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IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a Regulation of the European Parliament and of the Council on the establishment of the digital euro

and

Proposal for a Regulation of the European Parliament and of the Council on the provision of digital euro services by payment services providers incorporated in Member States whose currency is not the euro and amending Regulation (EU) 2021/1230 of the European Parliament and the Council

and

Proposal for a Regulation of the European Parliament and of the Council on the legal tender of euro banknotes and coins

{COM(2023) 364 final} - {COM(2023) 368 final} - {COM(2023) 369 final} -
{SEC(2023) 257 final} - {SWD(2023) 234 final}

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Glossary

Term or acronym	*Meaning or definition*
Application Programming Interface (API)	Interface that enables data transmission and thus interoperability between two different systems.
Central Bank Digital Currency (CBDC)	A CBDC is a form of official currency which constitutes a liability of a central bank, is issued and stored digitally.
Central bank money	It consists of banknotes and coins in circulation (cash) and the electronic accounts that credit institutions hold at the central banks (reserves). Cash has the status of legal tender unlike commercial bank money. Central bank money is credit and liquidity risk-free as the default risk of a central bank is in principle non-existent.
Commercial bank money	Liability of a commercial bank, in the form of deposits held at the commercial bank, which can be used for settlement purposes. Commercial bank money does not have the status of legal tender and carries a credit risk (i.e. the risk of default of a commercial bank).
Crypto-asset	Crypto-asset means a digital representation of a value or of a right that is able to be transferred and stored electronically using distributed ledger technology or similar technology.
Digital euro	The digital euro is a retail central bank digital currency (CBDC) that the Eurosystem may decide to issue. It would be accessible to all citizens and businesses and available for payments
Distributed Ledger Technology (DLT)	Distributed ledger technology (DLT) refers to a family of technologies aiming to solve the problem of reaching a consensus between participating entities, which is required for validating data and updating the distributed ledger, without relying on a central authoritative entity to mandate ledger updates.
Domestic card scheme	A payment card scheme, typically a debit card scheme, that for the most part operates in a single country, for instance Carte Bancaire in France, Bancontact in Belgium, or Dankort in Denmark.
Electronic money	A subcategory of commercial bank money is an electronic store of monetary value that may be widely used for making payments. Electronic money is issued by an electronic money institution/credit institution upon deposit of funds (e.g. pre-paid cards) and does not have therefore an impact on money creation. In the EU, e-money is regulated by the e-money directive.
European Digital Identity Wallet (EUDIW)	The EUDIW allows the user to store identity data, credentials and attributes linked to her/his identity, to provide them to relying parties on request and to use them for authentication, online and offline, and to create qualified electronic signatures and seals. It is part of the Commission's proposal for a regulation amending Regulation (EU) No 910/2014 as regards establishing a framework for a European Digital Identity.
European Payments	Private initiative to create a new pan-European payment solution

Initiative (EPI)	leveraging Instant Payments and the creation of digital wallets.
Industry 4.0	Industry 4.0 refers to the fourth industrial revolution representing a new stage of digital transformation for manufacturing/production and value creation processes. It is an interconnected data driven industry where the convergence of Artificial Intelligence, Internet of Things and DLT supports automated decision-making by machines
Instant payments	Credit transfer which arrives on the payee's account within ten seconds of the sending of a payment order by the payer
ICS	International Card Schemes (e.g., American Express, Discover, Mastercard, Visa, etc.)
Legal tender	Legal tender is a means of payment whose acceptance is mandatory by default (i.e. unless its acceptance is restricted for reasons of public interest or waived by contractual agreement), at its full-face value, for the discharge of payment obligations.
Peer-to-peer (P2P)	Peer-to-peer is a communication structure in which individuals interact directly, without going through a centralized system or hierarchy.
Point Of Interaction (POI)	The initial point in the payee's environment where data is exchanged with a payer device or where consumer data is entered to initiate a digital euro transaction
Point of Sales (POS)	'Point of Sale' means the address of the physical premises of the merchant at which the payment transaction is initiated. In the case of distance sales or distance contracts (i.e. e-commerce), the point of sale shall be the address of the fixed place of business at which the merchant conducts its business regardless of website or server locations through which the payment transaction is initiated.
Payment Service Provider (PSP)	A provider of payment services as defined in Annex I of Directive 2015/2366 (PSD2), including a credit institution, payment institution and electronic money institution
Payment scheme	A single set of rules, practices, standards and/or implementation guidelines agreed between payment service providers (PSPs) for the execution of payment transactions across the Union and within Member States, and which is separated from any infrastructure or payment system that supports its operation
Retail CBDC	A retail CBDC is a central bank liability issued in digital form for use by the general public (e.g. citizens, businesses and government entities) when making retail payments.
Retail payment	Payment transaction between consumers, businesses and public authorities, with the exclusion of payments made by payment service providers on their own account or on behalf of other payment service providers.
Stablecoin	A crypto-asset that references a fiat currency or a portfolio of liquid assets to stabilise its market value.

Web 3	The term web 3 refers to a vision for the third generation of computing, which would shift power from platforms to users by means of technologies that support decentralisation and P2P interactions. Web3 has a user centric vision where users not only consume services but also participate in the governance and retain more control over their own data.
Wholesale CBDC	A wholesale CBDC is a central bank liability issued in digital form for use by eligible entities only (usually banks) for payments and not for general use by people and businesses.

1. INTRODUCTION: POLITICAL AND LEGAL CONTEXT

1.1 Political context

Digitalisation and new technologies are increasingly shaping European citizens' lives and the European economy. With the European economy becoming more and more digital, Europeans also increasingly use digital means of payment to transact. The socio-economic impacts of the COVID-19 crisis accelerated this trend and increased the need to allow business to be conducted remotely and through innovative digital technologies, wherever possible. As President von der Leyen stated in her Political Guidelines for the current Commission[1], it is crucial that Europe can reap all the benefits of the digital age and that it strengthens its industry and innovation capacity in a safe and ethical way. In this context, a digital euro – as a retail central bank digital currency to be issued by the Eurosystem – can play an important role. The conference on the future of Europe further stressed the importance of "consolidating what has been done in terms of the single currency and the interconnection of payment systems and telecommunications".[2] The digital euro would contribute to achieving that objective.[3]

The Eurosystem provides safe money and reliable means of payments to households, businesses and the broader financial system in the euro area. By pursuing its objective of maintaining price stability i.a. through the task of promoting the smooth operation of payment systems, it ensures that money and payments serve European society.[4] However, while still prevalent, the use of euro banknotes and coins for payments in the euro area has been in decline over the past decade due to the progress of digitalisation and changing consumer preferences. Moreover, in a digitalising economy, central bank money such as that offered to households and businesses in its current form cannot be used for digital payments. This raises questions about the function of central bank money as 'monetary anchor' for private money created by commercial banks and other payment service providers. Namely, without widely available and usable central bank money and the option to convert private money into it, trust in private forms of money in the digital environment could decline especially during a financial crisis, to an extent that users lose confidence in euro denominated digital forms of private money. Eventually, such decline of trust could also undermine trust in the euro as such. This makes it thus important to safeguard the role of central bank money in all its forms, also in an increasingly digitalised economy.

In this context, the possibility to introduce a retail digital euro has received support from Member States, the European Parliament and the European Central Bank. At the Euro Summit of March 2021 Member States and the ECB called[5] for a stronger and more innovative digital finance sector and for more efficient and resilient payment systems, stating that exploratory work on a central bank digital currency, the digital euro, should be taken forward. This followed the joint statement of the Council and the European Commission on stablecoins issued in 2019. The Council Recommendation on the economic policy of the euro area for 2022 further stressed that depending on its design, a central bank digital currency could, inter alia, (i) offer a supply of public money in digital form, (ii) support the digitalisation of the European economy, (iii) actively encourage innovation in retail

[1] https://www.consilium.europa.eu/media/48975/25-03-21-eurosummit-statement-en.pdf
[2] Conference on the future of Europe, report on the final outcome, May 2022
[3] Commission communication, "Conference on the future of Europe, putting vision into concrete action", COM (2022) 404 final
[4] ECB Report on a Digital Euro, October 2020, page 1.
[5] https://www.consilium.europa.eu/media/48975/25-03-21-eurosummit-statement-en.pdf

payments, and (iv) contribute to strengthening the international role of the euro and Europe's open strategic autonomy. In its 25 February 2022 statement[6], the Eurogroup also acknowledged that "a properly designed digital euro that is safe, easy to use and widely accessible to the public has the potential to foster innovation in the financial system and deliver major benefits for citizens, businesses and Member States". A further statement adopted on 16 January 2023 reaffirmed the Eurogroup's support for the ongoing preparatory work for the potential issuance of a digital euro, encouraged a high level of innovation and ambition and recalled the Eurogroup's intention to continue to play an active role in the process.[7] The European Parliament resolution of 16 February 2022 on the European Central Bank – annual report 2021[8] also welcomed the ECB's decision to launch a 24-month investigation phase of a digital euro project. This decision was also welcomed by the ECOFIN on 29 March 2022.[9]

Participants in the ECB's public consultation, the Commission's targeted consultation and the Conference on the digital euro overall supported the introduction of a digital euro. Even though the sample of participants could not be deemed representative of the European population, most of the respondents to the ECB's public consultation (October 2020 – January 2021) [10] appeared to support the digital euro, on condition that cash would not be discontinued. Privacy was considered the most important feature for the digital euro by both people and professionals participating in the consultation. People also highlighted the importance of security, usability throughout the euro area, absence of additional costs and usability offline. Respondents to the Commission's targeted consultation (April – June 2022)[11], whose purpose was to complement the ECB's public consultation with further information gathered from professionals, insisted on the need for the digital euro to be fast, cost free, widely available and to ensure a high level of privacy. The Conference on the digital euro organized by the Commission and the ECB on 7 November 2022[12] confirmed the interest of policy makers and stakeholders in the deployment of the digital euro, alongside the Commission's determination to ensure that everyone will continue to have access to euro cash in the future.,

The digital euro legislative proposal is part of the Commission Work Programme 2023 under the headline of "An economy that works for people".

The Digital Finance and Retail Payment Strategies of the Commission[13] of September 2020 supports the emergence of competitive pan-European payment solutions and the exploration of a digital euro as a possible complement to euro cash. The digital euro should be considered in the context of ongoing efforts to reduce the fragmentation of the EU retail payments market, promote competition and innovation, including the full roll-out of instant payments and encourage industry initiatives to offer pan-European payment services. In its Retail Payment Strategy, the Commission also committed to safeguarding the legal tender of euro cash, and to this end established the Euro Legal Tender Expert Group.[14] As outlined in the Commission digital finance strategy, digital technologies also hold potential

[6] https://www.consilium.europa.eu/en/press/press-releases/2022/02/25/eurogroup-statement-on-the-digital-euro-project/
[7] https://www.consilium.europa.eu/en/press/press-releases/2023/01/16/eurogroup-statement-on-the-digital-euro-project-16-january-2023/
[8] 2021/2063(INI)
[9] https://data.consilium.europa.eu/doc/document/ST-6301-2022-INIT/en/pdf
[10] Eurosystem report on the public consultation on a digital euro (europa.eu)
[11] finance-2022-digital-euro (europa.eu)
[12] High level conference: Towards a legislative framework enabling a digital euro for citizens and businesses (europa.eu)
[13] https://ec.europa.eu/info/publications/200924-digital-finance-proposals_en
[14] The Euro Legal Tender Expert Group (ELTEG) consists of representatives of national central banks and finance ministries of the euro area and the ECB and is chaired by the Commission services.

for central banks to develop central bank digital currencies (CBDC) as a digital alternative to cash and a catalyst for continued innovation in payments, finance and commerce.

The retail digital euro has also been identified as an element of the Commission strategy to support open EU strategic autonomy. In particular, the 2021 Commission Communication on The European economic and financial system: fostering openness, strength and resilience identified "the euro in the digital era" as one way to deliver on the International Role of the Euro (IROE) agenda. The ECB recognises that the issuance of CBDCs by major third countries central banks (e.g. China, the United States of America, United Kingdom) could enhance the status of other international currencies at the expense of the euro and might therefore consider issuing a digital euro in part to support the international role of the euro.[15]

What would a digital euro be?

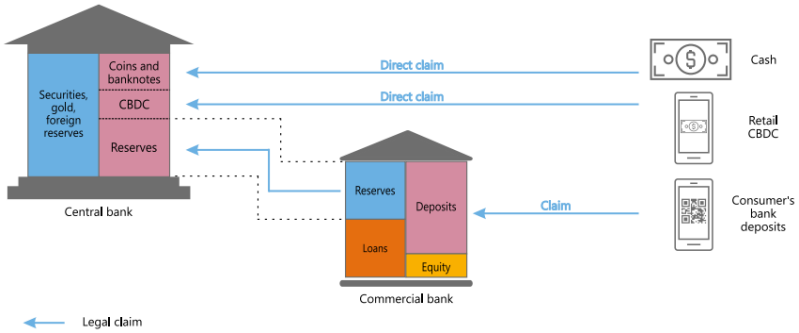
The idea of retail Central Bank Digital Currencies (CBDC) has gained significant attention over recent years. A retail CBDC, like cash, would be an official form of currency constituting a direct central bank liability towards its holder in digital form. A retail CBDC makes central bank digital money available to the general public (i.e. businesses and people), in the same way as cash is available to the general public as a direct claim on the central bank. This complements in the current monetary system the electronic/digital means of payment offered by the private sector on the basis of commercial bank money, which represents a credit claim of its holder towards the account holder's bank (see Chart 1 below). As liability of a commercial bank, commercial bank money carries an intrinsic credit risk, while a CBDC is – like cash – a credit risk-free liability of a central bank. Central banks are considering or engaged in similar projects in many other jurisdictions.[16] Currently, central banks in The Bahamas, China, the Eastern Caribbean Currency Union and Nigeria have issued or are piloting a live retail CBDC, and it is likely that other jurisdictions will follow.[17]

[15] Report on a digital euro, ECB, October 2020

[16] A survey by the Bank for International Settlements in 2021 found that 86% of surveyed central banks were actively researching the potential for central bank digital currencies, 60% were experimenting with the technology and 14% were deploying pilot projects.

[17] In the 2022 BIS survey ("Gaining momentum – Result of the 2021 BIS survey on CBDC, 68% of the 81 central bank respondents said they were either likely to issue a retail CBDC or "might possibly" do so. See Annex 10 for further details.

Chart 1: The monetary system with a retail CBDC



Source: R Auer and R Böhme, "Central bank digital currency: the quest for minimally invasive technology", *BIS Working Papers*, no 948, June 2021.

In the euro area, the establishment of a retail CBDC – a digital euro – could support a stronger and more innovative digital finance sector and more efficient and resilient payment systems. A digital euro could play a role in further enhancing competition and innovation in the European retail payments market by facilitating the development of a full range of pan-euro area end-user solutions accessible to consumers as well as supporting digital financial services. This is conditional on the digital euro itself being competitive as compared to alternative means of payment at the physical POS or online. According to the ECB,[18] as people increasingly shift towards digital payments, it is imperative to ensure that they continue to have access to central bank money, the fundamental underpinning of the euro. This is also key to strengthening the open strategic autonomy of the euro area and important for the efficiency of payments.

The ECB is investigating until October 2023 the key design and technical questions related to the potential issuance of a digital euro. The ECB issued its report on a digital euro in October 2020 and ran a public consultation on a digital euro between October 2020 and January 2021. In the light of digitalisation and rapid changes in the payment landscape, the ECB's Governing Council decided in July 2021 to launch a two-year investigation phase,[19] starting from October 2021, to explore the possibility of issuing a digital euro to complement cash and payment solutions supplied by the private sector. The ECB's investigation phase could be followed by a realisation phase with a view of developing the infrastructure and scheme necessary to the possible future establishment and issuance of a digital euro. The creation of a digital euro would require a Regulation, to be adopted by the Union legislature, establishing and regulating the essential aspects of the digital euro. The present document aims to assess the impacts of that legislative act.

The upcoming Regulation and the ECB's investigation phase focus on a retail central bank digital currency as opposed to a "wholesale" central bank digital currency. A digital currency can be issued for the exclusive use by regulated financial institutions ('wholesale CBDC') or for use by the general public ('retail CBDC'). The term retail is used in opposition to wholesale but does not mean that its use is restricted to a specific category (e.g. person-to-person payments or e-commerce). In the same way as banknotes may be used (albeit rarely) in the business-to-business payment segment, a similar logic applies to digital

[18] The case for a digital euro: key objectives and design considerations, July 2022, https://www.ecb.europa.eu/pub/pdf/other/key_objectives_digital_euro~f11592d6fb.en.pdf?da26139651d23580c8c0af69b21968dd
[19] https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210714~d99198ea23.en.html

euro. A digital central bank money for wholesale transactions between financial institutions already exists in the form of Eurosystem's TARGET services.[20].

A retail CBDC aims to serve the payment needs of people and businesses with a focus on their retail payments. Possible use cases include:

- Peer-to-peer or person-to-person payments (P2P): transferring money to another person e.g. buying from another person or handing over money as a gift;
- Person-to-business (P2B) or more generally customer to business payments (C2B) e.g. paying at point of sale (POS) in shops and on the internet (e-commerce);
- Person-and-business-to-government payments (X2G) e.g. paying taxes, duties, fines to local and central government or governments paying e.g. transfers, subsidies, rebates to people and businesses;
- Business-to-business payments (B2B), e.g. invoicing are also classified as retail payments and are performed so far mostly through credit transfers between bank accounts;
- Machine-to-machine payments (M2M) can work without human interaction and may include for example payments in the context of the Internet of Things (IoT) in the industry 4.0 era (e.g. automatic recharging of cars, automatic order of supply for manufacturing, logistical services, deliveries).

A digital euro is not a crypto-asset or a stablecoin. A crypto asset is a digital representation of value or rights which may be transferred, stored, and traded electronically using DLT or similar technology. A stablecoin typically also uses the DLT technology but in addition aims to anchor its value in reference to more reliable assets e.g. currencies (USD, EUR), commodities (gold, silver) or other assets and their combinations. The digital euro in contrast would be issued as a central bank liability, which anchors its value (just like for cash). The concept of a digital euro is technology-neutral i.e. it may or may not use DLT/blockchain technology or certain aspects of these technologies, such as for example the unspent transaction output (UTXO) model.[21] A digital euro may also build on existing credit transfer and payment systems, e.g. TARGET2,[22] or its dedicated service for instant payments, TIPS.[23] Consequently, the digital euro would be a form of central bank money, thus free from credit and liquidity risk, while crypto assets and stablecoins entail considerable risks (value, credit, liquidity) for their holders.

