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**Research Report**

## The digital euro and central bank digital currencies: Beware of taking off too early

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# STUDY

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## THE DIGITAL EURO AND CENTRAL BANK DIGITAL CURRENCIES: BEWARE OF TAKING-OFF TOO EARLY

Peter Bofinger<sup>1</sup>

### ABSTRACT

The paper discusses central digital currencies (CBDCs) with an analytical focus on the European Central Bank's Digital Euro (D€) project, which provides a unique lens for assessing the potential and challenges of CBDCs. The paper differs from the literature on CBDCs and the D€ by adopting a systemic perspective that distinguishes between the role of CBDCs as a new payment object and as a new payment system based on CBDC accounts. In a worst-case scenario, the D€ project could be a total flop, with people not opening accounts and the system failing to compete with existing platforms. This would be in line with the dismal experience of countries that have already introduced CBDCs. In a more positive scenario, many households would open D€ accounts alongside commercial bank accounts, potentially reducing the dominance of US platforms. However, even in this scenario, it is unlikely that there will be significant holdings of D€ deposits as a means of payment, making the D€ payment system an inefficient and costly detour between existing commercial bank accounts. The offline version remains difficult to justify. Our CBDC tracker shows that the ECB's strong commitment to the D€ is unique among central banks in advanced economies. Many of them, including the Federal Reserve, currently rule out the option of a retail CBDC. Thus, the ECB's unconditional commitment to the D€ carries a high risk of failure. It is therefore unclear why the ECB is not considering a scheme based on the existing SEPA infrastructures.

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**The Digital Euro and Central Bank Digital Currencies:  
Beware of Taking-Off Too Early**

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# The Digital Euro and Central Bank Digital Currencies: Beware of Taking-Off Too Early

## Executive Summary

Central Bank Digital Currencies (CBDC) have become a focal point for central banks worldwide: The Bank for International Settlements (BIS) recent survey (2024) shows that 94% of 86 responding central banks were engaged in CBDC work by the end of 2023.

The paper discusses the CBDC with an analytical focus on the European Central Bank's (ECB) Digital Euro (D€) project. It offers a unique lens for assessing the potential and challenges of CBDC in an advanced currency area. The paper also provides anecdotal evidence on CBDC projects that have already been implemented. In addition, based on statements of central banks in advanced economies and other major central banks, the paper surveys the current state of discussion on CBDC.

The paper differs from the literature on CBDC and the D€ by taking a **systemic perspective**, which consequently differs between the role of CBDC as a new payment object and as a payment system based on CBDC accounts.

The ECB's motivations for the D€ include macroeconomic and microeconomic considerations. The **macroeconomic justification** of a retail D€ as a “monetary anchor” is questionable as long as there is sufficient for central bank money by commercial banks. This also applies to argument that private “digital currency areas” might displace established monetary units by private currency units. So far, there is no evidence of such developments in the retail space. Thus, from a macroeconomic perspective there is no need of the D€ as a payment object.

**Microeconomic considerations** do not indicate a demand for holding D€ as a **payment object**. As far as the **online version** of the D€ is concerned, there are no benefits for private households holding D€ as a payment object. The legal difference between central bank deposits and commercial bank deposits is irrelevant for small deposit holdings. Moreover, holding D€ deposits in parallel with commercial bank deposits increases the risk of negative balances for low-income households which involves high overdraft interest rates. In particular, due to the “waterfall fall” functionalities of the D€ scheme, the D€ payment system can be used with zero D€ holdings. The **offline version** of the D€ is in many cases inferior to holding cash. Consumer surveys indicate only very limited use cases.

The proposed **D€ payment system increase the number of payment transactions by a factor of two to three**. This is due to the coexistence of commercial bank accounts and D€ accounts which requires two separate settlements schemes (TARGET2 and N€XT). The need to open specific bank accounts for the use of D€, in contrast to credit card schemes

and PayPal, may **hinder widespread public acceptance**. In addition, as commercial banks have to open and manage D€ accounts free of charge, they are unlikely to promote D€ accounts. So far it is unclear which institution might operate run the D€ payment system, i.e. the **network through which information flows between payers and payees** are sent. If the ECB were to take on this role, it could stifle innovation and competitiveness vis-à-vis private providers. **Implementation problems with the offline version** could prevent smartphone payments, which would require not very user-friendly payment cards.

Given these complexities, 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, as supported by the Banque de France's endorsement of an EPI-payment solution for European payment market sovereignty.

In a **worst-case scenario**, the D€ infrastructure could see limited adoption, with people not opening accounts and the scheme failing to compete with existing platforms. As our **survey of existing CBDC schemes** shows, this would in line with the consistently poor experiences of countries that have already introduced CBDCs.

In a **more positive scenario**, the D€ payment scheme will reach a wide acceptance, with a high number parallel D€ accounts alongside commercial bank accounts potentially reducing the dominance of US payment platforms. However, even in this scenario, significant holdings D€ deposits are unlikely, making the D€ scheme an inefficient and costly detour between existing commercial bank accounts. The offline version remains hard to justify.

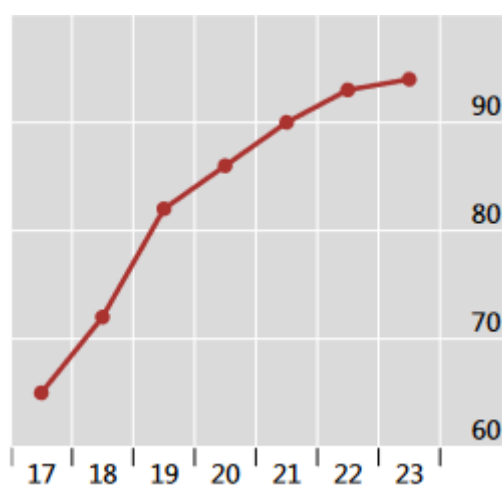
Our “**CBDC tracker**”, based on statements of central banks in advanced economies and of some other major central banks, shows that the ECB's absolute commitment to its D€ project is unparalleled. Many central banks, including the Federal Reserve, currently explicitly ruling out the option of a retail CBDC.

In conclusion, the perception of a widespread retail CBDC launch off is misleading. The ECB has embarked on a dangerous adventure with high costs for the taxpayer and high risks for its reputation. Therefore, central banks considering implementing CBDC should carefully scrutinize the D€ project.

## 1 Introduction

As the recent BIS survey on CBDC (BIS 2024) shows, more and more central banks are working on CBDC. From a sample of 86 responding central banks, at the end of 2023, 94% were engaged in CBDC work (Chart 1). According to the CBDC Tracker provided by the Atlantic Council, in May 2024 134 countries and currency unions, representing 98% of global GDP, are currently exploring a CBDC. In May 2020 that number was only 35 (Atlantic Council 2024).<sup>1</sup>

**Chart 1: Share of central banks working on CBDC**  
*as a percentage of respondents*



Source: BIS (2024)

The view that CBDC is becoming an indispensable element of a national monetary system in same way as cash is also supported by the strong efforts of the European Central Bank (ECB) to launch a **Digital euro** (D€). After an investigation phase (November 2021-October 2023), the ECB is now in a preparation phase (November 2023-October 2025) after which a phase of “potential development and rollout” which is scheduled. While the ECB is a frontrunner in the group of advanced economies, **China** and **India** have already implemented CBDC schemes in their countries.

In this paper, we want to take a closer look at the discussions on CBDC, especially in advanced economies and major emerging market economies. In most central bank reports and speeches of central bank representatives, a more nuanced view can be found that differs from the ECB’s enthusiastic commitment to CBDC. In any case, the experience of those countries that have already introduced CBDC suggests a cautious assessment of the necessity and prospects of success of CBDC.

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<sup>1</sup> <https://www.atlanticcouncil.org/cbdctracker/>

The ECB's **D€ project** provides a particularly good basis for assessing the prospects of CBDC. It is already relatively well developed and therefore makes it possible to identify the problems that could arise with such a fundamental reorganization of a country's or a currency area's monetary order. We will therefore present and discuss the Digital euro in detail below. While the D€ has been discussed in earlier papers (Bofinger and Haas 2023b), new ECB publications, notably "Update on the work of the digital euro scheme's Rulebook Development Group" (ECB 2024a), "Progress on the preparation phase of a digital euro: First progress report" (ECB 2024b) and a "Stocktake on the digital euro" (ECB 2023b) allow a more specific analysis of the D€ project.

In **section 2**, we present a **systemic approach on CBDC**. It is characterized by the insight that there is no such thing as a "CBDC" or a "Digital euro". For an analysis of payment systems, it is necessary to differentiate between payment objects, payment instruments and payment schemes. We will see that the prospects for CBDC vary depending on the individual constituent elements.

In **section 3**, we present and discuss the ECB's D€ project. We show that the **motivations of the ECB for introducing the D€** are based on macroeconomic and microeconomic considerations.

#### *D€ as a payment object*

In section 3.2 we first analyze the justification for the D€ as **a new payment object**. We show that there is no need for a retail D€ as a **monetary anchor**, as long as there is sufficient demand from commercial banks for central bank money. We also question the concept of "**digital currency areas**" as a justification for the D€. So far, there is no evidence that digital retail payment platforms plan the introduction of "private currencies". In summary, we do not see macroeconomic issues that call for the introduction of D€ as a payment object.

From a **microeconomic perspective**, it is difficult to see why private households should hold D€ deposits (**online version of the D€**). The difference between a central bank deposit and a commercial bank deposit, or central bank money and private money, is irrelevant for small deposit holdings. However, for low-income households, holding D€ deposits increases the risk of a negative balance in the commercial bank account, which is very costly. Due to the waterfall functionalities, it is not necessary to have a positive D€ balance to use the D€ payment system.

As for the **offline version**, which requires a positive D€ balance in a wallet, the question is what advantages it can offer over using cash. Consumer surveys confirm our finding that there is no obvious use case for this version of the D€.

#### *D€ as a payment scheme*

In section 3.3 we analyze the **rationale of a payment system based on D€ accounts**. We show that the scheme envisaged by the ECB leads to a doubling or tripling of settlement



transactions due to the parallel scheme of bank accounts and settlement schemes (TARGET and N€XT).

The need to open specific accounts for the use of the scheme, which is not required for credit card schemes and PayPal, might negatively affect the **acceptance of a D€ payment scheme**. This is particularly challenging as the creation of new markets requires “**dyadic alliances**” between the main players, i.e., commercial banks and the central bank. In the case of commercial banks, it is not very plausible that they would actively promote the opening of D€ accounts. The insight that it might be difficult to convince people to a D€ has led central bankers to think of enforcing D€ accounts by making public payments to such accounts only.

The blueprints for the D€ payment system indicate a **dominant role for the ECB** in a D€ payment scheme. This could have negative effects on the innovation activity of a European payment scheme and impair its competitiveness vis-à-vis the dominant private payment schemes.

Finally, the payment system based on the offline version faces serious implementation problems. They could prevent the use of smartphones as payment instruments requiring payment cards which are not very user-friendly.

In **section 4**, we briefly present an alternative approach to creating a pan-European payment system that is independent of US payment platforms. Surprisingly, the ECB has already floated the concept of using the SEPA instant payment system as the basis for such a system in 2019 under the heading “**SEPA for cards**”. The European Payments Initiative points out that the € does not offer any new added value compared to SEPA instant payments. That such an approach could also reach the objectives that the ECB is trying to reach is indirectly confirmed by the Vice-Governor of the Banque de France, who argued that an EPI-payment solution “will help strengthen the sovereignty of the European payment market by providing an alternative to using foreign schemes such as Mastercard and Visa”.

In **section 5**, we present two scenarios for the D€. In a **worst-case scenario**, the entire infrastructure would not be actively used by the population. People would not open accounts and the scheme would not be able to withstand the competition with existing platforms. This would be in line with the experience of those countries that have already implemented CDBC's.

In a **positive scenario**, the D€ payment scheme would be designed attractively enough to be used by the population which is willing to open D€ accounts in parallel to their commercial banks. In such a scenario, it might even be possible to reduce the dominance of US payment platforms. However, even in such positive scenario it is not likely that the D€ would be used as a payment object, i.e., that people would hold significant deposits on their D€ accounts. As a result, the D€ payment scheme would turn out as an inefficient

and very expensive way of linking existing commercial bank accounts. Even in a positive scenario, it is difficult to imagine a use case for the offline version.

In **section 6**, we present a summary of our own **CBDC tracker**, which is based on 22 central bank statements in major OECD countries and other important countries. There is no other central bank that is as strongly committed to the introduction of a CBDC as the ECB. Some central banks explicitly rule out the option of a retail CBDC for the time being. This applies above all for the Federal Reserve.

In this section, we also provide anecdotal **evidence for countries that have already introduced CBDC**. As there is no official information on the progress of these projects on central bank websites, we have to rely on newspaper reports. They all indicate that it is very difficult for CBDC projects to gain significant acceptance as a payments object and a payment scheme.

