EUROPEAN CENTRAL BANK

EUROSYSTEM

DIGITAL EURO

Cash in a digital age

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DIGITAL EURO FOUNDATIONS

Current state of play

After 25 years, the euro prepares for the digital age

Digital payments: on the rise*

From 2019 to 2022:

- Cash payments fell from 72% to 59%**
- Card payments rose from 25% to 34%**, of which most were contactless
- Online purchases rose from 6% to 34%**

A digital euro: bridging the gap

- Complementing physical central bank money
- Integrating central bank money and modern payment trends
- Ensuring the euro remains fit for purpose in the digital age

* Study on the payment attitudes of consumers in the euro area (SPACE), ECB, December 2022.
** As a proportion of total payments

Policy justifications of digital euro

Preserving the current role of central bank money in a digital age

1. anchor: commercial bank money is in essence a convertibility promise into central bank money, i.e. relies on the co-existence. In practice, daily convertibility test holds together the monetary system across issuers; is also a basis of financial stability

2. Payments is not just any function in modern society, but THE function required to have one. It therefore seems natural to keep also a public instrument controlled by society.

3. Choice: additional choice for citizens (designed from a public good perspective), which moreover limits potential abuse of market power by dominant private firms

No reason that the central bank would not update the form of central bank money; that it would be the only one staying with 17th century technology forever; that it would not react to changing preferences of citizens on how to pay (checks and bills of exchange have disappeared as well)

Strategic independence of Europe in view of geo-political deterioration (resilience; sufficient availability of payment solutions under European control

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Private providers at the frontline of distribution

Balancing central bank and commercial money

Intermediaries would play a key role in digital euro distribution

Distribution via supervised payment service providers (PSP)

- **Digital euro distribution** would be carried out **exclusively by PSPs**
- PSPs would exclusively maintain **customer relations**
- PSPs would benefit from **digital euro open standards**

Healthy equilibrium between central bank money and commercial money

- **Holding limits** for end users (none for corporates)
- (Reverse) **waterfall functionality**
- **No remuneration** for digital euro users

A digital euro would provide pan-European rails for private solutions…

…offering **a platform for innovation**, based on which private providers can build value-added services

…enabling private retail payment solutions to **leverage digital euro infrastructure** for pan-European reach

…reducing our **dependence** on other non-European players

A scheme to ensure usability across the euro area

Rulebook Development Group (RDG)

A **digital euro rulebook** would establish **common standards** to:

- Ensure **pan-European reach** and a **harmonised payment** experience
- Give **market participants** the **freedom** to develop innovative solutions
- Enable domestic instant payments solutions to also achieve **euro area reach**

A digital euro scheme is being defined with **broad market involvement** in order to represent society at large:

- **Intermediaries**
- **Retailers**
- **Consumers**

The progress made: from foundations to specifics

Digital euro rulebook [1st draft]

- **Document information**
- **Digital euro scheme scope and interplay**
- **Functional and operational model**
  - High-level E2E flows
  - Identification and authentication
  - Dispute management principles
- **Adherence model**
- **Technical scheme requirements**
- **Defined terms and conditions**
- **Annexes**
  - User journeys
  - Detailed end-to-end flows
  - FAQ

Digital euro rulebook [2nd draft]

- **Document information**
- **Digital euro scheme scope and interplay**
- **Functional and operational model**
  - Minimum UX standards
  - Dispute management
- **Adherence model**
- **Technical scheme requirements**
  - Interface standards and specifications
- **Risk management**
- **Scheme management**
- **Defined terms and conditions**
- **Annexes**
  - Branding standards
  - Detailed technical specifications, implementation guidelines, certification-related documentation

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Holding limits

Holding limits and design features of digital euro

Holding limits per user will contribute together with other design choices to make the digital euro primarily a means of payment rather than a store of value

- **Zero remuneration**: digital euro will not be remunerated, just like cash
- **"Reverse waterfall" functionality**: people can link digital euro to a payment account, such that they do not need to hold large amounts of digital euro to be sure they can always make payments
- **Zero holding limits for merchants:** merchants would not be able to hold digital euro, without constraining their ability to accept digital euro ("waterfall" functionality)