[20] Target2(T2) for wholesale payments, Target2 Securities (T2S) for the settlement of securities in central bank money and the Target Instant Payment Settlement (TIPS) service for instant payment. Over the past years, the Eurosystem has been working on a new consolidated TARGET platform to offer the market enhanced and modernised services and in July 2021, the ECB's Governing Council decided to launch a new Eurosystem work stream in order to explore possible technological improvements in the wholesale infrastructure. The new consolidated platform was launched in November 2022. Furthermore, several Eurosystem national central banks are experimenting wholesale CBDC projects in the form of tokenized central bank money.

[21] UTXOs are pieces of digital information representing any number of assets that result from a valid transaction in a distributed ledger. In a UTXO model, whenever a transaction is valid the UTXOs sent from payer to payee are consumed and can no longer be spent. Only unspent holdings, which are reflected in the latest update of the ledger, can be used in new transactions. Source: Project Stella, ECB and Bank of Japan, 2018

[22] TARGET2 is the real-time gross settlement (RTGS) system owned and operated by the Eurosystem. Central banks and commercial banks can submit payment orders in euro to TARGET2, where they are processed and settled in central bank money, i.e. money held in an account with a central bank. TARGET2 settles payments related to the Eurosystem's monetary policy operations, as well as bank-to-bank and commercial transactions.

[23] TARGET Instant Payment Settlement (TIPS) is a market infrastructure service launched by the Eurosystem in November 2018. It enables payment service providers to offer fund transfers to their customers in real time and around the clock, every day of the year. This means that thanks to TIPS, individuals and firms can transfer money between each other within seconds, irrespective of the opening hours of their local bank.

A digital euro, a direct claim on the Eurosystem in digital form for the payment needs of people and businesses, may take different forms. The ECB's digital euro report outlines two uses of a digital euro.[24] The first pertains to an offline use with more cash-like functionalities. It would allow transactions to take place without the need of an intermediary (e.g. bank) to validate the transaction. Similar to cash, it would be a bearer instrument i.e. peer-to-peer validated[25] and it would be made available only by means of specific user devices (e.g. smartphone or cards) and would work without internet connectivity. The second corresponds to an online use with transactions validated by third-party intermediaries. This may be used e.g. in shops or for e-commerce or in industry 4.0. Those digital euro uses can co-exist.

This initiative ensures that central bank money is made available, also in an innovative digital form in addition to its traditional physical form i.e. it does not intend to replace cash as a means of payment but to complement it. Cash will continue to serve the people's and businesses' needs in the EU. To ensure consistency between the legal tender status of the digital euro and of euro cash, this impact assessment also analyses how to better define and enforce the legal tender status of the euro cash, in the absence of a detailed regulation in EU secondary law.

The Regulation on the digital euro would be 'enabling' in nature. This means that the Regulation will establish the digital euro as a new form of central bank money, regulate its essential elements and provide the possibility, but not an obligation, for the ECB to issue the digital euro. Depending on the developments and risks described in the problem definition, the ECB can decide to issue the digital euro in line with its mandate and tasks. With a view to adapting the euro to technological changes and to ensuring its use as a single currency, the Regulation will establish the digital euro and lay down necessary rules concerning it, in particular as regards its legal tender status, privacy, AML, distribution, use (limits to its use as a store of value and conditions for its use outside the euro-area) and essential technical features. The essential technical features include the main functionalities of the digital euro: offline, online and conditional payments.

1.2 Legal context

In accordance with Article 3(1)(c) TFEU, the EU has exclusive competence in the area of monetary policy for the Member States whose currency is the euro. The definition and implementation of the monetary policy of the Union has been attributed to the European System of Central Banks (ESCB)[26] as one of its basic tasks (Article 127(2) first indent TFEU).According to the Court of Justice, the concept of 'monetary policy' is not limited to its implementation through monetary policy measures but also entails a regulatory dimension intended to guarantee the status of the euro as the single currency.[27] In other words, monetary law is part of monetary policy and the regulatory dimension of monetary policy falls under the remit of the EU co-legislators.

A new form of central bank money available to the general public, next to banknotes and coins, could be established and regulated in its essential elements by a Regulation adopted by the Council and Parliament on the basis of Article 133 TFEU if this is

[24] See Annex 5 for a description of the online and offline digital euro.
[25] A peer-to-peer validated retail CBDC is a payment solution in which payment does not require validation by a third party.
[26] The ESCB comprises the ECB and the national central banks (NCBs) of all EU Member States whether they have adopted the euro or not.
[27] See judgment of 26 January 2021 in Joined Cases C-422/19 and C-423/19, *Hessischer Rundfunk*, EU:C:2021:63, paragraph 38).

necessary for the use of the euro as the single currency. In this framework, one element to regulate, among others, would be the legal tender status to the digital euro.[28] The concept of legal tender as recently interpreted by the Court of Justice[29] as regards euro banknotes implies: (i) mandatory acceptance, (ii) acceptance at full face value and (iii) power to discharge from payment obligations.[30]

Box A - Implications for legal tender of cash

There are two main aspects to the legal tender of cash: the acceptance of cash, and its access. The former is dealt with in the jurisprudence of the European Court of Justice as explained below (and in annex 7). Should the Commission regulate the legal tender status of the digital euro in secondary legislation, it would be in the interests of coherence and better law-making to also regulate the legal tender status of cash, and the aspects related to the acceptance of cash which are covered in the CJEU ruling would be codified and clarified in secondary legislation. As this dimension concerns codification and clarification of Court jurisprudence, there is little margin for policy discretion which would have significant impacts. However, in relation to access to cash (the problem of which is further developed in the problem definition box B and annex 7), there is scope for policy choice in relation to the nature and form of action to be taken, and these aspects are therefore analysed in dedicated boxes throughout this impact assessment.

In accordance with the Treaties, issues pertaining to the definition and implementation of monetary policy are the exclusive competence of the European Central Bank/Eurosystem. The Regulation cannot therefore interfere with the ECB, an independent institution, as regards the definition and implementation of monetary policy. The decisions whether to issue digital euro, and in what amounts and at which times, can only be taken by the Governing Council of the ECB once the Union's legislature has adopted a Regulation that establishes the digital euro, recognises the competence of the Eurosystem to issue it, and regulates its essential aspects, without interfering with the ECB's exclusive competence and independence.

The provision of retail payments as an activity is mainly[31] regulated by the Payment Services Directive (PSD2)[32]. The PSD2 lays down the rights and obligations of the parties involved in a payment transaction between-payment service users and payment service providers. Payment Service providers can be credit institutions, e-money institutions, or payment institutions[33].

In addition, the Payment Account Directive (PAD)[34] supports a universal access to payment accounts and basic payment services for financially excluded consumers. The AML

[28] In the euro area, euro banknotes and coins are so far the only means of payment having the status of legal tender pursuant, respectively, to Article 128(1) TFEU and to Article 11 of Council Regulation (EC) No 974/98 of 3 May 1998 on the introduction of the euro. Currently, an explicit definition of the legal tender status of euro cash (banknotes) is only set out in the judgment of the Court of Justice of 26 January 2021 in Joined Cases C-422/19 and C-423/19, *Hessischer Rundfunk*, EU:C:2021:63. This judgment interpreted Article 128(1) TFEU and referred to the 2010 Recommendation (Commission Recommendation 2010/191/EU of 22 March 2010 on the scope and effects of legal tender of euro banknotes and coins)

[29] Judgment of 26 January 2021 in Joined Cases C-422/19 and C-423/19, *Hessischer Rundfunk*, EU:C:2021:63..

[30] See judgment of 26 January 2021 in Joined Cases C-422/19 and C-423/19, *Hessischer Rundfunk*, EU:C:2021:63, paragraph 49.

[31] Other EU Regulations include the Cross-border payments and SEPA Regulations.

[32] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market. The E-money Directive regulates the issuance of e-money, but payment transactions with E-money are subject to PSD2 rules.

[33] PSD2 also includes a licensing regime for payment institutions, for a list of payment services provided in its annex. E-money institutions can also provide any of these services and issue e-money, and credit institutions the same as e-money institutions, and in addition can take deposits and grant credit.

[34] Directive 2014/92/EU of the European Parliament and of the Council of 23 July 2014 on the comparability of fees related to payment accounts, payment account switching and access to payment accounts with basic features.

framework for both cash and electronic transfer of funds is governed by the AML Directive[35] and, when adopted, the AML package proposed by the Commission in July 2021.

Moreover, the proposed Digital Markets Act (DMA),[36] will address business practices of gatekeepers that may impede the distribution of a digital euro. This includes in particular granting access to and interoperability with and access to the operating system, hardware or software features of mobile devices for the purpose of interoperability with wallets that store credentials for initiating digital euro payments.

Also, the Commission's proposal for a framework for a European Digital Identity, if adopted, will establish the European Digital Identity Wallet.[37] The wallet will provide highly secure and trustworthy electronic identity solutions that can be linked to a variety of attributes and allow for the targeted sharing of identity data limited to the needs of the specific service requested. Where private relying parties providing services are required by national/Union or contract law to use strong customer authentication private relying parties shall also accept in an easily accessible and a non-discriminatory manner the use of European Digital Identity Wallets.

Certain acts based on Article 114 TFEU (internal market) may need to be adjusted, in particular if the coexistence of digital currencies may give rise to barriers to trade.

2 PROBLEM DEFINITION

2.1 Problem to be addressed by this initiative

Cash, the only current form of central bank money available to the public, alone is not sufficient in the digital age to support the role of public money in the EU's economy.[38] Cash is not always adapted to today's and tomorrow's payment habits and needs. Although cash is still predominantly used for small retail purchases, its role seems to be diminishing.[39] This is because businesses and consumers are increasing their share of other types of purchases such as online purchases, which means that for a large share of payments, people and businesses do not have the possibility to opt for a central bank issued money. In addition and more generally, businesses and consumers are shifting their payment preferences towards digital means of payment.

The lack of a widely available and usable central bank money in the digital age could weaken the monetary anchor and thus diminish trust towards private money. Private and public money are complementary. People's confidence in private money is underpinned by its convertibility on a one-to-one basis with the safest form of money in the economy – central bank money, which serves as a monetary anchor. Central bank money is the only money whose face value is intrinsically guaranteed. Private issuers have to rely on convertibility, as their money is exposed to operational, credit, liquidity and market risks. These risks are reduced through public policy safeguards, such as financial supervision,

[35] Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing.
[36] Proposal for a Regulation of the European Parliament and of the Council on contestable and fair markets in the digital sector (Digital Markets Act), COM/2020/842 final.
[37] Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 910/2014 as regards establishing a framework for a European Digital Identity, COM/2021/281 final.
[38] Cash can be used in some e-commerce uses cases, such as "cash on delivery" for example.
[39] For more information please see Annex 6 on cash usage.

capital requirements and deposit insurance. Convertibility at par provides confidence in private money because it reassures users regarding its ultimate value and its usability for payments.[40] At the same time, while still prevalent, cash is less and less usable in the digital age, because it does not have the same product characteristics (e.g. no remote (instant) payments, risk of loss, less convenient) and does not cater for the same type of demand as digital money (e.g. e-commerce). Lacking a form of a central bank money that can be used in the digital economy and is convertible at par from deposits may reduce the trust towards commercial bank money (monetary anchor) and weaken the EU's financial stability and monetary sovereignty.

The EU's open strategic and monetary autonomy may weaken. While today, private solutions offer fast and efficient payment methods in the EU, payers do not have the possibility to pay with a digital payment means offered by public institutions. Increased reliance on private solutions in the digital era without a public alternative may also increase the vulnerability of the EU's payment market and thus its economy. In addition, in the absence of a central bank digital currency in the euro area, future third country CBDCs and non-euro denominated global stablecoins made available to euro area residents may reduce the role of the euro and gradually undermine monetary sovereignty of the Eurosystem. While this risk may be very low at present, the ECB would need sufficient additional tools to react if it were to materialise anytime in the future. Classic monetary policy tools might not be sufficient to deal with these risks.

Box B - Problems related to the legal tender status of cash

The growth of electronic payments, a trend accelerated by COVID-19, and the attrition of the ATM networks has led to a general decline in cash payments and in the availability of cash (see annex 7). Thus, the issue of the scope and meaning of the legal tender status of cash has become more prominent in the EU policy agenda, as outlined in the Commission's Retail Payments Strategy and in view of the recent CJEU ruling on the matter. This ruling is significant because it sets out in the Court's jurisprudence the key principles of legal tender, which until now have only been found in the 2010 Commission Recommendation.

Problems with acceptance of cash

Although EU law directly attributes the status of legal tender to euro banknotes and coins, neither primary nor secondary EU law defines the concept of legal tender. In 2010, the Commission issued a recommendation outlining a definition of the concept of legal tender. The Court of Justice confirmed the Commission's definition in the Häring judgment of 26 January 2021 pointing out, however, that the concept of legal tender is not absolute. Given that, the 2010 Recommendation is a non-binding act that has not been widely followed, legal uncertainty will remain in the euro area concerning the scope of legal tender for euro cash. Moreover, revising this Recommendation would be unlikely to result in a common application and interpretation of legal tender principles, whilst the continued fragmentation of the situation across the euro area would not be coherent with the EU's exclusive competence for monetary policy and its decision to opt for a regulation of legal tender of the digital euro. This is also confirmed by the outcome of the ELTEG III discussions, where Member States identified a range of issues related to acceptance and availability of cash leading to legal uncertainty regarding the legal tender of euro cash. In this context, there was broad support from ELTEG and the targeted stakeholder consultation that if the EU were to regulate the legal tender of the digital euro in secondary legislation, it should do the same for the legal tender of cash by codifying and clarifying the case law of the Court of Justice of the European Union on the key principles of legal tender. Regarding cash acceptance, several Member States reported an increase in the number of retailers not accepting cash. In the Netherlands, for example, whereas 96% of physical retailers still accepted cash

[40] Source: ECB, https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211105~08781cb638.en.html

in 2020, 9% of physical retailers indicate that they expect not to accept cash in 5 years' time. Furthermore, non-acceptance is already more prevalent in the entertainment (6%), hospitality (5%) and retail pharmacy sectors (10%)[41]. The 2022 ECB SPACE study confirms a generally high level of euro area wide cash acceptance for now, but the start of a declining trend in acceptance in most Member States can be seen[42]. In fact, the euro area average masks the fact that some Member States seem to have experienced a more significant decline in cash acceptance between 2019 and 2022, with six Member States reporting a percentage point decrease of 5 points or higher, including two Member states reporting a 9 percentage point decrease[43]. This points to a situation where limited or circumstantial private restrictions on cash payments could evolve, because of their volume, into structural restrictions or exclusions of cash acceptance. This negatively affects the ability for cash to be used as an effective means of payment.

Problems with access to cash

In order to preserve the legal tender status of cash and to maintain its effective application in practice, it is key to ensure the ease of access to euro cash, because if citizens do not have access to cash they will not be able to pay with it and its effective legal tender status will be undermined. In order for cash to be used as an effective means of payment, access to various cash services should be ensured, in particular cash withdrawals and cash deposits. These services enable cash to circulate between different actors in society. By extension, the willingness and ability of retailers to accept cash is directly linked to the consumers' use of cash as a payment means. This in turn requires consumers to be able to make cash withdrawals from their accounts with the institutions, whilst it is also necessary for retailers to be able to access deposit services in order to convert cash into funds held by institutions. It is through this system of withdrawals and deposits of the institutions that cash is mainly circulating in society.

The number of ATMs in Europe as a whole has been decreasing steadily since 2016, from an estimated 420.200 in 2016 to 367.941 in 2022.[44] Looking at the Euro Area specifically, the overall number of cash access points is starting to show decreasing trends, although trends vary across Member States, pointing to a heterogeneous situation on the ground. Although there seems to be a clear declining trend in the number of bank branches per 100,000 inhabitants on average in the euro area, this is partially offset by the number of ATMs per 100,000 inhabitants in some countries that are resisting a downsizing of their ATM network (e.g. Germany) or even increasing it (e.g. Italy and Austria).[45] On the other hand, some Member States like the Netherlands and Belgium are clear examples of reductions in both bank branches and ATMs, which are projected to continue in the near future. For example, in Belgium, the number of ATMs is expected to decrease from 6912 (in 2020) to 4037 (in 2025).[46] The ECB study on the payment attitudes of consumers in the euro area (SPACE) shows a doubling of the people that expressed concerns about access to cash withdrawals between 2016 (when only 5% of the people in euro area were not satisfied with access to cash withdrawals) and 2022 (when 10% considered that access to cash withdrawals is fairly or very difficult).[47] A country-level breakdown demonstrates a significant decline in perceived access to cash in five Member States from 2019 to 2022, with in particular consumers in Belgium, (27% up from 15%), the

[41] See the final report under the 5th meeting of ELTEG III.
[42] ECB, Study on the payment attitudes of consumers in the euro area (SPACE) – 2022 – Consumer access to and acceptance of means of payment, p57.
[43] LV, FI, BE, MT, IE and EE reported a percentage point decrease of 5 points or higher in the change in the share of POS transactions where cash would be accepted. Most significantly, LV reports a decrease from 93% to 84% in acceptance, and FI from 94% to 85%, see ECB, Study on the payment attitudes of consumers in the euro area (SPACE) – 2022 – Consumer access to and acceptance of means of payment, p57.
[44] European Association for Secure Transactions (EAST) https://www.association-secure-transactions.eu/industry-information/atm-numbers-europe/#:~:text=The%20chart%20below%20shows%20the,decrease%20from%20the%202021%20total.
[45] ''Guaranteeing freedom of payment choice: access to cash in the euro area'', Alejandro Zamora-Pérez, Published as part of the ECB Economic Bulletin, Issue 5/2022.
[46] PARLEMENT DE LA RÉGION DE BRUXELLES-CAPITALE PROPOSITION DE RÉSOLUTION demandant une juste répartition des distributeurs de billets au sein de la Région de Bruxelles-Capitale; images.pdf (irisnet.be)
[47] European Central Bank (2022), Study on the payment attitudes of consumers in the euro area (SPACE) https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc7

Netherlands (19% up from 11%) and Luxembourg (14% up from 7%) reporting a significant decline.[48] In five Member States (Belgium, the Netherlands, Spain, Greece and Malta), access to cash is deemed fairly or very difficult by over 15% of the respondents to the study. Furthermore, the flash Eurobarometer[49] published in October 2022 shows that up to 13% of the citizens find it difficult to withdraw cash at ATMs or physical bank branches. These findings confirm the outcome of the ELTEG III meetings, which also points to a rather heterogeneous and sometimes problematic situation regarding cash access amongst the Member States.[50] The share of the population covered by cash access points is uneven across countries, with the share of people living within 5 km of the nearest cash access point ranging from 77% in the country with the lowest coverage to 100% in the country with highest coverage.[51] Cash access seems to remain strongest in those Member States which are already cash intensive, whilst others point to a gradual but structural deterioration of access, reflected in various issues such as the reduction of the ATM infrastructure and the imposition of withdrawal fees. As a result, there is a risk that it will not be possible to ensure that everyone in the euro area has access to basic cash services at a reasonable price and distance. This could lead to the exclusion of vulnerable groups with a dependency on cash payments, and to the erosion and gradual loss of the status of cash as meaningful and effective legal tender, but also as a possible contingency payment method in crisis situations. The 2022 ECB SPACE study confirms that older age groups (i.e. those over 55) tend to use cash relatively more often than younger generations and the share of cash payments also increases as the level of education and income decreases.[52] For example, the highest earning group of respondents paid just above half of its point-of-service transactions with cash, while the lowest income group paid two-thirds. This implies that these groups are more at risk of losing their access to effective payment methods if their access to cash deteriorates. Moreover, it should be noted that cash is seen by many as a payment method with social benefits, providing a clear overview of expenses, with high degrees of ease of use, speed, safety and anonymity. Indeed, the ECB SPACE study of 2022 confirms that the main reasons why cash is preferred are that (i) cash is considered to make one more aware of one's own expenses, and (ii) cash is perceived as anonymous (and therefore protects privacy).[53] The study also shows that in terms of preserving cash as a payment option, 60% of consumers still considered the option to pay with cash to be important or very important. It confirms that ''despite the impact of the pandemic and related lockdown measures and self-reported preferences, an increasing share of euro area consumers would like to have cash as a payment option''.[54]

2.2 Drivers

<u>Driver 1</u>: In a rapidly digitalizing economy, central bank money (currently only cash) is not available for payments in a growing part of the economy.

