Round Table Report

A digital euro beyond impulse - Think twice, act once

Chair

José Antonio Álvarez

Rapporteurs

Apostolos Thomadakis
Karel Lannoo
Farzaneh Shamsfakhr

CEPS

ECMI EUROPEAN CAPITAL MARKETS INSTITUTE

ecri EUROPEAN CREDIT RESEARCH INSTITUTE

This study reflects the discussions held among the members of the 'Round Table on the Digital Euro'. The Round Table was composed of a group of market operators and infrastructure providers, central bank representatives, regulators and academics. Five meetings were held between April and September 2023. The European Central Bank presented its digital euro proposal during the first meeting.

The views expressed in this report do not necessarily reflect the views and positions of the Chair or the members of the Round Table, or the views of their respective companies. The members do not necessarily agree with all the positions put forward or necessarily endorse the references to academic and independent studies. A robust and clear set of principles have guided the drafting process to preserve a balanced approach to a variety of views. All members were given ample opportunity to express their views. The content of the report and any remaining errors, however, are solely attributable to the rapporteurs.

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CEPS, ECMI and ECRI
Place du Congrès 1, B-1000 Brussels
Tel: 32 (0) 2 229 39 11
email: info@ceps.eu and ecmi@ceps.eu
internet: www.ceps.eu, www.ecmi.eu and www.ecri.eu

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Abbreviations

AML	Anti-money laundering
CBDC	Central bank digital currency
CBPR	Cross-Border Payment Regulation
CFT	Countering the financing of terrorism
DLT	Distributed ledger technology
ECB	European Central Bank
EMD	E-Money or Electronic Money Directive
MiCA	Markets in Crypto-Assets
NCB	National Central Bank
P2P	Peer-to-peer
P2M	Peer-to-merchant
PBoC	People's Bank of China
POS	Point of sale
PSD	Payment Services Directive
PSP	Payment Service Providers
RBA	Reserve Bank of Australia
SCT	SEPA Credit Transfer
SCT Inst	SEPA Instant Credit Transfer
SEPA	Single Euro Payments Area
SIPS	Systemically Important Payment Systems
TFEU	Treaty on the Functioning of the European Union
TIPS	TARGET Instant Payment Settlement

Foreword

We are living in an exciting time for retail payments, witnessing an unprecedented wave of innovation. This sector has seen remarkable advancements in recent years, with consumer needs evolving rapidly towards digital, instant and contactless solutions. Technology has paved the way for new and innovative payment methods like account-to-account payments, and buy-now-pay-later options, providing fresh and stimulating solutions.

Europe's payment systems are currently thriving, driven by a spirit of innovation and healthy competition. The continuous evolution of payments showcases the EU's ability to embrace progress. However, there are still challenges to overcome. Although there has been significant growth in domestic payment solutions across different Member States, at the European level there is still room for improvement in cross-border payments. It would be convenient to have a pan-European solution that enables citizens to make a peer-to-peer (P2P) payments from Portugal to Latvia.

Moreover, we anticipate emerging trends in payments that will require us to develop new and innovative payment solutions. By 2026, it is projected that there will be 49 billion installed IoT-connected devices. Just imagine a world where these interconnected devices can trigger actions and execute payments seamlessly, without any human intervention. We are also moving towards an increasingly tokenised economy, which has the potential to transform financial markets by introducing new, easily tradable financial and real-world assets and automating business processes.

The private sector is leading this exciting journey, providing novel payment solutions that cater to the evolving needs of citizens. Banks are exploring tokenised deposits and enhanced payment programmability to meet the demands of the tokenised economy and facilitate distributed ledger technology (DLT) payments. Instant payments have also become the new norm, with successful P2P solutions like Bizum in Spain, Bancomat in Italy, MB Way in Portugal or iDeal in Netherlands, widely used by the population for their daily payments. Additionally, various countries are in the process of developing similar solutions, such as the European Payments Initiative, recently named 'wero'.

In this context, the concept of central bank digital currencies (CBDCs) has emerged as one of the possible building blocks of the future payment ecosystem and central banks are exploring what role should they play. The European Central Bank has been conducting thorough research for the past two years and is ready to present the conclusions of its investigation phase of a retail digital euro. As a retail CBDC, the digital euro is intended to serve different objectives, including providing a new means of retail payment, providing a monetary anchor for the payment system, increasing financial inclusion, etc. This combination of goals presents its own set of complexities, requiring careful design and consideration.

Maintaining financial stability and ensuring an orderly deployment is of utmost importance when it comes to the digital euro's role as a store of value. Measures must be in place to prevent any potential impacts on financial stability and banks' capacity to fund the economy.

As a means of payment, the digital euro could compete with existing private payment methods, providing European citizens with another choice in their everyday transactions. It is essential to create an environment where it complements and enhances the value proposition of existing private solutions. Artificially crowding out successful domestic private solutions that are already widely used by citizens should be avoided.

The legislative proposal for the digital euro opens up new opportunities to further explore these questions. Should the digital euro be implemented, it must not only offer value to citizens, businesses

and intermediaries but also contribute to a more competitive, innovative and efficient European payments market.

Additionally, besides this retail digital euro, we should also consider the potential role of a wholesale digital euro, which, leveraging DLT, could complement existing wholesale payment systems and foster private innovation in European payments. This approach could serve as a foundation for innovative payment methods in the retail payments space, such as tokenised deposits. For instance, Banco Central do Brasil is already making strides in this direction.

CEPS, ECMI and ECRI embark on this report with a reflection on how the digital euro can contribute to the future of payments and the role it should play in this future. The report explores how the digital euro could contribute to the objectives that the authorities are pursuing with the project and analyses the main challenges that will need to be addressed to succeed. This is an exercise which is fundamental in my view to further deepening the design of the digital euro.

I would like to thank CEPS, ECMI and ECRI for contributing to this debate by bringing together the views of relevant stakeholders that reflect the variety of interests involved in the digital euro project, including market operators, infrastructure services, merchants, commercial banks, and academics.

The digital euro represents an opportunity to think together, the public and private sectors, about the payments of the future. A truly public-private partnership will be crucial to finding the best way to respond to actual and future challenges. Together, we can shape a future that is more competitive, efficient and inclusive, unleashing tremendous economic potential and fostering prosperity for Europe's citizens and businesses.

Jose Antonio Alvarez, Vice Chairman, Santander; and Chair of the Round Table

Members of the Round Table

CHAIR

Jose Antonio Alvarez, Vice Chairman, Santander

MEMBERS

Ignazio Angeloni, Part-time Professor, Robert Schuman Center, European University Institute

Phoebus Athanassiou, Associate Professor, University of Frankfurt/Senior Lead Legal Counsel, European Central Bank

Vitor Bento, Former Chairman, European Card Payments Association

Peter Bofinger, Professor of International and Monetary Economics, University Würzbürg

Arena Fernandez de Bobadilla Amoros Senior Product Manager, Payments Acceptance and Experience, Amazon

Mike Gallaher, Senior Director, Government Engagement, VISA

Antonio Garcia del Riego, Member, European Economic and Social Committee

Daniel Gros, Director, Institute for European Policymaking, Bocconi University

Tim Hermans, Director, National Bank of Belgium

Danuta Hübner, Member, European Parliament

Aleksander Kurtevski, Managing Director, Bankart

Rosa Lastra, Sir John Lubbock Chair in Banking Law, Queen Mary University of London

Teresa Mesquita, Chief Product Officer, SIBS

Anni Mykkänen, Senior Policy Adviser, Innovation & Payments, European Banking Federation

David Ostah, Managing Director, Payment Services Austria

Nickolas Reinhardt, Co-founder, Afore Consulting

Fernando Rodriguez Ferrer, Business Development Director, Bizum

Paul Thomalla, Independent Adviser

Katrin Tinn, Professor of Finance, McGill University

Andrew Whitworth, Policy Director, EMEA, Ripple

RAPPORTEURS

Apostolos Thomadakis, Research Fellow, CEPS and ECMI

Karel Lannoo, CEO, CEPS and General Manager, ECMI

Farzaneh Shamsfakhr, Researcher, CEPS

Executive summary

Payment markets have experienced a sea change over the last three decades as a result of economic and market developments, globalisation and migration, technological change and digitalisation. From a cash or paper-based market dominated by banks, payments have become digital, open to competition and driven by innovation. The worldwide volume of non-cash, direct digital transactions has increased from EUR 480 billion in 2016 to EUR 1.2 trillion in 2022, and is forecast to grow by a further 80 % by 2026.

Consumer payment behaviour has also changed over the years. The share of cash payments at the point of sale (POS) declined from 79 % in 2016 to 59 % in 2022. However, cash remains the most frequently used method for payments at the POS, in terms of both volume and value. As for peer-to-peer transactions, and despite a decline in the share of cash share in the total number of payments from 86 % in 2019 to 73 % in 2022, it is still the most common form of payment. As a store of value, however, the cash holdings of the euro area population increased from 34 % in 2019 to 37 % in 2022.

In response to the creation and proliferation of decentralised digital currencies, the declining use of cash at the POS and the advancements in digital payment technologies, central banks have proposed central bank digital currencies (CBDCs). A CBDC is the digital form of central bank money, enjoying the status of legal tender, and issued by a central bank. Yet, a CBDC differs from the existing digital/electronic money available to the public, in that a CBDC is a liability of the central bank, not a commercial bank.

At the international level, by September 2023 as many as 130 countries – representing about 98 % of global GDP – were exploring a CBDC, either by piloting CBDC projects, conducting experiments or launching consultations. At the European level, the two-year investigation that the European Central Bank (ECB) began in October 2021, which has just concluded, explored the technical and policy options that would form the basis of a retail digital euro. According to the ECB, a digital euro is to pursue three main objectives, namely to (i) preserve the role of public money as a monetary anchor, (ii) contribute to Europe's strategic autonomy, and (iii) improve financial inclusion.

However, these objectives either fail to add value to an already efficient and constantly developing payment system, or are ill defined and not well justified, or their relevance for the European region is limited and there are alternative ways to achieve them. The digital euro may bring benefits to end users in terms of costs, settlement, privacy and innovation. But, these are highly dependent on its specific design features, come with a set of complexities and risks, and need to be considered more thoroughly. Therefore, and before taking a decision to issue a digital euro, its benefits and value-added proposition for end users, compared with existing payment solutions, should be well understood and articulated. A detailed user-case analysis is necessary to clarify its scope, the envisaged customer base and the likely scale of demand.

Similarly, a holistic cost-benefit analysis would help to quantify the impact of a digital euro on current stakeholders such as banks, payment service providers and merchants. This would ensure that the implementation of the digital euro does not lead to an unsustainable economic model with high operational costs and new infrastructure investments that exceed the benefits.

In an effort to prevent or minimise any undesirable effects on financial stability and credit provision to the economy, as well as to preserve the equivalence between euro banknotes/coins and digital euro, further in-depth analysis is required with regard to holding limits. The analysis should assess the wisdom

of holding limits and the quantum of individual holding limits in line with the payment needs of the European public.

If a decision is taken to proceed with the issuance of a digital euro, it may be a good starting point to offer the most basic functionalities and to gradually incorporate additional ones if these prove necessary and as experience is gained. Moreover, the prioritisation of use cases should be based on the utility for consumers and phased in according to this principle.

The most efficient way to facilitate broad adoption and implementation of a digital euro, and to minimise the need to adapt the existing payment infrastructure, is for the digital euro to rely on and build upon current mechanisms in the payment infrastructure and to take advantage of service processes already in place. For example, including interoperability with SEPA (Single Euro Payments Area) instant payments, will not only optimise the distribution of the digital euro and its widespread payment acceptance by end users, but will also bridge the gap between European payment solutions and international card schemes.

The regulatory framework surrounding the digital euro should ensure a level playing field for the payment ecosystem, between providers and between currencies (public and private money). To achieve this, regulations for the digital euro ecosystem should not be kept separate from the current rules governing the payment ecosystem; instead, they may need to be extended to cover the digital euro.

Finally yet importantly, the decision to issue a digital euro should not be made in isolation from CBDC developments in other major economies and currencies. A high degree of collaboration and coordination among major currency areas (such as the US, the UK and Switzerland) is necessary, in light of their likely impact on the attractiveness of the euro as a global reserve currency. Thus, interoperability between the digital euro and other major CBDCs should be a feature of the design code.

Our work aims to ensure that in the digital age citizens and firms continue to have access to the safest form of money, central bank money.