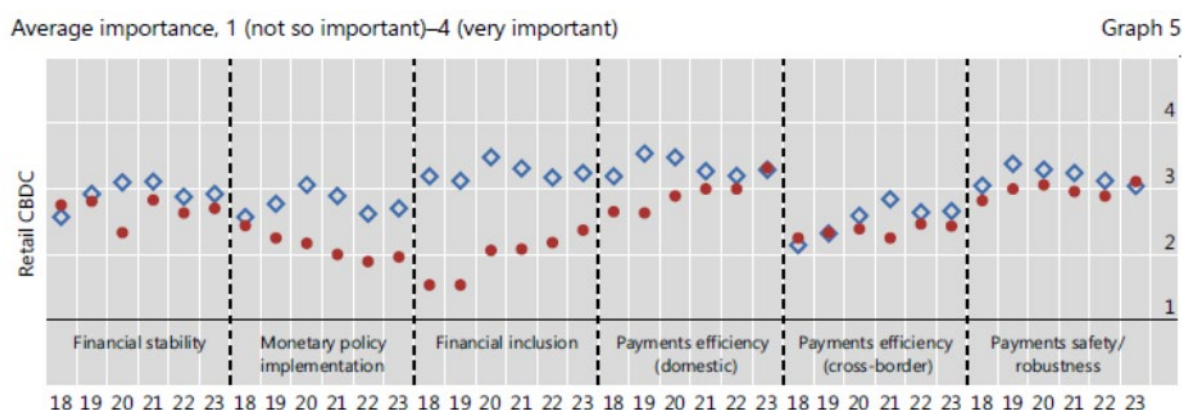
In summary, we conclude that the impression of a widespread take-off of retail CBDCs is misleading. There is no clear consensus about the use case of CBDC as payment object or a payment scheme. With its unconditional commitment to the D€, the ECB is an outlier among central banks in advanced countries. This implies a high risk of failure for the ECB's project. The ECB 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.

## 2 What is CBDC?

The BIS survey (BIS 2024) shows that for central banks in advanced countries “**payments efficiency**” is the most important motivation for issuing a retail CBDC.

**Chart 2: Motivations for issuing a retail CBDC**

*red dots: Advanced economies; blue squares: emerging market and developing economies*



Source: BIS (2024)

For an analysis of the potential and the implications of CDBC, it is therefore necessary to have a clear understanding of the constituent elements of a **payment system**. The BIS

Committee on Payments and Market Infrastructures (CPMI) defines a payment system as follows:

“A set of instruments, procedures, and rules for the transfer of funds between or among participants; the system includes the participants and the entity operating the arrangement.”<sup>2</sup>

From this, three key elements of a **payment system** can be defined:

**Payment objects** (“funds”) are the basis for making payments: cash or deposits held with commercial banks. They are identical to **money** in the definition of M1.

**Payment instruments** are the technical devices for initiating payment transactions: They include banknotes and coins, cards, cheques, smartphones, personal computers and QR-codes.

**Payment schemes** are infrastructures for the information and payment flows between the payer and the payee. Examples include SEPA for banking transactions, PayPal and credit card systems for retail and online transactions and Target for the settlement of payments.<sup>3</sup>

The discussion of CBDC suffers from the fact that there is **no consequent differentiation between these core concepts**. This confusion can be related to the fact that CBDC is often regarded as a **digital form of cash**, and that for cash such a differentiation is not required. In the words of the Banque de France (2018):

“This confusion stems from our day-to-day use of fiduciary money, i.e. banknotes and coins, which are both money (a store of value, unit of account and medium of exchange for commercial transactions) and payment instruments (used to transfer value). This is not the case for any other payment instrument.”

In other words, cash is simultaneously a payment object, a payment instrument and a peer-to-peer payment scheme. However, it is important to note that this identity does not apply to **digital payments systems**. For example, when a payment is made with a credit card,

the **payment object** is a deposit in the bank account to which the credit card is linked,

the **payment instrument** is the credit card in physical form, or in electronic form if embedded in a smartphone,

the **payment scheme** is operated by the credit card company.

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<sup>2</sup> <https://www.bis.org/cpmi/publ/d00b.htm?selection=49>

<sup>3</sup> The ECB (2021) describes **payment schemes** as follows: “A scheme is a set of formal, standardised and common rules enabling the transfer of value between end users by means of electronic payment instruments. It is managed by a governance body. The scheme rules describe the procedures and functions which enable payers and payees to use or accept electronic payment instruments.” <https://www.ecb.europa.eu/paym/pol/instr/html/index.en.html>

The Banque de France (2018) also addresses a related confusion concerning the term “**means of payment**”:

“As regards ‘means of payment’ and ‘payment instrument’, the difference here relates to the use of terminology. ‘means of payment’ is commonly used as a broad term covering both payment instruments (banknotes and coins, cards, cheques, credit transfers, direct debits and so on) and money (fiduciary money or scriptural money, i.e. bank account balances), without distinguishing between the two.”

Thus, in this paper, following the terminology of the Banque de France, we will avoid the ambiguous term “means of payment” and instead use unequivocal terms “payments object” and “payments instrument.”

Based on this systemic perspective, CBDCs can be regarded as a new payment object (money) and/or a new payments scheme. While CBDCs are often also referred to as a “payment instruments”, this expression does not match the classification made here. A CBDC scheme requires **technical devices** as payment instruments, such as credit cards or smartphones that can be used as wallets.

## 2.1 CBDC as a payment object

The object nature of CBDC is obvious, as it is designed as a digital asset which is a liability on the central bank balance sheet. In this paper, we will only address the so-called **retail CBDCs** which are accessible above all to private households. There is also an intensive discussion on **wholesale CBDCs**, which are designed for the used above all by financial institutions.<sup>4</sup>

Retail CBDCs can be regarded as a digital substitute for cash (“digital cash”) or as a substitute for traditional commercial bank deposits (“central bank money for non-banks”).

**Table 1: Classification of payment objects**

	<b>Physical</b>	<b>Digital</b>
<b>Central Bank</b>	Cash	<b>CBDC</b>
<b>Commercial Banks</b>		Bank Deposits

Due to this hybrid nature, CBDC fundamentally changes the traditional **division of labor between the central bank and commercial banks**. So far, central banks offer the physical payment object, while commercial banks produce the digital payment object. Thus, with CBDC as a digital payment object, central banks enter into competition with commercial banks. According to standard economic theory, such an intrusion of the government into the sphere of the market requires the identification of a **market failure** that needs to be repaired by government intervention.

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<sup>4</sup> For a more detailed discussion of the differences between wholesale and retail CBDC see Panetta (2022b).

2.2 CBDC as a payment scheme

So far, there is also clear division of labor in the provision of retail payments infrastructures. The **physical payment** scheme is based on cash, and it is provided by central banks. **Digital payment schemes** are characterized by a coexistence of private infrastructures with an infrastructure provided by the central bank.

- In Europe, the network for **information flows** authorizing and initiating payments between payer and payee is provided above all by **SEPA** (Single Euro Payments Area). It is managed by the European Payment Council (EPC), an international not-for-profit association formed of 77 members who are payment service providers (PSP) or associations of PSPs. PayPal, national payment schemes (e.g. Bizum in Spain) and credit card companies are other providers of payment schemes.
- The network organizing the **flow of funds** from the payer’s account to the payee’s account (“settlement”) is provided by central bank operated systems, like TARGET2 in the euro area.<sup>5</sup>

Table 2: Classification of digital payment schemes

	Private	Central Bank
Infrastructure for the flow of information between payee and payer	SEPA, credit card companies, PayPal	“CBDC”
Infrastructure for the flow of funds between payee and payer		TARGET2

The hybrid nature of CBDC also changes this division of labor. With CBDC as a form of **digital cash**, central banks provide a digital payment infrastructure that competes with private payment service providers. Viewing CBDC as an **alternative to bank deposits** does not necessarily raise the issue of new payment network. CBDC deposits could easily be integrated into the existing private payment infrastructures. However, as we will see, especially in the case of the Digital euro, some central banks have the ambition to develop a completely new payment network which competes with private payment schemes.

Again, the extension of the central bank activities into an area previously operated by private institutions raises the question of a **market failure** that justifies a government

<sup>5</sup> The Berlin Group (2024) differentiates in this context between “clearing” and “settlement”. “Clearing is performed in order to transmit the transaction data needed to validate the transaction between the card acceptor, the cardholder and their respective institutions within the card payment scheme, the acquirer and the card issuer. Settlement is performed between the banks of the card issuer and the acquirer in order to finally debit the cardholder’s bank bank. account and to credit the card acceptor’s account at the acquiring Normally it takes place between zero and two days after the clearing.”

intervention. And even if this is the case, one must ask whether a CBDC is the only solution for such a problem.

## 2.3 A systemic approach

A systemic perspective provides a conceptual framework for the analysis of CBDC. It requires that the rationale (or the uses cases) of CBDC must be discussed separately for

- CBDC as a new payment object,
- CBDC as a new payment scheme based on CBDC as a payment object.

Finally, it also leads to the question of whether there are alternative payment schemes for achieving the goals that are expected from a CBDC scheme based on CBDC as a payment object. The various options are presented in table 3.

**Table 3: Classification of CBDC solutions**

		New payment object (means of payment)	
		No	Yes
<b>New payment scheme</b>	<b>No</b>	Status quo	CBDC payments object integrated in existing payment solutions
	<b>Yes</b>	New payment scheme (without CBDC) orchestrated by central banks	CBDC as payment object and payment scheme

## 3 The Digital Euro: A Frontrunner in the CBDC Run

Among the advanced economies, the European Central Bank has made the most progress in the analysis and the concrete preparation of a CBDC. We will therefore discuss the Digital euro in detail, as it helps to identify and to analyze the core features and challenges of a comprehensive CBDC project.

### 3.1 What are the objectives of the ECB's project?

The ECB provides a comprehensive description of the D€ benefits in its “opinion on a proposal for a regulation on the establishment of the digital euro”. (ECB 2023). In this paper the ECB presents the “**monetary anchor’ role of central bank money**” as the main motivation for introducing the D€:

“To preserve the singleness of the euro and the effectiveness of monetary policy, and thus to enable the ECB to achieve its primary objective of maintaining price stability, the euro needs to continue to fulfil all functions of money as a unit of account, means of exchange and store of value. Making central bank money available to the public not just in physical

form, through cash, but also in digital form, will allow central bank money to continue to play its role as a monetary anchor and as an efficient means of payment, in a context where people increasingly choose to pay electronically, rather than in cash. Thus, the Digital euro will contribute to underpinning the stability of the monetary and payment system and to preserving the integrity of the euro in all its forms. This, in turn, is a precondition for the continued effectiveness of the ECB's monetary policy, which is aimed at preserving price stability."

Thus, for the ECB, the main rationale for the D€ seems to be of a **macroeconomic nature**. From the statement it is obvious, that in this context, the ECB regards the D€ as a form of money, i.e., as a **payment object**.

The **microeconomic dimension** of having a "**universally accepted digital means of payment**" is listed in second place:

"Making central bank money available in digital form for retail transactions would also have broader benefits, in particular by offering a universally accepted digital means of payment that can be used throughout the euro area for payments in shops, online and from person to person."

The term "means of payment" leaves open, whether the ECB has in mind a **payment object or a payment instrument**. This distinction is irrelevant for cash, but it is important for digital payments: For a vendor, it does not matter where the customer's bank is located and in what currency the account is held. What matters is that the customer uses a credit card as a payment instrument that the vendor is familiar with.

In third place, the D€ is presented as a **payment scheme**, i.e., a "**pan-European platform**":

"Furthermore, the digital euro would safeguard the strategic autonomy of the Union's payment ecosystem, while supporting competition and innovation in payments to the benefit of consumers and merchants alike. The digital euro would facilitate the development of payment solutions subject to European governance arrangements and provide a pan-European platform on which innovative services can be built."

Thus, the "opinion" shows that the ECB regards the D€ in a broad sense, encompassing it as a payments object and a payment system. So far, the ECB has far paid little attention to the need for a "universally accepted" payment instrument in its D€ concept.

### **3.2 The D€ as a payment object**

The ECB plans to issue the D€ in two different forms. In the **online version**, private households open a D€ bank account in parallel to their existing bank account. These accounts must be opened and managed by commercial banks free of charge. The deposit on the D€-bank account is a liability of the ECB. In the **offline version**, households can hold the

D€ on a smartphone wallet. Like cash, D€ is created by withdrawing from a D€ bank account or from an ATM.

The ECB plans **holding limits** for both forms of D€ holdings. For the online version the holding limit is not yet defined, but it seems that it will not exceed 3.000 euro.<sup>6</sup> Due to anti-money laundering and combating the financing of terrorism (AML/CFT) policies the holding limits for offline D€ will be much smaller. It might also be necessary to set limits for the number and the amount of transactions. Thus, the ECB wants to restrict the holding of D€ to the monetary function of a **means of payment** by discouraging its use **a store of value**.

