CBDCs, based upon tokenised money.

The offline CBDC, e.g. a smart card (more generally a Hardware Bearer Instrument HBI[78] or, even more generally, a Digital Bearer Instrument which may be implemented in a hardware smart card or as secure software in a mobile) that can be topped up from one's bank account[79] with Digital Euros (up to a holding limit) is surely a truly modern form of cash. It thus conforms perfectly to the role of the central bank. Instead of

[77] Prof. Bofinger, 29th October 2019, https://www.socialeurope.eu/central-bank-digital-currencies-proceed-with-caution

[78] "Eurosystem experimentation regarding a digital euro - Research workstream on hardware bearer instrument", Deutsche Bundesbank, https://www.bundesbank.de/resource/blob/873282/bd327431598f204c2ebac99f197ce863/mL/eurosystem-experimentation-regarding-a-digital-euro-data.pdf stating that "the digital euro could be implemented as an HBI" and that "this instrument could even support consecutive offline payments" and that "offline transactions can be sufficiently secure" under certain excellent key takeaways

[79] But caution is advised when topping up CBDC wallets with cash due to fraud concerns. Nevertheless, some, e.g. BoE, are saying that they want to assure "the interoperability with existing systems" which would imply funding of CBDC with cash …

handing over printed pieces of paper and milled pieces of metal one taps one's card/phone against another person's and the money is transferred. Thus, old central bank money (notes and coins) can over time be moved to a modern digital form. Physical P2P and POS payments can be effected by tapping phones together, tapping a phone/D€-card on a POS or by exchanging value between smart cards using an intermediary device (see Fig 10).

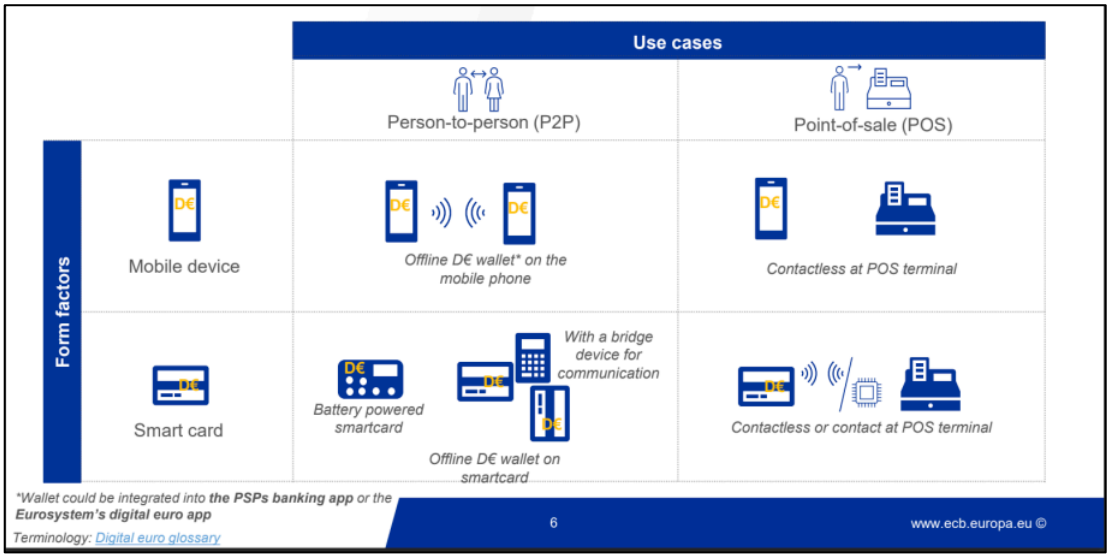

Fig 10 – Offline Digital Euro use cases and scenarios. Source: ECB[80]

Ideally the transfer would be in a tokenised form (see Fig 11) where cryptograms, issued by the ECB, are moved between wallets without the need for bank accounts, clearing & settlement infrastructures, messaging systems etc. or even traditional payment infrastructures. These cryptograms (e.g. 1€ Tokens[81]) can be issued by the ECB[82], just as they issue 1€ coins today, and can freely be exchanged between people and shops. The ECB can revoke tokens, just as they take old banknotes and coins out circulation if they wish to reduce the money supply[83]. This is a complex but highly resilient solution (independent of electricity and wireless networks) and can help to increase inclusion (which is important also in Europe, where 13.5 million adults are still unbanked[84]). Finally, all transactions between people are as private as cash[85]:

[80] ECB, "Progress on the preparation phase of a digital euro", https://www.ecb.europa.eu/euro/digital_euro/progress/html/ecb.deprp202406.en.html

[81] Or even tokens to the value of fractions of Euro, thus at last enabling micropayments – a subject that the industry has so far not been able to realise effectively

[82] The central-banked backed tokens could also be issued by highly regulated private entities under the RBT Reserve-Backed Token model https://www.ingentaconnect.com/content/hsp/jpss/2024/00000018/00000002/art00004. However this seems to add more risks and complexities with little advantage.

[83] Replacing old notes and coins if they are worn out through use or if their security features are no longer up to date will, of course no longer be necessary in the digital world

[84] "ESBG analysis of the Global Findex Database 2021, recently released by the World Bank", 2021, https://www.wsbi-esbg.org/number-of-unbanked-adult-eu-citizens-more-than-halved-in-the-last-four-years/

[85] Since the *online* CBDC will be embedded/managed in/initiated by phones (Apple iPhone, Google Android), accepted at merchant terminals, passed through commercial bank accounts and service providers the customer data of each payment will be shared with numerous parties beyond the ECB. Thus

"The offline functionality is innovative, ensuring a high degree of privacy: payments with the digital euro are made without an intermediary and without an internet connection."[86]