People still use cash in most of their everyday transactions, but trends seem to show a shift towards electronic payments. According to the ECB's 2022 SPACE study on the payment attitudes of consumers in the euro area,[55] consumers still predominantly use cash for Point-of-Sale (POS) and Person-to-person (P2P) payments, but its share seems to be declining especially after the pandemic. In 2022, the share of cash payments in the total

[48] Access to cash is perceived to be stable from 2019 to 2022 in 4 Member States, and to have increased in nine Member States.
[49] https://europa.eu/eurobarometer/surveys/detail/2666
[50] The Commission has convened three times an expert group of Member States' representatives (ELTEG I, II and III). ELTEG III published its final report in July 2022.
[51] https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_02~74b1fc0841.en.html
[52] European Central Bank (2022), Study on the payment attitudes of consumers in the euro area (SPACE) https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc7
[53] European Central Bank (2022), Study on the payment attitudes of consumers in the euro area (SPACE) https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc7
[54] European Central Bank (2022), Study on the payment attitudes of consumers in the euro area (SPACE), p59 https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc7
[55] European Central Bank (2022), Study on the payment attitudes of consumers in the euro area (SPACE)https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc7

number of POS retail payment transactions went down to 59% from 72% in 2019 and 79% in 2016. In two euro area countries, cash usage at POS has now decreased to 20%. In terms of value, the share of card transactions in 2022 (46%) was higher than the share of cash transactions (42%) for the first time. In 2019 the share of cash transactions by value was 47% and the equivalent share of card transactions 43%. Already before the pandemic in 2019 nearly half (49%) of consumers explicitly stated their preference for cards or other cashless payment instruments. In 2022, this went up to 55%. Online payments have become more frequent in comparison to POS and P2P across the euro area. SPACE 2022 shows that the share of online payments in consumer's non-recurring payments (that is payments that exclude regular bill payments such as electricity bills or rent) increased from 6% in 2019 to 17% in 2022. The number of POS terminals also significantly increased in the European Union from 10.4 million in 2016 to 16.1 million in 2021. Yet, significant differences exist across countries, with the proportion of cash in relation to the total number of payments at the point of sale varying from 77% in Malta, 73% in Slovenia and 70% in Austria to 39% in Luxembourg, 21% in the Netherlands and 19% in Finland. Compared to 2019, the number of cash payments decreased the most in Cyprus (-23 percentage points (p.p.)), Greece (-18 p.p.), Spain (-18 p.p.), and Portugal (-17 p.p.). For more information on the use of cash, please see Annex 6.

E-commerce has accelerated the increase in the use of electronic payments. In the past decades, e-commerce has increased quickly and accelerated during the pandemic period. According to Eurostat, the share of EU households with internet access has risen to 92%[56] in 2021 from 72% a decade earlier. In 2021 in the EU, 74% of the internet users shopped online compared to 54% in 2011. The COVID-19 pandemic has accelerated the shift toward digital payments[57], largely due to increased e-commerce. In the ECB's SPACE survey, consumers reported increased online shopping during the pandemic as online payments have become more frequent in comparison to POS and P2P across the euro area. In 2022, at least 10% of all non-recurring transactions were online payments in every euro area country. This is a notable change, given that online payments accounted for less than 5% of non-recurring payments in Malta, Cyprus and Germany in 2019. In several countries the share of online payments in 2022 was over 20%, the highest values being reported in Belgium (24%), Austria and Ireland (both 21%) and France (20%). Online payments were more frequently made for larger-value purchases. The share of online payments was higher in terms of value than number. The highest shares of online payments by value were reported in Slovenia (40%), Finland (37%), Belgium (36%) and Austria (35%). With the fast increase in e-commerce, online payments are expected to play an even greater role in tomorrow's consumer payment habits at the expense of cash payments. European e-commerce revenue is forecasted to double by 2025, from EUR 600 billion in 2020 to an estimated EUR 1.2 trillion in 2025.[58] In addition, European businesses are expected to increase the share of their online sales to 22.3% in 2025 compared to 13.7% in 2020. Card payments were used in 34% of POS transactions in 2022, up from 19% in 2016 and 25% in 2019.

<u>Driver 2</u>: Third country CBDCs and stablecoins not denominated in euro could reduce the role of the euro in the European retail payment markets

[56] Eurostat(2021), "https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals"
[57] Bank of International Settlements (2021), "Covid-19 accelerated the digitalisation of payments and Auer, Raphael, Cornelli, Giulio and Frost, Jon, (2020), "Covid-19, cash, and the future of payments", No 3, BIS Bulletins, Bank for International Settlements.
[58] Statista (2021), eCommerce - Europe

Foreign CBDCs may challenge the use of the euro both in the euro area and internationally (see also Annex 10). Many central banks around the world are currently exploring the issuance of central bank digital currencies and a growing number of countries have already issued a CBDC. In February 2022, the International Monetary Fund (IMF)[59] estimated that around 100 countries around the world are exploring CBDC's at various stages.[60] A survey[61] conducted by the Bank of International Settlements (BIS)[62] found that by late 2021 the share of central banks actively engaged in some form of CBDC work had grown to 90%. Besides domestic efforts, international collaboration between countries also takes place to explore cross border developments for CBDC. According to the Atlantic Council Research, nine countries (Nigeria, the Bahamas and seven East Caribbean countries) have already launched a CBDC, and a dozen of countries are in the pilot phase.[63] China's e-CNY is among the latest to have rolled out its pilot phase, having registered at the end of December 2021 already more than 260 million users with a strong growth. In the EU, Sweden appears to be the furthest ahead in terms of concrete experimentations with the e-krona pilot project.[64] While the first issued CBDCs and projects indicate a strong focus on domestic use cases, at least in first instance, their international use is technically possible and could be targeted at later stages.[65] In its public consultation on a digital dollar of 20 January 2022, the United States Federal Reserve outlines the potential need to preserve the dominant international role of the U.S. dollar in support of a US-issued CBDC.[66] The US President executive order points to the need to assess "the extent to which foreign CBDC could displace existing currencies and alter the payment system in ways that could undermine the United States financial centrality".[67] Though the overall risk from third country CBDCs pertains to developments in the future and is thus difficult to reliably quantify, the G7 principles on retail CBDC insist on the need to restrict the use of CBDC to safeguard financial stability and monetary sovereignty of other jurisdictions, implying that this risk is recognised by the G7 as credible. For more information on third country CBDCs please see Annex 10.

So called "Global stablecoins"[68] not denominated in euro and operating on Distributed Ledger Technology with smart contracts could reduce euro denominated payments by satisfying demand for "conditional payments" such as in e-commerce ("metaverse" use cases), mobility, capital markets or industry 4.0 (for details see Annex 8). With the increasing digitalisation of the global economy, crypto assets of various kind have emerged. Common to all forms of crypto assets is their ability to support "conditional payments" with "smart contracts" on Distributed Ledgers. "Stablecoins" – contrary to crypto assets like Bitcoin – which purport to maintain a stable value, are relatively stable in value and can serve as a means of payment. The disruptive potential of "global stablecoins" depends on several variables, amongst others on the sustainable and durable development of digital markets that operate with digital assets, and on the availability of central bank alternatives such as CBDC. As set out in Annex 8, among the potential future markets for stable coins are "conditional

[59] The International Monetary Fund promotes international financial stability and monetary cooperation. It also facilitates international trade, promotes employment and sustainable economic growth, and it helps reduce global poverty.
[60] The Future of Money: Gearing up for Central Bank Digital Currency
[61] Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies. See https://www.bis.org/publ/bppdf/bispap125.pdf
[62] The Bank of International Settlements is an international financial institution owned by central banks that fosters international money and financial cooperation and serves as a bank for central banks.
[63] Atlantic Council, Central Bank Digital Currency Tracker
[64] E-krona | Sveriges Riksbank
[65] Report on a digital euro, ECB, October 2020
[66] Federal Reserve Board - Federal Reserve Board releases discussion paper that examines pros and cons of a potential U.S. central bank digital currency (CBDC)
[67] Executive order on ensuring responsible development of digital asset, 9 March 2022.
[68] The Markets in Crytpo Assets Regulation refers to stablecoins either as asset referenced crypto asset or e-money token. In this Impact Assessment, use the non-legal term of stablecoin is used as umbrella term that captures both types of crypto assets with stable value.

payments" between machines (M2M payments) in manufacturing, mobility and energy. M2M payments could also be used in a number of industrial applications such as automatic recharging of cars, automatic order of supply for manufacturing, logistical services, deliveries. M2M transactions can increase efficiency by facilitating the roll-out of internet-of-things infrastructures and cutting cost in securities trading. The development of web 3 and a future metaverse would almost require a "stablecoin" or a CBDC for "conditional payments".

So called "Global stablecoins" not denominated in euro may gain market share not only in global remittance payments but also in local payments. Facebook/Meta's private tokenized money project Libra/Diem was advertised as the first crypto-asset/stablecoin with a potential to challenge central bank issued currencies in all three functions of money: means of payment, store of value and even unit of account. The project constituted a major turning point in central banks' attitude towards CBDCs, which were seen as a potential response to such challenges. According to ECB simulations,[69] Libra/Diem could have been a global stablecoin leveraging Facebook/Meta's user network and whose assets under management could have ranged from EUR 152.7 billion in a 'means of payment' scenario to around EUR 3 trillion in the most extreme 'store of value' scenario. Comparatively, there were EUR 1.5 trillion banknotes in circulation in February 2022. While Facebook/Meta eventually abandoned its project, similar "global stablecoin" projects could appear in the future.[70]

[69] European Central Bank (2020), A regulatory and financial stability perspective on global stablecoins.
[70] Stablecoins have a substantial market capitalization: about USD 150 billion at end September 2022, source: https://coinmarketcap.com/view/stablecoin/

2.3 Consequences

2.3.1 For the People

1. Limited choices in pan-European payments

Lacking central bank digital money for people to business payments (POS and e-commerce) may perpetuate the limited choice for people on the pan-European payment market, thereby increasing the costs for goods and services. Currently cash use overall seems to be in decline and payers more and more use electronic payments. At the same time, international card schemes (ICS) represent a large majority of the EU's electronic payments market for retail payments in physical shops and e-commerce (both for domestic transactions in a majority of EU countries, but also in particular for cross-border payments). According to the ECB,[71] at the end of 2016, the share of transactions processed by international card schemes for payment cards issued in the EU was 67.5%. The competitiveness of this market, which relies on few operators for cross-border transactions in particular, could be improved as a result of the introduction of additional offers. Such offers exist to some extent in nine EU Member States (BE, BU, DK, DE, FR, PT, MT, IT, SI), where domestic schemes compete with ICS, while they are dependent on ICSs for payments across Member States. These European domestic card schemes work, however, only within the borders of a single Member State,[72] while the cross-border EU retail electronic payments in physical shops are largely served by ICS or large, often foreign-owned platforms offering digital wallets to cardholders through which they can initiate a payment transaction which is often card-based. The same goes for e-commerce, where both ICS and large platforms dominate the market. The role of a few operators for cross-border transactions can be expected to grow further as consumer preferences change towards electronic payments and e-commerce, with possible negative implications also for the EU's open strategic autonomy in payments. Analogously, the concentration of the market can be expected to grow further also in non-e-commerce payments with negative implications such as higher fees which drive up the cost of goods and services for individuals.

Lacking central bank digital money also leads to limited choices for people in future developments of electronic communication such as the new web 3 applications, where users may have to rely on private alternatives to central bank money (i.e. stablecoins) or CBDCs from third countries.

2. Financial inclusion may be eroded

Cash plays an important role for the financially excluded, which may not be able or willing to use means of payment supplied by the private sector. The reasons for being financially excluded may vary, but often include one or all of the following elements: in the absence of documentation, intermediaries are unwilling to bear AML/CFT compliance risks; cost of maintaining an account/using a payment instrument, financial illiteracy, or lack of trust in the financial sector.

Financial exclusion in the digitalised society may increase as most private digital means of payments do not specifically cater for vulnerable groups of the society, may become too expensive and are not suitable in some rural or remote areas. Vulnerable groups (e.g. unbanked, over-indebted, minors and other individuals depending on legal guardians,

[71] European Central Bank, Card payments in Europe – current landscape and future prospects: a Eurosystem perspective
[72] With a few limited exceptions.

financially or digitally illiterate, as well as persons with certain disabilities and those living in rural areas) may not be skilled enough or able to access an account to use digital means of payments in the digitalised economy, where cash has limited use. In addition, missing internet infrastructure or digital skills could make online payments unusable in some rural areas. In 2021, about 8% of EU households had no internet access and an estimated 13.5 million citizens in the euro area live without a payment account.[73] Moreover, in 2021, only 60% of EU rural households have high-speed internet access, compared to the EU's total average of 92% and only 48% of rural residents have at least basic digital skills, compared to 62% of the urban population.[74]This could lead to situations where online payments cannot be used and transactions can thus not be settled.

According to the World Bank and the BIS, "efficient, accessible and safe retail payment systems and services are critical for greater financial inclusion".[75] This finding was further substantiated by the study on new Digital Payment Methods commissioned by the ECB, which concluded that for the unbanked/underbanked/offline population, the most important features of a new payment method are easiness of use, not requiring technological skills, and to be secure and free of charge.[76] Simple offline electronic payments could offer a solution for the vulnerable groups. Given the low profitability of this market, the private sector has not delivered such products at a wide scale.

2.3.2 For Businesses

Merchants have limited choices when accepting electronic payments (PoS and e-commerce). Presently merchants as well as corporate users have little choice but to accept the handful of ICS and platforms integrating these ICS to serve customers from across the EU, in particular cross-border. All responses of merchants to the Commission's open public consultation on instant payments stated that ensuring the ability to accept payments from customers from other Member States was very important. This situation would vary depending on the existence of alternative domestic card schemes or account-to-account payment solutions (e.g. via QR codes), and on the size of the merchant and the retail sector considered. This could also change with the development of instant payment solutions in shops and e-commerce offered by the private sector, which will be supported by the Commission's instant payments initiative.[77] A digital euro available across Member States for payments in shops and e-commerce would provide an important additional choice for both merchants and corporate users.

Innovative businesses could face potential loss of competitiveness due to higher risks (credit, forex, political) or higher cost when relying on innovative payment solutions (e.g. conditional payments) provided by foreign CBDCs or "stablecoins". Lacking a central bank issued euro denominated CBDC that supports innovative payment solutions including conditional payments may put the euro area economy at a competitive disadvantage. In the absence of such a euro denominated CBDC, innovative EU businesses may need to rely on private "stablecoins", or foreign CBDCs exposing them to market stability risks, currency conversion risks and/or a loss of control over their data. In addition,

[73] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_02~74b1fc0841.en.html
[74] Source: Eurobarometer, https://digital-strategy.ec.europa.eu/en/news/connectivity-key-revitalising-rural-areas
[75] https://documents1.worldbank.org/curated/en/806481470154477031/pdf/Payment-Aspects-of-Financial-Inclusion.pdf
[76] Study on New Digital Payment Methods (europa.eu), March 2022. According to the World Bank, financial inclusion means that individuals have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance".
[77] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12931-Instant-payments_en

businesses may refrain from innovation if they need to bear too many risks when using non-central bank issued money for conditional payments.

2.3.3 For the Eurosystem and the EU's economy

1. Weakened monetary anchor

As users seem to shift away from cash towards digital payments, central bank money is less and less able to act as an "anchor" for commercial bank money, i.e. bank deposits, which is at the core of our monetary and financial system. Today, the acceptability of private means of payment – like bank deposits in commercial bank money – relies on its one-to-one convertibility to central bank money. This convertibility at par between private money and the safest form of money in the economy – central bank money, the monetary anchor – underpins people's confidence in private money and other regulated forms of money.[78] Central bank money is the only money whose face value is intrinsically guaranteed by the central bank. In contrast, private money is not exempted from operational, credit, liquidity and market risks. The risks are reduced through public policy safeguards, such as financial supervision, prudential requirements and deposit insurance. The fact that central banks commit to issuing cash does not necessarily mean that demand for cash will continue to remain at current high levels, as in the ongoing shift towards in electronic payments – based on commercial bank money – is expected to continue. As a result, the trust in the currency – the euro – may become dependent on the trust in financial intermediaries issuing and managing commercial bank money.