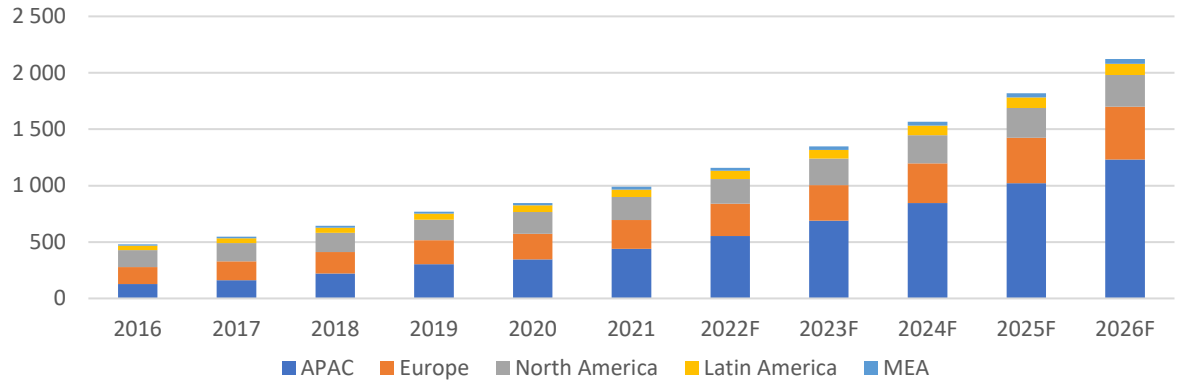
Christine Lagarde, President of the European Central Bank
Eurosystem launches digital euro project, 14 July 2021

1. Introduction

Payment markets have experienced a sea change over the last three decades as a result of economic and market developments, globalisation and migration, technological change and digitalisation. From a cash or paper-based market dominated by banks, payments have become digital, open to competition and driven by innovation. With the advent of crypto, transferring value without relying on centralised third parties has become possible through permissionless blockchains and, in most cases, at a much lower cost. In creating the right incentives for participants, a new system has emerged. This realisation has prompted central banks to react with proposals for a central bank digital currency (CBDC)[1].

The rapid growth and development of new payment solutions (e.g. peer-to-peer (P2P) transactions, contactless payments, mobile payments and digital wallets), has enabled new players to enter the market, compete and scale up, and for new business models to emerge. Moreover, the Covid-19 pandemic has led to a surge in e-commerce, including transactions on 'marketplaces' (i.e. online sites that match buyers and third-party sellers), and boosted the use of non-cash payment methods. The worldwide volume of non-cash, direct digital transactions has increased from EUR 480 billion in 2016 to EUR 1.2 trillion in 2022, and is forecast to grow by 80 % by 2026 (see Figure 1). This illustrates that the payment ecosystem is quickly adapting to consumer demand for speed and convenience, by expanding the set of point of sale (POS) and online payment options available to them, and by leveraging technological improvements.

Figure 1. Worldwide volume of non-cash POS transactions (EUR billion, 2016-2026)



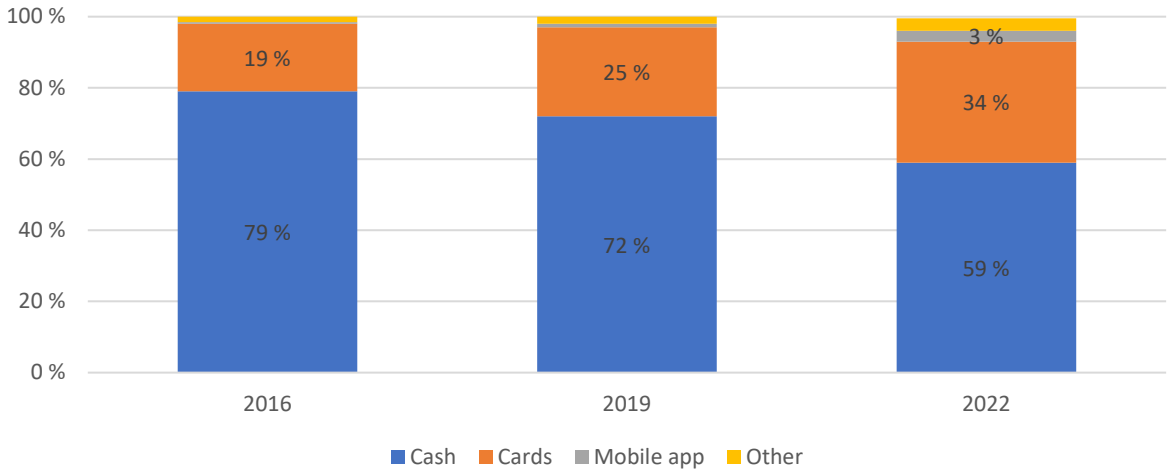
Notes: Non-cash (cashless) transactions refer to credit and debit cards, direct debits, and credit transfers. Figures are forecast for 2022 and beyond. APAC refers to the Asia-Pacific region, and MEA to the Middle East and Africa.
Source: Authors' calculations based on data from the World Payments Report (2022).

[1] Evaluating whether cryptocurrencies can be considered a form of money, the BIS concludes that this not the case. In fact, the BIS refers to them as a 'combination of a bubble, a Ponzi scheme and an environmental disaster', calling for a policy response (BIS, 2018b). Although development is underway to make cryptocurrencies easier to use, for now they are not very 'money-like'. This is why central banks now refer to them as 'cryptoassets' instead of 'cryptocurrencies'. We will follow this semantic description and refer to them as cryptoassets in the rest of this report.

Market-wise, after the strong gains that 'newcomer' payment companies[2] made up to 2021, in terms of revenue growth, EBITDA (earnings before interest, taxes, depreciation and amortisation) and shareholder returns, valuations declined markedly in 2022, and came back in line with those of the incumbents (McKinsey, 2022). This was triggered by the end of the pandemic, the return of normal shopping conditions and drastic changes in macroeconomic environment – with steep increases in inflation and rising interest rates.

Consumer payment behaviour has changed at a fast pace. This is also the case for cash payments in the euro area, whose share at the POS has declined over recent years from 79 % of POS transactions in 2016 to only 59 % in 2022 (see Figure 2). This trend has accelerated as a result of the pandemic and the related increased demand for contactless payments (ECB, 2022). However, cash remains the most frequently used method for payments at the POS, in terms of both volume and value. In peer-to-peer (P2P) transactions, cash is still dominant, despite a decline in the share of cash in the total number of payments from 86 % in 2019 to 73 % in 2022.

Figure 2. Share of payment instruments used at the POS in terms of the number of transactions (euro area)



Note: The category 'other' includes bank cheques, credit transfers, loyalty points, vouchers and gift cards, as well as other payment instruments.
Source: Authors' calculations based on data from the European Central Bank.

Online payments have also gained momentum in the last few years in comparison with POS and P2P across the euro area. The share of online payments in consumers' non-recurring transactions nearly tripled in terms of the number of transactions, from about 6 % in 2019 to 17 % in 2022, while it doubled in terms of the value of transactions (from 14 % to 28 % in 2022) (ECB, 2022). For online payments, cards remain the most widely used payment instrument, followed by alternative payment methods such as mobile apps or digital wallets.

Despite the fact that the use of cash as a means of payment has been decreasing in recent years, cash holdings as a percentage of GDP have continued to increase (Ashworth and Goodhart, 2020). This shows that a significant amount of cash is held for store-of-value purposes (Zamora-Pérez, 2021). Cash holdings

[2] 'Newcomer' payment companies can be described as those established less than 15 years ago that have a business and operating model characterised by 'disruptive' features in terms of either products (e.g. e-commerce acquiring only, the issue of non-physical cards or payments-as-a-service), distribution channels (e.g. partnerships with e-commerce/tech players) or technological infrastructure (e.g. cloud-based data centres).

rise sharply in times of high economic uncertainty (Muñoz and Soons, 2023). According to the European Central Bank (ECB), the share of euro area consumers using cash as a store of value grew from 34 % in 2019 to 37 % in 2022.

Beyond supporting new means of payment, providers and business models, technology is also enabling the emergence of new forms of money (see Table 1). As the era of the predominant use of physical currency (cash) slowly draws to an end, the age of digital currencies is beginning. In addition, competition between public and private currencies is also underway, as central bank money is increasingly competing with private digital money. For its part, the private sector is developing 'stablecoins', while central banks around the world are pondering the issuance of CBDCs.

Table 1. Forms of money in competition

		Commodity money	Central bank money (public money)	Fiat money (private money)	Private digital money (digital tokens)
Physical money		Gold, silver etc.	Cash		
Electronic/digital money	Wholesale		Commercial bank reserves		Cryptoassets
	Retail		Retail central bank digital currency	Customer deposits	Stablecoins, cryptoassets

Source: Authors' elaboration.

2. What is a CBDC?

A CBDC is the digital form of central bank money, enjoying the status of legal tender, and issued by the central bank, as representative of the government. Nowadays, beyond cash, people hold money mainly in digital (or scriptural) form, for example in bank accounts or with payment providers or in wallets. However, a CBDC is different from the existing digital/electronic money available to the public because a CBDC is a liability of the central bank, not a commercial bank.

A CBDC's defining attribute is that it provides – as public infrastructure – a single, more centralised ledger that records (and executes transfers of) end users' money. Today's payments landscape is characterised by a multi-tiered structure of multiple, independently maintained ledgers and complex settlement processes. The base layer is the central bank's ledger, which records reserve account balances held by commercial banks (BIS, 2018a). This is called 'public money', and it is a direct claim on the central bank's balance sheet (as with cash). The next layer consists of the independently maintained ledgers of balances (deposits) of commercial banks, owed to each of their customers. This is called 'private money', and it is a claim on the intermediary's balance sheet. E-money services can introduce a third layer, as they maintain their own separate record of e-money balances owed to customers, backed by deposits recorded in the second layer (i.e. the commercial banks' internal ledgers).

In this current, multi-tiered ledger structure, the internal deposit ledgers of commercial banks do not directly connect to one another. This means that bank-to-bank transfers must be routed through the central bank's ledger of commercial bank reserve accounts. Depending on its design, a retail CBDC could rely on a single centralised ledger to record end-user (not intermediary) funds and, therefore, settle transactions via a single ledger update. This is the defining characteristic of a retail CBDC: the central bank records end-user ownership, rather than intermediary ownership as it does today. Therefore a CBDC would allow for instant settlement in a single step, avoiding reconciliations and counterparty risk, which depending on its design features and the use case, could potentially lead to greater efficiency[3].

A CBDC is not a cryptoasset, even if it is often associated with it[4]. The only similarity between them is that both CBDCs and cryptoassets operate in the digital space as a digital form of currency[5]. Many cryptoassets, such as Bitcoin and Ethereum, operate on blockchain technology, which provides a shared ledger system. Likewise, some CBDC initiatives are exploring the use of blockchain or distributed ledger technology (DLT) for their digital currencies, but this may conflict with the decentralised nature of DLT.

Nevertheless, there are significant differences between CBDCs and cryptoassets, which can be summarised in the following key categories:

[3] It may also enable to streamline the intermediary architecture required to settle transactions. The current system of multiple, independently maintained ledgers results in a transaction path that requires a number of intermediaries, several 'data round trips' (i.e. the amount of time that it takes for a network request to go from a starting point to a destination point and back again to the starting point), delayed settlement and reconciliation across various data files and ledgers.

[4] A CBDC is also different compared with a stablecoin, as the latter is a specific type of private, stabilised cryptoasset pegged to another currency, commodity or financial instrument and its main goal is to maintain a relatively stable value over time.

[5] Strictly speaking, the term 'currency' refers to legal tender money in circulation. Crypto, legally speaking, is not money; hence, it cannot be a currency either.

- *Centralised control*. As the name suggests, a CBDC is centralised and issued by a central bank, which has control over the supply of the currency, its distribution and its supporting monetary policy. A cryptoasset, on the other hand, is decentralised. It operates without any central authority governing it[6] and lacks the anchor of trust in money provided by the central bank (BIS, 2023).

- *Legal tender*. A CBDC will typically enjoy the status of legal tender, meaning it is recognised and accepted as a form of payment within a specific jurisdiction. By contrast, a cryptoasset, as a rule, is not recognised as legal tender, and its acceptance will vary across countries and businesses (e.g. Bitcoin is legal tender in El Salvador and the Central African Republic).