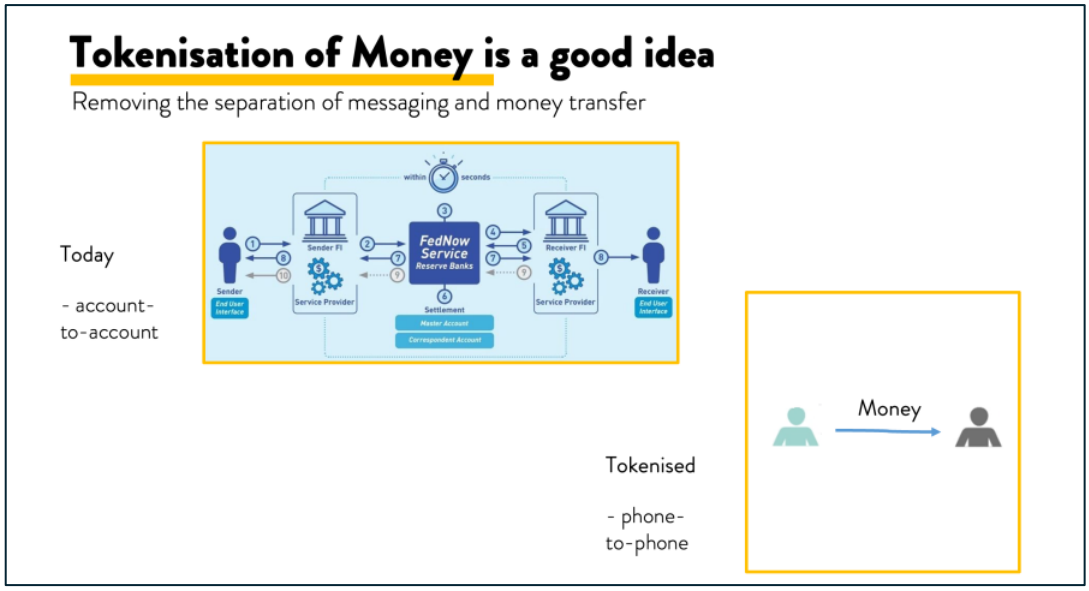

Fig 11 – Modern form of money – moving value directly between people/device/companies/machines
Using Tokens/cryptograms (but not necessarily DLT/Blockchain[87]) to provide "Instant Settlement Finality"

ECB can not ensure privacy and would not be credible to try asserting this. The *offline* CBDC, by contrast, can pass directly from wallet to wallet without intermediaries – and thus has maximal privacy by design. (Although it is not 100% as private as cash since both sender and recipient D€ wallets will be identified by KYC – unlike some other fully offline solutions for low amounts like PaySafeCard (which can even be used on the internet) and the anonymous Geldkarte. These are really as private as cash.)
The reasons why the D€ wallets require KYC (AML/CFT compliance due to more than 150€ per wallet, need to monitor holding limit across each person) are discussed by Godschalk, in "Digital Euro – No Full Anonymity. Why Not?", 15 February 2024, https://paytechlaw.com/en/digital-euro-no-full-anonymity/

[86] Piet Mallekoote, "Digital Euro Preparations Gain Momentum", in CBPN Central Bank Payments News, Vol 7, Issue 6, June 2024, pp 15-19, https://cbpn.currencyresearch.com/blog/2024/06/27/digital-euro-preparations-gain-momentum

[87] „Many also lump together several types … and even worse, also include different technologies, such as smart contracts, into this big ball of mud. But blockchains or smart contracts are not even a prerequisite of tokenisation" as noted by "What, if anything, is a token?", Lars Hupel, Giesecke+Devrient, 22 January 2024, https://www.linkedin.com/pulse/what-anything-token-dr-lars-hupel-lszdf/
However, some influential sources such as McKinsey, "From Ripples to Waves", June 2024, https://www.mckinsey.com/industries/financial-services/our-insights/from-ripples-to-waves-the-transformational-power-of-tokenizing-assets continue to conflate Tokenisation with Blockchain and cite DLT's "benefits" as efficiency, composability and programmability (against separate, siloed repositories – which is an unfair comparison) … although they do note that "the history of blockchain applications is littered with casualties", they also note that successful "technologies … typically exhibit their fastest growth (over 100% annually) in the first five years" whereas Blockchain – has not reached any deployment at scale 17 years later

In this world of tokenised transfer of money, the assets could

- Roam and redistribute themselves *free*ly (just as notes and coins redistribute themselves across an economy without anyone essentially controlling how much anyone has[88]).[89]
- Or, if one wants to keep more control – which would be very advisable[90] for AML/ATF/… reasons - one can impose technical *holding limits* (e.g. each person can never hold more than 3000€ in his smart card).[89]
  However there is a challenge how to manage the limit per person across the multiple wallets (at multiple providers, using multiple form factors and repositories, such as phone and cards).
- Alternatively, one could keep track not only of holdings, but also of all *transactions* using a suitable technology (classical modern distributed database or DLT – whatever has the best scalability, performance[91], privacy, costs, modifiability, environmental impact, predictability, …).

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[88] "Unlike in traditional bank payments, the balance sheets of the involved parties do not change. My CBDC is not on my bank's balance sheet, and neither will it be at the recipient's bank. As far as the central bank is concerned, some money changed hands, but it does not care who is holding it currently (like with cash).", Lars Hupel, Giesecke+Devrient, 15th October 2024, "How to route CBDC payments", https://www.linkedin.com/pulse/how-route-cbdc-payments-dr-lars-hupel-84axf/

[89] Of course this closed system must be extremely secure (e.g. using SE/TEE, not HCE) since any compromise of an entirely offline system would be disastrous. Apple has recently been forced to allow third-party access to the iPhone's secure environment for use of NFC https://www.apple.com/newsroom/2024/08/developers-can-soon-offer-in-app-nfc-transactions-using-the-secure-element/ , however should this still prove technically/commercially/geographically infeasible, secure elements in phones are already widely available using eSIMs https://www.linkedin.com/posts/lars-hupel_cbdc-can-gain-further-adoption-with-esim-activity-7224730639990759424-2fBi https://www.gi-de.com/en/group/press/press-releases/giesecke-devrient-and-mobile-payment-provider-instacash-facilitate-digital-currency-payments-on-feature-phones-in-eswatini have shown the viability of secure CBDC even on basic feature phones operated with USSD instead of smart phones.
Some companies (e.g. Crunchfish based on V-Key) are even asserting that a software SE can be more secure than hardware and have received numerous certifications for this. This would clearly offer many advantages over hardware solutions since a software secure environment does not require specialized components, is device-agnostic, does not require the manufacturer (e.g. Apple) to "open up" their hardware SE, is much easier to distribute and update, etc. However some security experts have expressed doubts https://www.linkedin.com/posts/activity-7245101614422724611-otRN