The holding limits for D€ accounts and the lack of an overdraft facility require a so-called **waterfall- and reverse-waterfall functionality** for the D€:

- **“Waterfall”**: If a D€ account is credited by an amount that exceeds the holding limit, the excess amount is automatically transferred to the payee’s commercial bank account.
- **“Reverse Waterfall”**: If a payment from a D€ account exceeds the deposit on that account, the difference is automatically provided by a transfer from the payer’s commercial bank account to his D€ account.

An analysis of the **object function** raises two interrelated questions:

- How can the D€ contribute to the “monetary anchor role” that the ECB emphasizes?
- What is the use case for private households to hold D€ online or offline for making payments?

### **3.2.1 The macroeconomic perspective: Is there a need for a “monetary anchor”**

While the BIS survey (BIS 2024) shows that for central banks in advanced economies the monetary policy implications of CBDC are not the main motivation (Chart 2), the monetary anchor plays a dominant role in the ECB’s argumentation for the D€. Former member of the ECB executive board, Fabio Panetta (2022a), explains the role of the monetary anchor as follows:

“(…) even digital payments will ultimately depend on the anchoring role of public money to function smoothly. Confidence that ‘one euro is one euro’ whatever form it takes rests on our ability to convert, at par, private money – such as funds held in bank deposits or digital wallets – into public money, which is the safest form of money available. This

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<sup>6</sup> A recent Bundesbank research indicates that the optimal amount could be in the range of 1,500 to 2,500 Digital euro per person. See Bidder, R. et al. (2024), CBDC and banks: Disintermediating fast and slow, Deutsche Bundesbank Discussion Paper No 15/2024.



possibility of conversion reinforces confidence in the various forms of private money used for euro payments, ensuring the smooth functioning of the payment system.”<sup>7</sup>

In Bofinger and Haas (2023a), we have argued that the ability to exchange deposits from a commercial bank account into a D€ account in fact contributes to the convertibility of private money, which is particularly valuable in a crisis. Thus, a valid argument can be made that the ability to hold D€ deposits could increase the confidence in private money. But the **institutional design of the D€** as envisaged by the ECB, is not compatible with an such an anchor role:

- Making a strong case for the convertibility of commercial bank money into central bank money is not compatible with rather low **holding limits**.
- The ECB does not plan to allow D€ deposits for the **corporate sector**.
- The demand for central bank deposits in times of instability would not be a demand for the D€ as a means of payment, but as a **store of value**.

Low holding limits for D€ deposits also question the ECB’s argument that the D€ “is a pre-condition for the continued effectiveness of the ECB’s monetary policy, which is aimed at preserving price stability”. Moreover, it can be shown that for an effective central bank control over the process of credit and money creation, it is sufficient that **commercial banks** have a stable demand for central bank money (Bofinger and Haas 2023a).<sup>8</sup> With the instrument of minimum reserves, the central bank can always generate a sufficient demand for bank reserves.

In sum the arguments of the ECB for the monetary anchor role, which it so far has not presented in a comprehensive theoretical analysis, are not very convincing.

This also applies to the argument that the D€ is required to maintain the **convertibility into cash** (Brunnermeier, 2024)<sup>9</sup> in an environment where the use of cash is declining in retail payments. The solution to this problem is not the issuance of a D€ but maintaining an adequate cash infrastructure by the ECB. In fact, the ECB promises in its “Eurosystem cash strategy” that cash will remain “widely available”:

“The ECB and the national central banks of the euro area are committed to making sure that cash remains widely available and accepted. We therefore welcome the European Commission’s proposal for a new EU Regulation to strengthen the legal tender status

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<sup>7</sup> <https://eacnny.com/news/chapternews/ecb-speech-fabio-panetta-public-money-for-the-digital-era-towards-a-digital-euro/>

<sup>8</sup> <https://www.suerf.org/publications/suerf-policy-notes-and-briefs/the-digital-euro-cbdc-as-a-monetary-anchor-of-the-financial-system/>

<sup>9</sup> „Traditionell ist die Verankerung des Euros im Bankensystem so gestaltet, dass die Konvertibilität zum Bargeld das Entscheidende ist. Wenn ich ein Bankkonto habe, dann kann ich das Guthaben in Bargeld umwandeln. Wenn die Bedeutung des Bargelds zurückgeht, dann geht diese Verankerung verloren.“

of euro cash. The proposal aims to ensure that access to and acceptance of euro banknotes and coins is legally guaranteed throughout the euro area.”<sup>10</sup>

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**Box: The flawed concept of “digital currency areas”**

The announcement of Facebook to create a payments system with a new currency (Libra)<sup>11</sup> was an important trigger for the engagement of many central banks in the field of Central Bank Digital Currencies. Central bankers feared that private currencies might out-compete public currencies. Brunnermeier et al. (2019) supported this view by propagating the concept of “**digital currency areas**”:

„The most important consequence of a system based on digital platforms may be that agents begin to write contracts in a unit of account specific to a platform rather than the central bank’s unit of account. A change in the unit of account convention may become more likely with a large technological change that eliminates the use of cash and shifts economic activity towards platforms with their own units of account.”<sup>12</sup>

The **failure** of the Libra concept shows that the risk of private monies crowding out public monies is not very high. First, even the Libra currency was not originally designed as a private currency, but as a currency basket made up of public monies. Second, this design was soon abandoned in favor of a concept of stablecoin Libras based on national currencies (Dollar-Libra, Euro-Libra, Yen-Libra, etc.). But this did not save the project.

The main problem with creating private currencies or units of account is that currencies are like **languages** that are deeply enshrined in the minds of people. Therefore, it requires high inflation episodes for people to switch to foreign currencies.

Another major flaw of Libra was its design, which required a positive balance on a Libra account in order to make payments. As the PayPal scheme shows, a successful payment scheme simply taps into existing accounts.

Thus, at least for the time being, the risk of private currencies gaining a dominant position that would threaten the unit of account role of the existing currencies and thus the business of central banks, cannot be regarded as a justification for introducing a D€. <sup>13</sup>

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<sup>10</sup> [https://www.ecb.europa.eu/euro/cash\\_strategy/html/index.en.html](https://www.ecb.europa.eu/euro/cash_strategy/html/index.en.html)

<sup>11</sup> <https://whitepaper.io/document/475/libra-1-whitepaper>

<sup>12</sup> Brunnermeier, M. K., James, H., und Landau, J.-P. (2019). The Digitalization of Money. NBER Working Paper Series, No. 26300.

<sup>13</sup> Brunnermeier (2024) still believes in his concept: „Durch die Digitalisierung besteht die Gefahr, dass viele private Gelder entstehen werden, mit denen man Transaktionen durchführen kann, die nicht notwendigerweise an den Euro gekoppelt sind. Diese können an andere Währungen gekoppelt sein, sie können aber auch eigenständig existieren. Der Vorteil des digitalen Euro ist, dass man die Koppelung an den Anker des Euros weiter behält und diese Gefahr für die Einheit der Währung abwendet.“ Wortprotokoll der 81. Sitzung Finanzausschuss Berlin, den 19. Februar 2024

### 3.2.2 The microeconomic perspective: Why should private households have a demand for holding D€ as a payment object?

The macroeconomic rationale of the D€ can also be assessed from a microeconomic perspective. For the D€ to be an effective monetary anchor, there would have to be sufficient demand for holding D€ as a payment object. As table 1 shows, the holding of D€ can either be regarded as a substitute for holding deposits on a traditional bank account or for holding cash in a physical wallet.

#### *Online use of the D€*

The main difference between of a deposit in a D€ account and a commercial bank account is the fact that the commercial bank deposit implies only the right to convert it into central bank money while the D€ deposit is central bank money. In its publicity campaigns for the D€, the ECB argues with the safety of the D€:

“A euro will always be a euro. One digital euro would always be worth exactly the same as a €1 coin.”<sup>14</sup>

But in practical life this differentiation is of little relevance due to the deposit insurance schemes which protect bank deposits in the EU to up to 100.000 euro. It would be a dangerous strategy if the ECB tried to sell the D€ with argument that bank deposits are not 100% safe.

One might think that, at least in the introductory phase, the demand for CBDC deposits could be increased by paying attractive interest rates. However, this is excluded by Article 16 (“Limits to the use of the digital euro as a store of value”) of the Proposal for a Regulation of the European Parliament and of the Council:

“Within the framework of this Regulation, the digital euro shall not bear interest.”

While there are no obvious benefits of holding deposits in D€ accounts, one can argue that this could lead to higher banking cost, especially for people with low incomes. A **parallel holding of deposits** on the commercial bank and the D€ account increases the risk of an overdraft of the commercial bank account which is very costly. In addition, as the D€ account does not provide an overdraft facility, the commercial bank account will always remain the dominant account.

One might think that the ability to use the D€ payment scheme might be an incentive to hold deposits on the D€ account. But due to the waterfall functionalities, the D€ payment scheme can be used while always keeping a zero balance on the D€ account.

Therefore, from an **information and transaction costs** perspective, the best solution for households is to maintain a zero balance on the D€ account and to take full advantage of the waterfall functionality.

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<sup>14</sup> [https://www.ecb.europa.eu/euro/digital\\_euro/features/html/index.en.html](https://www.ecb.europa.eu/euro/digital_euro/features/html/index.en.html)

This also shows that the ECB’s argument that the D€ has “**cash-like features**” does not apply to the online version. While using the cash payment systems requires a holding of cash, the D€ payment system can be used with zero holdings of D€ deposits.

#### *Offline use of the D€*

The offline use of the D€ requires holding a positive D€ balance in the digital wallet. In this regard, the D€ is like cash. But the use case for the offline use is not very clear. Even without internet connection, offline credit payments are already possible, e.g. during flights. When paying with a credit card on a plane, the offline credit line stored on the card applies.

A “Study on Digital Wallet Features” produced by Kantar (2023) for the ECB questioning focus groups comes to the following conclusion:

“The possibility of paying offline was considered the most innovative of the presented payment features. None of the participants recalled having used this option via other payment methods. In every country, most participants acknowledged the convenience of this function for situations where they do not have access to the internet (e.g. in areas without internet coverage, when running out of data, or when using in-flight mode). However, most also noted that these situations are rather limited, so they thought they would rarely use this option.”<sup>15</sup>

Like cash, holding positive D€ balances on a smartphone wallet implies the risk that one loses the smartphone or that it is stolen. Therefore, **compared with the online use** the only benefit of the offline use is a higher degree of anonymity. But if anonymity is the relevant criterion, it is not clear why the Digital euro should be a superior solution to cash.

For a comparison of the advantages of offline D€ holdings **compared with cash** one can use the information on the Bundesbank’s website, which provides a comprehensive description of the **advantages of using cash** (Table 4).<sup>16</sup>

**Table 4: The advantages of using cash**

<b>Cash (Bundesbank)</b>	<b>Digital Euro</b>
<i>“It ensures your freedom and autonomy. Banknotes and coins are the only form of money that people can keep without involving a third party. You don’t need access to equipment, the internet or electricity to pay with cash, meaning it can be used when the power is down or if you lose your card.”</i>	The D€ requires equipment in the form of a smartphone and it also requires that the battery is not empty
<i>“It’s legal tender”.</i>	The proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the establishment of the “Digital euro” from 28 June

<sup>15</sup> [https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr230424\\_1\\_annex~93abdb80da.it.pdf](https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr230424_1_annex~93abdb80da.it.pdf)

<sup>16</sup> <https://www.bundesbank.de/en/tasks/cash-management/the-eurosystem-cash-strategy/the-eurosystem-cash-strategy-and-the-role-of-cash-859166>

	2023 grants the D€ legal tender status in Article 7. But Article 9 defines a set of exceptions which includes the right for a microenterprise not to accept the Digital euro, unless it accepts comparable digital means of payment. Thus, while cash must be accepted generally, this would not be the case for the D€.
<i>It ensures your privacy. Cash transactions respect our fundamental right to have our privacy, data and identity protected in financial matters</i>	Even if the offline use would allow a higher degree of anonymity, it would not reach the anonymity of cash
<i>It's inclusive. Cash provides payment and savings options for people with limited or no access to digital money, making it crucial for the inclusion of socially vulnerable citizens such as the elderly or lower-income groups</i>	The use of the D€ requires a certain degree of digital competence which not guaranteed by elderly or lower income groups
<i>"It helps you keep track of your expenses. Cash allows you to keep closer control of your spending, for example by preventing you from overspending."</i>	Digital solutions cannot substitute the constraint set by physical money.
<i>It's fast. Banknotes and coins settle a payment instantly."</i>	In this regard, the D€ and cash are similar
<i>It's secure. Cash has proven to be secure in terms of cybercrime, fraud and counterfeiting. And, as it's central bank money, it doesn't entail financial risks for either the payer or the payee."</i>	There is also no obvious difference between the D€ and cash.
<i>"It's a store of value. Cash is more than just a payment instrument. It allows people to hold money for saving purposes without default risk. It is useful for small person-to-person gifts and payments. For example, parents can entrust small amounts of cash to their children for small purchases, (...) Cash also contributes to the financial literacy of children."</i>	This aspect clearly favors the using of cash instead of D€ which is explicitly designed to avoid the use of the D€ as a store of value.