- *Privacy and anonymity*. A cryptoasset generally offers some level of anonymity/pseudonymity and privacy, while a CBDC implemented by a central bank is likely to have stringent regulatory and reporting requirements, in an effort to prevent money laundering and terrorist financing, while at the same time ensuring a certain degree of privacy.

- *Value and volatility*. The value of a CBDC will always be the same as any other form of public money or its physical currency equivalent. In contrast, most cryptoassets (except stablecoins[7]) are not pegged to any physical currency. Thus, they are exposed to price volatility, being prone to significant fluctuations in value within short periods.

- *Purpose and function*. A cryptoasset is primarily designed as an alternative form of currency or asset, aiming to provide decentralised, borderless and P2P transactions. A CBDC, on the other hand, is designed to be a complement to the existing monetary and payment systems and can be used as a money substitute.

2.1. CBDCs around the world

As issuers of legal tender, central banks around the world have been researching the implications of the growing use of digital currencies for several years. Initially, competing cryptoassets were seen by central banks with suspicion, and their reaction to them was mostly negative. Yet, by 2018 central bank governors had changed tack and acknowledged the need to find an effective alternative in response to cryptoassets and to private digital money as a means of ensuring the continuing role of central bank money in payments and protecting the stability of the monetary system. This reaction was fuelled by Facebook's Libra proposal in June 2019, which – even though not realised – captured the public debate and has propelled efforts towards the introduction of CBDCs since then.

The central banks' investigation into CBDCs emerged as a response to the creation and proliferation of decentralised digital currencies (and more recently, stablecoins), the declining use of cash in some countries (e.g. Sweden and Norway) and the advancements in digital payment technologies. These developments prompted central banks to reflect on how best to adapt to a changing financial backdrop and to explore the potential benefits and risks associated with developing their own digital forms of money. Interest in developing a CBDC was initially higher in countries without a strong reserve currency, as their access to payments was often prohibitive, and also in jurisdictions with limited access to traditional banking systems.

[6] In the EU, this will change when the Markets in Crypto-Assets (MiCA) Regulation comes into force.

[7] Stablecoins are pegged to a physical currency, which, however, does not provide a guarantee for a 1-1 conversion.

In 2014, the Central Bank of Ecuador launched an electronic money project (Dinero Electrónico) in order to allow individuals to make mobile payments through a central bank-operated system (Arauz et al., 2021). The programme, which ran between 2014 and 2018, aimed to increase financial inclusion and reduce the need for the central bank to hold and distribute large quantities of USD notes. But strong opposition by private banks, the lack of a critical mass of users and its domestically limited usability led to the system being discontinued as of 2018.

Around the same time, the People's Bank of China (PBoC) initiated research and development through the Digital Currency/Electronic Payment project, which would later become the Chinese CBDC, the digital yuan (e-CNY). In 2016, the e-CNY prototype was built and it was launched in four large cities by the end of 2019 (presently used in 26 cities). According to the latest available data from PBoC, the value of e-CNY transactions have surpassed the CNY 100 billion mark, with 360 million transactions in over 5.6 million stores. Still, these figures are dwarfed by the volume of mobile payments, although the supply of e-CNY in circulation at the end of 2022 (CNY 13.6 billion or EUR 1.7 billion) represented only 0.13 % of the narrowest definition of money supply (M0). No official launch date for nationwide use of the e-CNY has yet been announced.

In 2015, the Bank of England expressed interest in CBDCs in its research activities for the year, primarily as a means of stabilising the financial system, enhancing monetary policy and promoting financial inclusion. After several years of exploring the topic of a CBDC, the Bank of England announced in April 2021 the creation of a taskforce jointly with HM Treasury to coordinate the investigation of a potential digital pound. More recently, in February 2023, the Bank and the Treasury published a consultation paper in which they set out their assessment. According to that, although a digital pound will be needed in the future, the conclusion was that it is too early to commit to building the infrastructure for it, and that further preparatory work is necessary.

Two years later, in September 2017, the Swedish Central Bank, Riksbank, launched a project with the aim of investigating the need for an e-krona and the possible consequences associated with it. Riksbank's initiative was driven by the declining use of cash in the country and the need for a more secure and efficient digital payments system. The project is currently in pilot phase three, where the focus is on how the bank could interact with other actors in the payment market to give the general public access to – and the possibility to pay with – an e-krona, how conditional payments can be made and whether a digital central bank currency can simplify cross-border payments. Although earlier this year, a government-appointed inquiry concluded that Sweden does not need a CBDC, the Riksbank continues to investigate how an e-krona could work if a decision is taken in the future to issue digital central bank money.

In June 2021, the Fed expressed its scepticism about most arguments made in favour of a CBDC, highlighting the need to thoroughly examine the potential risks and benefits associated with it, particularly with regard to cybersecurity, privacy and financial stability. In September 2023, the Fed was far away from making a decision on issuing a CBDC. While investigation and research are very important, they are very different from decision making about next steps in terms of payments system development.

In March 2023, the Reserve Bank of Australia (RBA) selected 14 CBDC use cases for live pilot tests. According to the RBA, a digital Australian dollar, called eAUD, could increase the efficiency and resilience of payments systems, by allowing money to be programmed and to settle transactions instantly on a blockchain system. However, based on the findings of the pilot tests, RBA is unconvinced that an eAUD

is necessary to create such benefits, given already existing payment solutions and the emergence of alternative new forms of money. As has been iterated on several occasions by the former Governor Philip Lowe (e.g. in December 2017, November 2018, December 2021 and December 2022), at the time, there is no a public policy case for moving in this direction as it is not clear that an eAUD would provide something that account-to-account transfers through the banking system do not.

By September 2023, as many as 130 countries – representing about 98 % of global GDP – were exploring a CBDC, according to the Atlantic Council's CBDC tracker. So far, four central banks have issued a live retail CBDC. The world's first, the Sand Dollar, was issued by the Central Bank of The Bahamas in October 2020. In March 2021, the Eastern Caribbean Central Bank launched DCash – the first union-wide CBDC – in four of its eight member states (i.e. Grenada, St. Kitts and Nevis, Antigua and Barbuda, and Saint Lucia). Today, DCash is available in all member countries. A few months later, in October 2021, the Central Bank of Nigeria issued the eNaira, followed by Jamaica's JAM-DEX in June 2022. The latter was the first CBDC to be ratified formally as legal tender; unlike DCash and the eNaira, it is not based on blockchain.

While some countries are piloting their CBDC projects (e.g. Canada, China, France, Hong Kong, India and Switzerland[8]), others are either conducting experiments (e.g. Australia, Malaysia, Singapore and Sweden) or launching consultations (e.g. Peru and the UK). These efforts focus on developing digital central bank money for either the interbank market (a wholesale CBDC) or consumers (a retail CBDC), or both. Still, CBDC adoption by the general public in the countries that have implemented pilot programmes or launched them has been relatively low so far (Blustein, 2022; Lukonga, 2023; Ree, 2023). Market penetration may take time and be subject to further experimentation, evaluation, and regulatory considerations.

Regarding the purpose of introducing a CBDC, there are notable differences occur around the world, reflecting the prevailing economic and geopolitical circumstances, the international status of the local currency, the efficiency of national payments systems and financial inclusion. In advanced economies, concerns around monopoly, monetary sovereignty, central bank mandate, and privacy have been the primary factors behind the development of a CBDC. In comparison, developing and emerging economies are motivated by such objectives as reducing the risk and costs of physical cash in circulation, encouraging the use of local currency and facilitating international payments.

[8] Several board members of the Swiss National Bank have stated that the country does not need a CBDC. See for example the statements made by Andrea Maechler and Thomas Moser.

3. The digital euro and its objectives: An ECB perspective

In January 2017, Yves Mersch, at that time Member of the Executive Board of the ECB, floated the idea that a central bank digital currency in the euro area (i.e. a digital euro) could potentially strengthen the transmission of monetary policy. In July 2022, President Christine Lagarde and Executive Board member Fabio Panetta stated that a digital euro would protect the strategic autonomy of European payments and monetary sovereignty, providing a fall-back solution if geopolitical tensions intensify. Moreover, they argued that a digital euro could also benefit people with limited access to digital payments, thus supporting financial inclusion.

3.1. The digital euro's objectives

According to the ECB, a digital euro is to pursue three main objectives, namely to (i) preserve the role of public money as a monetary anchor, (ii) contribute to Europe's strategic autonomy, and (iii) improve financial inclusion.

3.1.1. Monetary anchor

According to the ECB, the decreasing use of cash for POS payments in the euro area and the advent of alternative digital payment methods pose risks for the role of public money as the fundamental unit of value measurement. The ability of the ECB to maintain control over the financial system in a completely cashless economy would therefore be challenged. Bringing central bank money into the digital era is, hence, a logical step as payments become increasingly digitalised.

From the ECB's perspective, a digital euro would preserve the role of central bank money as a means of payment and complement cash and other various forms that money takes. Thus, it would maintain the role of public money as the monetary anchor of payments systems in the digital era. It is also assumed that a digital euro would ensure that the euro remains the single unifying unit of account and medium of exchange, by providing people and businesses with the option of converting privately issued money into digital central bank money.

3.1.2. Strategic autonomy

As other third-country jurisdictions enter the world of CBDCs and the private sector seeks to provide alternative payment solutions, including cryptoassets and stablecoins, the ECB is compelled to respond to challenges that might disrupt the use of the common currency in the euro area as well as long-term threats to the EU's payment ecosystem. Thus, in terms of strategic autonomy, the objective is threefold, namely to (i) strengthen the role of the euro in international transfers and address potential disruptions arising from other countries issuing CBDCs, (ii) provide an alternative to private currencies and the challenges they bring to payments systems, and (iii) decrease the reliance of European payments systems on international card schemes for cross-border transactions within the single market.

3.1.3. Financial inclusion

Financial inclusion has been a key consideration from the early stages of the digital euro project. This is because individuals and businesses should have access to useful and affordable financial products and services (e.g. banking, payment, credit and insurance) that meet their needs, regardless of their background or income.

The ECB suggests that a digital euro has the potential to support financial inclusion by being easily and widely usable (e.g. via an app and a physical payment card), accessible throughout the euro area, available offline and free for basic use. Moreover, a digital euro could encourage innovative approaches by industry to tackle some ongoing financial inclusion issues. Examples include consideration of how to get payments to people who do not have a bank account, provide greater functionality for those with specific vulnerabilities and expand product diversity in the market. In addition, a digital euro could complement existing initiatives as another option for some financially excluded groups.

3.2. What do we know so far?

To advance work on an eventual digital euro, the ECB's Governing Council established a High-Level Task Force in January 2020. Its task was to analyse the possible benefits and challenges, as well as the economic, technological, legal, societal and strategic implications associated with the introduction of a digital euro.

In October 2020, the ECB published a report that concluded that a more 'comprehensive and balanced policy-oriented assessment' was necessary. As a first step, aiming to gather the views of both the public and industry professionals, the ECB launched a public consultation from October 2020 to January 2021. The more than 8 000 responses highlighted that privacy, security, usability, reduced cost and accessibility were among the most popular features expected of a digital euro. But the consultation also revealed huge differences across countries, with half the responses coming from Germany, followed by Luxembourg, Cyprus and Austria.

In October 2021, the ECB and euro-area national central banks (NCBs) launched a two-year investigation phase to explore the technical and policy options that could form the basis of a retail digital euro. During that phase, the ECB considered how a digital euro could be distributed and used by people and businesses, as well as the potential impact that it may have on the European economy and society.

At the end of the investigation phase, in October 2023, the Governing Council is expected to decide on whether to launch a preparation and experimentation phase. This would entail the development and testing of technical solutions and business arrangements for a retail digital euro. However, the start of such a new phase does not necessarily mean the digital euro will be launched. A decision on whether to issue a digital euro will be taken after the conclusion of the preparation phase.

Moreover, in March 2023, the ECB decided to explore the potential of emerging technologies for wholesale settlement. It set up a dedicated market contact group (the New Technologies for Wholesale settlement Contact Group) to support the Eurosystem's exploratory work on a wholesale CBDC. This group is expected to provide expert input and keep the Eurosystem abreast of advances in the use of DLT and other new technologies in wholesale financial markets.

The progress made towards the potential launch of a digital euro is reflected in four progress reports published by the ECB in September 2022, December 2022, April 2023 and July 2023. Although these reports provide an insightful overview of some of the thinking underlying the digital euro project, they remain vague in certain respects. Many of the design decisions will continue to be discussed in parallel to the legislative process initiated by the Commission proposal for a regulation on the digital euro.