[90] Drug dealers would very much welcome passing compact D€ offline cards holding 1M€ to eachother instead of sending lorryloads of cash across borders

[91] "non-blockchain payment technology can perform ten times more transactions per second than a high-performace blockchain technology", "costs vary substantially and do not show a clear-cut advantage compared with traditional payment schemes", "costs vary depending on complexity of transaction or the congestion of the network, leading to higher fees", "the transaction costs are higher than those of ATM transactions or the average costs of Visa or Mastercard", "new blockchain technologies address scalability: … PoW blockchains are slower and less scalable, but also highly energy-consuming … new blockchains following PoS or PoW increase speed … however with a tradeoff in scalability, security", showing no advantage of Blockchain/DLT in speed, predictability, costs, security, scalability over classical (e.g. distributed data bases as used in current high-performance payment systems) approaches according to "Stablecoins' role in crypto and beyond: functions, risks and policy", ECB 2024, https://www.ecb.europa.eu/press/financial-stability-publications/macroprudential-bulletin/html/ecb.mpbu202207_2~836f682ed7.en.html

This last option, however, does require the offline CBDC to connect online periodically to update/synchronise the records[92].

Of course, the whole concept of the offline D€ stands and falls whether this can be made fully secure – since any compromise of an entirely offline system would be disastrous. However, prominent vendors assure us that technologies to implement these offline options securely are eminently available[93] [94] [95] and have been shown to be practicably secure and functioning also in large-scale deployments[96]. Clearly this would need to be extensively verified for the CBDC offline wallet through highest level security and penetration tests before any roll-out can be contemplated.

Positive is the fact that banks could find a role in all of the offline variants[97] as distributors of the modern form of cash[98]. Indeed banks and other parts of the payment system may find a positive business case in the use of the offline D€ at POS, thus assuring the support and motivation of the industry here.

Another positive aspect may be found in the B2B space. Most geographies evaluating CBDC, including Europe, are largely ignoring the corporate/B2B space (although it is actually much bigger and more lucrative/significant than consumer payment[99]). Indeed, some aspects of corporate use of D€ are actively disadvantaged (e.g. that D€ funds cannot be held at merchants). However, mostly the texts do not mention the B2B space beyond merchants, i.e. corporates, SMEs, self-employed, etc. Thus one may be able to assume that these – since not explicitly excluded - can use the D€. An attractive use case may be found in M2M/IoT scenarios[100], in corporate fleet management (paying for

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[92] See discusion about "intermittent offline" vs "extended offline" in Cyrus Minwalla et al, Central Bank of Canada, Feburary 2023, https://www.bankofcanada.ca/2023/02/staff-analytical-note-2023-2/

[93] "G+D unveils offline payments tech", 4th July 2024, https://www.finextra.com/newsarticle/44414/gd-unveils-offline-payments-tech

[94] "Worldline selected by ECB for joint prototyping of user interfaces for the offline P2P digital euro", 16th September 2002, https://worldline.com/en/home/top-navigation/media-relations/press-release/worldline-selected-by-ecb-for-joint-prototyping-of-user-interfaces-for-a-digital-euro

[95] "The digital Euro in the Digital Age: Can we really digitise Cash?", Maja Schwarz, NTT Data, 3rd September 2023, Journal of Payments Strategy & Systems, Vol. 17 No. 4, pp398-407, https://www.ingentaconnect.com/contentone/hsp/jpss/2023/00000017/00000004/art00005

[96] A practical example was the Geldkarte with its secure hardware wallet, smart chip, digital signatures etc. which allowed value to be transfered completely offline between its decentralised accounts without any double-spending (not using Blockchain/DLT!) nor any security issues. This system was eminently secure and the reasons for its eventual failure as a business/maket proposition were not technical.

[97] Examples are: "The Regulated Internet Of Value", https://www.citibank.com/tts/insights/assets/docs/articles/2031240-Regulated-Internet-Value.pdf "The Regulated Liability Network" https://regulatedliabilitynetwork.org/ and also commercial opportunities e.g. with CBDC ATMs (just as cash ATMs) can be explored for banks

[98] As the use of cash for payments is being reduced, the unit costs for the remaining cash (distribution, security, ATM management) are ever increasing for banks, thus an offline D€ could not only offer new revenue opportunities in distribution and management, but also reduce the remaining physical cash costs

[99] B2B accounts for ca. 80-90% of the value of all payments (consumer payments have the larger volume) and provides the biggest revenues according to all reports from McKinsey, CapGemini, Bain, etc.

[100] As currently forseen by law, the D€ will however be permitted only for "presence" payments. I.e. putting a pre-paid/offline D€ into a fridge to allow it to order goods autonomously (up to the prepaid limit) will be prohibited. This sadly kills applications in M2M, B2, IoT etc for the D€.

petrol and tolls), etc where prepaid solutions are often the method of choice and hence favour the offline D€.