In sum, there is no obvious case for offline use where the D€ would be superior to cash.

### 3.3 The D€ as a payment system

For the ECB the need of a pan-European payment solution and the sovereignty of the European payment system play a decisive role in its D€ project:

"The Eurosystem's Digital euro project aims to ensure central bank money evolves alongside current payment preferences and trends, as well as to facilitate electronic payments everywhere in the euro area and strengthen Europe's strategic autonomy."<sup>17</sup>

<sup>17</sup>[https://www.ecb.europa.eu/euro/digital\\_euro/progress/shared/pdf/ecb.deprp202406.en.pdf](https://www.ecb.europa.eu/euro/digital_euro/progress/shared/pdf/ecb.deprp202406.en.pdf)

The ECB justifies the need for the D€ with the following argument: “Currently, there is no European digital payment option that covers the entire euro area”<sup>18</sup>

In 2019, the ECB made a similar statement but acknowledging that there are no problems paying all over Europe with one card:

“The Eurosystem acknowledges that, in general, European cardholders are able to pay with one card all over Europe. However, at present the pan-European acceptance of cards issued under a national card scheme is entirely reliant on co-badging with an international card scheme.”

While the dominance of the US payment platforms, especially in card schemes, can be regarded as a market failure which justifies a government intervention, it is not obvious whether a payments scheme based on the D€ would be the best solution to this problem.

Two different options are possible:

- Introducing a D€ payment scheme which connects the existing national schemes **indirectly** by the creation of parallel infrastructures based on D€ accounts.
- Connecting the national infrastructures **directly** by the creation of a European-wide card scheme or by making the existing schemes interoperable throughout the Europe.

Since embarking on the D€ project the ECB has never explicitly discussed the pros and cons of such an alternative approach. This approach would have the advantage that one could use the existing payment infrastructures instead of creating a completely new payment universe. In addition, it would be in better condition for the competition with US payment platforms as it would be based on retail payment schemes which are widely in use and with which customers are already familiar.

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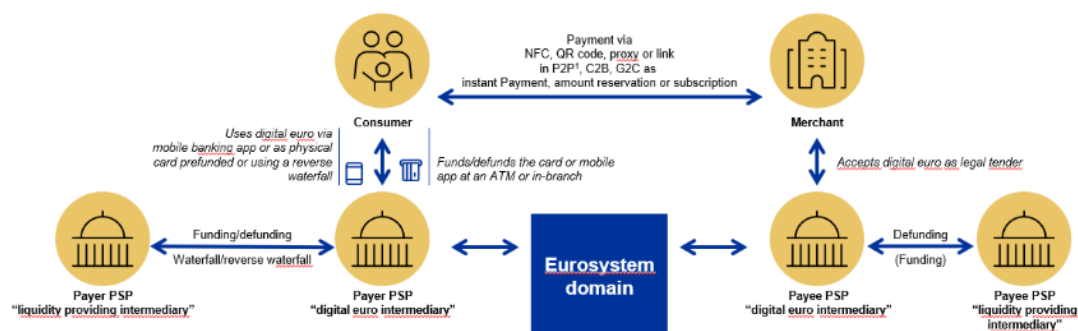
<sup>18</sup> [https://www.ecb.europa.eu/euro/digital\\_euro/html/index.en.html](https://www.ecb.europa.eu/euro/digital_euro/html/index.en.html)

### 3.3.1 Payment transactions within the D€ scheme

The ECB presents the D€ payment system with the following chart (Chart 4):

**Chart 4: The D€ payment scheme**

#### Digital euro core services and actors



In the case of P2P payments, the receiving party is another "consumer" with an intermediary offering the services depicted under "Payer PSP".

Source: ECB (2024a)

It shows the special feature of the D€ payment system that it can only operate with D€ accounts. Compared with existing payment schemes this leads to a **tripling of transactions**:

- In order to make a payment from a payer to a payee, the scheme transfers money from the payer's its commercial bank account to its D€ account (funding/reverse waterfall). This transaction is executed via TARGET2.
- From the D€ account of the payer a transaction is made to the D€ account of the payee. This transaction is executed via N€XT, the ECBs scheme for D€ online payments.<sup>19</sup>
- As firms will not be allowed to hold positive D€ balances, the money will be immediately transferred to the payee's commercial bank account (defunding/waterfall) which again requires a TARGET2 transaction.

In the unlikely case, that the payer holds a positive balance on its D€ account, which is sufficient for the payment, the transactions only double.

Thus, compared with a solution based on existing infrastructures the D€ scheme requires

- a parallel system of bank accounts and

<sup>19</sup> "The digital euro back-end prototype for online payments, called N€XT, is a bespoke design developed from scratch by the Eurosystem. The architecture of N€XT is not that of a distributed ledger, rather it is based on a UTXO data model which has been made popular by distributed ledger technologies (DLTs)." (EZB, 2023b, p. 5)

- a parallel settlement scheme for D€ settlements (N€XT) as TARGET2 is reserved for the settlement between banks.

While the ECB has never presented an estimate of the costs for establishing and operating such a parallel payment universe, it seems likely that it will be more expensive than a solution based on existing structures. The multiplication of settlement transactions is also difficult to reconcile with the ECB's commitment to **sustainability** which Vice-President Guindos (2023) has stated as follows:

“Looking to the future, we will continue to honour our commitments to stepping up our sustainability and climate protection efforts.”

### 3.3.2 The acceptance of the D€ payment scheme

The parallel structures of the D€ payment scheme are not only very expensive they might also jeopardize the acceptance by the public and thus reduce its competitiveness relative to US payment platforms.

The main impediment is the need to open **an additional bank** account which is not required for the use of credit card schemes or e.g. PayPal. In addition, for many people the logic of the waterfall functionalities and the lack of an overdraft facility will not be obvious.

A major disadvantage of the D€ scheme compared with other payment platforms is its **limitation on accounts denominated in euro**. This reduces its regional scope to the euro area so that even Europe is not completely covered by this payment scheme. Thus, it is not correct if the ECB praises the D€ as a “pan-European payment solution”.

For the competition with other platforms, one has to consider that they offer not only the pure payment transaction but also **related services**, above all consumer loans (without interest in the short-term) and consumer protection in online purchases. Some platforms also offer financing and marketing services for merchants.

Commercial banks play a crucial role in the acceptance of the D€ scheme, as they are the only institution that communicates directly with potential D€ users. As Ozcan and Gurses (2019) show, an important precondition for the creation of new markets is the cooperation between the dominant players (“**dyadic alliances**”). This is especially important, if the “new market requires complementary resources from different kinds of large firms or large firms from different industries”. In this case, the authors also mention the “Difficulty in reaching an agreement due to diverging plans for the new market (...) and beliefs about relative bargaining power.”

According to the ECB's design for the D€, commercial banks are obliged to open and to manage D€ accounts free of charge. In addition, if a customer decides to transfer deposits from its commercial bank account to a D€ account, the bank suffers a loss of cheap refinancing which it has to substitute by more costly refinancing sources. While the acceptance among merchants might be supported by lower fees, it is unlikely that they



would stop accepting the established payment schemes. Therefore, on the side of the customers there would be no incentive to switch to the D€.

Representatives of the Eurosystem also do not seem to be convinced of the acceptance of the D€ scheme. They therefore envisage **enforcing the opening of D€ accounts** by making public payments on D€ accounts only. E.g. Burkhard Balz (2024), member of the Bundesbank executive board, at the public hearing of the Finanzausschuss of the German Parliament on 9 February 2024 made the following statement:

“The specific use case, as we call it, is payments from government agencies directly to people via the digital euro wallet or vice versa.” (our translation).

And:

“For me, use cases also include, for example, being able to pay child benefit directly and other state benefits.” (our translation)

One could argue that in the past it had not been possible to make direct payments from the government to its citizens, e.g. during the energy crises. But in Germany, the institutional framework has been changed by linking the tax number with the IBAN number so that it is now possible to make such direct payments.<sup>20</sup>

Overall, forcing people to open D€ accounts would have a negative impact on the public perception of European integration. Already today, many people have the impression that the EU is involving too much in areas which go beyond its competencies. In addition, as the experience with the Digital Yuan shows, people who receive such payments seem to transfer the funds immediately to their commercial bank account.<sup>21</sup>

### 3.3.3 The dominance of the ECB in the European retail payment system

According to the rule book (ECB 2024a), the **Digital Euro Service Platform** (DESP) would become the key player in the D€ payment scheme. As Chart 5 shows, this institution would provide the link between the bank of the payer and the bank of the payee. The rule-book (ECB 2024a) describes e.g. the case of a payment which is initiated by the payer as follows:

- “1. The payer presents the amount to be paid to the payee.
2. The payee verifies the amount, consents and taps to accept the payment.
3. The payer receives the payee’s consent and submits the payment request to its intermediary.

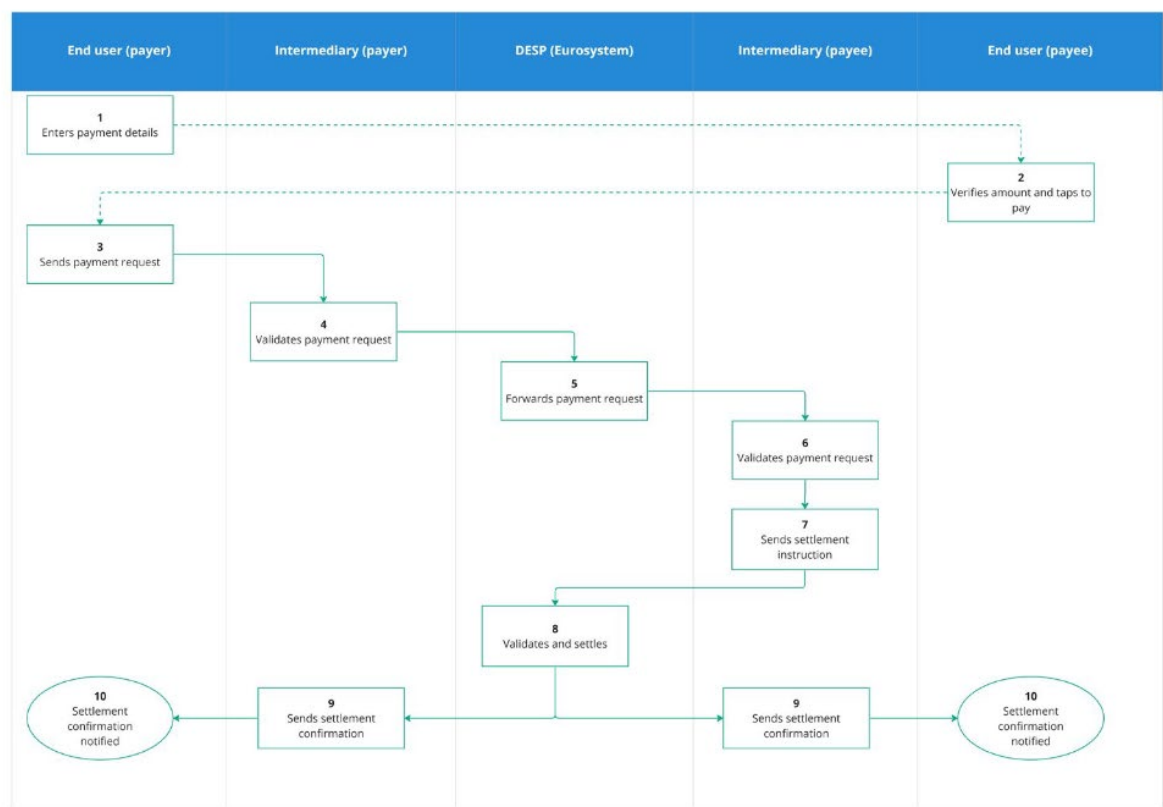
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<sup>20</sup>[https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Steuern/Weitere\\_Steuertemen/Organisation\\_Automation/2023-12-11-meldung-iban-bzst.html](https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Steuern/Weitere_Steuertemen/Organisation_Automation/2023-12-11-meldung-iban-bzst.html)

<sup>21</sup><https://www.coindesk.com/policy/2024/05/13/chinas-digital-yuan-isnt-taking-off-despite-state-employee-salary-trial-report/>

4. The payer's intermediary validates the payment request and sends it to the DESP.
5. The DESP forwards the payment request to the payee's intermediary.
6. The payee's intermediary validates the payment request.
7. The payee's intermediary sends the settlement instruction (including funding instruction if the reverse waterfall applies and/or defunding instruction if the waterfall applies) to the DESP.
8. The DESP validates the settlement instruction, settles the transaction and confirms the settlement to both the payer's intermediary and the payee's intermediary.
9. Each intermediary sends a settlement confirmation to its end user.
10. The payer and the payee are notified of the successful settlement of the transaction."