In an evolving digital age, a growing share of payments may be settled more effectively through digital means. The potential resulting declining relevance of euro-cash, driven by its declining use, would also weaken the effectiveness of legal tender for cash users. The mandatory acceptance linked to the legal tender status of euro cash implies that a creditor/payee cannot generally refuse a payment by a debtor in euro cash. However, cash is not always accessible and/or useable in the digitalised economy, which necessitates (instant and innovative) electronic payments[79]. Hence, the limitation of central bank money to cash impairs to a significant extent the general ability for payers to settle their monetary debts in an official form of the euro.

2. Potential impacts on monetary policy

Wide use of third country CBDCs and non-euro denominated "stablecoins" would limit the transmission of monetary policy and monetary sovereignty. According to the ECB,[80] "stablecoins" if they are widespread and assume a "store of value" function could have consequences for the transmission of monetary policy through various channels. The Eurosystem would face similar challenges in case a foreign CBDC gains hypothetically large-scale adoption in the euro area. However, for internal market participants to switch to non-euro denominated means of payment on a large scale, these payment means would need to provide tangible added value to both sides of the market. Currently, the risk of currency substitution can be considered very low in the euro area and mainly a matter of concern for emerging economies with less stable currencies. Nonetheless, emerging digital means of

[78] European Central Bank (2021), Central bank digital currencies: a monetary anchor for digital innovation, Fabio Panetta, November 2021
[79] The ECB's Cash2030 Strategy aims at ensuring that cash remains widely available and accepted as means of payment and a store of value, https://www.ecb.europa.eu/euro/cash_strategy/html/index.en.html
[80] European Central Bank (2020), Crypto Assets Task Force, Stablecoins: Implications for monetary policy, financial stability, market infrastructure and payments, and banking supervision in the euro area.

payment make such currency substitution significantly easier. A potential increase in foreign currency debt or -trade invoicing would imply that the euro area would be more exposed to foreign monetary policy spillovers and conversely making domestic monetary policy less effective.

3. Financial stability risks

A widespread adoption of "stablecoins" and foreign CBDCs would raise certain financial stability concerns. First, "stablecoins" widely used as a means of payment may be a source of instability, depending on their pegging mechanism and interconnectedness with the financial system. That is, just as banks, issuers of "stablecoins" could be subject to liquidity runs, a risk mitigated but not fully excluded by the recently agreed Markets in Crypto Assets (MiCA) Regulation.[81] Potentially resulting contagion effects could amplify and propagate shocks. Second, if the emergence of foreign-denominated digital payment means lead to an increase in foreign currency debt or -trade invoicing, exchange rate swings could induce strong effects on domestic financial markets.

4. Weakening international role of the euro

The emergence of foreign-denominated "stablecoins" and foreign CBDCs could negatively affect the euro's international role, if those means of payment reduce the share of the euro in cross-border payments, in trade invoicing, in terms of denomination of debt issuances or as a reserve currency. Foreign-denominated stablecoins hold potential in cross-border payments as well as for future metaverse applications, if these stablecoins provide for significant added value in terms of transaction speed and costs. Similarly, and irrespective of their use within the euro area, the issuance of CBDCs by major foreign central banks may enhance the international status of their respective currencies and provide a competitive advantage to the industries of their respective jurisdictions, possibly to the detriment of the euro[82]. Furthermore, depending on their respective design, foreign CBDCs could facilitate trade invoicing in their respective currency at the expense of the euro, a risk that is especially prevalent in small economies in the euro area neighbourhood. Reduced trade invoicing in euro makes euro area businesses more vulnerable to foreign exchange rate shocks or increases their hedging costs and may increase funding costs on international capital markets.

A weaker international role of the euro in turn implies negative consequences for the euro area economy at large. The December 2018 Commission communication "Towards a stronger international role of the euro" identified a number of benefits of an international use of the euro.[83].

5. Weakened open strategic autonomy of the EU

[81] Regulation providing a regulatory framework for crypto-assets and stablecoins and their service providers in the EU (i.e. single licensing regime). It covers 'asset-referenced token' and "e-money token". Asset-referenced token is a type of crypto-asset that purports to maintain a stable value by referring to the value of several fiat currencies that are legal tender, one or several commodities or one or several crypto-assets, or a combination of such asset. Electronic money token' is a type of crypto-asset the main purpose of which is to be used as a means of exchange and that purports to maintain a stable value by referring to the value of a fiat currency that is legal tender.

[82] Ferrari, Massimo & Mehl, Arnaud & Stracca, Livio, 2020. "Central bank digital currency in an open economy," Working Paper Series 2488, European Central Bank.

[83] This includes lower cost and lower risk of trading internationally for European businesses. Trading in euro rather than in a foreign currency; additional choice for market operators across the globe; stronger autonomy of European consumers and businesses, allowing them to pay or receive payments for their international trade, and finance themselves with reduced exposure to legal actions taken by third country jurisdictions, like extraterritorial sanctions and improved resilience of the international financial system and economy, making them less vulnerable to exchange rate shocks.

Europe's open strategic autonomy in payments could be weakened if businesses have to rely on third country solutions to meet their need for advanced payment solutions. Europe's digital economy may see a growing demand for conditional payments and demand by businesses for a means of payment that can be used for conditional transactions. At the current juncture, and despite ongoing legislative initiatives, this is not guaranteed. As a result, businesses would have to rely on third country, private, advanced payment solutions, a trend that could further weaken Europe's open strategic autonomy in payments. Absent a digital euro that allows for innovative payment use cases including conditional payments, Europe's industrial competitiveness would suffer in the long term. Businesses in the mobility sector, capital markets or industry 4.0 will need to build conditional payments as automation accelerates. They may then have no alternative but to build advanced conditional payment functionalities on third country issued CBDCs or private solutions controlled by players from third countries. The ingression of third country issued CBDCs or foreign stable coins could then also lead to a "dollar-isation" or "yuan-isation" of e-commerce ("metaverse" use cases).

2.4 How will this problem evolve without further action

Without further action, the trends described above are expected to continue, and the forms of money issued by the Eurosystem (banknotes and coins) do not sufficiently reflect the needs in the digital age. In the absence of a digital euro/retail CBDC in the euro area, an excessive decline in the availability and use of central bank money, together with a rapid increase in remote payments where cash cannot be used, pose risks to monetary sovereignty and the singleness of the euro[84] in the well-tested two-layer monetary system (i.e. central banks and commercial banks). Without such anchor in the digital age, confidence in the singleness of money and financial stability may erode. Furthermore, an excessive decline in the availability and use of central bank money in favour of private means of payments may pose risks to financial inclusion, although it is acknowledged that the Eurosystem's Cash2030 Strategy aims at ensuring that cash will remain accessible and accepted. The EU payments market may remain, to a significant degree, fragmented along national borders, as most domestic payment solutions based on cards or instant payments do not work cross-border. When it comes to players that can – and do – serve the intra-European cross-border payments market there is only very limited choice. Without a choice to use central bank issued money in payments, there is a risk that the retail payments market (for in-shops and e-commerce) remains concentrated in the hands of only a few players.

Existing or planned EU initiatives will partly address the problem but not fully, since they can regulate only payments using private money. SEPA has created a well-functioning, efficient and fast pan-European market for credit transfers. The Commission's instant payment initiative should create favourable conditions for instant-based, pan-European payment solutions to emerge and compete with the incumbents, but it will be up to the market to deliver competitive and viable pan-European payment solutions. To accelerate the rollout of instant payments in the EU, the Commission has adopted a legislative proposal in October 2022. The upcoming PSD2 Review can also reinforce a level playing field and a modern legal framework for state-of-the-art payment services. The digital euro, which will be distributed by intermediaries, could offer the opportunity to set-up an acceptance

[84] Article 133 of the TFEU (which would be used as the legal basis for the Regulation establishing the digital euro), highlights the need to lay down measures necessary for the use of the euro *as the single currency.* Based on this provision, it can be inferred that the singleness of the euro should be guaranteed and that fragmentation of the currency should generally be avoided. This is also confirmed by AG Pitruzzella in its Opinion in the Hessischer Rundfunk case in relation to article 119(2) TFEU: «*Furthermore, the reference to the singleness of the currency contained in Article 119(2) TFEU presupposes the conferral on the Union of exclusive competence, which, to be able to guarantee this singleness, must include the power to govern the regulatory aspects of the currency itself, and must therefore include monetary law.*» (See opinion of Advocate General Pitruzzella in Hessischer Rundfunk, C-422/19 and C-423/19, ECLI:EU:C:2020:756, § 60).

infrastructure that can also support private pan-European payment solutions through a dedicated EU scheme. If this is the case, this may help private payment solutions to broaden their acceptance network. In the absence of a digital euro and the related acceptance infrastructure, a pan-European payment solution might have more difficulties to emerge and have wide access to merchants.

Without a credit risk-free solution and monetary anchor in innovative digital payments European competitiveness in industry 4.0 and web 3[85] can erode in the future. Private actors developing applications for web 3 or industry 4.0 would rely on stablecoins and foreign CBDC as a means for conditional payments, which would dominate the future of e-commerce for immersive audio-visual experiences as well as machine to machine payments. This indicated by the rapid growth of crypto-asset markets which reveals society's growing demand for digital instruments, even though crypto assets can hardly perform a currency's three functions: means of payment, store of value and unit of account. Such digital instruments include new payments products, such as crypto-based digital money and other electronic money products. The Regulation on Markets in Crypto-Assets[86] (MiCA), as well as a recast of the Transfer of Funds Regulation[87] (TFR) will bring more legal certainty to this domain. MiCA is intended to support innovation and fair competition across crypto-assets services providers[88] while ensuring a high level of consumer and investor protection and market integrity in the crypto-assets markets. TFR aims at ensuring full traceability of transfers of funds and, after its recast as part of the AML package, full traceability of transfers of crypto-assets. The European Commission has also proposed key legislative initiatives to prepare for Europe's digital future by increasing competitiveness for all the actors in the Digital Single Market. Built on the strong framework of the General Data Protection Regulation, policies to establish a harmonised framework for data sharing and data use include the Data Governance Act to make better use of publicly held data and to define the role of data intermediation services; the Data Act to setting general rules for business-to-business data sharing across sectors.

Though the EU has pioneered global regulation on crypto-assets and data, state-of-the art regulation is not a sufficient condition to ensure the integrity and stability of the financial system in the digital age. To achieve this goal, it is necessary to ensure the continued co-existence of private and public money. This is precisely the function of the digital euro, which would not be a crypto asset, but public digital money: a new form of the euro currency, backed by the central bank and its price stability mandate. Significant reliance on crypto-assets, stablecoins and foreign CBDCs is expected to pose intensifying competition to the euro, limit its international role,[89] increase its sensitivity to foreign shocks,[90] and limit the Eurosystem's monetary autonomy.[91] These risks of course depend on concrete use-cases

[85] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.

[86] Proposal for a Regulation on Markets in Crypto-assets, and amending Directive (EU) 2019/1937. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0593. Final text adopted on 5 July 2022, available at on tokenised e-money or on foreign CBDCs, publication in Official Journal pending.

[87] Proposal for a Regulation on information accompanying transfers of funds and certain crypto-assets (recast). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0422

[88] See Commission staff working document, impact assessment accompanying the document Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets and amending Directive (EU) 2019/1937https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0380

[89] Third-country issued CBDCs could help to increase the role of their unit of denomination in global trade payments, if designed more competitively than existing means of payments to settle international transactions. In this scenario, a successful third-country issued CBDC would strengthen the international role of the currency of the issuing-country, increase its role as global invoicing and settlement units and lower funding costs in that currency. Gopinath, G., Stein, J. C., 2018. "Banking, Trade, and the making of a Dominant Currency," NBER Working Papers 24485, National Bureau of Economic Research, Inc.

[90] Ferrari, M., Mehl, A., Stracca, L., 2022. "Central bank digital currency in an open economy," *Journal of Monetary Economics*, forthcoming.

[91] The ECB might need to react more strongly to shocks to stabilize the euro area business cycle, thereby limiting monetary policy autonomy

and on the issuance and usage of non-euro denominated CBDCs and stablecoins. Eventually, this would reduce the competitiveness of EU businesses compared to countries with locally denominated CBDCs that are able to support innovative payment needs.

Box C – How the problems related to the legal tender status of cash could evolve without EU intervention

In the absence of EU-level action, the extent to which cash is accepted by businesses and the ability of citizens and businesses to get sufficient access to cash will remain suboptimal and variable across the euro area, due to the lack of a common application and interpretation of legal tender principles. Regarding acceptance, this means that the mandatory acceptance principle will continue to be interpreted differently, and good faith exceptions to the mandatory acceptance principle will be differently applied on the ground; this is inconsistent with the notion that the single currency has legal tender across the euro area. Regarding access to cash, it is likely that at least some Member States, in particular those most affected by the decline in cash payment services and ATM networks on their territories, will first take soft law or policy action to credit institutions of their social role to provide adequate cash services to citizens and business customers, with the needed geographical coverage. This is attested by the range of measures already being taken by some Member States, including stakeholder agreements and/or covenants on access to cash services, memorandums with stakeholders, recommendations on fees and communication campaigns[92]. An example of this can be found in the Netherlands, where a recently set up covenant on cash access puts a temporary standstill on the further closure of ATMs and bank branches, pending possible decisions by the Dutch parliament in the first half of 2023 on measures to ensure access to cash.

Under the current legal framework[93], "cash back" services by retailers are possible and allow citizens to have access to cash, but only when they make a purchase. Thus, some retailers offer "cash back" services which can facilitate access to cash by enabling their customers to withdraw cash when paying for their groceries electronically. However, according to the ECB, these cash services are limited in their scope and, hence, cannot be regarded as full substitutes of traditional cash service points offered by banks or postal services[94]. ELTEG III discussions also confirmed that neither the cash services provided by post offices nor the cash-back service could be considered equivalent to ATMs in terms of providing access to cash, and hence should be seen as complementary to the services to be offered by credit/depository institutions. [95]

If these type of soft law measures do not work, Member States might resort to hard legislative actions to guarantee sufficient access to cash. Such legislative actions may further exacerbate the incoherence between those Member States that opt for these and those that do not, thereby risking highly divergent cash access levels on the ground. Both soft law and legislative measures taken individually by Member States may therefore not achieve a common minimum level of access to cash across the euro area and consequently risk to erode the effectiveness of the legal tender status of the euro.

3 WHY SHOULD THE EU ACT?

3.1 Legal basis

In accordance with Article 3(1)(c) TFEU, the EU has an exclusive competence in the area of monetary policy for the Member States whose currency is the euro. A new form of central bank money available to the general public, alongside the euro banknotes and coins, shall be established and regulated in its essential aspects by an EU Regulation based on Article 133 of the TFEU. This provision allows for laying down "measures necessary to the use of the euro

[92] For an overview of the measures currently being undertaken by the Member States, please see the final ELTEG III report of July 2022.
[93] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (Text with EEA relevance)
[94] ECB, Access to cash, 12 November 2020, Access to cash (europa.eu).
[95] See ELTEG III report Ares(2022)5045125-220706 Final ELTEG report (3).pdf.

as the single currency". This has been emphasised by the Council recommendation of January 2022 on the economic policy of the euro area for 2022. At the same time, as already noted, an EU Regulation based on Article 133 of the TFEU cannot interfere with the definition and implementation of monetary policy, which is entrusted by the Treaties to the ECB while ensuring its independence. Hence, once the Union legislature will have adopted a Regulation establishing the digital euro, the decisions whether to issue digital euro, in what volumes and at which times, will fall within the ECB's competence in a similar way as for banknotes.

3.2 Subsidiarity: Necessity and added value of EU action

Action by the euro area Member States is not possible as the Union has an exclusive competence in the area of monetary policy for the Member States whose currency is the euro. In accordance with Article 5(3) TEU, the principle of subsidiarity does not apply in areas which fall within the Union's exclusive competence.

As already noted, the intervention of the EU legislator is needed for the adoption of a regulation establishing the digital euro and regulating its essential aspects. The ECB may then take its decisions on the issuance of the digital euro and its volume, as a matter of defining and implementing monetary policy.

Box D – Legal basis and subsidiarity for the legal tender of cash

Legal basis

The scope and effects of the legal tender of, and access to, euro banknotes and coins shall be regulated by an EU Regulation based on Article 133 of the TFEU, which provides for the adoption of measures necessary for the use of the euro as the single currency. This Treaty provision reflects the need to establish uniform principles for all Member States whose currency is the euro, in order to safeguard the overall interests of the Economic and Monetary Union and of the euro as the single currency.

Subsidiarity: necessity and added value of EU action

Action by the euro area Member States to regulate the legal tender status of euro cash is not possible as the Union has an exclusive competence in the area of monetary policy for the Member States whose currency is the euro. In accordance with Article 5(3) TEU, the principle of subsidiarity does not apply in areas which fall within the Union's exclusive competence. In order for citizens to be able to pay in cash, they need to have sufficient access to cash. The analysis of the problem in box B has shown that in a number of Member States, access to cash has significantly declined, and there is concern about a possible further and more widespread deterioration in access to cash in the future. Action to safeguard access to cash is therefore necessary to ensure the effective use of euro banknotes and coins. While Member States may adopt legislative or non-legislative measures at national level to address access to cash on their territory, only the Union legislator can impose a euro area wide obligation on Member States to ensure sufficient and effective access to euro cash in accordance with Article 133. In order to take into account the heterogeneous situation in respect of access to cash in the Member States of the euro area, options for action at EU level to ensure sufficient and effective access to cash should allow appropriate flexibility for Member States to tailor the extent and nature of action to the situation on their territory, and should be proportionate to the objective to be achieved.

4 OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1 General objective

Under the headline ambition "An economy that works for the people" of the Commission's 2019-2024 political guidelines, the general objective of this initiative is to ensure that the central bank money issued by the ECB can support the EU's economy in the digital age, while safeguarding the role of cash.