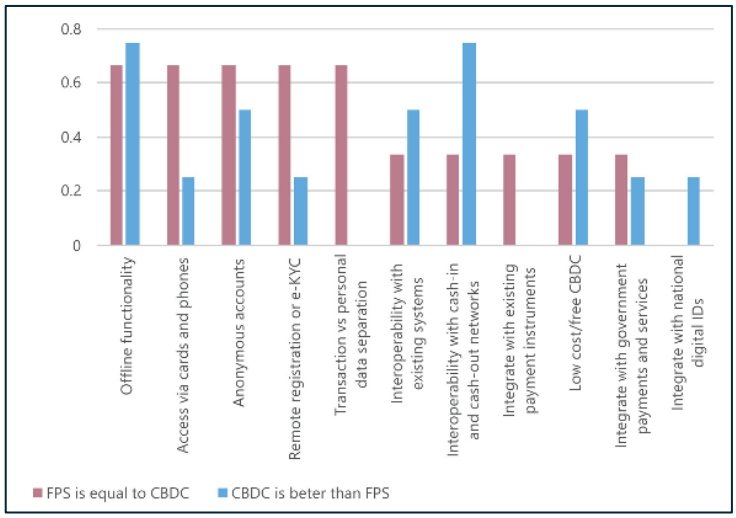

Fig 12 – In the BIS Survey[105] "offline" is the leading category where CBDC is considered better than "normal" faster payments. In the context of Project Polaris[101], 49% of central banks consider offline payments with retail CBDC to be "vital", while another 49% deemed it to be "advantageous" – i.e. all think this is a good idea.

A concern that does still need to be addressed for the offline wallet scenario is that historically almost all such pre-paid e-purses have failed globally. Geldkarte[102], Proton, Mondex[103], Avant[104], Dinero Electrónico[105] etc. were all spectacular failures. Academics have studied and evidenced this phenomenon systematically[106]. The empirical evidence was thus against the offline D€. However, technology has since moved on[107] and maybe the offline Digital Euro can join the ranks of major e-wallet successes like those of

[101] "Project Polaris: Handbook for offline payments with CBDC", BIS, 11th May 2023, https://www.bis.org/publ/othp64.htm

[102] The German pre-paid card "Geldkarte" was introduced 1996 and closed 2024, never having achieved any significant adoption (0.1%) despite huge investments in cards, terminals, communication over many years, https://www.spiegel.de/netzwelt/tech/geldkarte-von-den-kaeufern-verschmaeht-a-60536.html

[103] The 1990s Mondex scheme: the Mondex purse, on a smart card, carried up to five currencies, against reserves at central banks, https://chyp.com/2021/07/13/mondex-memories-and-cbdc/ by Neil McEvoy

[104] Aleksi Grym, "Lessons learned from the world's first CBDC", Bank of Finland, August 2020, https://www.econstor.eu/bitstream/10419/224448/1/1733131086.pdf

[105] Sally Chen et al, BIS, Journal of Payments Strategy & Systems Vol. 17 No. 4,pp 408-421, "Beyond Technology: Considerations for rCBDC adoption", https://www.ingentaconnect.com/contentone/hsp/jpss/2023/00000017/00000004/art00006

[106] Leo Van Hove's multiple publications on the subject e.g. "Electronic purses: (which) way to go?", First Monday, Vol. 5, Nr. 7, July 2000, https://firstmonday.org/ojs/index.php/fm/article/view/770/679 saying "initial expectations about consumer uptake and retailer acceptance of e-purses were unrealistic ... the initial euphoria has faded away ... Today, things look even bleaker"

[107] See Kantar, "Study on Digital Wallet Features", March 2023, https://www.ecb.europa.eu/euro/digital_euro/timeline/profuse/shared/pdf/ecb.dedocs220330_report.en.pdf which conducted focus group sessions with "general population, tech-savvy, underbanked, and merchants" to assess each of their their affinities to modern Digital Wallets. However most noted that situations for offline use cases are rather limited, so thought they would rarely use this option.

Starbucks[108], Suica/Pasmo[109] in Japan, Octopus in Hong Kong or further Asian wallets like Alipay/WeChatPay in China[110].

Indeed, looking more internationally beyond Europe, the offline D€ could be a very attractive proposition for people in developing economies with unstable currencies. Instead of jumping from the frying pan into the fire (going from local/corrupt money to crypto[111] [136], losing all their money), unbanked people from developing countries (see Fig 13) could use Euros backed by the European Central Bank. A CBDC-card (or phone) could be tapped onto that of another family member or merchant – even in the depths of sub-Saharan Africa without electricity or internet (see Fig 14). Although politically sensitive, would promote the Euro as an international currency and also has advantages for the local population there. China is already in the process of making its currency, the Renminbi, more dominant in developing countries[112] [113] with quite some success[114] [115] also due to its Digital Yuan eCNY[116] (see Fig 4). The US has left the race for CBDC[128], thus Europe could offer a strategic alternative for the benefit of developing nations and for its own geopolitical agenda.

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[108] Starbucks e-wallets held ca 1.5bn$ in 2021 – which means they held more assets than 85% of US banks, https://fieconsult.com/starbucks-a-bank-that-sells-coffee-the-epitome-of-digital-wallets-strategy/ 19th August 2022 – however these are, of course, closed wallets, not open to all merchants

[109] These remain successful proprietary systems, unlike the Oyster card in UK which moved to an open system based on EMV standards and thus also allows use of normal contactless bank cards

[110] Alipay and WeChatPay each have more than a billion active users https://docs.stripe.com/payments/alipay & https://www.businessofapps.com/data/wechat-statistics

[111] "HyperVerse crypto scheme targeted developing countries before collapse left some investors 'suicidal'", The Guardian, 23 January 2024, https://www.theguardian.com/technology/2024/jan/24/hyperverse-crypto-scheme-targeted-developing-countries-before-collapse-left-some-investors-suicidal

[112] "Renminbi ascending: How China's currency impacts global markets, foreign policy, and transatlantic financial regulation", Chris Brummer, 22 June 2015, Atlantic Council, https://www.atlanticcouncil.org/in-depth-research-reports/report/renminbi-ascending-how-china-s-currency-impacts-global-markets-foreign-policy-and-transatlantic-financial-regulation/ on RMB Internationalisation

[113] "China plans to have its currency rival the dollar", Krysten Crawford, Stanford Institute for Economic Policy research (SIEPR), 19 August 2022, https://siepr.stanford.edu/news/china-plans-have-its-currency-rival-dollar-new-study-assesses-its-prospects where Matteao Maggiori suggests the RMB may be a viable contener to the US Dollar

[114] "The renminbi is becoming increasingly popular in Africa", China Global Television Network CGTN, 17 August 2018, https://news.cgtn.com/news/3d3d514e3455544e79457a6333566d54/index.html

[115] "Chinese yuan penetrates African markets - Could it be the next global reserve currency?, UN Africa Renewal, August 2014, Tonderayi Mukeredzi, https://www.un.org/africarenewal/magazine/august-2014/chinese-yuan-penetrates-african-markets

[116] „Africa and the Digital Yuan: Helping China Break U.S. Hegemony Over the Global Financial Order", Afronomics Law, Fernando Saldivar, 17 December 2021, https://www.afronomicslaw.org/category/analysis/africa-and-digital-yuan-helping-china-break-us-hegemony-over-global-financial stating that the proportion of RMB settlement across the continent rose from 5% on 2015 to 12% in 2018.