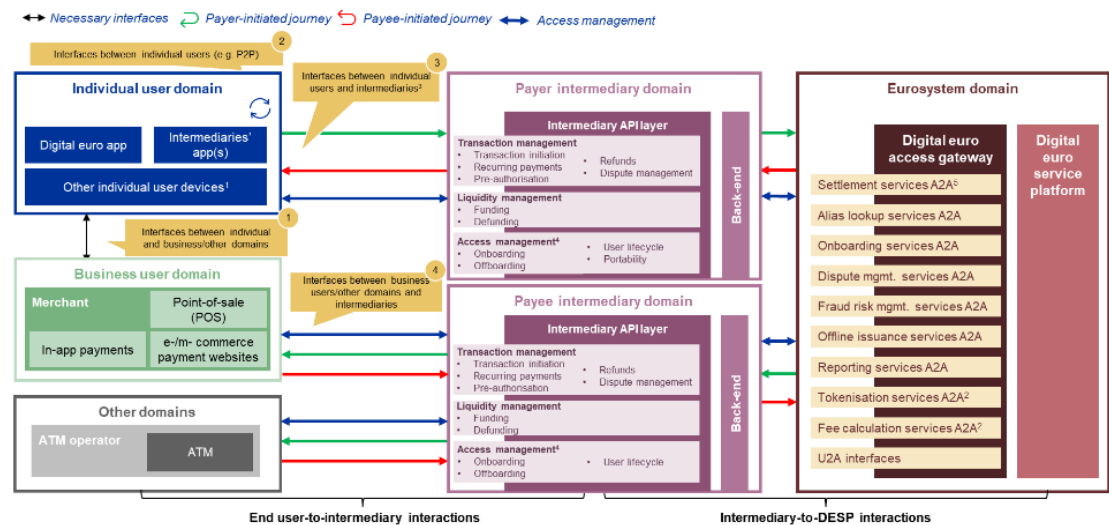
Chart 5: High-level process flow of a Digital euro payer-initiated transaction



Source: ECB (2024a)

As chart 5 shows, the DESP leaves no room for non-bank payment service providers. The dominant role of the DESP is also reflected in another chart of the rulebook:

Chart 6: High-level architecture



Source: ECB (2024a)

While it is not totally clear how the system would function, the concept outlined in the rulebook seems to lead to a solution where the ECB would dominate the complete payment scheme leaving no or only little room for private payment service providers. This point was raised in the statement of the European Payments Initiative (EPI 2024) for a public hearing of the Finanzausschuss of the German Parliament on 19 February 2024:

“EPI does not believe that the digital euro should be additionally developed as a broad payment solution. In our view, it is not the role of a public authority or the central bank to become a privileged provider of solutions in this market environment, but that the private sector should develop its own solutions at European level (to avoid fragmentation of the market) that can compete with international solutions such as PayPal and Apple Pay. These private solutions should also offer consumers the choice to use the digital euro as a means of payment and, by building up additional services, offer the digital euro attractive. Private providers are in competition with each other, and it would be against the principle of a level playing field in Europe if a regulatory authority, which is supposed to regulate its future competitors, were to become a preferred provider of solutions in this market game.” (our translation)

The negative effects of a centralized payment scheme, especially on innovation are also mentioned by the Rijksbank (2023):

“However, such a high level of governance may reduce the scope for achieving the overall objectives of fostering innovation and competition, as it reduces the ability of participants to design their own unique e-krona services.”

In other words, the dominant role of a public institution in the D€ payment system might lead to solutions which are not competitive in relation to privately managed payment platforms. The result could be the opposite of what Burkhard Balz (2024) expects:

“The third motivation is that a digital euro could promote competition and innovation in European payments.”

Thus, one can ask whether the aim of gaining European sovereignty in the payments landscape would not be better served by a solution that relies on private payment providers.

### **3.3.4 The difficulty of implementing the offline solution**

The Riksbank has started very early discussing the scope of a central bank digital currency. In recent paper “E-krona pilot Phase 4” (Riksbank 2024) the focus has been “on testing and evaluating whether it is possible to design a secure, balance-based offline solution.” A surprising result of the study is “the fact that mobile phones are insecure components so that user-to-user payments require many steps to be considered secure, which compromises user-friendliness.” As a result, all offline transactions require cards that must be loaded online.

The complexity of such a payments solution can be demonstrated with the transactions that are required to top up the payments card (Riksbank 2024):

- “1. The user opens their e-krona app on their mobile phone and enters the amount to be transferred.
2. The user enters the PIN code of the e-krona app and brings the card to the NFC reader of the mobile phone.
3. The mobile phone creates a digitally signed request that is sent to the intermediary's e-krona node.
4. The intermediary verifies the digital signature and transfers the amount from the user's online wallet to the user's shadow wallet.
5. The intermediary reads the updated balance on the user's shadow wallet, signs the balance and sends the signed balance to the user's e-krona app.
6. The user holds the card against the mobile phone's NFC reader and the user's e-krona app transmits the updated balance to the card.
7. The card changes its balance to the updated balance value.”

In its “First progress report: Progress on the preparation phase of a digital euro” (ECB 2024b) the ECB also discusses these technicalities. The ECB leaves it open whether it will be legally possible to get **effective access to the secure element** (SE) installed in users’ devices. In a letter to Thierry Breton from 19 April 2024, Piero Cipollone (2024), Member of the ECB Executive Board admits that currently iPhones cannot be used for the offline D€:

“Crucially, access to the SE is vital for mobile device based offline digital euro payments. Therefore, Apple’s proposed commitments, which do not provide full access to the SE of iOS smart phones, would not facilitate offline payments with digital euro on iPhones.”

The ECB (2024b) therefore also discusses rather clumsy solutions for cards: “battery-powered smart cards and non-powered smart cards which use a “bridge-device to connect.”<sup>22</sup>

In sum, the offline solution could require complex transactions and additional devices which reduce **the user-friendliness**. Given the limited advantages of the offline use, it is not clear whether the D€ would receive wide acceptance in this design.

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<sup>22</sup> The ECB describes this as follows: “A ‘bridge device’ is a simple, pocket-sized, battery-powered device for establishing a connection channel between two non-powered smart cards, enabling transactions between them. At a minimum, this device should have: i) a user interface (e.g. screen and keypad), ii) communication capabilities, iii) card reader and near-field communication capabilities, and iv) a small me

#### 4 An alternative: a pan-European payment scheme based on existing infrastructures

The high costs of creating and maintaining parallel payment infrastructures in Europe raises the question if the ECB's aim of safeguarding "the strategic autonomy of the Union's payment ecosystem" cannot be reached in a more efficient way, above all by using the existing payment infrastructures.

Surprisingly, in 2019 the ECB (2019) itself has proposed such a solution under the heading "SEPA for cards":

"The implementation of a European instant payments scheme and the development of common or interoperable instant payments infrastructure to process such payments may create new momentum to interconnect existing national card schemes. The use of this newly installed instant payments infrastructure could be a way to support the interlinking and interoperability of national card schemes and, if full pan-European coverage is ensured, would provide a possible alternative to establishing a European card scheme. To promote the use of such cards, it would be helpful to have a common European logo indicating the possibility of using the cards of national card schemes at EU level."

The advantage of using exiting infrastructures is also mentioned by EPI (2024):

EPI also makes the point that it is already in the process of establishing a pan-European solution using the existing payment infrastructures:

"From the user's point of view, the digital euro does not offer any new added value compared to SEPA Instant Payments (SCT Inst), which were recently defined by EU legislators as a legally binding means of payment that must be offered by banks and other payment service providers across the EU. Indeed, there is no use case (P2P, e-commerce or in-shop payments) or service that the digital euro would serve better than SEPA Instant Payments. However, the digital euro doubles the investments within the EU for two similar infrastructures."

The concept of a SEPA for cards leads to the question of the **payment instrument** that is required for any European solution.

- One solution would be a credit card in physical form that could be embedded into digital wallets like Google Pay or Apple Pay.
- An alternative instrument are QR-codes that can be read by smartphones.

So far, the ECB has not been very specific about this decisive element of its D€ scheme. In ECB (2023b) it states:

"PSPs are responsible for distributing the payment instrument to the consumer and for its maintenance. This may be an app on a mobile device or a payment card."

This leaves it open, whether the mobile device or the payment card would be issued by the private sector or the ECB. But it becomes clear that a pan-European payment instrument is required for both alternatives. In other words, the difficulty to reach such an arrangement in the past is not an argument for a D€-scheme.

An astonishingly clear commitment to a solution based on SEPA and the European Payments Initiative comes from Denis Beau (2023) who is the First Deputy Governor of the Banque de France:

“In particular, the Banque de France and the Eurosystem are actively backing the European Payments Initiative (EPI). This new pan-European payment solution will allow consumers and businesses to make instant account-to-account payments via QR code. It will be integrated in the digital wallet Wero, on which other means of payment and payment-related services will be accessible, such as a digital ID or access to merchant loyalty programmes. This payment solution will help strengthen the sovereignty of the European payment market by providing an alternative to using foreign schemes such as Mastercard and Visa, while ensuring that payments and related data are processed by European organisations.”

As we show in Bofinger and Haas (2023b), the **PIX** payment system in Brazil and the **TWINT** system in Switzerland are good examples for domestic solutions which are able to compete successfully with forego platforms without using a CBDC.

## 5 Scenarios for the D€

The key question for an assessment of the D€ is whether one can identify **market failures and related externalities** that could justify such a large-scale project. In addition, it is not clear whether the D€ as payment object or a payment system will be able to compete successfully with existing private solutions.

In this paper we show that there is no such thing as a “Digital Euro”. For a comprehensive evaluation of the D€ it is necessary to split up the whole concept into its constituent elements: the D€ as payments object and the D€ as a payments scheme. This avoids the confusion that the ECB creates by referring to the Digital euro indiscriminately as a “means of payment”, “payment instrument” and “payment solution”. A case in point is a statement that can be found on the ECB’s website which confuses the object function (central bank money”) with the function of the payment scheme:

“Our aim is to combine the benefits of central bank money and the ease with which people make their payments in today’s world.”

### *D€ as a payment scheme*

The ECB argues on the macroeconomic level that the D€ is needed as a monetary anchor in an increasingly digital financial system. But one can show that this is not an externality that could justify a fundamental change in the division of labor between the central bank and commercial banks.

The microeconomic argument that holding D€ deposits provides the “benefits of central bank” is also not convincing. With an effective deposit insurance bank deposits are as safe as central bank money. But for households the need to hold parallel accounts would lead to additional transactions and information costs. With zero interest and the possibility to use the D€ payment scheme with zero balances the use case for holding deposits on D€ accounts is not clear.

The offline use of the D€ requires a positive balance on a wallet or a card. But the use cases for this functionality are limited and it is unclear whether it would be very user-friendly.

### *D€ as a payment scheme*

In the case of payment schemes, the ECB argues that the D€ is required for the sake of the “strategic autonomy of the Union’s payment ecosystem”. While this is a clear externality, one must ask whether the creation of completely new D€ payment scheme is the optimum solution.

According to the rule book, the ECB is planning to establish a comprehensive pan-European payment scheme which is reserved for transactions between D€ accounts. This requires high costs for creating and maintaining the D€ infrastructure. It might impair the attractiveness of the scheme as, in contrast to other payment schemes, it requires opening a new bank account. In addition, the scheme would duplicate the existing SEPA scheme which is open for all kinds of bank accounts.

If the ECB sticks to its D€ project, which is likely after its strong efforts so far, from the analysis of this paper two scenarios can be derived.

#### *A worst case scenario:*

In the worst-case scenario, the D€ project becomes a complete failure. Most households would not open a D€ account and those who would open it, would only keep very low balances on it. Due to the lack of participants, the D€ payment scheme would not reach a sufficient coverage among merchants so that it would also not be attractive for payment service providers to connect with the scheme. Due to its technical complexity the offline D€ would also not be used in a significant way. With this outcome, the reputation of the ECB would receive a serious blow as it would need to justify the huge investment costs for parallel infrastructures that remain widely unused.



### *A positive, but inefficient scenario:*

In a positive scenario, most households open a D€ account. But they make full use of the waterfall functionalities and do not hold any significant balances on their D€ accounts. A payment service provider can be found that supplies a common payment instrument, which is widely used by households and merchants. A large share of retail transactions is made with the D€ payment scheme and the dominance of US platforms is reduced. In this scenario, the D€ system would de facto provide an **indirect payment infrastructure** for commercial bank accounts. As already mentioned, such a scheme would, compared with current infrastructures, lead to a tripling of payment transactions which is difficult to reconcile with the ECB's attempts to "supporting an orderly transition to a climate-neutral economy", and to recognize "the importance of continuing to drive positive change by reducing its own impact on the environment."