3.2.1. First progress report

The first report explains that a digital euro would be an **electronic means of payment for retail payments**, issued by the central bank (i.e. the ECB) and accessible to residents of the euro area. Moreover, it argues

that a digital euro would preserve the role of public money as the anchor of payments systems in the digital age and suggests that a digital euro would contribute to Europe's strategic autonomy and economic efficiency. Regarding use cases or market segments that will be served by a digital euro, a decisive factor will be the market size of these segments, as well as whether they contribute towards two policy objectives: (i) the harmonisation of payment solutions and (ii) the strengthening of European strategic autonomy. The use cases prioritised are payments in e-commerce and physical stores, as well as P2P payments, alongside payments between governments and individuals.

On the transfer mechanism used for a digital euro, the Eurosystem considered both **online and offline payments**. In particular, it looked at a system in which transactions would be made online and be validated by a third party, and a P2P-validated method for offline payments. As for privacy, one of the most important design demands for a digital euro, the report emphasises that it would provide a level of privacy equal to that of current private-sector digital solutions. Alternatively, other options examined include privacy for low-value/low-risk payments (i.e. selective privacy) and privacy for close physical proximity offline payments (i.e. offline functionality). The ECB held that full anonymity was not a viable option as it would counteract anti-money laundering (AML) and counter financing of terrorism (CFT), and make it impossible to cap per capita holdings – an important feature for financial stability purposes.

Finally, and in order to mitigate financial stability issues arising from users holding large amounts of digital euro (something that could result in the structural substitution of bank deposits), the Eurosystem considered introducing limits and remuneration-based tools. Although the purpose of such tools would be to restrain the use of a digital euro as a form of investment, the report acknowledged the potential side effects. For example, quantitative limits on the digital euro holdings of individual users could slow individual take-up and the speed at which bank deposits are converted into digital euro. As for remuneration-based tools, these could be calibrated to make large digital euro holdings above a certain threshold unattractive compared with other highly liquid, low-risk assets.

3.2.2. Second progress report

The second progress report examines a set of **design and distribution options** for a digital euro. It starts by laying out a **division of tasks between the Eurosystem and private intermediaries**. In particular, the former would be responsible for supervision and the issuance of the digital euro, and for providing the platform for the settlement of transactions. The latter would be responsible for customer onboarding, the distribution of digital euro, all other end-user activities and the provision of devices and interfaces to pay with digital euro in stores (either physical or online) or P2P. Intermediaries would also be responsible for transaction management tasks, such as initiation, authentication, validation and post-settlement activities.

In terms of **funding and defunding functionalities** of end-user accounts, which would be provided by intermediaries, the aim is to offer a seamless experience. This means that users would be able to choose whether the conversion of private money or cash into digital euro, and vice versa, takes place manually or automatically. Automatic conversion implies that users will be able to receive or make payments in digital euro in excess of any holding limit set by the central bank. This 'waterfall' (or 'reverse waterfall') functionality may result in the digital euro holdings of end users exceeding the holding thresholds. According to the report, such deviations should be temporary and not occur for longer than a calendar day.

On the **distribution model**, the report anticipates a 'digital euro scheme' as being the most appropriate for the initial roll-out of the digital euro. The aim is to harmonise user experience across the euro area,

meaning that paying with digital euro should always be an option, irrespective of the entity with which end users open digital euro accounts or wallets, or their country of origin. Moreover, digital euro should be accepted by all merchants in the euro area, and be accessible to people with lack of (or only limited) access to digital means of payment.

3.2.3. Third progress report

The third progress report considers **access and distribution design features** for a digital euro. The Eurosystem proposes that the digital euro will be available only, at least initially, to euro area residents, merchants and governments. Those living in the wider European Economic Area or in third countries may have access to it at a later stage and given that there is an agreement with the relevant authorities in such jurisdictions. The report clarifies that the **holding limits** will be different for individual users on the one hand and merchants and governments on the other. While a uniform holding limit would apply for individual users across the region, merchants and governments would not be allowed to actively hold digital euro at all (a zero-holding limit). All incoming and outgoing payments of merchants and governments would be linked to and transacted through a commercial bank account. Although these entities may open multiple digital accounts (as they would not actively hold digital euro), individuals would be restricted to a limited number of accounts.

A digital euro would be accessible to end users through existing online banking/payment apps of payment service providers (PSPs), or through a new, dedicated digital euro app provided by the Eurosystem (with all payment functionalities performed by PSPs). With regard to the distribution of a digital euro, the ECB limits the set of supervised intermediaries eligible to qualify as participants in the digital euro scheme to those defined under the second Payment Services Directive (PSD2) (i.e. credit institutions, e-money and payment institutions).

A series of digital euro **services would be offered to end users by the supervised intermediaries**. These would include a range of core services that intermediaries would be required to offer free to charge to end-users, such as the opening/closing of digital euro accounts, the linking of digital euro and payments accounts, funding/defunding, payment initiation, authentication and notifications. Optional services could entail recurring and pay-per-use payments, the linking of digital euro accounts held by another intermediary and value-added services (e.g. delivery versus payment, splitting the bill, or conditional payments in general).

As for the cross-currency and cross-border functionalities of a digital euro, the Eurosystem envisages the international interoperability[9] of the digital euro system. The provision of such functions could be supported only when there are mutual interests with other monetary jurisdictions. Still, the possibility for such interoperability, both technologically and legally, would have to be built into the system at a

[9] Interoperability can be defined as the ability of users (agents) to seamlessly access (offer) payment services from different service providers/schemes/platforms, including across different jurisdictions. It thus allows participants in different systems to conduct and settle payments or securities transactions across systems while continuing to operate only in their own respective systems (Carstens, 2021; WEF, 2022). The increased interoperability of payment systems has the potential to boost competition in payment services, resulting in more innovative products and services for end users. It could also add efficiency to payment processing for system participants and help increase financial inclusion. Reducing the barriers between payment systems can help bring about efficient, cost-effective and innovative payment ecosystems that benefit end users and further digitalise the economy in both a domestic and cross-border context (World Bank, 2021).

relatively early stage of design. On top of that, the issue is politically sensitive as it will involve decisions as to which jurisdictions the euro area wishes to explore such cross-border interoperability further.

3.2.4. Fourth progress report

The fourth progress report focusses on a set of core principles that a compensation model for a digital euro should comply with. As a starting point, central banks would carry their own costs of providing the necessary management and settlement processes, reflecting the public good nature of a digital euro. Nevertheless, intermediaries would incur implementation costs and those related to opening and administering accounts for end users and to processing payments for merchants. However, the basic use of a digital euro should be free of charge for private individuals.

As for intermediaries, the report considers that these should be compensated for their services. Revenues could be generated from end-user fees for services that are not basic, for example optional and value-added services. For merchants, intermediaries could apply a fee for digital euro-acquiring services, as is currently the case for comparable electronic card payments. But legislative safeguards should be put in place to avoid overcharging merchants, particularly since they have to accept digital euro as legal tender.

The report further explains other design features that a digital euro should exhibit. In particular, there is an emphasis on portability (i.e. transferring digital euro access from one intermediary to another), fraud detection and prevention, financial inclusion and the roll-out approach. Being inclusive and accessible to a broad range of individuals – including those with low digital/financial skills, those with disabilities and the elderly – is a key principle underlying the concept of a digital euro. To achieve that, the Eurosystem considered a number of options, such as the issuance of a physical card, the possibility to fund/defund via cash and without a smartphone, in-person onboarding and offline use. On rolling out a digital euro, the ECB considered a two-stage approach: at the first stage, the digital euro would be made available for P2P and e-commerce payments, with POS payments becoming available at the second stage.

Finally, the report discusses the results of the prototyping and market research exercises conducted with market participants during the investigation phase. The former aimed to test how the design choices for a digital euro could be technically implemented and integrated into the existing European payments landscape, while the market research exercise aimed to gather feedback on technical solutions for a digital euro, from the relevant stakeholders. The prototyping results show that a digital euro could be smoothly integrated into the current European payment landscape and serve different use cases, leaving ample scope for innovative features and technologies. The market research illustrated the readiness of European providers to develop digital euro solutions.

4. The regulatory framework

In the EU, developments in payment markets have been amplified by the need to create a single market and by the introduction of the euro. As with other utilities, the single market meant creating a level playing field among payment methods and providers by setting minimum standards and requiring interoperability. Integration among payments systems was even more necessary for the monetary union, now comprising 20 of the 27 Member States, with the ECB involved in the oversight of payments systems.

4.1. EU activity in the domain of payments

EU rules affecting payments systems have followed market developments. They have gradually allowed a growing number of actors to participate in the market, thus bringing more competition. Nowadays, payment transmitters can operate under several regulatory regimes, at the EU or global level.

Until the start of the century, payments fell within the exclusive remit of the banks. With the adoption of the E-Money or Electronic Money Directive (EMD1) in 2000, a first step was taken to open up payment markets to a broader group of providers. This was followed in 2007 by the first Payment Services Directive (PSD1), which defined and expanded the scope of PSPs and set minimum operational criteria for the transparency of costs, among other things.

Since then, both directives have been amended. The EMD2 of 2009 sought to address the shortcomings of EMD1 by facilitating the application process for e-money licenses and bringing its provisions in line with PSD1. The PSD2 of 2015, which was a milestone in Europe's journey towards 'open banking', laid down information requirements for the establishment and operation of payment institutions and for their registration as account information service providers and as payment initiation service providers. PSD2 enables consumers to access innovative payment services from non-banks and increases security through strong customer authentication and fraud-prevention safeguards[10].

The performance of cross-border payments in the EU has been regulated since 2001, starting with the first Cross-Border Payment Regulation (CBPR1), adopted after long and protracted discussions with the banking sector on the question of interchange fees[11]. For a long time, high interchange fees on the use of payment cards were a stumbling block for cross-border card use, and a matter of interest for the EU's competition policy authorities. Fees were capped at 0.2 % of the value of a transaction for debit cards and at 0.3 % for credit cards in a 2015 regulation. But the credit card dominance of Visa and Mastercard remains (Siragusa *et al.*, 2019).

The regulatory rollercoaster did not stop there (see Table 2). With the adoption of the Markets in Crypto-Assets (MiCA) Regulation in 2023, a regulatory framework was established for payments based

[10] Though the regulation has fallen short in achieving a level playing field between banks and non-bank PSPs, and creating an environment that will offer pan-European payment schemes incentives to innovate and develop a proper ecosystem.

[11] The CBPR has been substantially amended several times: in 2012, by establishing technical and business requirements for credit transfers and direct debits in euro; in 2019 (CBPR2), by ensuring that cross-border payments in euro are not more costly than national transactions in the national currency of a non-euro Member State, as well as by increasing cost transparency requirements; and in 2021 (codified CBPR2), by extending the scope of price equality to non-euro Member States and further increasing transparency for currency conversion rates and charges.

on DLT, using cryptoassets or stablecoins. The European Commission has also made proposals to stimulate instant payments, and to allow for the eventual use of digital euro as legal tender.

Table 2. Main EU regulations on payments (excluding banking rules)

Legislation	Scope	Impact
EMD2	Banks, e-money institutions, national banks and the ECB	• Emergence of new market participants • Increased competition • Easier market access and enhanced consumer security
PSD2	Payment Initiation Services, Account Information Services, and banks	• Better integrated EU payments market • Enhanced consumer security • Increased competition
CBPR	All financial services providers	• Cross-border payments in EU at same costs as domestic ones
SEPA	All financial services providers	• Regulatory and technical standards for direct debit and credit transfers in euro
MiCA	DLT-based crypto asset schemes	• Different DLT-based cryptoasset structures allowed to function in the EU

Source: Authors' elaboration.

Hence, after two decades of intense regulatory activity, the backdrop is that the European payment providers market is fragmented, and is expected to become even more so with the implementation of MiCA and the remaining regulatory initiatives, including on instant payments. For this reason, it has been suggested that some of the applicable regulatory regimes be consolidated, in particular by merging EMD2 with PSD2 (European Commission, 2022)[12]. It has also been noted that PSD2 charging practices are not sufficiently unified, a problem that will be exacerbated by the new rules and the Commission's recent proposal on the establishment of the digital euro[13].