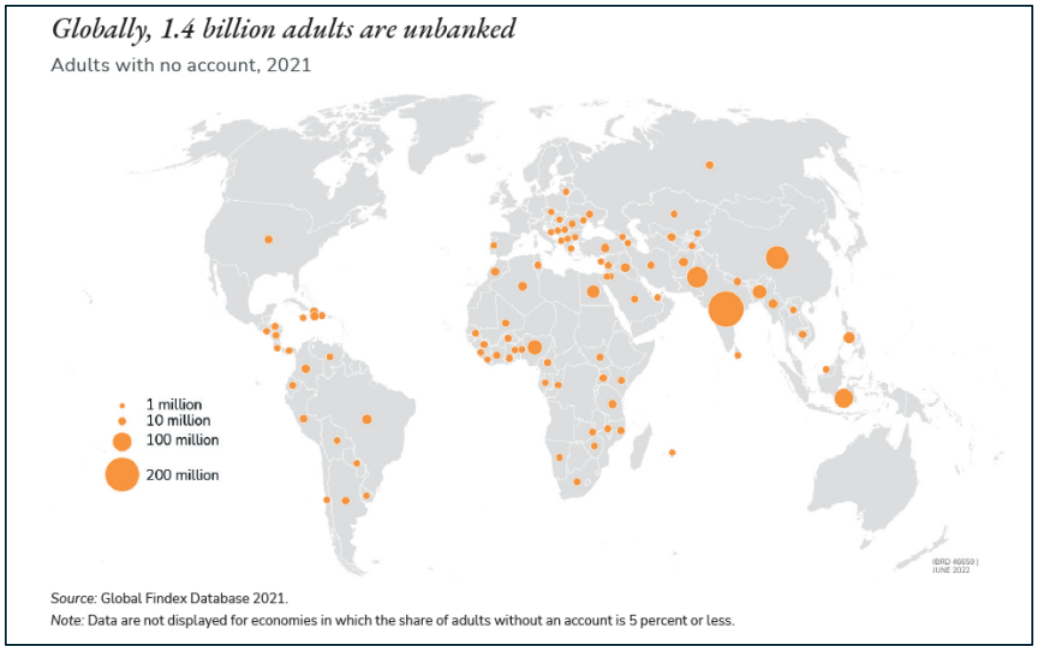

Fig 13 – Over 1bn unbanked people, especially in developing countries, could benefit from a modern form of cash: stable, private, with no need for electricity or internet - such as offline CBDC from Europe
Source: World Bank[117]

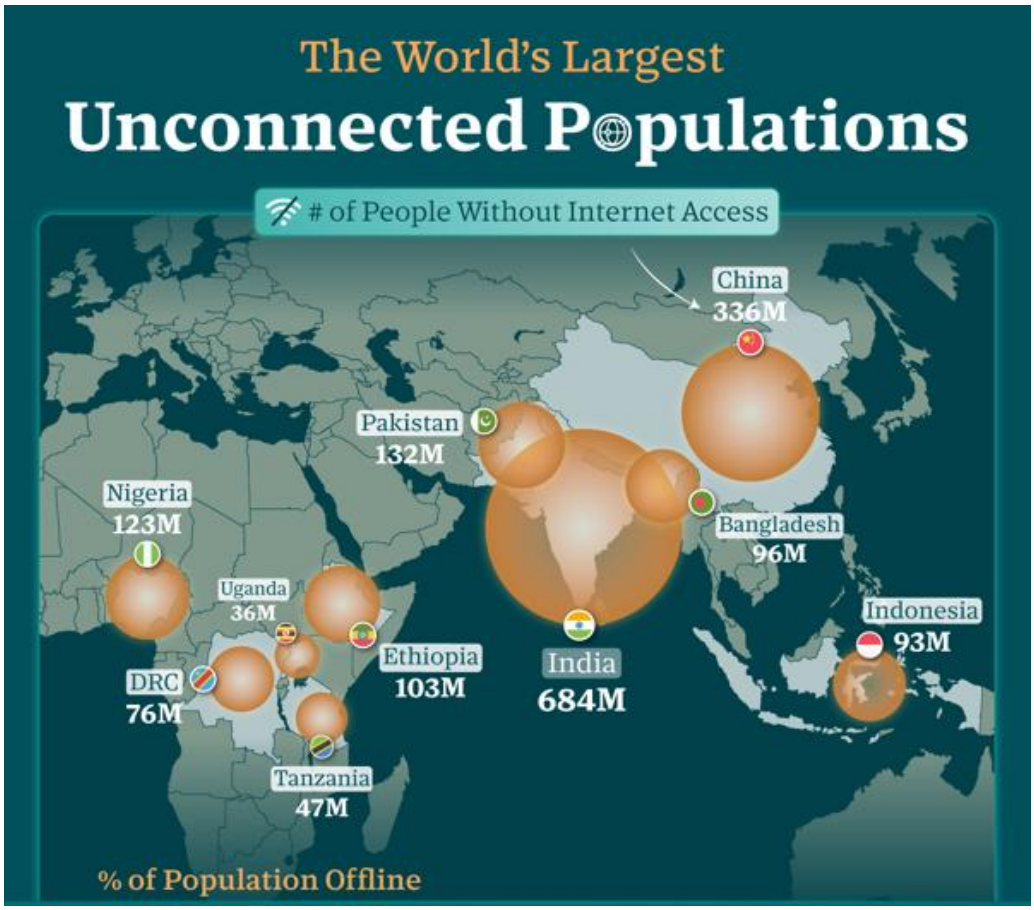

Fig 14 – Populations not connected to the internet[118] – where offline payments are therefore the only option.