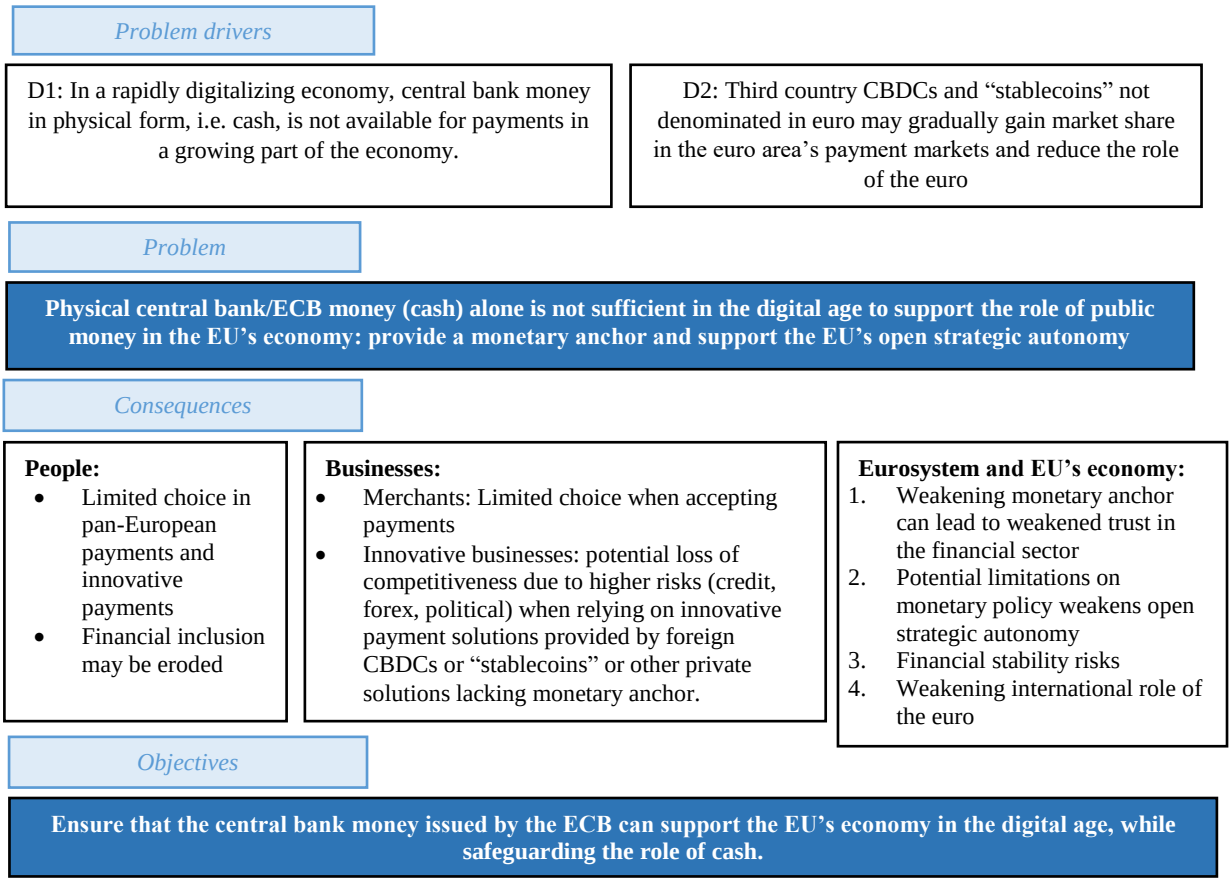
4.2 Specific objectives

The specific objectives are to:

1. Reinforce the euro's monetary anchor in the digital age by ensuring that central bank money in both its physical and future digital form is widely available to and accepted by all euro-area residents/businesses and tailored to their needs, while preserving financial stability.
2. Strengthen the EU's open strategic autonomy by increasing the euro's competitiveness vis-à-vis other currencies, third country CBDCs and "stablecoins" not denominated in euro.

Achieving these objectives by establishing, designing and issuing a digital euro raises a number of trade-offs. The policy options need to take into account these trade-offs and analyse their impacts. Especially as regards the first specific objective, the wide availability, presence and potential wide use of the digital euro require that many merchants accept it, and PSPs distribute it. At the same time, a level playing field with private means of payments on the EU's payment market needs to be maintained (policy options 1). Furthermore, privacy is a fundamental right and people appreciate the high level of privacy offered by cash payments. However, full anonymity of payments can be in contradiction with the goals of anti-money-laundering and terrorist financing policies (policy options 2). Finally, potential wide use should not pose risks to financial stability (policy options 3). As regards the second specific objective, the potential international use of the digital euro should neither endanger the monetary and financial autonomy of non-euro area countries, nor cause harm to the Eurosystem balance sheet and its monetary autonomy (policy options 4). Table 1 below provides an outline of how these trade-offs are taken into account in the option structure.

4.1 Intervention logic



SO1: Reinforce the euro's monetary anchor in the digital age by ensuring that central bank money in both its physical and future digital form is widely available and accepted by all euro-area residents/businesses and tailored to their needs, while preserving financial stability.	SO2: Strengthen the EU's open strategic autonomy by increasing the euro's competitiveness vis-à-vis other currencies, third country CBDCs and stablecoins

Policy options and trade-offs

No digital euro *versus* Establishment of a digital euro and developing its payment system	
SO1+SO2 Legal tender – ensure wide availability, distribution, and acceptance while ensuring level playing field with private payment services	
SO1 Privacy – to foster trust and enable wide usage while managing risks of money laundering and terrorist financing **SO1 Store of value** - Limiting its store of value function to preserve financial stability	**SO2 International use** – to increase the international role of the euro and the EU's open strategic autonomy while protecting the Eurosystem's balance sheet and monetary sovereignty and the stability of non-euro area countries

5 WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1 Baseline - no digital euro

The EU would not develop any new regulatory or non-regulatory action on a central bank digital currency. The ECB would thus not be in a position to decide to issue a digital euro for retail use. To achieve the objectives laid down in Commission retail payment strategies and promote the international role of the euro and the EU's open strategic autonomy, the Commission and the ECB would concentrate on improving the EU's payment systems that use private money without having the tools to ensure the availability and usability of central bank money in payments in the increasingly digital economy.

5.2 Establishing and regulating a digital euro

Under this option, the Commission would propose a Regulation on the digital euro establishing a digital form of central bank money available for use by people and businesses, and regulating its essential aspects. Based on the Regulation, the ECB/Eurosystem may decide to issue a digital euro in addition to banknotes and coins. As explained in the introduction, this Regulation would establish the digital euro in the relevant framing legislation. When the ECB concludes that the problems and risks described above justify the issuance of the digital euro, it could issue the digital euro given that it has been established by the Regulation, based on its own powers derived from the Treaties. How well a digital euro can achieve the general and specific objectives set out above, also depends on how the Regulation addresses the digital euro's essential aspects, since these aspects will drive the usage, availability and acceptance of the digital euro as well as its competitiveness.

This section therefore sets out policy options on a number of essential aspects/trade-offs (sections 5) and analyses their impact (section 6), before coming back to an overall assessment of impacts of establishing and regulating a digital euro (section 7).

The policy options listed in the table below relate to the essential aspects of a digital euro which were selected in view of (i) their significant potential impact on society, economy, people and businesses and (ii) their importance in reaching the objectives of the digital euro. The options in the respective subsections are to be seen as mutually exclusive, unless indicated otherwise.

The legal tender status of a digital euro would largely affect how both specific objectives could be achieved. Acceptance, distribution and the compensation model will also significantly affect wide availability and usage and thus contribute to maintaining the monetary anchor and strengthening the open strategic autonomy of the EU. At the same time, it is important to maintain level playing field with the private payment solutions and encourage other pan-European payment solutions in line with the Commission's Retail Payment Strategy. The privacy design will influence the potential wide use of a digital euro, as evidenced by the consultations and market research. At the same time the objectives of anti-money laundering and terrorist financing need to be balanced with the desired privacy. Furthermore, while potential holding limits may reduce the usability of a digital euro, such features may be key in maintaining financial stability. Finally, the potential international use of a digital euro would contribute to increasing the international role of the euro. At the same time, the balance sheet of the Eurosystem needs to be protected and the stability (both macro and financial sector) of non-euro area Member States needs to be maintained. This latter aspect will be key especially in achieving the second specific objective.

Table 1. Trade-offs and policy options

Trade-offs	Specific Objectives and Policy options
Enable wide usage while ensuring level playing field with private payment solutions *NB:* *The set of options a/b/c, d/e/f and g/h/i are exclusive within their groups but complementary between each other (with the exception of 1a, which would be exclusive to all other options)*	**SO1 and SO2** ***Access and Usability*** **<u>Legal tender status</u>** Option 1a - Digital euro without legal tender status Option 1b - Digital euro with legal tender status, including general mandatory acceptance by payees Option 1c - Digital euro with legal tender status with some exceptions to mandatory acceptance *NB: options 1b and 1c are also linked in terms of coherence to the legal tender status of cash.* **<u>Distribution</u>** Option 1d - Compulsory distribution of digital euro by all PSPs Option 1e - Compulsory distribution of digital euro by credit institutions with retail business Option 1f - No compulsory distribution of digital euro by PSPs, subject to a review clause *NB: sub-options 1(b-c)i and 1(b-c)ii regarding the access to euro cash are further described in box D.* **Compensation model and fees on merchants** Option 1g - Merchant fee pricing left to the market Option 1h - ECB mandated to regulate merchant fees on the basis of criteria set by the legislature Option 1i - ECB mandated to issue pricing expectations/guidelines on merchant fees on the basis of criteria set by the legislature
Protection of privacy and ensuring traceability *NB:* *Options 2d and 2e can be combined with Options 2a, 2b and/or 2c.*	**SO1** ***Privacy*** Option 2a – No processing of personal data related to a user's identity or transactions Option 2b – Processing of personal data related to a user's identity, but not to transaction data Option 2c – Processing of personal data related to a user's identity and transaction data Option 2d – Processing of personal data related to a user's identity, but not to transaction data for *offline* low value payments – non-exclusive option Option 2e - Processing of personal data related to a user's identity, but not to transaction data for *online* low value payments – non-exclusive option
Ensure wide usage while protecting financial stability and credit provision	**SO1** ***Financial stability and credit provision*** Option 3a – Digital euro with unrestricted store of value function Option 3b – Possibility of introducing limits to the digital euro's store of value function
Benefit from international use while mitigating risks for non-euro countries and the Eurosystem	**SO2** ***International use*** Option 4a - Digital euro available for all EU residents/businesses and third countries residents/businesses Option 4b - Digital euro available for visitors to the euro-area and under conditions for non-euro area residents/businesses and third countries residents/businesses Option 4c - Digital euro available only for euro-area residents/businesses and visitors to the euro-area

Technical design choices that are not of a regulatory nature and fall within the competence of the Eurosystem are not the focus of analysis in this impact assessment as they will be made by the ECB/Eurosystem when developing a digital euro.[96]

The digital euro project being investigated by the ECB is based on the following working assumptions:

- **Use case prioritisation.** Depending on technical feasibility, the first release of the digital euro may target payment segments that have the highest additional value for users and potential network effects, i.eP2P and P2B-(e-commerce payments. In subsequent releases, additional use cases could be added, also depending on market developments, including P2B-POS and M2M payments.

- **Offline and online digital euro**. The first releases of the digital euro would aim to be available for both an offline (bearer based) and an online use (account based), as described in Section 1.2 and would aim to serve the use cases identified in Section 1.2 (e.g. Person-to-Person, POS, e-commerce). Online and offline functionalities outlined in the ECB digital euro report are further presented in Annex 5.

- **Future payment needs**. The ECB is monitoring emerging trends in industry 4.0 such as machine-to-machine and conditional payments, which are presented in Annex 8, and is looking into solutions to respond to these trends in future releases of a digital euro.

- **Distribution by PSPs**. The digital euro, issued by the Eurosystem, would be made available to people and businesses by PSPs, which would perform the functions which payment legislation (PSD2) entitles them to provide. The main categories of PSPs that would be best suited to distribute the digital euro are credit institutions, payment institutions and electronic money institutions. Acquiring services to merchants would likely be provided by the same PSPs that currently offer such services in relation to private payments e.g. card payments. When distributing the digital euro, PSPs could leverage their existing customer facing services and avoid the costly duplication of processes. PSPs would for instance open and close digital euro accounts, provide front-end solutions, carry out customer due diligence, AML/CFT and fraud checks, and process payment transactions (to the exclusion of settling them since this task would fall under the responsibility of the Eurosystem). While the PSPs would execute the account management functions and operations described above, the digital euro would remain a direct claim towards the Eurosystem. At the same time, it is envisaged that PSPs, and not the Eurosystem directly, would have a contractual account management relationship with the end user.

- The **settlement of the on-line digital euro** (i.e. validation and recording of the transaction) will be made under the control of the Eurosystem. The settlement of the offline digital euro would rely on local storage (secure hardware) where no third party would be involved.

- **Free use of basic services with the digital euro for private individuals**. According to the ECB's report on a digital euro, the digital euro should be free of charge for

[96] Assessment of the influence of technical design choices including on the protection of privacy and personal data falls within the competence of the ECB/Eurosystem in line with the applicable data protection laws.

basic use by private individuals. The reason for that is that if the digital euro is granted legal tender status, it would have to be accepted at face value. The digital euro could hence not be subject to fees that would erode directly or indirectly the face value of holdings and payments received (unless there is a proper justification for such fees and they respect the principle of proportionality). Basic use services would include, in particular, the opening of digital euro wallets/accounts, making basic payments in digital euro as well as the funding and defunding of digital euro accounts/wallets.

- **Ensuring pan euro area reach from a technical perspective**. The ECB would need to ensure that if a citizen is provided with a digital euro payment instrument by one intermediary in one country, it can use this instrument without barriers to pay at any merchant accepting digital euro in the euro area, independent of the intermediary and the country of the merchant. A set of technical rules standards and procedures will be developed together with market participants in order to guarantee the pan-euro area reach of the digital euro.[97]

These ECB working assumptions outlined above are explicitly or implicitly reflected in the impact assessment.

5.2.1 Access and Usability

The usage, availability and acceptance of the digital euro as well as its competitiveness (specific objectives 1 and 2) largely depend on the ability, willingness or legal obligations of payers and payees to use the payment means in transactions, and on its costs for payees and payers.

The digital euro would co-exist, complement and to some extent compete with private payment solutions on the EU's payment market. Private payment solutions include domestic and international payment cards, instant payments, and any other payment solutions that build on them e.g. digital wallets. They provide substantial benefit for both people and businesses by offering a fast, reliable and efficient payment in both physical (shops, restaurants, etc.) and online (e-commerce) environment.

This payment market is a dynamic one shaped by consumers' evolving preferences and technological evolution. The digital euro aims at offering payments through an electronic version of central bank money (CBDC), which currently is not available for people and businesses. The digital euro would offer citizens a free (at least for basic services) payments alternative, on top of the existing payment means. Depending on consumers' evolving preferences, a digital euro could be used in parallel with private solutions such as international and domestic card-based payments, instant payments and new upcoming possible payment means such as stablecoins. While the digital euro would offer an additional choice for users, ensuring a level playing field between payments in digital euro and with private services is important to ensure competition, and maintain and maximise the overall value of payment services for the EU's economy.

[97] In January 2023, the ECB set up a Rulebook Development Group (RDG). The digital euro RDG will develop as main deliverable a draft digital euro rulebook which will consist of a set of rules, practices and "standards" that will allow the distribution of digital euro through intermediaries by the means of user management, liquidity management and transaction management. The RDG consist of a maximum of 24 members and composed by 10 representatives from the public and 14 representatives from the private sector. The private sector representatives come from consumer organisations, corporate treasurers, small and medium sized businesses, retailers with a physical presence, online retailers, acquirers, the European Payment Council, credit institutions, payment institutions. An approved draft of the first version of the digital euro scheme rulebook will be subject to a public consultation.

Legal tender status

A critical question which is considered in the context of the access to and the usability of the digital euro is whether it should be granted the legal tender status, and if so, if exceptions to the mandatory acceptance deriving from this status should be specified. Options 1a, 1b and 1c are mutually exclusive options.

Option 1a: Digital euro without legal tender status

Under this option, the digital euro would be issued without legal tender status. Euro banknotes and coins would remain the only forms of the euro in circulation having legal tender status. Therefore, the acceptance of payments in digital euro would depend on whether payers and payees, typically merchants (shops, hotels, restaurants, e-commerce etc.), are willing to accept the digital euro.

Option 1b: Digital euro with legal tender status, including general mandatory acceptance by payees

Under this option, legal tender status for the digital euro would be defined and no exceptions would limit the principle of mandatory acceptance, save for natural persons acting in the course of a purely personal or household activity who would not be obliged to accept digital euro payments. All other payees would be required to accept payments in digital euro. Such a default obligation of the payee to accept payments in digital euro at face value would entail a right of the payer to pay with the digital euro and discharge its debt. This is without prejudice to the possibility for the parties to a transaction to freely agree, contractually, on a different means of payment.

Option 1c: Digital euro with legal tender status with some exceptions to mandatory acceptance

Under this option, legal tender status for the digital euro would be defined as in Option 1b, subject to exceptions to the principle of mandatory acceptance. The Regulation would provide that the following categories of payees would be exempted from mandatory acceptance:

- Payees who qualify as microenterprises (less than 10 employees and a turnover or balance sheet size under EUR 2 million)[98] or non-profit legal entities, unless they already accept digital payments. This exception would cater for the necessary proportionality for microenterprises and non-profit legal entities which only accept cash and would avoid imposing costs of infrastructure to process digital euro payments.
- Payees who refuse a digital euro payment in good faith, based on legitimate and temporary grounds and in line with the principle of proportionality in view of concrete circumstances, beyond the control of the payee, where the payee would bear the burden of proof. This exception would allow payees to refuse *individual* digital euro payments in cases such as a power outage or an internet blackout preventing online digital euro payments. In case a dispute would arise on the fulfilment of these

[98] As defined in the EU recommendation 2003/361.

conditions, the payee would have to prove that the conditions were met and that he/she rightfully refused to process the payment in digital euro.

- Natural persons acting in the course of a purely personal or household activity, as natural persons should be free to select the means of payment of their choice to discharge a debt purely relating to the private sphere.
- Payees who have expressly agreed with payers on a different means of payment prior to the payment. This exception would cater for a certain level of contractual freedom as some Member States are of the view that mandatory acceptance of digital euro payments should not limit the contractual freedom of parties to pay with the means of payment of their choice.