4.2. ECB rules affecting payments systems

Payments systems regulation and oversight in the EU are rendered even more complex by euro area rules in this domain. On the regulatory front, the ECB enacted the Single Euro Payments Area (SEPA) Regulation in 2012, setting regulatory and technical standards for direct debit and credit transfers in euro, applicable to all financial services providers in the EU. The ECB is assisted by the Euro Retail Payments Board, which contributes towards an integrated, innovative and competitive market for euro retail payments in the EU. The SEPA Credit Transfer (SCT) and SEPA Direct Debit have become the standard for euro payments, making cross-border transactions more seamless. What is more, the Eurosystem has launched the SEPA Instant Credit Transfer (SCT Inst) scheme, enabling individuals and businesses to make near real-time euro transactions.

On the oversight front, the Eurosystem oversight of payments systems primarily distinguishes between systemically important payment systems (SIPS), which are subject to legally binding requirements under

[12] On 28 June 2023, the European Commission put forward a proposal for a new Payment Services and Electronic Money Services Directive (PSD3). This will incorporate electronic money institutions as a sub-category of payment institutions and therefore embed, and subsequently repeal, the existing EMD2.

[13] The latter proposes that the merchant service charge or inter-PSP fee should not exceed the lowest of the following amounts: (i) the relevant costs incurred by payment service providers, including a reasonable margin for profit, and (ii) fees or charges requested for comparable means of payment (Article 17).

the SIPS Regulation, and non-systemically important ones. This distinction is mainly based on criteria related to size, market share, cross-border activity and the provision of settlement services to the wider financial market infrastructure.

4.3. The Commission's Digital Euro Currency Package

The possible issuance by the ECB of a digital euro raises the question of its legal tender status. At present, only coins and banknotes enjoy the status of legal tender. Most of the payments people make on a day-to-day basis are not made with legal tender money, but with money issued by private entities, including banks. Should euro-denominated digital money issued by the ECB enjoy the status of public money, when other forms of privately issued digital money do not?

On 28 June 2023, the European Commission published a digital currency package consisting of two proposals. The first legislative proposal on the legal tender of the digital euro aims to ensure the continued accessibility and usability of euro banknotes and coins for individuals and businesses throughout the euro area. The second legislative proposal outlines a regulatory framework for a possible digital euro, which could be issued by the ECB as a digital complement to physical cash.

The Treaty provision serving as a legal basis for both proposals is Article 133 of the Treaty on the Functioning of the European Union (TFEU), which states that the EU legislature (i.e. the European Parliament and the European Council, at the initiative of the European Commission) 'shall lay down the measures necessary of the use of the euro as a single currency'. This competence is to be exercised in accordance with the ordinary legislative procedure and upon consultation with the ECB[14]. Regarding the responsibility for authorising the issuance of the digital euro by the ECB and the NCBs, this lies with the ECB (Article 128 TFEU).

4.3.1. The draft digital euro regulation

The proposed regulation on the digital euro lays down rules for its legal tender status, distribution, use and essential technical features. The proposal sets out the legal framework to guarantee the successful use of the digital euro throughout the euro area, addressing the demands of users in the digital age, and supporting competitiveness, efficiency, innovation and resilience in the EU's increasingly digitalised economy.

According to the proposal, and in terms of design, the digital euro will be a retail (not wholesale) CBDC and it will not bear any interest. In addition, the digital euro will be a direct liability of the ECB and NCBs, while the legal tender status granted to it will entail mandatory acceptance by payees. In other words, the digital euro must be accepted at face value with the ability to satisfy a payment obligation (although this is not the case for existing electronic means of payments provided by commercial banks).

In an effort to guarantee the digital euro's legal tender status as a unified currency throughout the euro area, as well as its acceptance in electronic payments, provisions on sanctions for infringements will be adopted and implemented in the Member States. Surcharges will be prohibited, although payees are to

[14] Under the former EC Treaty, it was part of a broader provision that assigned various competences to the Council with a view to regulating the introduction of the euro (ex. Article 123 EC Treaty). When the Lisbon Treaty was adopted, these transitionary and introductory provisions were no longer deemed necessary. Although the EU legislature is the competent actor to regulate the single currency, it has, until now, not made extensive use of this power (Heynen and Vanhoyland, 2023).

be entitled to refuse payment in digital euro under certain circumstances (Article 9)[15]. The digital euro will be redeemable in euro banknotes and coins, in the same way as scriptural and electronic money. Where both digital euro and euro cash acceptance is required, the payer may choose between the two.

To safeguard financial stability, the proposal introduces limits on the use of the digital euro as a store of value (i.e. holding limits). There is a fear that unrestricted use of the digital euro could have adverse effects on credit provision to the economy by credit institutions. If the digital euro were to become too attractive, that could lead savers to withdraw their money from bank deposits and store it in safer digital euro accounts backed by the ECB, leading to bank disintermediation. But the question that arises, is how firm will holding limits be in times of stress. One would imagine that holding limits could be adjusted rapidly in a crisis situation.

In terms of distribution, credit institutions would be required to provide basic payment services in digital euro upon the request of their clients. These services shall be offered for free to natural persons, even if they are not customers of credit institutions. In that case, public institutions, such as postal offices or local and regional authorities, could distribute the digital euro, thus promoting its use. The proposal also includes provisions on interoperability and on European Digital Identity Wallets, to allow users to onboard and make payments. Interestingly, the proposal says nothing with regard to the rules governing digital euro accounts with the ECB and the NCBs (within the meaning of Article 17 of the Statue of the European System of Central Bank and of the ECB). An account-based digital euro could be implemented by opening accounts directly with the Eurosystem or through supervised intermediaries, while distribution of a bearer digital euro (i.e. a token-based or value-based digital euro) would require the involvement of supervised intermediaries (ECB, 2020)[16]. The proposal is thus geared towards the needs of a bearer, intermediated digital euro, to the detriment of the account-based variant.

With regard to the compensation model proposed in the regulation, this builds mainly around the transaction costs, without mentioning other non-transaction related costs that might be very relevant (e.g. customer onboarding costs, customer service costs, investments made, or additional funding costs). In addition, it sets limits to the level of fees to be paid by merchants to PSPs, and between PSPs. Fees shall not exceed the lowest of: (a) the relevant costs incurred for the provision of digital euro payments, including a reasonable margin of profit; and (b) fees or charges requested for comparable digital means of payment.

Regarding the modalities of the issuance of a digital euro by the ECB, the proposal is silent, merely stating that the ECB has the exclusive right to authorise it in accordance with the Treaties. The choice of the system for the issuance of a digital euro and its governance remains in the hands of the ECB, which is to adopt its own legal act(s), in due course, ahead of the effective start.

[15] For example, where the payee is an enterprise that employs fewer than 10 people, or whose annual turnover (or annual balance sheet) does not exceed EUR 2 million. Another exception is where, prior to the payment, the payee has agreed with the payer on a different means of payment (e.g. debit card payments or instant payment solutions).

[16] In an account-based model, the digital euro will constitute a claim or a representation of a claim on the ECB or the relevant NCB for convertibility at par with another representation of the sovereign currency.

5. Analysis of key issues

While in the sections above we focused on a stocktaking exercise as well as on what can be considered current public knowledge about the digital euro, in this section we examine the extent to which the envisaged attributes of the digital euro may be fit to meet its declared goals.

5.1. Strategic autonomy of European payments and monetary sovereignty

Among electronic payments systems in the EU, card-based payments remain the most widely used by consumers, especially for cross-border payments and e-commerce. At the domestic level, the retail payment landscape has become more diverse in recent years as alternative digital payment methods (frequently based on real-time payments) have emerged (e.g. Swish, MB WAY, Bizum, Bancontact Payconiq and Bancomat Pay). Nevertheless, up to two thirds of EU payments continue to be processed through international payment schemes (i.e. Visa and Mastercard), reflecting a reliance on US infrastructure (ECB, 2019).

At the cross-border level, national card schemes are co-badging with the main international card schemes (e.g. Visa and MasterCard). The reliance on international card networks arises from the lack of truly pan-European payment solutions. Against this background, 'the strategic autonomy of European payments and monetary sovereignty' was indicated by the ECB as a key objective of the digital euro. Will the proposed design of the digital euro meet its desired objectives?

According to the ECB, the digital euro is intended to preserve and promote the role of public money while fostering innovation and increasing the efficiency of the European payments market alongside private payment methods (e.g. cards, mobile payments and digital wallets). Therefore, the ECB proposes that, once issued, the digital euro should be made available for use in P2P, POS, e-commerce, ATM and government payments. However, this range of use cases leaves some scope for ambiguity on the types of payments the digital euro will capture from the already existing methods (Angeloni, 2023): what would be a sufficient share of digital euro payments in the total payment ecosystem, and how can this be achieved?

Although it is not yet apparent how a digital euro will fit into the current payment setting, there is a risk of crowding out European private solutions, or of failing to articulate a value proposition to customers, which could affect competition and hinder adoption, while at the same time failing to challenge the dominance of international card schemes and other, non-European solutions. The challenge for the ECB will be to ensure the competitiveness of a digital euro in the payment market and at the same time promote its efficiency, without discouraging private initiatives nor prompting them to adopt a 'wait and see' mode until they have understood what the digital euro will be about and what impact it will have.

It could be argued that the objective of strategic autonomy could be accomplished without issuing a digital euro. Across the euro area, successful domestic schemes already exist, providing instant payment alternatives to international cards. Fostering interoperability among those existing schemes – which aspire to become the new normal – would be an alternative way forward, instead of establishing a new form of money and a new payment system to settle transactions in it.

5.2. The digital euro as a potential monetary anchor

Interbank and other large-value commercial transactions in the euro area are processed and settled in central bank money via TARGET2. Through this avenue, the banking system remains anchored to the central bank, maintains the central bank's dominant role in the financial system and safeguards the role of public money. Hence, a strong monetary anchor is already present even without the retail digital euro in the monetary system and without the convertibility of bank deposits into cash or a CBDC (Bofinger and Haas, 2023). Cash does not play a crucial role in either conducting monetary policy or anchoring the value of money (Levin, 2014; Armelius *et al.*, 2020; Cunliffe 2021). In any case, cash will not disappear, but would continue to exist alongside a potential digital euro.

Concerning the role of the euro as the unit of account and a means of payment, the key determining factor is the stability of the value of the currency. This is safeguarded through the pursuit of price stability as the main objective of monetary policy. It is the monetary policy regime and not the specific form (physical or digital) that money takes that plays a role in this process. Also, regarding the risks to the role of public money amid emerging innovations in digital payment platforms and privately issued money, the experience of successful payment platforms such as PayPal shows that they can deal with a suite of existing currencies, as well as payment objects and payment instruments, without necessarily having to issue their own digital currency.

Finally, motivating the digital euro as a monetary anchor for payments requires its convertibility on a one-to-one basis with private money or commercial bank money. However, due to concerns around possible deposit outflows from commercial banks and financial stability risks, the ECB has envisaged limits/caps on holdings of the digital euro. This appears to be inconsistent with the argument about confidence in the currency and implications for the efficiency of payments systems, as well as the transmission of monetary policy (Panetta, 2021).

5.3. Monetary policy and financial stability

The implications of introducing a digital euro for the stability of the banking system have been extensively discussed by experts and policymakers (Ahnert *et al.*, 2022). The digital substitution of bank notes/cash will not pose challenges for banks, and will be neutral with respect to the monetary policy process and transmission. Still, a major substitution is likely to occur for bank deposits. Since a digital euro can be considered an alternative to bank deposits for households and firms, it is likely to affect the liability side of commercial bank balance sheets, the supply of credit and, consequently, the transmission of monetary policy.

If a digital euro is to be widely adopted and depositors are induced to move some of their liquidity from a bank deposit to a digital euro wallet, there could be a deposit outflow from the banking sector, reducing banks' balance sheet and liquidity. To the extent that the balance sheets of banks would be affected, the monetary transmission through banks and their ability to finance the economy would be diminished. This disintermediation might have an impact on the lending channel, reducing the availability of credit, increasing the banks' cost of funding, reducing their profitability and, possibly, endangering financial stability. Risks are expected to be greater for smaller banks, which rely largely on deposits as a source of funding. Moreover, even if the risks to financial stability can be contained, the risks of adverse effects on credit provision by banks and of higher costs for people and businesses would remain.