Design impacts on macro-economic and financial stability implications of digital euro

- "Macro-economic modelling of CBDC: A critical review" U. Bindseil and R. Senner, April 2024
- "The digital euro after the investigation phase: Demystifying fears about bank disintermediation", U. Bindseil, P. Cipollone and R. Senner, February 2024

Figure 1: Financial accounts impact of CBDC as in CPMI-MC (2018) and Bindseil (2020)

Households					
Other Assets			Household Equity		
Sight deposits	+ DIG	- CBDC2			
Savings + time deposits			Bank loans		
CBDC		+CBDC1+CBDC2			
Banknotes	- DIG -CBDC1				
Commercial Banks					
Other assets			Sight deposit	+ DIG	- CBDC2
Central bank deposits			Central bank credit	- DIG	+ CBDC2
Central Bank					
Credit to banks	- DIG	+ CBDC2	Banknotes issued	- DIG -CBDC1	
Other assets			Deposits of banks		
			CBDC		+CBDC1 +CBDC2

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Offline digital euro

Use cases, (de)funding and integrity check, delivery considerations and POS strategy

Use cases: overview

Form factors	Use cases: Person-to-person (P2P)	Use cases: Point-of-sale (POS)
Mobile device	*Offline D€ wallet* on the mobile phone*	*Contactless at POS terminal*
Smart card	*Battery powered smartcard* *Offline D€ wallet on smartcard* *With a bridge device for communication*	*Contactless or contact at POS terminal*

Wallet could be integrated into **the PSPs banking app or the **Eurosystem's digital euro app***

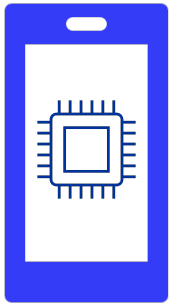
Terminology: Digital euro glossary

Provision of digital euro offline solution

PSPs are responsible for **distributing the payment instrument** to user and for **its maintenance**.

Digital euro offline smart card:
Delivered physically (proximity / mail)

Digital euro offline mobile solution:
Installed on Secure Element of mobile device



On mobile devices, the offline solution offers instant installation without delivery wait, but involves technical complexity

Funding and defunding of digital euro offline wallet

Digital euro user

(de)funding operations

always online!

Possible sources

Cash

Private money

Online digital euro

Possible funding methods

ATM

Bank branch

POS terminal

Depending on the user's form factor:

using the same device

via a secondary device providing physical connectivity (e.g. mobile phone, ATM, POS terminal)

AML and forgery check during (de)funding operation

Offline payments do not involve sharing transaction data with PSPs, the Eurosystem or any potential providers of supporting services, except for what may be required to avoid forgery of digital euro.

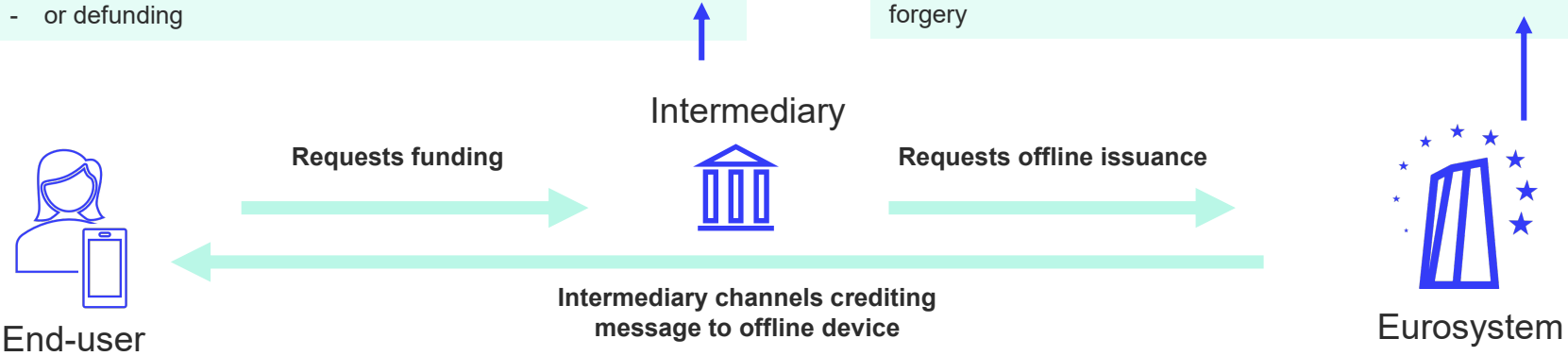
The draft legislation provides for a high level of privacy for low-value offline payments, which are treated as cash-like proximity payment