Additionally, a framed delegated power for the Commission could be defined that would allow introducing additional exceptions to mandatory acceptance, which would apply in a harmonized way across the euro area. Nonetheless, such additional exceptions would still need to ensure the necessary network effects, and the use of the digital euro as a single currency in the euro area, while avoiding imposing a disproportionate burden.[99]

Distribution

As introduced above, it is expected that intermediaries and not the Eurosystem directly would distribute the digital euro. Intermediaries have experience, infrastructure, processes and customer relations that enable them to distribute the digital euro more efficiently than the Eurosystem. Furthermore, the ECB's statute does not allow the opening of accounts to non-financial sector institutions, businesses and natural persons.

The distribution of the digital euro primarily means the provision of basic services to its users (e.g. opening, managing and closing digital euro accounts, non-automated payments in digital euro).

Option 1d: Compulsory distribution of digital euro by *all* PSPs

Under this option, payment service providers would be obliged to distribute the digital euro on request.

Compulsory distribution would ensure the availability and enable wide usage of the digital euro as a means of payment and would ensure the effectiveness of a possible legal tender status under Option 1b or 1c.

[99] Provided fees for the distribution of the digital euro are not disproportionate in comparison with currently accepted electronic means of payment by merchants.

Option 1e: Compulsory distribution of digital euro by credit institutions with retail business

To avoid disproportionate costs and comply with the principle of proportionality, mandatory distribution would be limited to credit institutions that are providing equivalent retail business services in commercial bank money. Other PSPs (e.g. electronic money and payment institutions) would be free to decide whether or not to distribute the digital euro.

The selection of credit institutions as compulsory distributors considers three main factors. First, under PSD2, account servicing payment service providers (ASPSPs) can offer services related to account management. They include the following institutions: payment institutions (PIs), electronic money institution (EMI), credit institutions (CIs). Other PSPs, such as payment initiation services providers (PISPs) and account information services providers (AISPs) offer services based on access to payment accounts, but do not provide account servicing payment services, and therefore would not be able to offer some of the distribution services mentioned above, based on AIS/PIS license only. The same holds true for PSPs providing only money remittance services.

Second, among the ASPSPs only credit institutions have access to central bank reserves. This ability is key when converting commercial bank money into central bank money i.e. funding digital euro at the request of clients. Lacking access to central bank reserves, EMIs and PIs would be able to offer funding services for their clients only with the cooperation of credit institutions, which would entail additional cost for them.

Third, not all credit institutions have retail business i.e. offer account management services for people as they specialise on serving businesses or provide investment services. It would not be proportionate and rational to oblige these more specialised credit institutions to distribute the digital euro.

Consequently, only credit institutions that have retail business can offer the full range of basic digital euro services for users without relying on other providers and without disproportional investment needs and costs.

Option 1f: No compulsory distribution of digital euro by PSPs subject to a review clause

Under this option, distribution of the digital euro would be left to PSPs business decisions who may thus decide not to offer the service upon request. As part of this option, the Commission would assess the functioning of the market for the distribution of the digital euro after its issuance and determine whether it is adequately developed to ensure a sufficient access to the digital euro for people and businesses, and whether additional measures regarding distribution would be required.

Compensation model

The compensation model for the digital euro not only determines the costs and revenues of the different stakeholders of digital euro payment transactions, but through its incentive structure has an influence on its competitive position in the markets for retail payments affecting its future use. The choice of the digital euro compensation model needs to consider several aspects.

First, payment services are two-sided network markets, where market dynamics depend not only on the total costs of the payment, but also on the relative costs on the two sides. Different stakeholders may take the position of the payer and payee side depending on the

actual use case, such as P2P, POI, P2G, G2P etc. Payments with a digital euro intermediated by PSPs (at least for online) may also follow a four-party model[100].

Second, the basic payment services of the digital euro as public money would be offered for free to private individuals. The reason is that the digital euro – like cash – would be a public good enjoying, preferably, legal tender status and can therefore not be subject to fees that would erode directly or indirectly, the face value of holdings and payments received, unless there is a proper justification for such fees, and they respect the principle of proportionality.

Third, the PSPs that distribute the digital euro to both people and businesses should get compensation in order to maintain their economic incentives to provide quality services in a competitive environment. This includes merchant fees that merchants would pay to their acquirers for POI payments. However, merchants – especially smaller merchants – already have limited countervailing market power in the acquiring market, which would be aggravated by any acceptance obligation. Granting the digital euro legal tender status, with the corollary of mandatory acceptance, carries the risk that intermediaries overcharge merchants for digital euro payment services if the pricing is left entirely to the market, given that merchants would have no choice but to accept digital euro payments. Therefore, one should consider certain measures to address merchant fees, should these risks materialise.

Fourth, four-party models, such as several payment card schemes, often apply inter-PSP (interchange) fees as a tool that redistributes costs and revenues between the intermediaries on the issuer (payer) and the acquirer (payee) side[101]. The existence of such interchange fees for competing retail payment schemes raises the question of its application in the digital euro payment scheme as well due to level playing field reasons. The potential application of intra-PSP fees in the digital euro scheme would have to take into account several aspects: (i) it could provide at least partial compensation for issuers that are mandated to provide digital euro basic services for free for private individuals; (ii) it would build into the fees that merchants pay for acquiring services[102], a particular concern in the presence of any acceptance obligation; (iii) it changes the economic incentives of the four-party model participants, hence would affect the competitive outcome on the market of retail payments.

Fifth, the digital euro compensation model should aim to preserve level playing field with other private means of payment to foster competition and innovation. The objective of the digital euro is to enable the choice of using central bank money in the digital economy, but not to decide the competitive outcome e.g. by crowding out existing other private means of payment.

Three options regarding the compensation model and merchant fees may be considered:

<u>Option 1g: Merchant fee pricing left to the market</u>

[100] In the four-party model, four main entities are involved in payment transactions: (i) the customer making a payment; (ii) the customer's PSP or issuer, which holds the customer's funds and has issued the payment instrument (typically card); (iii) the merchant accepting the payment; (iv) and the merchant's PSP or acquirer, which provides the necessary facilities for the merchant, such as point-of-sale (POS) hardware and software, and initiates the processing of transactions. Visa, MasterCard, and domestic card schemes operate in a four-party model.

[101] In the POI environment interchange fees are paid by the acquirer to the issuer.

[102] Hence restrict competition on the acquiring side as interchange fees create a floor for merchant fees, i.e. merchants are unable to negotiate merchant fees below these interchange fee levels.

Under this option, the PSPs would set the merchant fee (acquiring and/or inter-PSP fees) based on bilateral negotiations with each other and the merchants[103], and competition on the market. It should be noted that in the presence of inter-PSP fees, merchants will not be able to negotiate merchant fees below these inter-PSP fee levels.

Option 1h: Determination of maximum amounts of merchant fees on the basis of a methodology set by the legislature and developed by the ECB

Under this option, mandatory caps on merchant fees (acquiring and/or inter-PSP fees) would be based on specific criteria set by the legislature (e.g. considering intermediaries' costs, considering the Interchange Fee Regulation or the merchant indifference test[104] as benchmarks for inter-PSP fees, considering the two-sided and network nature of payments, no excessive fees for merchants, no crowding-out of private means of payment), and to adapt it periodically in view of market developments.

Option 1i: Pricing recommendations on merchant fees on the basis of criteria set by the legislature

In the absence of observable market data, even before the issuance of a digital euro, the ECB could be mandated/requested to provide pricing recommendations or guidelines that merchant fees (acquiring and inter-PSP fees) should follow on the basis of criteria set by the legislature (e.g. considering intermediaries' costs, considering the Interchange Fee Regulation or the merchant indifference test as benchmarks for inter-PSP fees, considering the two-sided and network nature of payments, no excessive fees for merchants, no crowding-out of private means of payment), and to adapt it periodically in view of market developments.

Legal tender status of euro cash

Regulating the legal tender status of the digital euro (options 1b and 1c) would have implications in terms of coherence for the legal tender status of euro cash (see box E below) even though the provisions laid down in each Regulation need not be identical[105].

Box E – Legal tender status of cash

Acceptance of cash

In terms of the content of a legislative proposal on the legal tender of euro cash, there is broad support from euro area Member States that there should be at least a codification of the jurisprudence of the Court of Justice of the European Union, also taking into account the Commission Recommendation on the key principles of legal tender. These are: mandatory acceptance in principle, at full face value, with the power to discharge payment obligations. Furthermore, the analysis undertaken in the context of ELTEG, the ELTEG principles set out in the ELTEG III report and the targeted stakeholder consultation results also suggest that more detailed clarifications as to the meaning of legal tender should be considered for the legal proposal to ensure added-value and legal certainty, whilst respecting the jurisprudence of the Court of Justice of the European Union. In particular, the Commission Regulation on the legal tender of cash should also include[106]:

- A non-exhaustive specification of possible exceptions to the principle of mandatory

[103] While PSPs negotiate with their merchant customers bilaterally during onboarding (merchant service charge), bilateral negotiations among more than 4,000 PSPs can face substantial practical difficulties (inter-PSP fees). Inter-PSP fees therefore are typically negotiated multilaterally under the scheme rules, or are set by the scheme owner (as a default fee) in competing retail payment schemes.

[104] See section 6.x for details.

105 ELTEG III Report, 2022: 24."When regulating the legal tender status of central bank money in its physical and digital forms, there is a need for coherence and consistency between the legal acts, as well as with other existing legislation. The Regulations do not need to be identical, since the concrete implementation of the key principles of legal tender can differ for physical and digital forms of money (e.g. the availability of change is not applicable in a digital context)".

[106] For further explanation of the elements to be included, please see Annex 7.

acceptance based on the 'good faith' principle;

- A provision empowering the Commission to introduce rules of a monetary law nature that would establish additional but limited exceptions to the principle of mandatory acceptance, on condition that they are justified and proportionate, after consulting the ECB;
- A provision requiring Member States to monitor cash acceptance levels in their area and the prevalence of unjustified no-cash policies and to take measures if acceptance of cash is not ensured.

As these matters relate to the scope, effects and exceptions to the key principles of legal tender which are covered in the jurisprudence of the Court, legislating on these matters would be largely a matter of clarification and codification in the interests of coherence and better law-making, with little margin for policy choice. These aspects are therefore not further assessed.

Access to cash

While the issue of acceptance of cash and its exceptions is covered in the Court jurisprudence, issues concerning problems with access to cash have been raised by Member States and stakeholders and are not covered by the Court ruling. The nature of these problems are outlined in the problem definition (box B) and elaborated in annex 7. These actions could in principle be addressed in one of two ways, as set out below.

Option 1(b-c)i: A soft law instrument (e.g. a Commission Recommendation)

Under option 1(b-c).i, the Commission would adopt a Recommendation addressed to the Member States, which would invite them to take measures (via soft law or national law) to incite or require banks to provide a certain minimum level of access to cash via their bank branches or ATMs within a certain geographic area. Member States would also be invited to recommend to non-banks, such as post offices or retailers, to provide access to cash to the public or businesses as a complement to banks. Finally Member States would be invited to monitor the levels of bank and ATM provision across their territory to assess whether or not it is sufficient.

Option 1(b-c)ii: A legally binding obligation on Member States in the proposed Regulation on legal tender of cash to be implemented by Member States

Under option 1(b-c)ii, the Commission would include in its proposed Regulation on the legal tender of cash a legally binding obligation on Member States to ensure sufficient and effective access to cash on their territory. To comply with this obligation, Member States would be required to designate one or more competent national authorities with oversight and regulatory powers over the market activities of the cash industry, which could be an existing authority such as the national central bank. In order to assess whether access to cash is ensured, these designated national competent authorities would be obligated to monitor access to cash on the basis of a set of common indicators. To this end, the Commission would be able to adopt an implementing act in order to specify a set of common indicators, which will allow the Member States to assess the access to cash in their territory and in all their different regions and urban areas.

The Member States would have to notify the results of their monitoring and analysis of the situation as regards access to cash in an annual report to be addressed to the Commission and the European Central Bank. This report should assess whether there is sufficient and effective access to cash throughout the national territory and in all regions and urban areas, giving grounds and objective data for its assessment. If a Member State concludes that access to cash is sufficient and effective, it would not be required to take action. Conversely, if a Member State concludes that access to cash is not sufficient and effective in all or part of its territory, or is at risk of deteriorating in the absence of action, appropriate measures would have to be taken to remedy the situation. These measures could include the setting of geographic access requirements on credit institutions to maintain cash services at a sufficient number of their branch offices where they conduct business, or through an appointed agent for online only credit institutions, and/or maintain a sufficient density of ATMs where they conduct business taking into account a good geographic spread in relation to population. Other measures could include a regulation of fees, if necessary, or recommendations addressed to non-credit institutions, such as independent ATM operators, retailers or post offices, encouraging them to complement the cash services of banks.

The Commission would examine the annual reports in close consultation with the European Central Bank. If the measures proposed by a Member State appear insufficient, or if the Commission considers that access to cash in a Member State is not sufficient in spite of the findings of the annual report, the Commission would be able to adopt implementing acts providing for adequate and proportionate measures that need to be adopted by the Member State concerned.

5.2.2 Privacy and personal data protection

The usage and acceptance of a digital euro (specific objective 1) will depend on ensuring a high level of privacy and data protection. Ensuring high level of privacy and personal data protection is important to foster public trust in a digital euro, within the euro area and beyond.[107] The right to privacy and personal data protection are fundamental rights enshrined in the Charter of Fundamental Rights of the European Union[108] and their protection was highlighted as a key concern both in the Eurosystem Report on a digital euro,[109] the ECB consultation[110] and the Commission's targeted consultation. Indeed, the public may expect that payments in digital euro will provide for a high degree of privacy and data protection, as the public may to a certain extent draw an analogy to cash as the current form of central bank money, which offers a high degree of privacy.[111]

At the same time, a users' right to data protection and privacy can be limited in accordance with Article 52 of the Charter[112] when this is necessary to achieve important objectives of public interests, insofar such limitations are proportionate and respect the essence of the rights concerned. Any limitation on the protection of personal data and privacy must apply only in so far as it is strictly necessary. Such limitations already exist in EU law, e.g. to ensure transparency and traceability for the purpose of combatting and preventing money laundering, terrorist financing or tax evasion.[113]

The processing of personal data may be necessary, while fully respecting the requirements of the Charter, for specified purposes. For example, ensuring a necessary level of traceability of transactions is important to achieve public policy objectives underpinning the AML/CFT framework. It might also be necessary to comply with the obligations related to taxation, which are applicable to funds (e.g. the Common Reporting Standard/Directive on Administrative Co-operation 2). Personal data processing may also be necessary for activities related to the use and distribution of a digital euro, including payment settlements, funding and defunding of digital euro accounts, operational resilience and combating fraud (see Annex 12: applying Union data protection law to the digital euro).

Options 2a-2e differ in terms of how personal data related to a digital euro user's identity and transactions are processed by supervised intermediaries to ensure the proper functioning of the digital euro. Certain activities of public interest are common features for all options

[107] The G7 Public Policy Principles for Retail Central Bank Digital Currencies underlined that rigorous standards of privacy, accountability for the protection of users' data, and transparency on how information will be secured and used is essential for any CBDC to command trust and confidence.
[108] The right to privacy and personal data protection are enshrined in Articles 7 and 8 of the Charter of Fundamental Rights of the European Union.
[109] See Eurosystem report on a digital euro
[110] See Eurosystem report on the public consultation on a digital euro". Among the requested features of a potential digital euro, privacy ranked highest for 43% of respondents.
[111] Cash transactions are anonymous in that they do not reveal the identity of the payer and the payee. However, where large cash transactions are not prohibited, they are subject to customer due diligence (CDD) checks, and are therefore no longer anonymous. Such threshold is set at 10.000 EUR at EU level, although some Member States have opted for lower thresholds.]
[112] Charter of Fundamental Rights of the European Union, OJ C 202, 7.6.2016, p. 389–405
[113] Anti-money laundering (AML), counter terrorist financing (CFT) and taxation are recognised as important public interests in the EU's data protection framework.

(except option 2a). For example, for the purposes of AML/CFT, supervised intermediaries distributing the digital euro would act as obliged entities within the meaning of the AML/CFT Directive and would be responsible for the processing of personal data of users as required under the AML/CFT framework.[114] For the purpose of taxation, supervised intermediaries acting as payment service providers would be responsible for the processing of personal data of users to combat tax avoidance. For the purpose of payment transactions, supervised intermediaries would be responsible for the processing personal data of users in order to manage transactions at the front end of the payments process.

The ECB/Eurosystem would process categories of data strictly necessary to perform its activities.[115] The ECB/Eurosystem may be required to process personal data to validate transactions at the back end of the payments process (payment settlement). The ECB/Eurosystem's role in payment settlement is therefore a common feature in most options described below (except Option 2a and Option 2d for offline proximity payments). Clear segregation of personal data between supervised intermediaries and the ECB/Eurosystem, as well as privacy enhancing technologies (PETs)[116], would ensure that data processed by the Eurosystem cannot be directly attributed to an identified digital euro user by the Eurosystem (see Annex 12: applying Union data protection law to the digital euro).

To preserve the privacy of users, all options laid down below (except option 2a) would mandate intermediaries to provide the EU-wide interoperable European Digital Identity Wallet (EUDIW) as one option for on-boarding and payment initiation with the digital euro.[117] In this respect, the European Digital Identity Wallet will provide a European tool that will enable users not only to disclose only those data points that they need/wish to share ('selective disclosure') but also to use pseudonyms. Further, the usage of the European Digital Identity Wallet as proposed by the Commission will ensure compliance with the EU data protection requirements and the principle of data minimisation.[118]

Option 2a: No processing of personal data related to a user's identity or transactions

Under this option, personal data related to a user's identity and digital euro transactions are not processed by the ECB/Eurosystem or by supervised intermediaries. A user would neither be identified when opening a digital euro account (onboarding) nor when conducting digital euro transactions. In terms of AML/CFT requirements, the digital euro would be subject to the cash treatment laid down in the AML/CFT package adopted by the Commission in July 2021 (i.e. an upper limit of EUR 10,000 for large transactions in cash[119]). Supervised intermediaries and the ECB/Eurosystem would not identify taxable persons neither in the case of transactions below national thresholds nor when the transacting parties fail to abide to requirements on self-declaration/notification of larger transactions. Moreover, intermediaries and the ECB/Eurosystem would not identify users for other purposes (e.g. management of operational ICT risks, payment fraud, funding and defunding).