Despite these threats, banks retain key advantages that can offset these risks. They have large existing bases of customers with high levels of engagement and trust. They can also combine payments with core banking products, such as deposit accounts and lending, enhancing the customer proposition and offering a proven path to monetisation. The ability of banks to limit the run-off risk through interest-bearing deposits and cross-selling initiatives would chiefly depend on the specific design features of an eventual digital euro (e.g. holding limits and the ability of intermediaries to charge for the services provided).

To minimise or eliminate such risks, and prevent a structural shift from bank deposits, the ECB is exploring several design options for the digital euro, particularly regarding its holding limits, as well as its remuneration scales. Additional tools have also been considered to control the possible excess of transactions or holdings above the threshold. In this case, the excess amount would be transferred automatically to a linked commercial bank account.

The analysis of different demand scenarios for a digital euro and the outcome for banks' balance sheet and profitability conducted by the ECB, as well as European Commission staff, suggests that the envisaged holding limit of up to EUR 3 000 for each euro area resident would not pose any significant risks to financial stability (Bellia and Calès, 2023). However, a higher holding limit, starting from EUR 5 000, would significantly impact the sustainability of the banking ecosystem, and decrease the capacity of banks to finance the economy and to operate profitably. Given that the overall profitability (as measured by return on equity) of the European banking sector is satisfactory, and that it could be challenged by the rapid development of fintech companies, careful consideration of the design of a digital euro is necessary for ensuring the viability of the banking sector.

Holding limits may be an effective tool in constraining the amount of digital euro in circulation, but their implementation may prove to be difficult. For example, finding the appropriate holding limit that can be equally applied to different users of a digital euro (e.g. households and merchants), with different payment needs, and across different Member States, is not an easy task. One solution that the ECB proposes to overcome this problem is to apply different limits for different users (e.g. zero-holding limits for businesses).

In addition, to overcome the risk of holding limits constraining the ability of payees to accept payments in digital euro, the ECB has considered the 'waterfall functionality', which allows the transfer of amounts exceeding the maximum holding amount to a bank account. But this would make the digital euro dependent on the possession of a bank account. Furthermore, holding limits may challenge the central bank's credibility and commitment (Dotsey, 2008), as the bank may find it difficult to enforce or tighten these limits when they are needed most (e.g. in the case of a bank run).

There is uncertainty about the impact that a digital euro will have on possible outflows of deposits from the banking system. On the one hand, the actions taken by banks to safeguard deposits (e.g. through higher remuneration incentives for customers), may offset run-off risks. On the other hand, the introduction of a digital euro may increase the risk of runs on banks in times of stress if the cost of shifting funds between bank liabilities and digital euro is low and execution is rapid (Mancini-Griffoli *et al.*, 2018; Infante *et al.*, 2022). If a bank is facing the risk of a run on its deposits, the contagion effects and flight to the digital euro's safety may propagate the crisis to other banks even more rapidly. These

effects may be worsened by the incompleteness of the Banking Union in the euro area and, in particular, the lack of a European Deposit Insurance Scheme (Angeloni, 2023)[17].

By offering a risk-free online alternative to bank deposits, a potential digital euro could magnify the risk of bank runs. Even a limit of EUR 3 000 may not be sufficient to mitigate the effects of liquidity outflows and their contractionary effects. This is because, in the event of market turbulence, interest rates – even prohibitive ones (i.e. a rate lower than the market rate) – may not prevent people from moving temporarily to a digital euro in order to protect their money (at least for a short period). Although the central bank can always counterbalance this effect through open market operations, as bank deposits and central bank funding are not perfect substitutes, the contractionary effect is likely to persist. In addition, the ECB could easily justify an increase of the holding limit in times of stress.

That being stated, a digital euro may improve the information flow to policymakers, and the lender of last resort, and thus improve the efficiency of interventions (Keister and Monnet, 2022). As described earlier, a digital euro may provide a safe alternative to bank deposits, induce depositors to withdraw their money, and thus increase financial instability. However, if withdrawals are converted into digital euro during a bank run, the central bank would learn about the state of the economy and respond more quickly. As a result, this would reduce costly liquidation and the misallocation of resources, and minimise ex-ante incentives of investors to withdraw. Thus, a digital euro could have a beneficial impact on financial stability.

Going forward, it is necessary to ensure that a digital euro does not have any consequences in terms of the stability and predictability of bank funding, and does not hinder the flow of credit to the economy. Regarding holding limits, for example, conducting an in-depth bottom-up analysis is needed to identify how these limits would affect different banks (e.g. small versus large banks, banks with a higher dependence on deposits, banks with less access to wholesale funding) and different Member States. There is also a need for an in-depth and systematic examination of these risks, as well as the mitigation strategies that would be adopted.

5.4. Functionality and use cases

According to design options proposed by the ECB, the digital euro will be available for both online and offline payments. In the latter case, neither the payer nor payee would be connected to the internet (identical to cash payments). Yet, it is still unclear if the users could use the offline option despite the availability of an internet connection, for example for the sake of greater privacy or to avoid having to share transaction information with intermediaries.

Compared with existing payment instruments, is it also unclear what new challenges a digital euro, as proposed and designed, will address. On the face of it, it will largely overlap with both the traditional and innovative solutions used today, such as cards and mobile payments based on instant payments. In view of this, the digital euro will be an extension of instant payments, thus leveraging the existing infrastructure and, at the same time, providing benefits for end users.

[17] However, even when a deposit insurance is in place, a CBDC may give rise to panics and bank runs, relative to a regime with a physical currency (Williamson, 2022). A CBDC tends to trigger banking panics, in part because panics are less disruptive with a central bank digital currency than with physical currency.

The offline option for the digital euro introduces a new aspect to existing payments systems, aiming to provide a higher level of privacy and financial inclusion[18]. But the offline option would presumably entail only a limited amount, compared with the online option, as well as add operational challenges[19] and risk-management considerations. It is essential to identify and address potential risks associated with offline transactions, such as counterfeiting, money laundering and illicit activities.

Finally yet importantly, the main question remains as to whether an offline digital euro will be widely adopted. The ECB's public consultation on a digital euro indicated that the offline functionality is the aspect that respondents expect least from a digital euro, with only 8% of respondents mentioning offline use as their preferred feature. An alternative option would be a self-custody wallet[20], for which the customer would directly hold the key. This solution could also preserve privacy and allow for greater financial inclusion, assuming that a customer would be allowed to open a self-custody wallet even if that person does not hold a bank account (ECB, 2023).

As mentioned earlier, the primary use cases for the digital euro will be for online purchases, P2P transfers and in-store transactions. Government payments are another important use case for the digital euro. This includes payments related to social benefits, tax refunds and other government services. Some stakeholders nevertheless find the focus of the digital euro use cases to be limited, which strengthens the need for a digital euro to offer clear benefits for the end user. There could be areas that might raise questions for the general public and require further clarification. Among them are the possible integration of the digital euro with innovative and growing financial services and solutions, such as decentralised finance protocols and platforms, and tokenisation as additional use cases. These technologies could enable automated and programmable payments, as well as the transfer of digital assets.

5.5. Financial inclusion

Although financial inclusion is relatively high in most euro area countries, and the number of unbanked adults (aged 15+) has declined by a third over the last decade or so (from 10 % in 2011 to just 3 % in 2021)[21], there were still about 9 million adults in 2021 who lacked access to formal financial services (see Figure 3). Portugal and Cyprus had the highest no-account rates (7% of the population), while there was hardly any unbanked adult in Austria, Germany, Finland, Ireland or the Netherlands[22].

[18] Nevertheless, this would depend on the specific design features. For example, if the offline variant of a digital euro consisted of a rechargeable card, the effect on privacy and financial inclusion would depend on how the recharge functionality were designed.

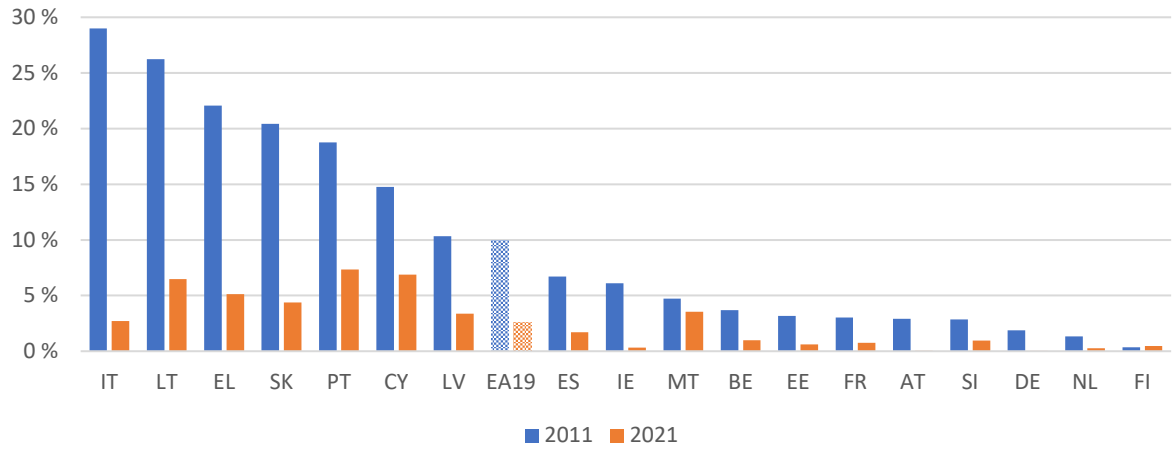
[19] For example, the top-up mechanism would need to be online since the original balance would be reduced instantly.

[20] While a custodial wallet – where a third party takes custody of private keys on behalf of users – is the current standard in payment instruments, a self-custody wallet (or non-custodial wallet) gives end users full control of their digital assets.

[21] Several factors contributed to this development. On the one hand, banking has become an element of social integration, as access to and use of a bank account has become a way of life. On the other hand, the use of cash is on the decline, as salaries, benefits and utilities are being paid via bank accounts while consumer goods and services are paid via payment cards. Technology has also played a role in the rising banking population, while the emergence of challenger banks has enabled individuals to open bank accounts at the click of a button on their smartphones.

[22] The declining trend in the unbanked rate over the past decade is encouraging, but understanding why many people remain unbanked is crucial for developing solutions to reach them (Ampudia and Ehrmann, 2017; Maniff,

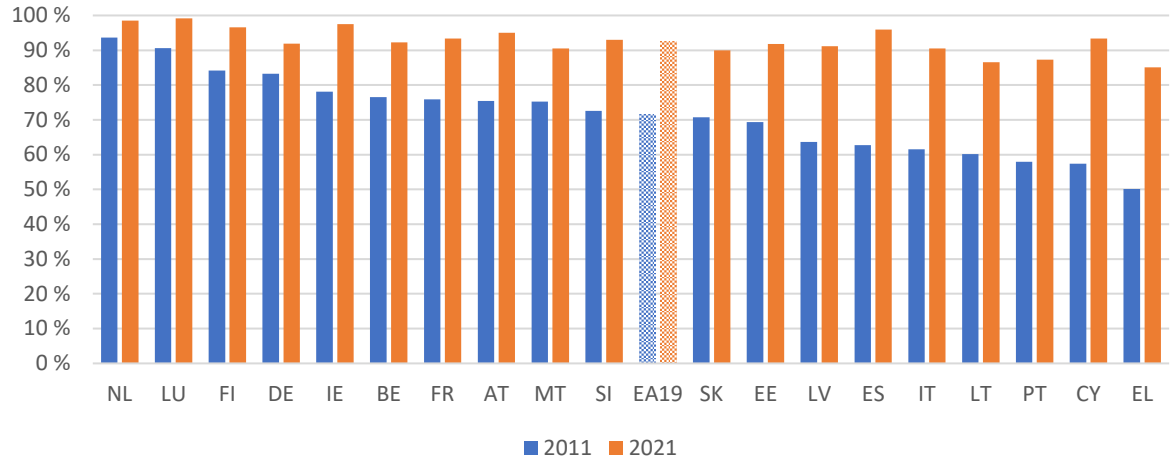
Figure 3. Share of the unbanked population in the euro area (aged 15+)



Notes: The figure depicts the percentage of adults (aged 15+) who have not had an account at a bank or another type of financial institution, or used a mobile money service in the past year. Data for Luxembourg are not available.
Source: Authors' calculations based on data from the Global Findex Database.