[117] "The Global Findex Database 2021", https://www.worldbank.org/en/publication/globalfindex/Report
[118] "The World's Largest Unconnected Populations", 8th November 2024, https://www.visualcapitalist.com/the-worlds-largest-unconnected-populations/

In summary an offline Digital Euro

- Conforms with the ECB's role as a provider of cash – not establishing a state-driven competitor to emerging industry-driven multi-country payment solutions such as EPI, EuroPA[119], EMPSA[120], SPAA/giroAPI, EAPS 2.0[121], SepaR2P, etc.
- Enhances the sovereignty of the Euro, also internationally.
- Ensures the maximum privacy (like cash) as an intrinsically offline means of payment.
- Provides the basis for a business case for banks, ensuring key stakeholders are motivated to distribute it (unlike the online CBDC, which negatively impacts banks and potentially the wider economy[122]).
- Increases financial inclusion in Europe and internationally.
- May be a basis for M2M/IoT/fleet management payments and other areas in the B2B space where prepaid is the method of choice.
- Does not double or triple the number of transactions[25] (as is the case with online), hence is more efficient and aids the sustainabilty goal.
- Takes the wind out of the sails of populist parties who scare the population about the abolition of cash[123] (by showing that cash is now actually being *reinforced* in a modern way).
- Is simple to use and understandable for the average consumer (unlike the online CBDC, where consumers have a normal Euro in their mobile banking as well as a central bank Euro, which is confusing and unnecessary).
- Paves the way for the wider introduction of modern tokenised money.

Thus, the offline CBDC may thus be the best and perhaps the only viable path to pursue.

[119] SIBS (Portugal), Bancomat (Italy), Bizum (Spain) interoperability initiative https://thepaypers.com/expert-opinion/mobile-payment-southern-europe-moves-towards-interoperability--1267582

[120] Blik (Poland), Swish (Sweden), Twint (Switzerland), Vipps (Nordics), Bancomat (Italy) etc interoperability initiative https://empsa.org/ - now also with Alipay (China) https://www.linkedin.com/feed/update/urn:li:activity:7217414616639782912/

[121] German girocard interoperability in France https://www.linkedin.com/posts/french-sys_girocard-payment-frv6-activity-7135259480618889217-k44d

[122] https://www.linkedin.com/posts/activity-7151499739992080384-ZKlG/

[123] See panel with Prof. Bofinger and Bundesbank on 11th July 2024 at https://www.bundesbank.de/de/aufgaben/themen/der-digitale-euro-podiumsdiskussion-mit-joachim-nagel-und-peter-bofinger-935492

Summary

Politically the Digital Euro is clearly "doomed to success"[124] since the ECB/Eurosystem will not stop (after the gigantic investments, promises and developments) until the D€ is a "success" (however that may be measured). The D€ is, after all, a fundamentally *political* project to retain control of the monetary system. Maybe this is a good approach: there are several example of agendas[125] that have been pushed by regulators, against much opposition, raising many concerns, which ultimately ended up being of benefit to all. The best strategy may be to accept the inevitable, make it work and see how each actor can profit the most form it. Resistance is futile.

But the game is not over yet. Some other geographies are having another think, notably

- UK ("A solution in search of a problem"[126], recently decided to explore only Wholesale CBDC[127])
- US (who recently passed the "CBDC anti-surveillance act" blocking a central bank digital currency[128] also after scathing remarks on CBDC by the Federal Reserve[129] and more recently confirmed by Trump[130])

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[124] As [25] notes, "Given the large financial and intangible investments that the ECB has already made in this project, it is unlikely to be politically possible for it to get off the train again." They conclude "The ECB's commitment to its D€ project is unparalleled … the ECB has embarked on a dangerous adventure with high costs for the taxpayer and high risks for its reputation."

[125] In the payments domain: SEPA, Instant, etc. … in other domains: car safety belts, food labelling, etc. … were all initially much resisted by the relevant industries before they were later embraced for the benefit of all, including/especially the industries themselves

[126] Lord King, ex-Governour of the Bank of England stated on 2nd August 2024, in an interview https://youtu.be/gnGOFvzMO6I?si=CL_cldbZzUjM4IPk&t=4479 "CBDCs do not have much of a role in most advanced economies. We have a competitive commercial banking system that offers the benefits of competition, better services, cheaper services and is digital (all my banking transactions I make through my computer). I don't need a CBDC to do that … So there is no particular value in it. But there are some dangers … deposits would flow immediately to CBDC unless the central bank would say "You can't hold more than a certain amount" in which case what is the point? And for wholesale (banks, institutions) we already have a CBDC … reserves with a central bank held by financial institutions play the role of a wholesale CBDC. All of which adds up to the conclusion 'A solution in search of a problem' (see House of Lords Report https://committees.parliament.uk/committee/175/economic-affairs-committee/news/160221/central-bank-digital-currencies-a-solution-in-search-of-a-problem-report-published/ of 13th January 2022).
We have enough things to worry about … let's not spend time on CBDC"

[127] "Bank of England discussion paper on innovations in money and payments", 20th August 2024, https://www.jdsupra.com/legalnews/bank-of-england-publishes-discussion-1864599/

[128] "US House of Representatives pass Republican-led anti-CBDC bill along partisan lines", MK Manoylov and Sarah Wynn, 23 May 2024, The Block, https://www.theblock.co/post/296361/us-house-of-representatives-pass-republican-led-anti-cbdc-bill-along-partisan-lines