[114] This includes carrying out the appropriate level of customer due diligence, reporting unusual and suspicious transactions, and the sharing of information by competent authorities as required under AMLD5 EUR-Lex - 32018L0843 - EN - EUR-Lex (europa.eu), and future AMLR EUR-Lex - 32015L0849 - EN - EUR-Lex (europa.eu)

[115] This would be limited to information strictly necessary for payment settlement, as well as aggregated information for statistical, research, supervisory and oversight purposes.

[116] PETs are technologies that eliminate or minimise personal data processing, thereby protecting informational privacy of a data subject, without causing the loss of the functionality of the information system. See EDPS Opinion 5/2018, Privacy by Design | European Data Protection Supervisor (europa.eu)

[117] See also the result of the public consultation where more than 50% of the professional stakeholders suggested

[118] See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0281.

[119] Under the new AML/CFT package, the Commission proposes to introduce at EU level a maximum amount of €10,000 for large cash transactions. Member States will remain free to maintain lower limits at national level.

Option 2a would provide a user with more privacy than cash (given that the identity of cash users is checked by supervised intermediaries when withdrawing or depositing cash).

Option 2b: Processing of personal data related to user's identity but not to transaction data

Under this option, personal data related to a user's identity would be processed by a supervised intermediary when opening a digital euro account (onboarding). Personal data related to a user's identity would only be processed exclusively by the supervised intermediary who has onboarded the user for specific purposes (e.g. management of operational ICT risks, payment fraud, funding and defunding, AML/CFT. Taxation). This includes, for example, obligations stemming from taxation law which are applicable to funds: the supervised intermediary who has onboarded the user would identify the user as a taxable person under national thresholds. However, personal data related to a user's payment transactions are not processed by supervised intermediaries when a user conducts a digital euro transaction.

Option 2b would provide a high level of privacy and data protection to a user when conducting digital euro transactions.

Option 2c: Processing of personal data related to users' identity and transaction data

Under this option, personal data related to a user's identity and digital euro transactions would be processed by supervised intermediaries subject to the same treatment as private electronic payments today. This means that personal data related to a user's identity and digital euro transactions would be visible to and processed by supervised intermediaries in accordance with the requirements of the GDPR and in compliance with AML/CFT, to fight fraud and for other lawful purposes (e.g. the management of operational ICT risks).[120]

Option 2c would require that personal data related to a user's identity are processed by a supervised intermediary when opening a digital euro account (onboarding), in line with customer due diligence (CDD) requirements. In addition, personal data related to a user's identity and digital euro transaction data would be processed by all relevant supervised intermediaries (the intermediary of both the sender and beneficiary of the payment) when conducting digital euro transactions.

However, this option may include the possibility to apply simplified due diligence, reducing the information accompanying certain digital euro transactions below a threshold, where justified by a risk assessment as laid down in the AML package adopted in July 2021.[121] In terms of AML/CFT requirements, a user of a digital euro would be subject to CDD treatment established for private payments (i.e. a supervised intermediary would need to identify a user for an occasional transaction that constitutes a transfer of funds above EUR 1,000).[122] The processing of personal data related to the user's identity for other purposes (e.g. management of operational ICT risks, payment fraud, funding and defunding) would be conducted by supervised intermediaries.

[120] As with private payments, supervised intermediaries would be required to apply customer due diligence (CDD) measures on a risk-sensitive basis, when establishing a business relationship, when carrying out an occasional transaction, or when there is suspicion of money laundering as set out in Article 11, Article 12 and Article 13 AMLD.

[121] In the case of simplified due diligence justified under a risk assessment, obliged entities would nevertheless be required to apply more stringent due diligence where needed, in keeping with the risk-based approach underpinning the AML framework. This means that the extent of the monitoring of transaction data collected on clients would have to be adjusted on a case-by-case basis, which would not guarantee a high level of privacy as a sufficient transaction monitoring would have to take place.

[122] As defined in Article 11 AMLD.

Option 2c would give a user a similar level of privacy and data protection as current electronic payments today.

Option 2d: Processing of personal data related to users' identity but not to transaction data for *offline* low-value payments – non-exclusive option

Under this option, a user's personal data is processed by a supervised intermediary during onboarding. Supervised intermediaries would process personal data related to a user's identity and digital euro transactions when they conduct *online* digital euro transactions (in accordance with option 2c). However, personal data would not be processed by supervised intermediaries when conducting *offline* digital euro transactions below a certain low value threshold (which distinguishes it from options 2b and 2c). This would grant the user with a high level of privacy and data protection when conducting low-value digital euro transactions in proximity offline. Consistent with the AML package[123], the low transaction threshold would be determined and justified on the basis of an AML/CFT risk assessment, conducted by the EU AML Authority (AMLA). These thresholds would be introduced by means of a Commission delegated act before the issuance of the digital euro. Offline digital euro transactions would be limited to proximity payments to mitigate money laundering and terrorist financing risks and technical measures would be taken to prevent the circumvention of established thresholds.

Transactions of low-value offline transactions would be settled on a person-to-person basis without intermediation by an intermediary or the ECB/Eurosystem. Neither supervised intermediaries nor the ECB/Eurosystem would therefore process data for low-value offline transactions.

Option 2d goes beyond the current baseline for electronic payments by offering users a level of privacy similar to cash for low-value *offline* transactions. *Online* transactions would still require processing of personal data in accordance with Option 2c.

Option 2e: Processing of personal data related to users' identity but not to transaction data for *online* low-value payments – non-exclusive option

Under this option, personal data related to a user's identity is processed by a supervised intermediary during onboarding. In addition, supervised intermediaries may process personal data related to *high value* online digital euro transactions (in accordance with option 2c). However, personal data related to a user's digital euro transactions would not be processed by supervised intermediaries when conducting online *low-value* digital euro transactions below a threshold (which distinguishes it from option 2d). This would grant the user with a high level of privacy and data protection when conducting low-value online digital euro transactions. This low value transaction threshold would have to be determined and justified on the basis of an AML/CFT risk assessment similar to the solution in Option 2d.

Option 2e goes beyond the current baseline for electronic payments by offering users more privacy for conducting their online low-value transactions. High-value online transactions would require processing of personal data in accordance with option 2c.

Table 2: Summary of privacy options

[123] https://finance.ec.europa.eu/publications/anti-money-laundering-and-countering-financing-terrorism-legislative-package_en

	Processing of personal data related to a user (Y/N)	Processing of personal data related to transactions (Y/N)	Outcome
Option 2a	NO – to intermediaries NO – to ECB	NO – to intermediaries NO – to ECB	Neither ECB nor intermediaries identify the user; personal data is not processed when onboarding a user; personal data is not processed when a user conducts transactions fixed at a limit equivalent for large transactions in cash.
Option 2b	YES – to intermediaries NO – to ECB	NO – to intermediaries YES - to ECB	Personal data is processed exclusively by the specific intermediary onboarding a user; personal data is not processed when a user conducts transactions. ECB would settle payment transactions, therefore data relating to the individuals would be processed. However, without directly identifying the individual.
Option 2c	YES – to intermediaries NO – to ECB	YES – to intermediaries YES – to ECB	Personal data is processed by *all* relevant intermediaries when onboarding the user, and when a user conducts transactions above the upper limit for a transfer of funds. ECB would settle payment transactions, therefore data relating to the individuals would be processed. However, without directly identifying the individual.
Option 2d *Non exclusive*	YES – to intermediaries (quantity of information depends on threshold) NO – to ECB	NO – to Intermediaries NO – to ECB	Personal data is processed by all relevant intermediaries when onboarding a user; and high value *offline* transactions would not be possible; personal data is not processed by the ECB or intermediaries when a user conducts low-value *offline* transaction.
Option 2e *Non exclusive*	YES – to intermediaries NO – to ECB	YES or NO – to Intermediaries (depends on transaction amount) Yes – to ECB (only for high level online transactions.)	Personal data is processed by all relevant intermediaries when onboarding a user and when a user conducts high value transactions; personal data is not processed when a user conducts low-value *online* transaction. ECB would settle online payment transactions, therefore data relating to the individuals would be processed. However, without directly identifying the individual.

5.2.3 Financial stability and credit provision

Large-scale use of digital euro as a store of value might divert large amounts of deposits from commercial banks to the balance sheet of the Eurosystem. Such a migration of deposits to digital euro can be both of a structural nature and occur in times of crisis, with different implications for banks' intermediation capacity and financial stability, and potential varying impacts for individual banks depending on their liability structure (see Annex 11 §3.2). These liability structures vary widely across countries in the euro area and in the EU (see Annex 11).

A digital euro could thus negatively impact the financing of the real economy by banks and may endanger financial stability unless offsetting measures are adopted.[124] In a similar fashion, a digital euro would have implications on capital flows and the central bank's balance sheet.

Option 3a: Digital euro with unrestricted store of value function

[124] ECB's preliminary analyses indicate that keeping total digital euro holdings between one trillion and one and a half trillion euro would avoid negative effects for the financial system and monetary policy. See Fabio Panetta's opening remarks, ECON Committee, June 2022.

Under this option, people and businesses could hold as much digital euro as they desire and any possible remuneration (i.e. interest) connected to holding digital euro would be irrespective of the amount held.

Option 3b: Possibility of introducing limits to the digital euro's store of value function

This option would allow for the introduction of measures, providing for clear objectives and criteria for them, to mitigate risks to financial stability and credit provision that could arise from large-scale deposit conversion into digital euro. For instance, if justified within the framework established by the legislature, the Eurosystem could set proportionate ceilings on individual digital euro holdings ('holding limits') or on the amount of deposits per user to be converted to digital euro within a given time period ('conversion limits') for both people and businesses, insofar as this is warranted to safeguard credit provision to the economy and ensure financial stability. Excessive digital euro holdings could also be disincentivised, if this is justified and proportionate (i.e. if there are no less restrictive alternative measures) by imposing for instance less favourable interest rates on holdings above certain thresholds.

The specific tools to limit the digital euro's store of value function would be flexibly defined, employed and calibrated by the Eurosystem, on the basis of the Regulation. The Regulation would provide for the possibility to employ such tools and set clear objectives and criteria for their operational use by the Eurosystem, as part of its role in supporting financial stability. This would guarantee the strict, justified and proportionate use of these tools for their intended purpose, while giving the Eurosystem the necessary flexibility to adapt them through time to the prevailing and changing circumstances, including the level of excess reserves in the financial system. In terms of accountability, the Regulation would require the ECB to provide, periodically, any necessary explanation and analysis to the Commission, the Council, and the European Parliament, justifying the use of a tool and its parameters.

Criteria for the definition and use of the tools would include inter alia their proportionality to the objective of safeguarding financial stability, their non-discriminatory and uniform application across the euro area, and the requirement to not unduly alter the free competition within the retail payment market. Furthermore, limits to the digital euro's store of value function should not constrain the payment functionality sought by users, . For this purpose, mechanisms to ensure that e.g. individual holding limits do not stand in the way of a digital euro transaction, both on the payer's and the payee's end, are being explored by the ECB. This includes so called 'waterfall' and 'reverse waterfall' mechanisms, whereby payments surpassing holding limits would be accepted while triggering an automatic transfer to or from a private payment account (e.g. bank or e-money account). That is, when a payee receives a digital euro payment that results in a balance above the holding limit, the excess amount would automatically be transferred to the user's linked private payment account ('waterfall' mechanism). Similarly, when a payer wants to transfer higher amounts in digital euro than the maximum holding amount, an automatic conversion of private money funds from the linked payment account can automatically be initiated to allow the transfer ('reverse waterfall' mechanism). Both mechanisms would be specified in the Regulation as they are essential elements to the use of the digital euro as a means of payment, though the use of these mechanisms would remain a choice of the digital euro users.

5.2.4 International use

Cross-border payments in digital euro across euro area member states will be an inherent characteristic of the digital euro. In addition, in order to achieve specific objectives 1 and 2, the Regulation will provide that a digital euro could be used for payment transactions beyond the euro area and beyond the EU. The international use of the digital euro would also be

subject to arrangements/agreements between the ECB and the respective central banks in non-euro area countries and bilateral agreements between the Union and third countries.

While a digital euro has the potential to facilitate trade and cross-border payment, it also carries risks to the financial stability of the euro area (for instance, as a strong international use of the digital euro could significantly expand the Eurosystem balance sheet) as well as risks to the financial stability and the monetary sovereignty of non-euro area countries. This potential for spillovers to other countries from overseas access to a jurisdiction's CBDC has led the G7 to caution about a wide international use of CBDC.[125]

In any event, the digital euro would need to be successful first within the euro area and only after that expand to international use. For the foreseeable future, the key driver for achieving specific objectives 1 and 2 and for impacts, is the use of the digital euro within the euro-area. Given the many uncertainties, a prudent, step-wise approach with respect to international use would be preferable. However since the actual use depends on agreements to be signed with non-euro area countries, no precise timeline can be established. The policy options are presented and analysed in Annex 9.

5.3 Options discarded at an early stage

Option 2a: No processing of personal data related to a user's identity or transactions

Option 2a would offer a high level of privacy but could undermine the applicable and upcoming rules addressing money laundering and terrorist financing risks. The Union's and FATF objectives ban anonymous accounts (Article 10 of AMLD 5). Article 58 of the AML regulation proposal[126] which forms part of the legislative package adopted in July 2021 proposes to extend that prohibition to digital wallets.[127]

Option 2a also does not take into account the risk profile of a digital euro, which is different from cash. As emphasized by FATF,[128] CBDCs could present greater ML/FT risks than cash as they would be acting as an instrument with the liquidity and privacy level higher then cash but without the limitations on portability that come with physical cash unless their use (holdings, transaction values) will be limited. As the combination of high level of privacy, portability and likely mass adoption would not allow for AML checks, this option would undermine the Union policy and entail reputational risk for the ECB as issuer of a digital currency.

Moreover, setting limits to the use of a digital euro, which could be desirable from a financial stability perspective to limit its potential use as a form of investment, would not be possible in a context of option 2a. Therefore, Option 2a would not be consistent with Option 3b outlined above. In addition, Option 2a would provide for a less stringent AML/CFT regime than cash while risks are much higher according to FATF[129] and evidenced in the answers to the Commission targeted consultation.[130] While option 2a will provide for higher level of

[125] The G7 Public Policy Principles for Retail Central Bank Digital Currencies
[126] COM(2021) 420 final
127 "Credit institutions, financial institutions and crypto-asset service providers shall be prohibited from keeping anonymous accounts, anonymous passbooks, anonymous safe-deposit boxes or anonymous crypto-asset wallets as well as any account otherwise allowing for the anonymisation of the customer account holder. Owners and beneficiaries of existing anonymous accounts, anonymous passbooks, anonymous safe-deposit boxes or crypto-asset wallets shall be subject to customer due diligence measures before those accounts, passbooks, deposit boxes or crypto-asset wallets are used in any way".
[128] Virtual assets - FATF report to G20 on so-called stablecoins, June 2020.
[129] FATF report to G20 on virtual assets, see discussion of option 2b in Part 7.2.2 for further details.
[130] See Annex 2

privacy than cash, in contrast, the identity of users is monitored when depositing or withdrawing cash.

In addition to AML/CFT checks, supervised intermediaries would also not be in a position to perform other activities that require the processing of personal data (e.g. taxation, management of operational ICT risks, payment fraud). This option is also not consistent with the need for the ECB to process personal data for settlement purposes.

6 WHAT ARE THE IMPACTS OF THE POLICY OPTIONS AND HOW DO THEY COMPARE?

This section outlines impacts of the policy options related to the digital euro. Given the lack of observable and forecastable impacts, both the ECB and the Commission, with the help of the Joint Research Center, used scenario analyses. Scenarios were developed based on professional judgement and their impacts quantified based on modelling and statistical techniques. For more on the scenario analyses, please see Annex 11.

6.1 Baseline – no digital euro

As the role of cash seems to be decreasing in the digitalising economy, the usage of central bank money could be more and more replaced by private money and private electronic means of payment. The observed decline in the use of cash in payments can be expected to continue in the coming years with the expansion of e-commerce and the availability of more and more comfortable and cheaper electronic means of payments. This will reduce the role of central bank money as monetary anchor. Beyond a certain point, the trend of declining cash usage could endanger the sustainability of the cash infrastructure and hamper the provision of adequate cash services. European citizens would thus encounter difficulties in accessing the only means of payment that is provided by the public sector and that provides unique features of central bank money.

Private money cannot perform the core function of central bank money as an anchor of the payments and monetary system. The lack of a monetary anchor i.e. one-to-one convertibility of private money to central bank money usable in the digital economy, could eventually weaken trust towards private money and the financial system. Without central bank money to provide an undisputed monetary anchor, people would have to monitor the safety of private money issuers in order to value each form of money, undermining the singleness of the currency. Predicting how trust in the euro would erode in the absence of a CBDC is not possible and difficult to quantify. The impact of such an unfavourable development on the EU's economy is even less quantifiable but potentially huge and difficult to reverse. Furthermore, relying on payment services provided entirely by the private sector would also mean having no backstop in case of operational failures or other causes of service interruptions. Lastly, not offering a public alternative to private digital means of payments could have adverse effects on financial inclusion.

Private money cannot solve all the problems and reach the objectives, especially to support innovative payments for Industry 4.0 and Web3. Private payment solutions for conditional payments in a tokenised economy (industry 4.0 and web 3) are stablecoins and, to a lesser degree, commercial bank money tokens. Both categories of private solutions lack interoperability, fungibility and reliability to support the tokenised economy of industry 4.0 and web 3 absent a public alternative. Leaving the development of payment solutions entirely to the private sector, without a digital euro as monetary anchor, would carry the risk of a fragmented outcome across the euro area. As indicated in Annex 8, such private solutions,

alone, without a digital euro as public alternative would be more likely to (i) carry credit risks and (ii) increase market concentration and reduce competition. Commercial bank money tokens carry different credit risks depending on the bank issuing them. Stablecoins, too, carry specific systemic risks depending on the assets used to peg their value. The recent collapse of US pegged stablecoins suggests that the stability of private payment solutions is doubtful. Stablecoins are finally also predominantly pegged to the USD which creates risks for monetary policy (*dollarisation*).