Access to the internet can improve financial inclusion by facilitating easy access to financial services, offering secure transaction platforms, reducing transaction costs, and providing a competitive business framework. Internet penetration has increased over the years, and as a result the proportion of the euro area population that has never used the internet has rapidly declined during the last decade. In 2011, 72 % of all euro area households had internet access, while by 2021 the share had risen to 93 % (see Figure 4). This still means that 7 % or 20 million households in the euro area struggle to get internet coverage. In countries like Luxembourg and the Netherlands, internet access is highest (99 % of the adult population), while Greek and Lithuanian households have the lowest rates of internet access (85 % and 87 %, respectively), despite the significant increase that has taken place since 2011 (up from 50 % and 60 %, respectively).

Figure 4. Share of households with internet access in the euro area

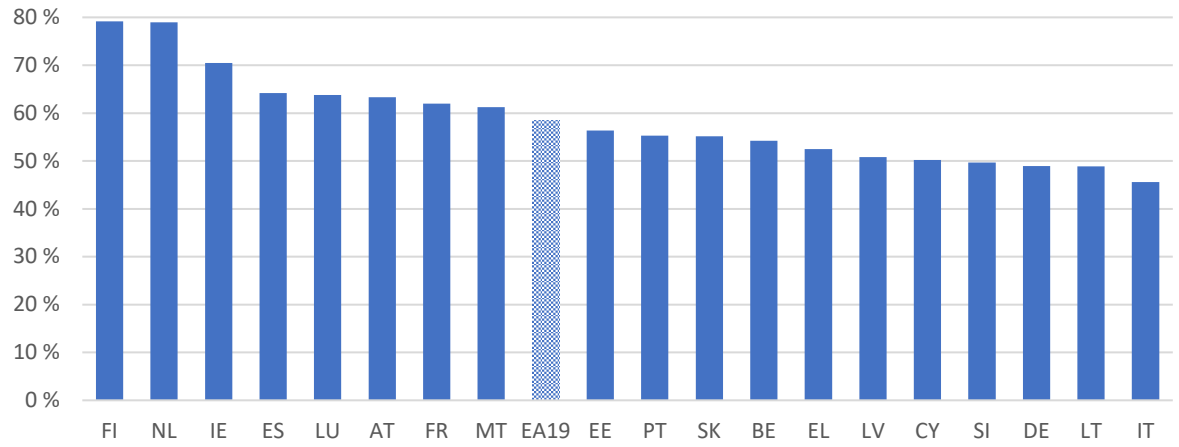


Source: Authors' calculations based on data from Eurostat.

2020). The reasons may vary from unemployment and lack of education to more specific ones, such as (i) cost-related concerns (e.g. not enough money to meet minimum balance requirements, or bank account fees that are too high and too unpredictable); (ii) lack of trust in financial institutions; (iii) personal identification, credit or former bank account problems; or (iv) privacy.

Although having a bank account is important, it does not necessarily translate into being adequately equipped to pay digitally. Financial inclusion could be hampered by digital exclusion, and the unwillingness or inability to use digital payments. For instance, some individuals (e.g. those on a lower income, vulnerable groups or migrants) may not have the digital skills or access to the right technology required to navigate and access financial services and products, such as online banking or payments. In 2021, the share of euro are population lacking basic overall digital skills stood at 42 % or 122 million (see Figure 5). Moreover, there is a gap between the share of the population having an account (97 %) and the share of population owning a credit or debit card (92 %), and a further gap with the share of the population actually using it (86 %).

Figure 5. Share of the population with at least basic overall digital skills in the euro area (% of those aged 16-74, 2021)



Source: Authors' calculations based on data from Eurostat.

Encouraging financial inclusion is one potential motivation for issuing a digital euro. Yet, to address financial inclusion, the digital euro should be designed around this goal. This means that consumers should be able to transact with it anytime, anywhere and for little or no cost. To foster financial inclusion, the digital euro will have to be free of technical (digital) complexities and link seamlessly with bank accounts. At the same time, it will have to be – as much as possible – equal to cash, which is a challenging proposition.

Allowing for self-custody wallets, which could be offered to customers without requiring them to have a bank account, may also have the potential to support the financial inclusion objective of the digital euro (Whitehouse-Levine and Kelleher, 2020; Narula *et al*., 2023; ECB, 2023)[23]. It will not only help to widen adoption, but also mimic the convenience of cash in a digital form (although it will never be a full cash equivalent). In addition, endpoint access to a digital euro should be as broad as possible and include more than a digital wallet via a smartphone app or webpage. Financially excluded and unbanked people are less likely to have a smartphone or internet access, and significantly more likely to be digitally

[23] However, self-custody wallets do come with a higher level of complexity and responsibility compared with custodial wallets. For example, users need to be familiar with private keys, seed phrases and other technical aspects, while extra precautions are necessary to ensure that users' private keys and seed phrases are kept safe and secure. Thus, and given that a key obstacle to financial inclusion is financial illiteracy (18 % of the EU public has a low level of financial literacy and 64 % a medium level), self-custody wallets may exacerbate financial exclusion.

excluded than banked ones (Toh and Tran, 2020). Thus, a variety of endpoint solutions will be necessary to reach them (i.e. brick-and-mortar locations, stored-value cards and portable hardware devices).

There are nonetheless significant challenges and risks that should be carefully assessed. The expansion of a retail digital euro to financially excluded people may likely result in competition with mobile money[24], given that the retail use case of the two products appears to be similar (i.e. safekeeping, P2P transfers and means of retail payment). Where oligopolistic market powers are a predominant concern, the use of a retail CBDC to enhance competition appears to be an attractive option for policymakers (Ree, 2023). But the same objective may also be achieved by competition policies[25] and without the risk of central banks straying into an area of commerce or being deemed to crowd out the private sector.

Evidence shows that a CBDC can be more effective in promoting financial inclusion in economies with underdeveloped banking and payments systems and no e-money (Wang and Hu, 2022). In this case, a CBDC is more convenient than a bank deposit, so some customers will migrate from cash to a CBDC, which improves financial inclusion. By contrast, the effect of a CBDC on financial inclusion is limited in economies with advanced banking and payments systems. This is because a CBDC is less likely to be more convenient than existing methods of digital payments. If the aim of the central bank is to offer a retail CBDC that surpasses the convenience of all other digital payment methods, then it will not only need to collaborate with all current PSPs (e.g. commercial banks, card networks and merchant acquirers), but also to offer more features on a CBDC, in order to achieve wider acceptance than bank payments. In other words, in advanced economies a CBDC needs to be more convenient than the means of payment already available.

It is not only the impact that a digital euro could have on financial inclusion, but also the other way around. For example, financial inclusion could influence the impact a digital euro could have on household welfare, bank disintermediation, and overall lending. The issuance of a digital euro could increase bank deposits from the previously unbanked by incentivising the opening of bank accounts for access to digital euro wallets (Tan, 2023). This inflow of new deposits from the unbanked could offset potential flows from deposits to digital euro among those already banked. In addition, the use of a digital euro for payments may help borrowers establish a credit history, thus reducing credit-risk information asymmetry for lending.

Although a CBDC could help ensure equal access to a digital means of payment for everyone, thereby favouring financial inclusion, other solutions also exist that have proven to address the same objective. But such solutions depend on the degree of financial exclusion and factors that cause it. If cash is difficult to obtain and use in underpopulated and rural areas, the infrastructure for cash (e.g. distribution

[24] Mobile money can be defined as financial transactions and services that can conducted using a mobile phone, where value is stored virtually (e-money) in an account associated with a SIM card and facilitated by a network of mobile money agents (IMF, 2019). Mobile money services are designed primarily for financial inclusion, targeting unbanked and underbanked populations worldwide. To use mobile money services, a bank account is not required; instead, the only prerequisite is a basic mobile phone. This is in contrast to mobile banking, where the use of an application on a mobile device to access and execute banking services (e.g. to check deposits or make balance inquiries or payment transfers) is mandatory. However, mobile money should not be confused with mobile wallets, software-based applications that securely store users' payment information, facilitating electronic transactions via smartphones and other digital devices.

[25] For example, other ways to enable greater competition may include: (i) opening up retail payment systems to more participants, including non-banks; (ii) capping interchange fees that merchants pay on credit and debit sales; and (iii) setting minimum standards for speed, access and interoperability – to enable payments across different payment networks (Menon, 2022).

networks, counting machines and armoured services) deteriorates and businesses resist dealing with it, then government intervention is warranted (e.g. by subsidising the provision of cash in underserved areas). If limited access to technology is a barrier to financial inclusion, then a CBDC may not be a viable solution. If the problem instead is the supply of bank accounts, which banks deem unprofitable or require unaffordable/inexistent technology[26], then perhaps the private sector could offer alternative solutions[27]. Where these solutions are not feasible, a CBDC could provide an alternative. If, however, barriers to financial inclusion stem from an aversion to formalisation, neither a CBDC nor other initiatives would prove satisfactory (Mancini-Griffoli *et al.*, 2018).

5.6. Privacy

The digital age poses serious challenges to privacy (DeVries, 2003; Nissenbaum, 2009; Bélanger and Crossler, 2011; Haksar *et al.*, 2021), a fundamental right enshrined in the Charter of Fundamental Rights of the European Union and the General Data Protection Regulation. Privacy protection is one of the most important design features of a digital euro and a key concern of future users. According to the respondents to the ECB's public consultation on a digital euro, 43 % of them consider privacy the most preferred feature, the element they would expect most from a digital euro. This was also evident from the Commission's targeted consultation, where 53 % of the EU public and 64 % of professionals considered preserving privacy and data protection in payments to be a main policy objective of a digital euro.

All the same, privacy should not be confused with anonymity (Gritzalis, 2004). Privacy can be described as the ability of users to control the type and amount of data they share with others. This does not imply unwillingness to share data, but rather control over sharing (Acquisti *et al.*, 2016). In payment terms, anonymity means that the parties involved remain unknown, while privacy means that the content of the communication remains hidden to everyone but the actors involved in the payment transaction.

Although a digital euro that respects the right to privacy is required by law, full anonymity is not considered a viable option from a public policy perspective (Panetta, 2022). Physical cash, by comparison, provides an anonymous means of payment, and its use preserves the anonymity of the payer (Kahn *et al.*, 2005). However, the technological nature of a digital euro inevitably challenges the attainment of anonymity in payments, which is a key difference between the two forms of central bank money, cash and digital. This is because a retail CBDC could facilitate the traceability of payments and financial data transmission and analysis. Thus, concerns have been raised about the risks to fundamental rights and freedoms (EDPB, 2022) associated with the development of a digital euro.

As explained by the ECB in its second progress report, privacy is safeguarded by the fact that customer information will remain with the supervised intermediaries (i.e. banks and other PSPs distributing the digital euro). This means that the ECB will not be able to access customer accounts (but only settle the transactions) or the private information in them. Supervised intermediaries will have to abide by their

[26] When fees are constrained, banks find low-balance accounts unprofitable, so access to bank accounts can decline (Boel and Zommerman, 2022), although the Payment Accounts Directive ensures the provision of basic payment accounts to any citizen.

[27] Alternatively, the government could subsidise the deployment of bank branches or facilitate the development of online banking infrastructure in rural areas and reduce the cost of bank-intermediated small-value transactions by deploying fast payments.

privacy obligations, as well as their AML/CFT (AML/CFT) obligations. Whether these will prove sufficient safeguards remains to be seen.

The specific measures and mechanisms to ensure privacy compliance are still to be defined. Furthermore, clarity is still lacking on the level of user consent and control over personal data in the digital euro ecosystem, as well as on the exact nature of the involvement of third-party service providers and their access to user data. As a potential approach, the concept of selective privacy for low-value/low-risk payments was mentioned in the first progress report, but specific details on how it will be implemented or what criteria will be used to determine which transactions will receive a higher level of privacy are still to be decided. Such an option (i.e. proximity/offline payments) could help preserve the privacy value that many users attribute to cash today (i.e. users may not need to prove identity to third-party institutions and can minimise their 'digital trail' for such transactions)[28]. In addition, it might offer customers a distinctive attribute of a digital euro – as opposed to existing electronic means of payment – which may foster adoption and customer use. It could also allow banks and other financial intermediaries performing know-your-customer verification to streamline the process, reducing the overall cost of adopting the digital euro.

Moving forward, it is important that robust encryption and cybersecurity measures are in place to protect against data breaches and unauthorised access, especially considering the possible risks that the concentration of the settlement in a centralised platform and entity (i.e. the ECB) may entail. The establishment of clear guidelines on how users could manage their data and have control over its usage, is equally important. Addressing the potential risks associated with third-party access and ensuring that adequate safeguards are in place are elements that should be taken into account when designing a digital euro[29].