[129] "US Fed Governor Bowman: CBDC Benefits Remain Unclear, Could Pose Significant Risks", G Dowd Law, 17th October 2023, https://gdowd.law/2023/10/us-fed-governor-bowman-cbdc-benefits-remain-unclear-could-pose-significant-risks/ and, to cite just one other voice, Fed chairman Jerome Powell testified before Congress on 7th March 2024 saying that they are "nowhere near taking action … nothing like that is remotely close to happening anytime soon … we're a very long way from even thinking about it"

[130] Executive Order of 23rd Jan 2025 "Strengthening American leadership in digital financial technology" bans CBDCs in the U.S. – it even potentially means that US Banks connote even "use" or "circulate" any (also foreign) CBDC https://www.linkedin.com/posts/ojmandeng_cbdc-crypto-stablecoin-activity-7288608244548186113-iUvS/

- The Bank of Canada, after many years of research, has now shelved their CBDC[131], the South African Reserve Bank has been publicly doubtful about the retail CBDC ("Standard Bank CEO worries retail CBDC could be unfair competition"[132]), instead exploring mainly wholesale CBDC for interbank settlement, the same is true of others like the Reserve Bank of Australia [133] with Project Acacia[134] who say there is no case for the retail CBDC
- Even voices in the EU e.g. the Spanish member of European Parliament publically[135] advocating for a "wholesale, not retail" Digital Euro; indeed the whole European Parliament in their paper "Digital Euro: When in doubt, abstain"[72] raise significant concerns:

  > "Launching a digital euro would put the ECB in a new position: that of offering a new payment instrument in competition with banks and other payment service providers (PSPs). It is not clear that there is a market niche for a D€, nor that a D€ would have a good chance of establishing itself in today's highly diversified, competitive, innovative, and fast-moving retail payment industry.
  >
  > ... the ECB should continue its exploration, including a testing phase, but in the end not launch a D€ unless new elements emerge strongly supporting such a decision. At the present time, the risks and imponderables of this enterprise are stronger than the arguments in favour of it."

- early adopters like El Salvador[136] (who rejected CBDC after their disastrous foray into trying to make Bitcoin legal tender), Nigeria (whose eNaira, after massive push[137] for years is now only being used by 0.5% of Nigerians[138] despite more than 50% of the population having already fallen for crypto[139]), Eastern

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[131] https://www.cbc.ca/news/business/bakx-boc-cbdc-digital-currency-1.7326887, 18th September 2024
[132] https://www.ledgerinsights.com/standard-bank-cbdc-unfair-competition/, 17th March 2023
[133] https://www.finextra.com/newsarticle/44753/australia-gives-priority-to-wholesale-cbdc-over-retail, 19th September 2024
[134] https://www.rba.gov.au/speeches/2024/sp-ag-2024-09-18.html
[135] Mr Navarrete, Coordinator of Economic and Monetary Affairs ni the largest political group in the European Parliament, in his article on 12th November 2024 (in Spanish press "Euro digital y BCE: activismo digno de mejor causa" - Digital Euro and ECB: activism worthy of a better cause), advocates for a "wholesale, not retail" Digital Euro (as other countries are pursuing), on the basis of cost, disruption of private solutions and also financial stability https://www.linkedin.com/posts/fernando-navarrete-rojas_ciertamente-mejorar-la-eficiencia-de-los-activity-7268609724009369600-zOce
[136] The Conversation, „One year on, El Salvador's Bitcoin experiment has proven a spectacular failure", 11th September 2022, https://theconversation.com/one-year-on-el-salvadors-bitcoin-experiment-has-proven-a-spectacular-failure-190229
[137] In a rather desperate move to compel its people to eNaira, the government caused cash shortages in the country. Although this resulted in protest, riots and unrest it did also initially resulted in a 12-fold increase in eNaira wallets. But to this day 98.5% of eNaira wallets have not been used even once.[25]
[138] https://theconversation.com/enaira-nigerias-digital-currency-has-had-a-slow-start-whats-holding-it-back-209470#:~:text=The%20eNaira%20was%20launched%20in,year%20after%20it%20was%20launched
[139] Jookyung Ree, "Nigeria's eNaira, One Year After", IMF Working Paper No. 2023/104, https://www.imf.org/en/Publications/WP/Issues/2023/05/16/Nigerias-eNaira-One-Year-After-533487

Caribbean Currency Union/Bahamas, India[140], Jamaica all experienced very poor adoption and 20 other countries are now inactive or have cancelled their CBDC engagements. Even China – despite its massive push of the eCNY - is not seeing the hoped-for adoption[141] [142] [143] [144]. Only Russia sees an opportunity in CBDC - in circumventing sanctions.[145]

As a prominent worldwide analysis[25] concludes: "So far there is not a single CBDC success story" … "in contrast to reports that more and more countries are engaging in CBDC, most central banks have a rather skeptical and often negative attitude towards CBDC … this finding is supported by the recent BIS survey which shows that the number of central banks which are planning to introduce a retail CBDC in the medium term in declining". Thus they conclude "ECB is an outlier … and should therefore prepare for the failure of its project and consider how to deal with it in a way that limits the damage to its reputation."

These are coming out against the mainstream hype towards CBDC[146] and now maybe spending their central banks' time, money and resources maybe more wisely, especially

[140] The e-Rupee's adoption has fallen to 1/10th, so the central bank RBI is now bringing in Google, Amazon, Walmart to increase adoption – which may work, but will further reduce strategic autonomy, "Google, Amazon, Walmart seek to join Indian cenbank's digital currency project", Reuters, 5th August 2024, https://www.reuters.com/business/finance/google-amazon-walmart-seek-join-indian-cenbanks-digital-currency-project-sources-2024-08-05/

[141] "What's next for China's digital currency?" says "Almost three years later it seems the government is still struggling to find compelling applications for it, and adoption has been minimal", in MIT Technology Review, 3 August 2023, https://www.technologyreview.com/2023/08/03/1077181/whats-next-for-chinas-digital-currency/

[142] South China Morning Post, 4th March 2023, "China's ambitious e-CNY plan faces a giant hurdle" https://www.scmp.com/tech/policy/article/3212245/chinas-ambitious-e-cny-plan-faces-one-giant-hurdle-winning-over-1-billion-consumers-home