Thus, in such a scenario the D€ would ultimately provide a **complex detour solution** for payments between commercial bank accounts. It would be **a costly substitute** for the direct solution of reducing dependence on non-European payment platforms via a SEPA for cards. In addition to the complexity and the costs, the dominant role of the ECB in such a scheme could have negative effects on innovation and user-friendliness with the effect that the DE scheme cannot successfully compete with the dominant international platforms.

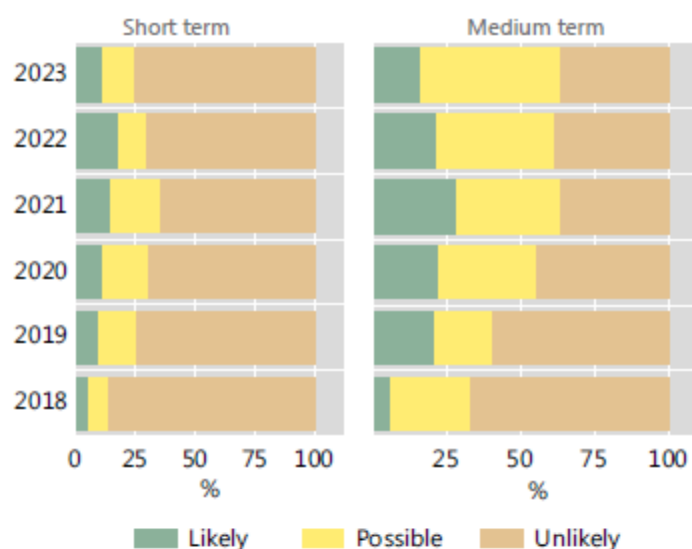
A convincing use case for the offline D€ is difficult to imagine, even in a positive scenario.

## **6 The international perspective: a sobering picture**

Our critical assessment of the D€ is supported by an international perspective. In the **Annex 1** we show that none of the existing CBDC projects have not been able to gain a significant market share although the authorities tried to support their usage. So far there is not a single CBDC success story.

In **Annex 2**, we provide our own "CBDC Tracker" which gives a comprehensive overview of the assessment of CBDC by the central banks in the major OECD countries. The result is striking: In contrast to reports that more and more countries are engaging in CBDC projects, most central banks have a rather sceptical attitude towards the necessity of a retail CBDC. This finding is supported by the recent BIS survey (BIS 2024), which shows that the number of central banks which are planning to introduce a retail CBDC in the medium term is declining.

**Chart 7: Likelihood of issuing a CBDC in the foreseeable future (As a percentage of respondents that have not issued a CBDC)**



Source: BIS (2024)

The absolute number of central banks that are planning to introduce a retail CBDC within the next few years has declined from 11 to six. Thus, the increasing engagement of central banks in CBDC seems to have led to a certain disillusionment.

## 7 Summary: Beware of taking off too early

Even though the number of central banks dealing with CBDC is still increasing, this should not lead to the impression that we are now on the verge of a breakthrough in this innovation. The projects implemented so far are anything but success stories. The majority of large and major central banks have a sceptical and often negative attitude towards CBDC.

Against this backdrop, the ECB is taking a major risk with its unconditional commitment to the Digital euro. Even under optimistic assumptions, it is difficult to imagine developments in which the ECB's objectives can be achieved in an efficient manner. It is difficult to understand why the ECB insists on developing a completely new parallel universe instead of attempting to integrate the existing and efficient systems in such a way that a solution can be developed that can compete effectively with the US platforms.

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. This should serve as a warning to central banks that have so far been cautious about CBDCs not to jump on such a bandwagon too soon.

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## **Annex: A CBDC tracker based on central bank statements and experiences**

### **I. Countries which have implemented or plan introducing CBDC**

Bahamas

China

Eastern Caribbean Currency Union (ECCU)

India

Jamaica

Mexico (planned)

Nigeria

### **II. Countries with a sceptic view of CBDC (advanced economies, Brazil, Chile, Indonesia, Malaysia, Kenya, Philippines)**

Australia

Brazil

Canada

Chile

Czech Republic

Denmark

Hong Kong SAR

Iceland

Indonesia

Israel

Japan

Korea

Malaysia

New Zealand

Norway

Philippines

Singapore

Sweden

Switzerland

Thailand

Taiwan

United Kingdom

United States

## **Part I: Countries which have started a CBDC project or announced the start of a CBDC project**

*In the following, we present evidence from newspapers and online reports, as it not possible to find sufficient information the issuance of CBDC on central bank websites. The links to the sources are provided within the text.*

### **Bahamas**

#### **Sand Dollar only 0.19 % of the total currency in circulation**

“About one year after the Sand Dollar went nationwide (October 20, 2020), Sand Dollar circulation reached around B\$300,000; however, adoption was relatively flat for the following year. In May 2023, the Sand Dollar had about 104,664 consumer wallets and around 1,500 merchant wallets (CBOB 2023). After a series of Sand Dollar educational campaigns, promotions, and giveaways—as well as the integration of the rCBDC with government payments and the ACH system—circulation rose by about B\$1 million, reaching B\$1,099,910 by September 2023 (Branch, Ward, and Wright 2023). Still, this value amounts to only 0.19 percent of the total currency in circulation at the time.”

**Source:** Franklin Nol, Observations from the Retail CBDCs of the Caribbean, Federal Reserve Bank of Kansas City, 10 April 2024. <https://www.kansascityfed.org/Payments%20Systems%20Research%20Briefings/documents/10104/PaymentsSystemResearchBriefing24Noll0410.pdf>

### **China**

#### **e-Yuan only 0.16 % of the China's M0 (Reuters 19 July 2023)**

Transactions using China's digital yuan hit 1.8 trillion yuan (\$249.33 billion) at end-June, the country's central bank governor Yi Gang said on Wednesday, marking a jump from over 100 billion yuan as of August last year.

The numbers cement China's role as a leader among countries that are developing their own central bank digital currencies (CBDC) - digital tokens issued by central banks - although adoption is still in the early stages. The e-CNY, as the digital yuan is called, has so far been used mainly for domestic retail payments.

Speaking at a lecture organised by the Monetary Authority of Singapore (MAS) in the Southeast Asian city-state, Yi said China's digital currency in circulation reached 16.5 billion yuan as of end-June.

Total e-CNY transactions reached 950 million, with 120 million wallets being opened, Yi said. Still, e-CNY in circulation accounted for only 0.16% of China's M0 money supply, or cash in circulation, Yi said.

"And you can see that right now the balance of e-CNY is only counting two-tenths of 1% of M0, so that the balance is very small, but with this kind of balance (we) support a big number of transactions, which means that the velocity is high and more efficient," Yi said.

Chinese state-owned banks participated last year in a trial focused on cross-border transactions developed by the Bank of International Settlements.

Source: <https://www.reuters.com/markets/asia/chinas-digital-yuan-transactions-seeing-strong-momentum-says-cbank-gov-yi-2023-07-19/>

### **China is paying some workers in digital yuan – but few are choosing to use it (South Chinese Morning Post 13 May 2024)**

China's digital yuan, also known as e-CNY, is failing to catch on during a trial in which state employees receive their salary in the central bank digital currency (CBDC), according to a report by the South China Morning Post (SCMP).

Most of the early recipients immediately transfer the digital yuan balances to their bank accounts to spend as cash, the SCMP reported.

"I prefer not to keep the money in the e-CNY app, because there's no interest if I leave it there," Sammy Lin, one participant in the pilot, said. "There are also not so many places, online or offline, where I can use the e-yuan

Source: <https://www.scmp.com/economy/china-economy/article/3262194/china-paying-some-workers-digital-yuan-few-are-choosing-use-it>

### **Eastern Caribbean Currency Union (ECCU)**

#### **DCash only 0.16 % of total currency in circulation**

Less than nine months after the start of the DCash pilot in 2021, the DCash platform went down for close to 10 weeks; when service was restored, around 4,000 wallet holders, roughly 20 financial institutions, and 10 government agencies across the ECCU were participating in the pilot. Later, DCash educational campaigns expanded and included in-person demonstrations. By March 2023, 400 merchants were participating. Overall, DCash circulation appears to have grown modestly from its initial issuance of EC\$2 million to EC\$2.45 million in March 2023 (ECCB 2022, 2023). This amount is still very small, accounting for only 0.16 percent of the total currency in circulation at the time.

Source: Franklin Nol, Observations from the Retail CBDCs of the Caribbean, Federal Reserve Bank of Kansas City, 10 April 2024 <https://www.kansascityfed.org/Payments%20Systems%20Research%20Briefings/documents/10104/PaymentsSystemResearchBriefing24Noll0410.pdf>



## India

### **E-rupee: “Little organic demand” (Reuters 25 June 2024)**

Usage of India's digital currency, the e-rupee, has slumped to just a tenth of the peak hit in December, four sources said, reflecting the struggles several countries have experienced in trying to generate public support for digital currencies.

The Reserve Bank of India started a pilot for the e-rupee, devised as a digital alternative to physical cash, in December 2022, and successfully reached a target of 1 million retail transactions per day by December 2023.

The achievement came only after banks were asked to push up transactions by offering incentives to retail users and disbursing a portion of bank employees' salaries using the e-rupee.

But now that the push has diminished, daily transaction numbers have fallen to about 100,000, said two of the sources, who are directly involved in the pilot.

This shows there is little organic demand to use the e-rupee, said a third source, a banker involved in the project.

The sources declined to be identified because they are not allowed to speak to media. The RBI did not respond to an email seeking comment and the data on retail transactions via the e-rupee is not publicly disclosed.

The transactions that are continuing are in part due to banks disbursing benefits to their employees via the e-rupee, all four of the sources said.

This has helped to push up transactions to about 250,000 to 300,000 per day towards the end of each month, the two sources cited earlier said

Source: <https://www.reuters.com/technology/india-digital-currency-transactions-slump-after-reaching-initial-cbank-target-2024-06-25/>

### **Inaugural Address by Shri Shaktikanta Das, Governor, Reserve Bank of India on August 26, 2024**

“It is important to emphasise that there should not be in any rush to roll out system-wide CBDC before one acquires a comprehensive understanding of its impact on users.”

Source: <https://www.bis.org/review/r240828p.htm>

## Jamaica

### **JAM-DEX roughly 0.11 percent of total currency**

JAM-DEX launched on July 11, 2022; by the end of the month, around 120,000 individuals and 2,300 merchants were reportedly on the JAM-DEX network via the Lynk platform. The

first 100,000 customers to sign up for the rCBDC received an incentive bonus of JMD\$2,500, resulting in circulation increasing by JMD\$250 million. After this initial increase, circulation basically stalled. Consequently, the BOJ engaged in cash promotions, merchant outreach, and an education campaign to encourage adoption. By February 2023, these efforts had resulted in 185,410 individuals, 90 small merchants, and 4,500 micro merchants participating in JAM-DEX. Currently, JAM-DEX circulation is hovering around JMD\$257 million, roughly 0.11 percent of the total currency in circulation in Jamaica (Jamaica Observer 2022b; BOJ n.d.; Patterson 2023).

Source: Franklin Nol, Observations from the Retail CBDCs of the Caribbean, Federal Reserve Bank of Kansas City, 10 April 2024. <https://www.kansascityfed.org/Payments%20Systems%20Research%20Briefings/documents/10104/PaymentsSystemResearchBriefing24Noll0410.pdf>

## Mexico

### Digital peso delayed without further notice (Cointelegraph 8 January 2023)

The development of Mexico's central bank digital currency (CBDC) is still at an early stage, and is unlikely to be ready for launch in 2024.

According to local media reports, Mexico's central bank, known as Banxico, is currently working on the legal, administrative and technological requirements for the digital version of the peso. The first of three stages of the proposed launch schedule.

In December 2021, the local government announced its plan to introduce a national digital currency, noting in a Twitter post that "new technologies and next-generation payments infrastructure" would improve Mexico's financial inclusion and projecting a launch by 2024. A year later, authorities reportedly avoided forecasting a launch date.

"The outcome of this initial phase involves the development of a budget that is in the process of being determined, and will in turn allow us to establish a likely date on which the MDBC [CDBC] will be available," Mexico's central bank said.

The original plan included in a first stage the creation of the PagoCel platform, which will allow users to make bank transfers using their cell phone numbers or personal information. A second phase will involve the country's financial institutions, which will issue a security code for digital currencies to be transferred through the Interbank Electronic Payments System (SPEI), a transfer system owned and operated by the central bank. The system will also allow users to make bank transfers using their cell phone numbers or personal information.

Source: <https://es.cointelegraph.com/news/mexico-s-digital-peso-delayed-unclear-launch-date>

## Nigeria

### **eNaira: Is It Here to Stay or Are Nigerians Going to Say ‘Nay’? EOS Intelligence (15 February 2024)**

With the release of eNaira in October 2021, Nigeria became the first country in the African continent and second in the world after the Bahamas to launch a CBDC. Major motivations behind launching CBDC in Nigeria included encouraging financial inclusion, improving cross-border transactions, complementing the current payment systems, and enabling diaspora remittances. However, the adoption of eNaira has been low, with only 0.5% of the Nigerian population using CBDC within a year of its launch.