5.7. Impact on market participants

PSPs are expected to act as intermediaries between the central banks and the end-users of a digital euro. Thus, they will have to integrate the digital euro into their existing infrastructure and facilitate transactions using the currency. However, it remains to be seen whether this will work, and under what conditions.

When considering the role of a digital euro, particularly as a European cross-border payment instrument, a sustainable business model is indispensable[30]. This model, overall, will depend on a combination of factors, including user adoption, intermediary value proposition, a regulatory framework under which the digital euro will operate, security and privacy, cost-effectiveness and competition. Intermediaries that can navigate these factors effectively are more likely to build a sustainable business model and succeed in the digital euro ecosystem.

The digital euro scheme envisages that the supervised intermediaries would be the direct counterparts of individuals, merchants and businesses. These intermediaries would also be responsible for the

[28] According to the Commission's proposal, this higher level of privacy would apply to the offline digital euro, enabling low-value offline proximity payments without disclosing transaction data to payment service providers.
[29] Privacy-enhancing technologies have the potential to enable payment and data processing, while at the same time minimising personal data exposure, and maximising security. Such technologies may be cryptographic, statistical or procedural in nature (WEF, 2021; Bank of England, 2023).
[30] This is even more relevant considering that according to the proposal on the digital euro, credit institutions will be obliged to provide basic services to their customers and that these are to be free of charge.

distribution of the digital euro to end users (including identification and authentication), as well as for the provision of customer-facing services and the fulfilment of other account and transaction management tasks. In fact, and as indicated in the last progress report by the ECB, the provision of these core services would be mandatory for the intermediaries distributing the digital euro. In addition, these intermediaries could offer optional and/or value-added services. While the optional services would be facilitated by the Eurosystem, the value-added services could be entirely developed by the market.

Among the aspects of the business case for intermediaries and their compensation model are the economic incentives. The core services provided are considered to be free of charge for the individual consumers. This could create additional costs for the intermediaries, affecting their profitability and competition capacity. Intermediaries should be compensated for the costs associated with all the digital euro-related services that they are expected to provide, including opening and maintaining digital euro accounts or wallets, transaction management, AML/CFT and anti-fraud checks, customer support, etc.

A digital euro is expected to provide increased choices for consumers and merchants. Fostering competition would be key to ensuring the broad adoption and overall success of the digital euro initiative. It is equally important that a digital euro remains innovative. For that, PSPs should be incentivised to offer value-added services for which they should be free to set prices according to the value they offer. But can this be done for free?

The digital euro scheme currently envisages zero-holding limits of digital euro for merchants and governments, which can affect PSP operational costs and the efficiency of the payment ecosystem overall. Therefore, if the digital euro is to become mandatory, then it is crucial that it comes hand in hand with an underlying sustainable business model and design options that promote efficiency, in order to ensure both its success and acceptance by market players and end users.

For the ECB, as the issuer of the digital euro, the benefit from seigniorage could be significant if the digital euro were to be widely adopted and used in retail transactions. The exact impact on seigniorage income, however, will depend on the design and implementation of the digital euro and the policies of the ECB. For now, the details of how seigniorage would be distributed or allocated are not known. It is therefore expected that PSPs will ask for their share of the revenue for the services provided.

6. Conclusions

A digital euro, according to the ECB, aims to fulfil different objectives, such as to provide a new means of payment, serve as a monetary anchor for the payment system in the digital era and support financial inclusion. Depending on its design features, a digital euro has the potential to deliver the following key benefits: (i) lower costs for users, (ii) settlement in a single ledger, (iii) enhanced privacy if offline and/or self-custody wallets are incorporated into the design, (iv) greater innovation if conditional payments are enabled, and (v) increased financial inclusion if digital identity wallets can be used to open a digital euro account.

However, and as illustrated in this report, digital euro's objectives either fail to add value to an already efficient and constantly developing payment system, or are ill defined and not well justified, or their relevance for the European region is limited and there are alternative ways to achieve them. Moreover, some of the potential benefits of a digital euro (e.g. in terms of costs, settlement, privacy and innovation) are highly dependent on its specific design features and come with a set of complexities that are difficult to implement. To ensure widespread adoption, the digital euro must offer a compelling value proposition and clear benefits to consumers and merchants in the EU, while the EU legislative framework should allow for these benefits to emerge.

Building public trust in the digital euro project will be essential. Data protection and confidentiality, identity management, protection from data leakages and abuses and regulatory compliance are all important considerations in addressing privacy concerns in the digital euro ecosystem. By implementing robust privacy measures and complying with relevant regulations, the digital euro project can strive to protect user privacy and ensure the secure and responsible use of digital currency. Addressing privacy concerns and putting in place strong privacy safeguards will help instil confidence in users and encourage the widest possible adoption of the digital euro.

To promote financial inclusion, the digital euro should remain accessible to vulnerable groups, whose members may not have access to the conventional banking system or to reliable internet connectivity. Offline use can help address this by allowing transactions to take place even without internet access. Apart from carrying a higher risk of latency or loss, the option of offline use raises concerns with regard to users' personal information and transaction data. It will therefore be crucial to implement robust security measures so as to minimise the risk of unauthorised tampering or fraudulent activities when using the digital euro offline.

To reduce the costs of the digital euro project, the optimal course of action would be to leverage as much as possible the existing infrastructure for instant payments and well-known domestic payment methods. This would be the most efficient strategy to facilitate introduction of the digital euro and boost its adoption by individuals and businesses that are familiar with current forms of payment.

The digital euro scheme will eventually be designed by the ECB together with representatives of the retail payments market (the Rulebook Development Group). The aim is for the digital euro to achieve the same degree of popularity for POS transactions as cash and card schemes. This is the area where competition in the payment ecosystem is crucial, and where central bank currency and commercial bank currency should coexist. This implies that enhancing the cross-border payments systems in Europe should not be left to the digital euro alone. It is also crucial that the digital euro be designed so that it can be used efficiently for cross-border payments.

A digital euro – if properly designed – could add value for consumers and merchants by enabling the interoperability that has been missing from existing payments systems in Europe. It could also enable these systems to have pan-European reachability, which has been a constant European policy objective but has not yet been achieved. Nevertheless, attaining European payment sovereignty cannot solely be a policy-driven ambition. It should also be driven by the market, through promoting market innovation and competition, empowering European private service providers and ensuring compliance with legal and regulatory requirements.

The main obstacle to interoperability in Europe is the high investment costs it would entail. Against this background, the future digital euro scheme could enable interoperability between European payment instruments and instant payments (which is a current European priority), thus bridging one of the most challenging gaps with international card schemes. However, the digital euro is not a precondition for interoperability, as the latter should be achieved with or without it. At present, Europe lacks a truly pan-European payment system, despite the existence of successful local/national payment schemes and the long-standing operation of international cards. By leveraging current networks and investments already made in the field of instant payments, and fostering interoperability in European payments, a digital euro could gain in popularity among consumers and merchants. If not, the digital euro will constitute an additional option in an already rich and diversified ecosystem.

In this context, the digital euro project could also consider addressing the issues associated with cross-border remittances between the euro area and the rest of the world. Remittances play a crucial role in supporting financial inclusion and the advantages of digital currencies could be used to help reduce remittance costs and improve their accessibility.

To add value, an online digital euro should be designed in such a way that it complements (rather than merely duplicates or replaces) the present and relatively widespread means of instant payment. To this end, the design of the digital euro could cater for conditional payments and encourage the unbundling of intermediary services to enable new value-added services for consumers. It will also need to address (i) the challenges facing instant payment standards (e.g. SCT Inst) and technical solutions (e.g. TARGET Instant Payment Settlement (TIPS)), including significant gaps in standardisation for P2P and person to merchant (P2M) proximity use cases; (ii) the lack of EU-wide standards for wallet interoperability; (iii) the absence of a common business framework (e.g. to make sure that payments are free of charge for consumers); and (iv) the lack of common standards for dispute resolution. Especially P2M proximity and remote payments are currently dominated by cash or card-based schemes due to the lack of common standards for instant payments. The ability of the digital euro to contribute with open standards, processes and business rules could be the key to unlocking true pan-European interoperability in payments.

7. Policy recommendations

The digital euro may have the potential to fulfil its objectives and provide benefits for end users. However, this report has shown that these objectives either fail to add value to an already efficient and constantly developing payment system, or are ill defined and not well justified, or their relevance for the European region is limited and there are alternative ways to achieve them. In addition, some of the potential benefits of a digital euro are highly dependent on its specific design features and come with a set of complexities that are difficult to implement.

Therefore, prior to making a decision to proceed with the digital euro project, the following aspects call for assessment:

1. The benefits of an eventual digital euro and its **added value** for end users (i.e. individuals, merchants and businesses), compared with existing payment solutions, should be crystal clear, well understood and communicated. A detailed user-case analysis is desirable to clarify the **scope** of a potential digital euro, the envisaged **customer base** and the likely **scale of demand** by end users. As it currently stands, it is hard to see how a digital euro will endure in the crowded payment ecosystem and what value proposition it will offer, apart from being official money.

   A digital euro should offer clear advantages in response to consumer needs. The ramifications of its issuance should be thoroughly debated with stakeholders and greater interaction between the public and private sector is necessary. Moreover, its features and capabilities should be adapted accordingly to align it with market realities.

2. The digital euro should be **cost efficient** and **economically viable**, as well as contribute to making payments, and ultimately Europe, more **competitive**. A holistic cost-benefit analysis should be carried out of the **impact** of introducing the digital euro on current stakeholders, including the **banking** and **payment infrastructures**.

   This will ensure that the launch of the digital euro does not lead to an unsustainable economic model with high operational costs and new infrastructure investments that exceed the benefits. Such an analysis should not only examine the costs and impacts for banks/PSPs (e.g. lost revenues vs payment revenues), but also for merchants (e.g. the costs of accepting an additional payment method). It should also include the costs associated with the project overall (e.g. personnel, infrastructure and ongoing scheme services offered at no cost by the ECB). In addition, the social costs of implementing the project and providing corresponding services, should be well analysed.

3. The **necessity** and **effectiveness** of **holding limits** to address concerns related to AML/CFT and bank disintermediation, as the ECB anticipates, should be better justified and explained. An in-depth analysis should be conducted to assess the **wisdom** of holding limits, and if adopted, the level of individual holding limits in line with the **payment needs** of the European public.

   Although holding limits may have the potential to prevent any undesirable effects on financial stability and credit provision to the economy, as well as preserve the perfect substitution between euro banknotes/coins and digital euro (to be convertible at par), their rationale it terms of AML/CFT it is unclear. The analysis should be based on bank-

level data and be conducted in close collaboration with financial institutions across Member States, drawing on a diversity of models and considering the existing legal framework.

If a decision is made to proceed with the digital euro project, we propose approaching it as follows:

4. Start with a digital euro that is as **simple** as possible and includes only the most **basic functionalities**.

   Additional functionalities could be incorporated if necessary, as experience is gained. The prioritisation of use cases should be based on utility for consumers and phased in according to this principle.

5. The digital euro should rely on and build upon **existing mechanisms** in the **payment infrastructure**, as much as possible, and take advantage of current service processes.

   This will minimise the need to adapt the existing payment infrastructure and create new systems. A digital euro that is interoperable with SEPA instant payments will not only optimise its distribution and promote widespread payment acceptance by end users, but also close the gap between domestic payment solutions in Europe and international card schemes. The features, rules and standards of the digital euro should also be open to other European payments systems (e.g. mobile payments based on SEPA Inst).

6. Establish a **regulatory framework** that ensures a **level playing field** for the payment ecosystem, between providers and between currencies (public and private money).

   This means that regulations for the digital euro ecosystem should not be kept separate from the current rules governing the payment ecosystem, but that they need to be extended to the digital euro.

7. The **decision to issue** a digital euro in the euro area (either a retail or a wholesale one) **cannot be taken in isolation** from CBDC developments in other **major jurisdictions**, as such a decision would impact the **attractiveness** of the euro, as a means of payment relative to other major currencies.

   A high-degree of collaboration and coordination among major currency areas – in particular, the US, the UK and Switzerland – is necessary. Any differences in the digital currency schemes adopted by the major countries should also be assessed in the light of their likely impact on the attractiveness of the euro as a global reserve currency. Interoperability between the digital euro and other major CBDCs should be a feature of the design code.

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