Anti-money laundering check seeing:

- Amount (de)funded
- Identifier local storage device
- The date and hour of the (de)funding transaction;
- Accounts number of online account used for funding
- or defunding

System security and integrity check

To make sure that the funds recirculating back to the digital euro system are genuine and to detect possible double spending and fraudulent currency, Eurosystem to receive the minimum amount of data* compatible with the need to detect forgery



*This data would not enable Eurosystem to identify individuals

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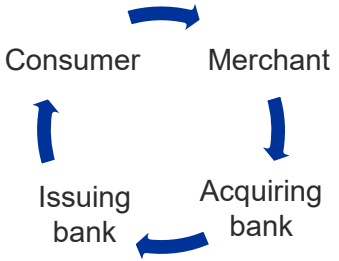
Compensation model

Subject to legislation

A fair and balanced compensation model* for digital euro

4-party model



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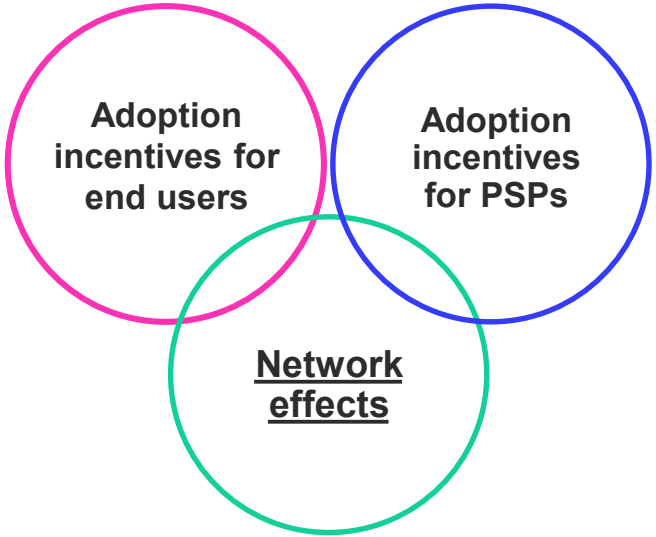
Public good features

- Wide **usability** across the euro area
- **Free** for basic use by individuals
- Eurosystem bears its **own costs**
- **Safeguards for merchants**



* Subject to digital euro legislation.

Compensation model provisions according to the draft legal act

Core compensation model principles

- Wide **usability** across the euro area
- Eurosystem bears its **own costs**
- **Free** basic use by individuals
- **Safeguards for merchants**

Reported cost for digital euro provision
+
Reasonable profit margin

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Fees for comparable means of payment

=

Adequate safeguards for **merchants** & reliable compensation for **PSPs**

Range of costs for digital euro provision

According to the legislative proposal:
*Fees shall be based on costs incurred for providing digital euro payment services by **the most cost-efficient payment service providers** representing collectively **one-quarter** of digital euro distributed in a given year*

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How can the co-existence of central bank money and private money be organized if both are digital?

Stable co-existence of CBDC and private electronic payment solutions?

- Should central banks worry more about being too successful with their CBDCs or to be non-successful? Store of value vs. means of payment distinction.

- Stable, distinguishable habitats? (like for some time banknotes vs card payments?)

1. How to achieve distinguishability? Different use cases; Different features (offline); different app and form factor differentiation?
2. How to achieve distinguishability while maximizing synergies and at the same time minimize investment costs for PSPs? Or closed loop CBDC solution run by central bank which does not require investment on PSP side because it relies on uploading via direct debit on a completely separated wallet & app?
3. Should distinguishability be limited to the front end appearance (or would this imply losing value added of CBDC for resilience?)