In a rather desperate move to compel its people to adopt eNaira, the government caused cash shortages in the country. This resulted in protests, riots, and unrest among Nigerians. As a result of the currency shortages in early 2022, Nigeria witnessed a 12-fold increase in the number of e-Naira wallets to 13 million since October 2021.

As of July 2023, the value of transactions had also seen a 63% rise to N22 billion (US\$48 million) since its launch in October 2021. According to the International Monetary Fund (IMF), 98.5% of the eNaira wallets were inactive one year after the launch of the CBDC, meaning 98.5% of eNaira wallets have not been used even once during any given week. These low levels of activity mirror the low public adoption of eNaira.

Source: <https://www.eos-intelligence.com/perspectives/technology/enaira-is-it-here-to-stay-or-are-nigerians-going-to-say-nay/>

## **Part II: Statements of major central banks on retail CBDCs**

*In the following, we present statements from central bank publications or from speeches of central bankers on CBDC.*

### **Australia**

#### **Reserve Bank of Australia: Australian CBDC Pilot for Digital Finance Innovation (August 2023)**

“Considering the broader context – where the Australian payments system is currently meeting most of the needs of end users and work on CBDC in advanced economies is generally still in an exploratory stage – it is likely that any serious policy consideration of issuing a CBDC in Australia is still some years away.

Source: <https://www.rba.gov.au/payments-and-infrastructure/central-bank-digital-currency/pdf/australian-cbdc-pilot-for-digital-finance-innovation-project-report.pdf>

#### **Speech by Brad Jones: The Economics of a Central Bank Digital Currency in Australia (17th Central Bank Conference on the Microstructure of Financial Markets Sydney – 8 December 2022)**

As far as monetary economics goes, the introduction of a general purpose CBDC would be revolutionary – for centuries, physical cash has been the only source of central bank-issued money to which households and non-financial firms have had access. Prior to crossing this Rubicon, a strong public interest case would first need to emerge. On balance, we have yet to see that case made in Australia. We are not alone here – no other advanced economy central bank has committed to issuing a general purpose CBDC. But with our eAUD pilot program in full swing, and changes in the digital economy and money and payments landscape occurring at a frenetic pace, the Bank is keeping an open mind.”

Source: <https://www.rba.gov.au/speeches/2022/sp-ag-2022-12-08.html>

### **Brazil**

#### **Economist Intelligence Unit: Brazil prepares to launch digital currency by early 2025 (7 May 2024)**

Whereas Pix is an instant payments system focused on retail transactions, the Drex is the digital representation of the Brazilian currency, the Real. The use of blockchain technology, as is the case for cryptocurrencies, and distributed ledger technology (DLT) will provide security and transparency, helping to engender confidence in the Drex. However, unlike cryptocurrencies, which are unregulated and decentralised, the Drex will be regulated and its value guaranteed by the BCB, meaning that its value will be stabilised, equal to the Brazilian Real. These features will make the Drex more suitable for carrying out the larger transactions that are required in wholesale and government operations. For example, the

Drex could be used to price assets, conduct streamlined cross-asset operations without intermediaries, facilitate international transactions and automate contracts, to the benefit of the country's business environment.

In practice, the Drex Platform is a Distributed Ledger Technology (DLT) ecosystem, in which regulated financial intermediaries will convert balances of demand deposits and electronic money in Drex, so that their clients have access to various intelligent financial services. Thus, the retail Drex will enable the population to access various types of financial transactions with digital assets and smart contracts to be settled in the wholesale Drex issued by the BCB within the Drex Platform

Source: <https://www.eiu.com/n/brazil-prepares-to-launch-digital-currency-by-early-2025>

## **Canada**

### **Bank of Canada: Digital Canadian Dollar (Webpage Bank of Canada)**

In an era of rapid digitalization, we need to do the necessary work to be ready if Canadians' payment preferences or needs change. As commerce becomes ever more digital, Canadians should continue to have all the benefits of money issued by the central bank.

Whether and when Canada will need a Digital Dollar is uncertain. Ultimately, Canadians will decide—through their representatives in Parliament—if a Digital Dollar should be issued.

Source: <https://www.bankofcanada.ca/digitaldollar>

## **Chile**

### **Central Bank of Chile: Emision de moneda digital. Segunda informem: Avances de la exploracion conceptual, Marzo 2024. (Eigene Übersetzung)**

The evaluation of the advantages and challenges associated with an MDBC indicates that its issuance is not justified today, but that it cannot be ruled out in the future. In line with what most central banks around the world are doing, the BCCh has decided to continue with the process of exploring CDBC, in order to be prepared to do so in the future. This includes moving forward with practical experimentation via proofs of concept.

Finally, it is necessary to mention that the Bank still considers that there is not yet sufficient information to make a final decision regarding the issuance of an CDBC. Therefore, the decision to explore further should in no way be understood as a decision to issue an MDBC or as a change in the Bank's commitment to provide cash to those who require it.

Source: <https://www.bcentral.cl/documents/33528/130503/Segundo-Informe-MDBC.pdf/1c506d66-1dbf-2434-54bd-3997ec84784b?t=1712352384816>

## Denmark

### **Governor Signe Krogstrup's speech at the conference New types of Digital Money at Danmarks Nationalbank (9 March 2023)**

“The question of a retail CBDC goes far beyond technology. Its introduction would change the structure of the financial system and the respective roles and demarcation lines between commercial banks, central banks and other institutions, in the provision of money.

Several reasons have been proposed for introducing retail CBDC. Examples include improving critical infrastructures, financial inclusion or strengthening competition and cybersecurity. Some of these issues are not new and have typically been addressed by regulation, or by improving existing technologies. It is not clear to me that we require a different approach now, but perspectives and circumstances across countries differ.

A key question often voiced is whether the decline in cash use will eventually lead to a lack of trust in money, and if so, whether a retail CBDC could take the role of cash in ensuring this trust.

As already noted, based on what we know today, it is not clear to me that cash in the hands of private citizens is the anchor of trust in our monetary system, certainly not in Denmark. But this is an open question, and I look forward to discussing today.

Source: <https://www.nationalbanken.dk/media/zh3n2jbu/skro-keynote-cbdc.pdf>

### **Danmarks National Bank: New types of digital money (23 June 2022)**

Central Bank: “At present, and with the associated costs and possible risks, it is not clear how retail CBDCs will create significant added value relative to the existing solutions in Denmark.”

Source: <https://www.nationalbanken.dk/media/z12aimyo/analysis-no-8-new-types-of-digital-money.pdf>

## Hungary

### **Anikó Szombati, Chief Digital Officer of the Hungarian Central Bank (CoinDEsk 10 May 2023)**

“For the moment we don't see any imminent need for large scale retail CBDC to be introduced” by regular citizens and merchants, Anikó Szombati, Chief Digital Officer of the Hungarian Central Bank, said at an event hosted by think tank the Official Monetary and Financial Institutions Forum.

But, she added, “we are also exploring the possibilities for issuing a central bank digital currency” via a series of pilots, and “would like to remain in the forefront of CBDC research.

Source: <https://www.coindesk.com/policy/2023/05/10/hungarian-central-bank-sees-no-imminent-need-for-e-forint/>

### **Anikó Szombati: Interview Global government Fintech (4 September 2023)**

Overall her key message is ultimately similar to most central banks' thinking on (retail) CBDC, which she describes as "a society-wide project in the long-term".

"We haven't identified yet such a strong motivation factor that would drive us to launch a 'Big Bang' project," Szombati concludes on CBDC.

Source: <https://www.globalgovernmentfintech.com/hungary-fintech-interview-central-bank-of-hungary-aniko-szombati/>

## **Indonesia**

### **Bank of Indonesia on its website: Project Garuda: Navigating the Architecture Of Digital Rupiah**

Bank Indonesia believes that Digital Rupiah has the potential to preserve the sovereignty of Rupiah in the digital era, including supporting integrated digital economy and finance as well as creating the opportunities for more equitable and sustainable financial inclusion. Nonetheless, most central banks are still mindful before taking a decision to issue a CBDC for the public. There are stages of further experimentations and discussions required.

Source: <https://www.bi.go.id/en/rupiah/digital-rupiah/default.aspx>

## **Japan**

### **Central Bank Digital Currency Experiments: Progress on the Pilot Program (April 2024)**

In the pilot program, the Bank has been conducting experiments and discussions from a broad perspective based on the two pillars of "development of a system for the pilot program and experimentation" and the "CBDC Forum." Taking into account the discussions at the CBDC Forum, the Bank will proceed further with efforts to develop the system.

Source: <https://www.boj.or.jp/en/paym/digital/dig240531a.pdf>

### **Remarks by Mr Kazuo Ueda, Governor of the Bank of Japan, at the Fintech Summit FIN/SUM 2024, Tokyo, 5 March 2024.**

While CBDC is being explored on the assumption that it will possess the features of cash that I have just described, there is, in fact, a stark difference between the two, namely, in terms of tangibility. Specifically, whereas cash is a tangible asset and comes in physical form, such as paper and metal, CBDC is intangible, with information on the amount and

holder provided in the form of electronic data. This intangible feature is a crucial point in considering the differences between CBDC and cash.

Whether to issue a retail CBDC in Japan should be decided by discussions among the public.

(...) the sharing of roles between central bank money and private money as well as private firms' capacity for resource allocation and innovation should also be valued.

Source: <https://www.bis.org/review/r240306a.htm>

## **Kenya**

### **Central Bank of Kenya: Discussion Paper on Digital Currency (February 2022)**

As is with mobile money, the focus of the assessment of CBDC innovation must be on functionality and the problem it resolves for the people rather than the underlying technology. Whilst CBDC offers opportunities to reduce costs associated with digital payments, it also comes with risks particularly related to cybersecurity and unknowns on how it would impact central banks' core functions of monetary policy, financial stability and payment systems oversight. Further, in the case of Kenya where electronic money has taken root, the proposed value solution offered by CBDC seems to be already met.

Source: [https://www.centralbank.go.ke/uploads/discussion\\_papers/CentralBankDigitalCurrency.pdf](https://www.centralbank.go.ke/uploads/discussion_papers/CentralBankDigitalCurrency.pdf)

### **Central Bank of Kenya: Discussion Paper on Central Bank Digital Currency: Comments from the Public (May 2023)**

Ultimately, the rollout of CBDC should not be a race to be first. CBK's vision is for a payments system that is secure, efficient, and widely available to and works for Kenyans. Presently, Kenya's pain points in payments can potentially be solved by strengthening innovations around the existing payment ecosystem. Accordingly, implementation of a CBDC may not be a priority in Kenya in the short to medium term. However, CBK will continue to monitor developments in the CBDC world and periodically assess the need for CBDC in Kenya.

Source: <https://www.centralbank.go.ke/wp-content/uploads/2023/06/Discussion-Paper-on-Central-Bank-Digital-Currency-Comments-from-the-Public.pdf>

## **Korea**

### **Ledger Insights: Korean wholesale CBDC pilot to support tokenized deposits (4 October 2023)**

Today the Bank of Korea (BoK) announced plans for a wholesale central bank digital currency (wholesale CBDC) pilot in conjunction with the Bank for International Settlements



(BIS). Key motivations for the Korean wholesale CBDC include acting as a settlement asset for commercial bank tokenized deposits, and exploring the BIS' Unified Ledger concept.

The central bank previously ran retail CBDC trials but has concluded there is no current need for a retail CBDC, given the efficient payments landscape. However, it will continue to explore technology for an offline CBDC and privacy preserving technologies.<sup>23</sup>

Source: <https://www.ledgerinsights.com/korean-wholesale-cbdc-pilot-to-support-tokenized-deposits-unified-ledger/>

## Malaysia

### **Bank Negara Malaysia (Central Bank Malaysia): Annual Report 2020**

At the moment, the Bank does not have any immediate plans to issue CBDC. In Malaysia, the financial system continues to support the functioning of the economy while meeting the needs of individuals and businesses. To this end, the existing monetary and financial policy tools have remained effective in safeguarding monetary and financial stability. Moreover, domestic payment systems, including the RPP continue to operate safely and efficiently to support the needs of the economy and allow real-time digital payments.