[143] the private sector's Alipay and WeChatPay – and not the government's CBDC - still handle over 98% of the country's mobile payments https://www.hoover.org/research/digital-currencies-us-china-and-world-crossroads

[144] Although 1 in 8 Chinese people have downloaded a digital RMB Wallet, the recent central bank publication did note even mention the digital RMB, https://www.ledgerinsights.com/one-in-eight-chinese-people-have-a-digital-rmb-wallet, 11 October 2024

[145] "Russia's official backs CBDC as key tool for business to dodge sanctions", citing the deputy chairman of the State Duma's economic policy committee in https://crypto.news/russias-official-backs-cbdc-as-key-tool-for-business-to-dodge-sanctions-report/ of 27th January 2025

[146] Over 130 countries are currently exploring CBDC, most of them in the "research" phase https://www.atlanticcouncil.org/cbdctracker/

on making the *existing* Fiat money system[147] better[148] rather than inventing a parallel/competing infrastructure[149].

Indeed, the ECB seems intent on simultaneously being the issuer (of new payment object[150], new payment instruments[151]), the operator (of the new N€XT infrastructure platform, the new DESP Digital Euro Service Platform and of the ECB's own TARGET platform) and the supervisor. This is clearly a very unhealthy concentration of power which has rightly been opposed[152] in the private sector.

Conclusion

The topic of CBDC is extremely extensive and multi-dimensional, so here we were not able to touch on many aspects, also the interesting dimensions of store-of-value/synthetic CBDC[77], or wholesale CBDC (which may improve cross-border payments[153] – a nut that the industry, G20, and others have been trying to crack for

[147] Better to leverage Europe's true assets: SCTinst (i.e. instant payment between all accounts), IBAN (standard addressability of all accounts), APIs (standard access by third parties to all payment accounts to enable Fintech innovation), EUID (for standard private & public attribute verifiction, onboarding, authentication), etc. – an infrastructure that most other countries, incl US, can only dream of - by adding standard QR, European card, pan-European wallet, etc. This would address the remaining failings, for example that the EU is the only major economic region in the world not to have a unified POS system.
As [25] notes, "it is surprising that the ECB does not even mention the alternative approach of creating a pan-European payment system based on existing infrastructures. A natural candidate is the SEPA Instant Payment System, as the ECB explicitly acknowledged 2019. As the European Payments Initiative argues, the D€ scheme does not offer any new value compared to SEPA Instant Payments. This approach could achieve the ECB's objectives"
They also note that "... the dominance of the US payment platforms ... can be regarded as a market failure ... it is not obvious whether ... the D€ would be the best solution to this problem."
[148] M. Salmony, "Do we need another dollar, euro, pound or yuan? How to create the right ecosystem for a successful central bank digital currency" in special edition on "Next Steps for Digital Currencies" of the Journal of Payments Strategy & Systems, JPSS, Henry Stewart Publications, March 2023
[149] Tony McLaughlin, „Tokenizing Commercial Bank & E-Money", Banct Whitepaper, "Fiat 2.0 – Cryptopia or Fiatland", https://www.citigroup.com/tts/insights/articles/article25.html
[150] Some say the D€ is effectively a new kind of money/currency. Although interchangeable at 1:1 with the Euro and issued by an authority that has already issued another currency, the digital Euro has different structure, legal framework (see new D€ law, including the enforcement to be legal tender), has own schemes (see exxtensive new rulebooks and new settlement platform), its monetary supply will be separately controlled, its interest rate (zero) is different, etc thus one can say that this is indeed effectively a new currency
[151] New card, new app, new QR-code, etc – maybe some in cooperation with the private sector
[152] For example, the Interchange Fee Regulation (IFR), specifically Regulation (EU) 2015/751, which came into effect in December 2015, rightly requires the separation of scheme and proessing so as not to stifle competition by powerful players
[153] M. Salmony, "CBDC: The silver bullet for cross-border payments?" in Trade Finance Global, 25 October 2023, https://www.tradefinanceglobal.com/posts/cbdc-the-silver-bullet-for-cross-border-payments/

decades) – which is garnering increased attention[154], also in Europe[155]. But in summary we can say that there are severe risks for retail CBDC and specifically the Digital Euro project. We have evidenced that there currently is no clear focus and that there is a very unhealthy competition between the state and the private sector which will likely mean failure for both sides. We conclude that a narrow focus on solving a real problem, which is the evolution of physical cash, based on a private/public partnership model where all sides benefit is the best and maybe only viable path to pursue.

So the answer to this paper's title "Can the Digital Euro be made attractive to all key stakeholders?" is clear: if the policy goals are defined in a realistic and focused manner, if a public-private partnership model is designed to provide benefits to all stakeholders, then, yes – CBDC and specifically the Digital Euro (maybe beginning with the offline version with the many clear advantages explored above) can become yet another example where Europe leads the world in finance infrastructure, regulation and payments[156].

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[154] "the banks are now shifting focus to wholesale", "likelihood that central banks will issue a CBDC within the next six years is now generally greater for wholesale than for retail CBDC" according to BIS https://www.finextra.com/newsarticle/44327/wholesale-not-retail-cbdcs-more-likely-to-be-issued-in-near-term---bis?utm_medium=dailynewsletter&utm_source=2024-6-20&member=141534 report "Wholesale, not retail, CBDCs more likely to be issued in near-term"

[155] "Wholesale CBDCs in the Eurosystem", Viktoria Liehmann, 14th November 2024, https://www.der-bank-blog.de/die-zukunft-der-digitalen-zentralbankwaehrung/mobile-payment/37715208/

[156] Europe has a long history of leading the world on global infrastructures and regulation: from GSM for mobile in the 1980s, to GDPR for privacy, first to regulate Open Banking, … all becoming global standards. More recently Europe is leading the world in pervasive, instant, fully-addressable payments[147] for all its 750 million inhabitants, and has now defined and is rolling out a new world-leading identity infrastructure to become the next global phenomenon.