- Or is co-existence no problem, in the way Visa and Mastercard co-exist although they appear so similar from the user's perspective? Is distinguishability not necessary?

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Conservative vs radical options regarding the future of central bank money

The conservative and some radical options

- Conservative option 1 – "conservative CBDC": preserve banknotes, and commercial bank money, CBDC is introduced to take over a part of the usage of banknotes (because of digitalization), in a way to broadly keep the balance between private and public money unchanged (digital euro philosophy). Advantages: conserve what has worked well in terms of sharing of roles between private and public sector; be innovative but preserve the advantages of cash. Disadvantage: costs of two forms of central bank money; forego bigger advantages of radical solutions?

- Conservative option 2 – "no CBDC but all energy into restoring role of cash": no CBDC and (try to) stop downward trend in use of cash by enforcing an effective legal tender status; enforcing infrastructure (ATM number having to go up again); enforcing / subsidizing free usage, etc. Advantages: CB does not have to enter electronic retail payments and associated uncertainty; positive aspects associated with cash (privacy, inclusion, resilience) strengthened; unable to cover ever-growing e-commerce. Disadvantages: achievable? Inefficient, backward-looking and anti-innovative? Like insisting on "gold and silver coins only" (no to book money and no to banknotes) as means of settlement in past centuries?

The conservative and some radical options

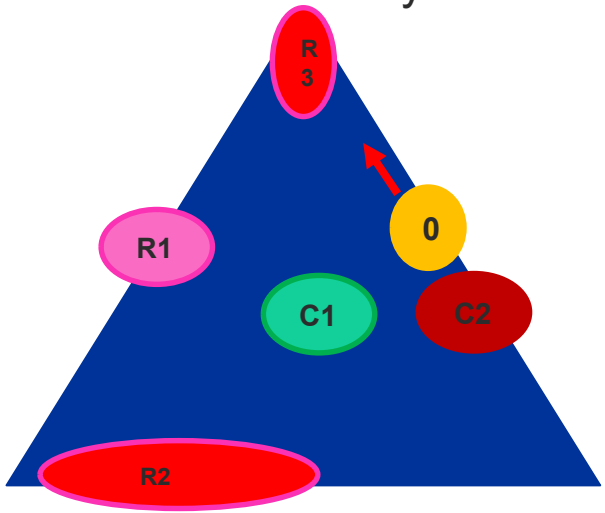
- Radical option 1 - “cashless society”. Some jurisdictions (India, UA Emirates) chose that direction. CBDC and private electronic money solutions co-exist. Advantages: cost saving (cash infrastructure and distribution cost can be closed down); forward-looking, courageous and innovative. Prevent illicit payments, tax evasion and money laundering through cash. Disadvantage: loss of strengths of cash (privacy; inclusion; resilience)

- Radical option 2 - “sovereign money”: eliminate commercial bank money and replace it by CBDC as technology would now allow CBDC to play all roles. Advantages: once achieved, no deposit runs any longer => financial stability; seignorage income. Disadvantage: transition for banking system; loss of synergies bank deposits – bank lending; centralization of credit provision in economy because of much larger CB balance sheet.

Radical option 3 “end of central bank money”: do not introduce CBDC and accept that banknotes disappear => give up on central bank money in circulation. Advantage: minimize risk of a CBDC “flop” and no cost of CBDC; do not irritate private sector; libertarian ideal of minimum role of public sector in the field of money. Disadvantage: anchoring of monetary system and monetary architecture unclear; financial stability risk; abuse of market power by dominant private providers; geopolitical vulnerability.