Source: [https://www.bnm.gov.my/documents/20124/3026128/ar2020\\_en\\_box2\\_digitalcurrency.pdf](https://www.bnm.gov.my/documents/20124/3026128/ar2020_en_box2_digitalcurrency.pdf)

### **Malaysia Financial Sector Blueprint 2022-26 - A Booster For Digital Finance (NEW STRAITS TIMES, 24 Februar 2022)**

To catch up with the popularity of the Central Bank Digital Currency (CBDC), BNM will intensify research and experimentation on the use of CBDC for Malaysia's monetary and financial infrastructures with the initial focus on wholesale CBDC, making it clear that retail CBDC is not on the radar of the central bank. CBDC will also be handy in exploring emerging payment innovations for cross-border payments, such as the use of multi-CBDC arrangements”

Source: <https://www.kkd.gov.my/dasar-privasi/233-kkd-news/21482-malaysia-financial-sector-blueprint-2022-26-a-booster-for-digital-finance>

## New Zealand

### Reserve Bank New Zealand: Digital Cash in New Zealand (17 April 2024)

At the Reserve Bank - Te Pūtea Matua, we're looking at digital cash. It would be an electronic version of cash, issued by the Reserve Bank of New Zealand, but it would not replace cash.

We are in stage 2 of a multi-year, multi-stage process of considering digital cash. We've developed some principles and design options for New Zealand's digital cash, and we want you to tell us if we have got it right and what it would mean for you.

There are many details to work out before we can decide if digital cash is right for New Zealand, and we plan to consult again in the future on whether we should go ahead and issue digital cash.

Source: [https://consultations.rbnz.govt.nz/money-and-cash/digital-cash-in-new-zealand/?\\_gl=1\\*dmmbz\\*\\_ga\\*MjAyOTcxNzk5OS4xNzE5NTkxODA3\\*\\_ga\\_51JCWD9FGD\\*MTcx-OTU5MjU3MS4xLjEuMTcxOTU5MjYwMC4wLjAuMA..#documents](https://consultations.rbnz.govt.nz/money-and-cash/digital-cash-in-new-zealand/?_gl=1*dmmbz*_ga*MjAyOTcxNzk5OS4xNzE5NTkxODA3*_ga_51JCWD9FGD*MTcx-OTU5MjU3MS4xLjEuMTcxOTU5MjYwMC4wLjAuMA..#documents)

## Norway

### Norges Bank Papers: Central bank digital currency - final report for project Phase 4

In summary, our assessment so far is that with respect to the precautionary approach, introducing retail CBDC is not a very urgent matter. The idea that the introduction of retail CBDC is the most adequate instrument for managing risks in Norges Bank's areas of responsibility associated with new monetary and payment systems is uncertain as well. Nevertheless, we cannot exclude the possibility that highly secured stablecoins in foreign currency issued by, for example, bigtechs, or CBDC from countries with significant economic relations to Norway, may be used by Norwegian audiences to a certain extent. Norges Bank should therefore pursue its assessment of how to ensure that payments in NOK offer required functionality demanded by end users in the future. Retail CBDC, wholesale CBDC, other changes in the settlement system and regulatory instruments are all relevant in such an assessment.

Source: <https://www.norges-bank.no/contentassets/fb85d452791d4d1a9f04aa4d3c18683d/norges-bank-papers-2---phase-4---final-report.pdf?v=18122023133556>

## Philippines

### Jan Marlon A. Evangelista, Bank Officer, Payments Policy and Development Department Payments and Currency Management Sector (25 April 2024)

There is minimal perceived added value for the use of retail CBDC in the Philippines given the progress in the implementation of retail payment and financial inclusion reforms.

Account-based CBDCs may not yield much value compared to current retail payment instruments in the Philippines.

Source: [https://www.bsp.gov.ph/Inclusive%20Finance/EFLP/EFLP2024\\_1\\_2c.pdf](https://www.bsp.gov.ph/Inclusive%20Finance/EFLP/EFLP2024_1_2c.pdf)

## **Poland**

### **NPB Management Board (May 2021)**

The NBP Management Board has adopted the following stance of Narodowy Bank Polski on the issuance of digital zloty:

For many years Narodowy Bank Polski has been closely monitoring the progress of the work of other central banks on the issue of a new form of currency, i.e., central bank digital currency (CBDC), and it has been evaluating the needs of the Polish market in this respect. At the same time, NBP has been thoroughly examining the potential implications of CBDC issuance – its legal, technological and economic consequences (particularly, for the functioning of the banking sector, financial stability, monetary policy, and the operation of the payment system).

The current circumstances in Poland do not justify the rationale behind the launching of the pilot tests on CBDC issuance or digital currency implementation by other central banks. Until now NBP has not identified a systemic objective for the issuance of digital zloty or any specific needs of consumers or business entities that could not be satisfied by payment service providers in Poland but only through the central bank through the introduction of CBDC. The results of the analyzes conducted show no clear benefits from the introduction of central bank digital currency in Poland versus the identified risks related to its issuance for the economy, cash circulation and the financial system. NBP takes a prudent approach to the possibility of introducing digital zloty and does not currently choose to issue it, in the absence of any convincing justification. NBP's current stance on the issuance of CBDC may be modified should factors (domestic or international) justifying such a change emerge.

Source: <https://nbp.pl/en/payment-system/statistical-data/analyzes-and-studies/central-bank-digital-currency/>

## **Singapore**

### **Monetary Authority of Singapore: A Retail Central Bank Digital Currency: Economic Considerations in the Singapore Context (November 2021)**

“Overall, MAS’ current view is that there is no pressing need for a retail CBDC in Singapore at this point in time. Demand for cash domestically remains some way from the

“minimum threshold” where concerns of the negative implications from the lack of cash in circulation might arise.

MAS’ decision to proceed with further technological and policy explorations of a retail CBDC should not be taken as a commitment to its issuance. There are broader considerations for CBDC issuance, such as whether the public expects direct access to central bank money as part of the social contract in Singapore. At the same time, while there is general consensus that money and payments are public goods whose provision should not be left entirely to the private sector, the appropriate “division of labour” between the public and private sector ultimately also involves some normative judgement.

Source: <https://www.mas.gov.sg/-/media/MAS/EPG/Monographs-or-Information-Paper/A-retail-CBDC---Economic-Considerations-in-the-Singapore-Context.pdf>

## **Sweden**

### **The state and the payments: Summary of the report of Betalningsutredningen, Stockholm 2023**

The Inquiry therefore does not currently see sufficiently strong societal needs for the Riksbank to issue an e-krona. Given that development is occurring rapidly, economic, political and technological changes may prompt a new assessment.

Source: <https://www.regeringen.se/contentassets/c01377cf65424cf0b12addf64c04374a/english-summary-the-state-and-the-payments.pdf>

### **Sveriges Riksbank: E-krona – state money in digital form**

Whether or not to introduce an e-krona in Sweden is ultimately a political decision. An inquiry into the role of the state in the payment market, presented in March 2023, assesses that there is currently insufficient social need for the Riksbank to issue an e-krona. However, global changes may lead to a different assessment in the future. In its consultation response, the Riksbank points out that work on developing legislation for a possible e-krona needs to begin now, so as to shorten the implementation period if the launch of an e-krona becomes relevant later.

Source: <https://www.riksbank.se/en-gb/payments--cash/e-krona>

## **Switzerland**

### **Speech by Thomas J. Jordan: Towards the future monetary system. Introductory remarks, event 'Towards the future monetary system', Zurich (8 April 2024)**

Some central banks are also exploring the issuance of a digital form of cash as a retail payment instrument. The SNB currently sees no need in Switzerland for such digital central bank money for the general public, also known as retail CBDC. Consumers and

businesses already have access to a wide range of efficient and innovative payment instruments offered by the private sector. Retail CBDC could fundamentally alter the current monetary system and the role of central banks and commercial banks, with far-reaching consequences for the financial system. From a Swiss perspective, the risks of retail CBDC currently outweigh its potential benefits.

Source: [https://www.snb.ch/en/publications/communication/speeches/2024/ref\\_20240408\\_tjn](https://www.snb.ch/en/publications/communication/speeches/2024/ref_20240408_tjn)

## **Taiwan**

### **Central bank Deputy Governor Chu Mei-lie (Taipeh Times, 8 December 2023)**

Taiwan's central bank is prudently approaching the issue and has no timetable on when to reach a conclusion, she said.

Source: <https://www.taipeitimes.com/News/biz/archives/2023/12/08/2003810290>

### **Taiwan c.bank says no timetable for launching digital currency (Reuters 7 July 2024)**

Taiwan's central bank said on Sunday that it has no timetable for launching a digital currency, warning the process will be "huge and complex", but it will hold public hearings on the matter next year to spread knowledge.

Source: <https://www.reuters.com/world/asia-pacific/taiwan-cbank-says-no-timetable-launching-digital-currency-2024-07-07/>

## **Thailand**

### **Bank of Thailand: Pilot Program, Retail CBDC Conclusion Report (March 2024)**

In a nutshell, the BOT envisions that CBDC can foster competition among FSPs, enable new financial innovations, and make more capable and cost-efficient services available to the public in the future. Nonetheless, challenges associated with Retail CBDC remain such as user adoption, as well as its consequences on the business models of FSPs. Meanwhile, the value-added benefits of CBDC remain unclear to many central banks, leading them to designate their respective CBDC plans as long-term endeavors.

At present, the BOT has no immediate plan to officially issue Retail CBDC, but the BOT will use the results from the pilot, especially insights related to the technology design, to apply to new areas and future studies on enhancing the payment system.

Source: <https://www.bot.or.th/content/dam/bot/documents/en/financial-innovation/cbdc-digital-currency/rCBDC%20Conclusion%20Report.pdf>

## United Kingdom

### **Treasury Committee, Oral evidence: Bank of England Financial Stability Reports, HC 140, Monday 16 January 2023**

Andrew Bailey (Governor at the Bank of England): “I am not convinced about some of the problems that we might be trying to solve. I am not necessarily convinced that the retail payment systems need this sort of upgrade at the moment.

Frankly, I am still thinking hard about this, and the thing that I come back to is that if there is a demand for retail digital money—if there is a demand for stablecoins—and we must set the standard very high because of the need for certainty of value of stablecoins, is it actually different from a central bank digital currency? Should we make that distinction, or not? It remains to me an open question.

From the Bank of England's point of view, our main motivation for a retail CBDC would be to promote the singleness of money by ensuring that the public always has the option of going into fully functional central bank money that can be used in their everyday lives. We have set out a number of arguments for why this might be needed in our consultation paper. But we do not yet know if we'll definitely need to do it – this will depend on how trends in money and payments play out.

Source: <https://committees.parliament.uk/oralevidence/12520/pdf>

### **House of Commons Treasury Committee: The digital pound: still a solution in search of a problem? First Report of Session 2023–24**

58. There are some potential benefits to the UK economy from a digital pound. A digital pound could help support innovation in domestic payments, while guarding against some of the risks posed by new forms of private digital money by maintaining public access to a form of central bank money. Innovation brought about by a digital pound could also support the UK's international competitiveness in payments (and related) technologies, particularly if it is amongst the first major central banks to issue a retail CBDC. The extent of these benefits is unclear, however. Nor is it yet clear that a digital pound is the only (or best) means of achieving them.

60. Building the infrastructure needed for a digital pound would also likely be very expensive, and the eventual decision on whether to launch a digital pound will need to be subject to a rigorous cost-benefit analysis. The Bank of England and Treasury must approach this analysis from a neutral stance—the launch of a digital pound must not be viewed as an inevitable consequence of investing in further detailed design work. The policy question must remain ‘why do it’ rather than becoming one of ‘why not do it’.

Source: <https://committees.parliament.uk/oralevidence/12520/pdf/>

## United States

### On the website of the Board of Governors of the Federal System: Has the Federal Reserve decided to create a CBDC?

The Federal Reserve issued Money and Payments: The U.S. Dollar in the Age of Digital Transformation as a first step in fostering a broad and transparent public dialogue about CBDCs in general, and about the potential benefits and risks of a U.S. CBDC. The paper is not intended to advance any specific policy outcome and no decisions have been made at this time. The Federal Reserve has made no decision on issuing a central bank digital currency (CBDC) and would only proceed with the issuance of a CBDC with an authorizing law. Testifying before the House Financial Services Committee in March 2023, Chair Powell said a central bank digital currency is, "something we would certainly need Congressional approval for."

Source: <https://www.federalreserve.gov/cbdc-faqs.htm>

### Jerome Powell testifying before Congress on March 7 2024 (Reuters)

Federal Reserve Chairman **Jerome Powell** significantly downplayed the possibility of the central bank issuing its own digital currency, and said if it ever came to pass, the government would play a limited role. Testifying before Congress Thursday, Powell said policymakers were "nowhere near" taking action on adopting such a tool.

"People don't need to worry about a central bank digital currency, nothing like that is remotely close to happening anytime soon," he told the Senate Banking Committee.

He added that the Fed has no interest in establishing accounts for individuals that would compete with the banking system, and it would not support any Fed monitoring of personal financial transactions.

"If we were to ever do something like this, and we're a very long way from even thinking about it, we would do this through the banking system, the last thing...we the Federal Reserve would want would be to have individual accounts for all Americans," he said.

Source: <https://www.reuters.com/markets/us/powell-says-fed-not-remotely-close-central-bank-digital-currency-2024-03-07/>

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