Triangles of choice for retail payments…

ComBank money based

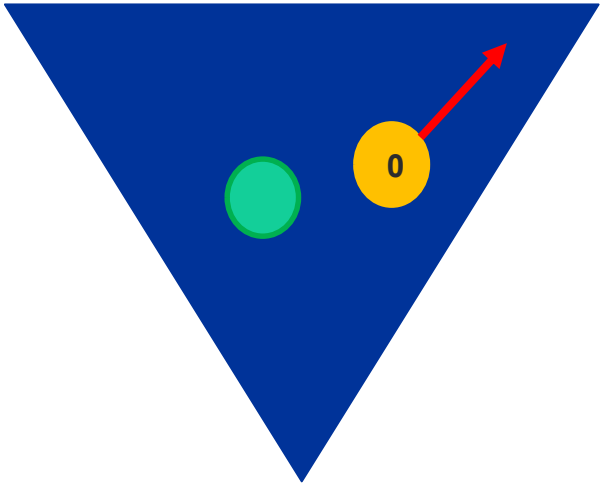


D€

banknotes

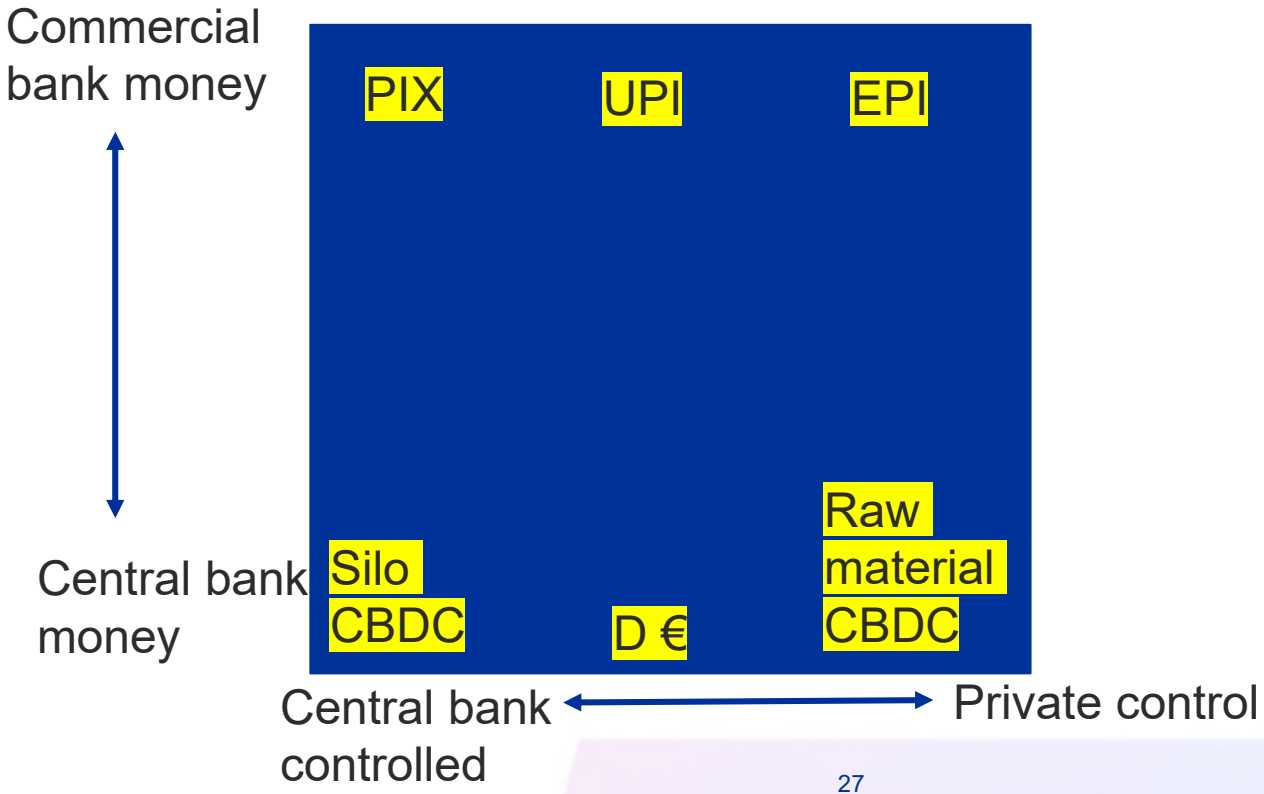
European private
Payment
instruments

Global groups'
Payment instruments



CeB money

Forms of money vs. public control of payment instrument?



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Thank you

Additional supporting materials:

- Updated digital euro FAQ
- Report: A stocktake on the digital euro
- ECB opinion on the EU Commission's digital euro legislative proposal
- Digital euro one-pager
- Digital euro booklet
- Digital euro LinkedIn page