Other regulatory measures can help improving the payment market in the EU but cannot offer public money for payments in the digitalising economy. SEPA created common schemes for credit transfers and instant credit transfers within the European Economic Area. These schemes contributed to the creation of a single euro payments market in Europe by making it possible for consumers to rely on just one payment account to make euro credit transfers, including instant credit transfers, not only in their own country, but also in an area larger than the European Union. The PSD2 and its ongoing review aimed to address barriers to new types of payment services, such as payment initiation services and account information services, and improve the level of consumer protection and security. The regulation on Instant Payments will significantly increase speed and convenience for consumers, for example when paying bills or receiving urgent transfers (e.g. in case of medical emergency). In addition, they help to significantly improve cash flow, and bring cost savings for businesses, especially for SMEs, including retailers. These measures make payments with commercial money more efficient, safer, and faster in the EU. Nevertheless, they all concern commercial money and payment systems. Commercial bank money benefited from trust due partly to its one-to-one convertibility to central bank money. This trust may be at risk if this convertibility is only limited to cash, which is less and less usable in a fast-digitalising society.

The monetary policy instruments of the ECB can address some of the problems and objectives but lacking a digital euro, a possible wide acceptance of a means of payment or store of value not denominated in euro in the future could weaken or even impair the transmission of monetary policy in the euro area. It would also have unclear implications for financial intermediation and cross-border capital mobility, which could ultimately affect financial stability.

MICA will reduce risks related to global stablecoins but is not aimed at addressing the problem set out in this impact assessment. Crypto-assets that stabilise their value by referencing other assets, be it a single official currency (e-money token) or any other asset/basket of assets (asset-referenced tokens), have a potential to be widely used as a means of exchange which may in the case of asset-referenced tokens and e-money tokens denominated in non-EU currency pose the risks to the smooth operation of payment systems, monetary policy transmission or monetary sovereignty. MICA addresses these risks by limiting the extent to which asset-referenced tokens and e-money tokens denominated in a non-EU currency may be used as means of exchange, including by giving the ECB the power to limit or stop the issuance of those tokens.

As a conclusion, the existing and planned measures can promote private digital means of payment, however, they cannot ensure continued availability and use of public/central bank money when citizens and businesses decide to use more and more digital means of payment. Private solutions cannot fulfil this demand either.

6.2 Establishing and regulating the digital euro

Establishing a digital euro would make it possible for the Eurosystem to issue central bank money in digital form for general use by people and businesses. The Regulation would enable the Eurosystem to issue central bank money in digital form. This would ensure that the central bank issued euro can remain usable in the digitalised economy and society and thus can support the European people and businesses. A digital euro would thus effectively reach the general objective and – with the right design – support the specific objectives.

A digital euro would have a number of specific benefits for and potential impacts on different stakeholders, for example in relation to availability and usage of central bank money, financial stability, privacy and personal data protection, anti-money laundering. As these effects would be influenced by a number of regulatory and normative choices, the impacts are analysed in the following sections by setting out specific options for these choices, before coming back at the end to the overall impact of the digital euro (section 7.2).

Non-financial industry representatives call for a digital euro because a digital euro in industry 4.0 and web 3 would guarantee market stability, avoid market fragmentation and safeguard European monetary sovereignty. In the public consultation, stakeholders expressed that a digital euro is needed to support innovative payment solutions in the private sector especially the possibility to program conditional payments as a crucial and attractive feature.

6.2.1 Access and Usability

Legal tender status

Option 1a: Digital euro without legal tender status

Without legal tender status, acceptance of a payment in digital euro would be fully voluntary for merchants. The payees (merchants) and distributors (PSPs) may decide to only invest in an infrastructure when they perceive a high demand from users, unless the comparative costs of accepting the digital euro against other electronic payments are clearly lower. Even if users would see benefits in the digital euro such as privacy, low cost and fast transactions, their demand for payments in digital euro might remain low until a wide acceptance infrastructure is available. This would be detrimental to the development of network effects and use of the digital euro.

Option 1a would only partially fulfil the general objective (enabling payments with central bank money in the digital age) as it would not allow to fully reach specific objectives (see section that aims at ensuring that central bank money remains available and accepted by everyone in the digital sphere), as this option does not guarantee the wide availability and acceptance of the digital euro. Without legal tender status, the drivers of acceptance would be comparable to all other electronic private payment solutions where payees decide whether to accept a particular payment method as a means to discharge payment obligations, e.g. based on level of fees and convenience. A wide acceptance might prove difficult to achieve should the digital euro not have legal tender status as it takes time, cost, and effort for users to adopt a new payment method.

This was evidenced in the Kantar survey commissioned by the ECB,[131] where participants expressed "a strong preference for payment methods with pan-European reach and universal acceptance in physical shops and online". No legal tender status may limit incentives for merchants to invest in the necessary infrastructure to accept payments in digital euro. Lacking a wide acceptance of the digital euro by payees, adoption and use of the digital euro by payers cannot be guaranteed. Issuance of a digital euro without granting legal tender status could thus result in a limited take-up by users.

Under Option 1a, a digital euro without legal tender status would not carry any mandatory compliance costs, as its use would be voluntary. The overall cost would depend on the business decision of merchants and PSPs, which might decide to accept and distribute the digital euro. Since neither the acceptance nor the distribution would be mandatory for any business, their decision would be entirely based on commercial considerations. It should be noted, however, that high one-off and running costs could deter PSPs and businesses from offering and accepting digital euro services, all the more if the digital euro take-up by users is uncertain (see more details under Option 1b) or slow[132].

Option 1b: Digital euro with legal tender status, including general mandatory acceptance by payees

With the introduction of a digital euro with legal tender status, people and businesses would benefit from an additional choice to pay in central bank money in electronic form (e.g. at POS or e-commerce) that would be accepted throughout the euro area. ECB market research has shown that the option to pay anywhere and to anybody with a digital euro is the most valuable feature for citizens, differentiating it from existing payment instruments. Also, it is a means of payment that merchants would be happy to accommodate as long as broad adoption by consumers could be ensured.[133] This was also confirmed by the Commission's public consultation.[134]

Legal tender is a usual attribute of official currencies in the relevant territory (as a liability of the central bank). For some, legal tender status is an essential and inherent element of a CBDC.[135] In addition, "*robust legal tender provisions can ensure that the use of the national currency is favoured in domestic payments*"[136], as opposed to third country CBDCs or non-euro denominated stablecoins. This has led the ECB as well to consider a legal tender status as a desirable feature of the digital euro.[137] The legal tender status of the digital euro would be an essential factor in payment decisions of people and businesses as it would imply that the digital euro would have to be accepted widely by payees and in particular merchants. According to the Kantar survey[138], this is a crucial aspect for the general public and the tech-

[131] Study on New Digital Payment Methods, Report March 2022
[132] Payments is a two-sided network industry featuring positive adoption externalities, meaning that a user joining the network brings benefits that accrue to others in the network. In other words, the value of a payment service to a provider or end user increases with the number of other participating providers or end users. When these positive effects are not internalized, market demand tends to be too low at any price, hence the equilibrium network size is smaller than the socially optimal network size, and even a perfectly competitive equilibrium is not efficient.
[133] Study on New Digital Payment Methods, Report March 2022
[134] As BEUC (European consumer organisation) put it, "it is necessary to maintain public access to and full usability of central bank money at the time of developing electronic payment". In the Commission's targeted consultation EU citizens ranked the wide availability, easy on-boarding and use, ability to pay offline, anywhere to anyone, instant settlement and cost free features as very important or important.
[135] As the European Payment Council (EPC) put it in its answer to the Commission's public consultation, "legal tender seems inherent to the concept of the digital euro". IMF staff defined CBDC as "a new form of money, issued digitally by the central bank and intended to serve as legal tender." IMF Staff, 2018, Casting Light on Central Bank Digital Currency, IMF, SDN/18/08 and IMF Working paper (WP/20/254) "Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations", W. Bossu and alii.
[136] See BIS Annual Economic Report, June 2021, CBDCs: an opportunity for the monetary system
[137] Report on a digital euro, ECB, October 2020
[138] Study on New Digital Payment Methods, Report March 2022

savvy: "*Universal acceptance was considered the most important feature – ideally, across the euro area, all merchants in physical and online stores would need to accept it, regardless of the size of the purchase.*" Such a universal acceptance, which would replicate the acceptance model of cash, is described as a possible leveraging factor leading to the improved financial inclusion of the unbanked population in the Kantar survey. "*The new method should be as easy to use as possible and still provide the same control as cash. It should also be accessible around the clock and be accepted in any shop.*" People and businesses could benefit from a wide acceptance network and thus have a real choice to pay with central bank money in a digital way. In legal terms, granting the digital euro the status of legal tender is sound and would seem logical. Option 1b, i.e. granting legal tender status to the digital euro with a general mandatory acceptance of digital euro payments for payees[139], would be effective in meeting the general and both specific objectives.

- In terms of general objective, the issuance of a digital euro would ensure that the central bank money issued by the ECB can also meet payment needs in the digital age.
- In terms of specific objective 1, the legal tender status, which implies mandatory acceptance, would guarantee wide acceptance by payees of the digital euro and hence enable wide usage of the digital euro for payments in the digital economy. However, the actual use of the digital euro will also be determined by other factors, such as convenience for consumers compared to other means of payment, while its effective success will also depend on factors such as charges for merchants. Granting legal tender status to the digital euro would further support the use of the euro in a digitalised economy.[140]
- Likewise, if the digital euro has a mandatory acceptance and thus a strong acceptance network, reaching specific objective 2, i.e. maintaining the dominance and use of euro vis-à-vis non-euro denominated stablecoins and foreign CBDCs, would also be more effectively achieved than under Option 1.a. Granting legal tender status to the digital euro could thus help avoiding that foreign CBDCs or non-euro denominated stablecoins result in currency substitution, provided charges to consumers remain low.[141] This would tend to ensure a convergent use of the euro as the single currency of the euro area.

On the other hand, granting legal tender to the digital euro may negatively impact payment services providers' current business with private means of payment, as the legal tender status may foster the acceptance of the digital euro to the detriment of private means of payment. In that respect, some payment service providers pointed to the "unlevel playing field" between the digital euro and private means of payment, should a legal tender be introduced.[142] However, the digital euro with legal tender status is an official currency and has a different nature than private means of payment. The future market position of the digital euro will not only depend on its acceptance network, but several other characteristics as well, such as convenience and payers' fees. In addition, payment service providers could benefit from

[139] Under this option 1b, mandatory acceptance would not apply to natural persons acting in the course of a purely personal or household activity.

[140] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.

[141] The Legal tender status is also in other jurisdictions seen as a key attribute of CBDCs. One of the more advanced CBDC projects – e-CNY in China – has received legal tender status. In Sweden, the Riskbank has proposed that e-krona be made legal tender "to give the e-krona a strong position and ensure that it becomes established and accepted by the market" (Sveriges Riksbank (2019): "The Riksbank proposes a review of the concept of legal tender", press announcement; The Riskbank's e-krona project, Report 2, October 2018. "Put simply, a trader should not be able to discriminate against a digital payment with state e-krona if they otherwise accept private digital money").

[142] See Annex 2 for a summary of the public consultation

distributing the digital euro, which would be widely accepted due to the legal tender status. Benefits include additional income from value added services, potential expansion of customer base and potential revenues generated on the merchant side. 'Level playing field' issues are unlikely to materialise if merchants will have to accept the digital euro, as they generally accept a mix of payment means, including more expensive means of payment in order to satisfy their customers (must-take nature of certain payment means). On the other hand, mandatory acceptance carries the risk that intermediaries overcharge merchants for digital euro payment services if the pricing is left to the market, given that merchants would have no choice but to accept digital euro payments.

In terms of costs, a digital euro with legal tender status would require the necessary infrastructure throughout the euro area for **payees** to be able to accept the digital euro in all forms, i.e. both online and offline.

Overall, the level of costs incurred by **PSPs** will depend on the design of the digital euro and factors such as the possibility of reusing existing payment infrastructure, the exact role of intermediaries in the digital euro ecosystem (e.g. opening and managing accounts, settlement of transactions, provision of the end-user interface, acquiring, dispute resolution), the options or eventual obligations for PSPs to distribute the digital euro (e.g. mandatory requirement for all or part of the PSPs to distribute the digital euro), the design of the compensation model (e.g. free basic uses for private individuals, Eurosystem compensation to PSPs, scheme and processing fees, merchant fees, potential fees charged by smart phone operators for hosting wallets of PSPs) the possibility to grant access to ancillary services, the possibility to expand more easily into other national markets in the euro area, and the share of PSPs deciding to voluntarily offer such services (which depend on several of the factors listed above, and also the actual demand for digital euro). The PSPs might need to cover the cost of expanding their current business processes, including developing and running the customer facing interfaces, onboarding of customers, managing accounts and transactions, providing payment tools, checking compliance.

Original Equipment Manufacturers (OEMs) of mobile devices such as smartphones could charge PSPs a per transaction fee on digital euro transactions for storing software on hardware components of mobile devices like secure elements. A secure element is a tamper-resistant hardware and platform which is separate from the Operating System of a mobile device and the device's processor/chip. Secure elements securely host applications and their confidential data in accordance with rules set by trusted authorities. Secure elements are similar to a smart card in a mobile phone and provide the highest level of security for applications residing on it. Access to secure elements of OEMs is in particular necessary to store tokenised primary account numbers (PANs) which are needed to authorise payments.

In the Commission's targeted consultation, 35% of professionals, especially financial intermediaries, reported that PSPs would face potentially considerable one-off costs and less than one fifth anticipated considerable recurrent costs. Expected costs in connection to a digital euro mostly relate to the deployment of new distribution channels, expansion of PSPs account management systems (both hardware, software), IT connections to the ECB and legacy systems, customer support, scheme fees, transaction processing, KYC/AML, fraud management, payment guarantee, accounting, back-office, training and marketing. Most of these functions are already in place for existing payment solutions, but the expansion of services, especially opening and managing new accounts might require additional investments from PSPs. Nevertheless, some of the costs listed by PSPs above (e.g. scheme fees if Eurosystem covers them) might not occur eventually and many other functions are

already in place and may not need additional investments. Most professional respondents pointed out the difficulties in estimating future costs owing to large uncertainties as regards the design of the digital euro and the possibility to reuse existing banking and payment infrastructures (e.g. SCT Inst).

Nevertheless, one may attempt to provide a very basic one-off adjustment cost estimate for PSPs, based on the recent Commission Impact Assessment on Instant Payments.[143] The basis for such an estimate is the similarity of actions necessary for PSPs to provide services based on a new payment scheme.[144] The total one-off adjustment costs for SEPA instant payment are reported by PSPs to fall in the range of EUR 10,000 to EUR 1.3 million per PSP.[145] Considering the total number of 5,242 institutions providing payment services in the euro area,[146] the overall one-off costs of providing digital euro services for these PSPs can be estimated to amount to up to EUR 6.8 billion. This can be considered as a conservative estimate, as the actual costs of smaller PSPs will fall in the smaller end of the range. Indeed, if one follows the estimation method applied in the Commission Impact Assessment on Instant Payments, namely by grouping PSPs into two size groups (total assets above and below EUR 1 billion), applying a smaller cost estimate for smaller PSPs, the cost for all PSPs can be estimated to amount to up to only EUR 3.6 billion[147].

It is not possible to estimate the recurrent costs of providing digital euro services at this stage due to uncertainties as regards implementation details and the actual future digital euro usage. In addition, one may also need to consider the provision of acquiring services to merchants, which is a specific service and is expected to be offered by only a subset of PSPs.[148] However, the related one-off and recurrent costs are also not possible to estimate due to unavailability of data. At the same time, (acquirer) PSPs will recover their costs via merchant fees (as the case with existing payment means) and additional fees coming from value added services build on the digital euro (e.g. conditional payments).

For **merchants** to accept payments in digital euro, new POS terminals, new software or new app-based POS solutions may be needed, and/or integration with existing infrastructure may need to be developed. The cost of the acceptance for merchants in the euro area was estimated in two ways using two sources of information, i.e. the targeted consultation and ECB's discussion with market experts. The costs calculated based on the targeted consultation results in a wide-range estimate. The estimates received from the ECB, while falling within the range resulting from the targeted consultation, is a narrower range estimate, which also indicates that the real cost can be at the lower end of the estimates from the targeted consultation.

In the Commission targeted consultation, merchants and PSPs reported that it was impossible to predict future costs of the acceptance of payments in digital euro as the details of the design of the digital euro are still unknown. Costs are also very dependent on the individual merchant profile. Companies that already accept digital means of payments will face lower

[143] Link to be provided after the adoption of the IP proposal and publication of the IP IA.
[144] See Box 2 in the Commission Impact Assessment on Instant Payments. Notable that an important one-off cost item, the setting up of the 24/7/365 operation would not have to be redone for the digital euro – hence this estimate is conservative.
[145] The data for instant payments had its own limitations. The limited number of observations, and the wide range of estimates (which is not hard data) calls for a necessary caution.
[146] 2021 data, ECB Payment statistics. https://sdw.ecb.europa.eu/reports.do?node=1000004051
[147] The share of the two size groups were estimated based on a sample of 2,886 PSPs that adhere to the SEPA credit transfer scheme, and whose total assets data was available in the ORBIS database. As a result, it was assumed that 53.6% of the relevant institutions had total assets below 1 billion euro. As per the Commission Impact Assessment on Instant Payments, for the lower bucket, the range of one-off compliance costs reported was EUR 10 000 to EUR 143 000, while for the upper bucket the range was EUR 100 000 to EUR 1.3 million.
[148] Fewer than 400 acquirers were active in Europe in 2018. Europe's biggest Merchant Acquirers by volume - Payment Card Yearbook (paymentscardsandmobile.com)

setup costs compared to those not accepting digital means of payments. Nevertheless, few professional respondents (PSPs, merchants) provided an estimate of the incremental costs necessary to accept payments in digital euro. The ranges are summarized below, however, given the uncertainty around the exact needs and the very low response rate, it needs to be treated with caution.

Table 3. Merchants' possible costs related to the acceptance infrastructure of payments in digital euro[149]

	Merchants already accepting electronic payments	Merchants not yet accepting electronic payments
	In EUR per terminal	In EUR per terminal
One off costs related to (new) POS terminals for accepting payments in digital euro :	50-500	100-1000
One-off costs related to software:	10-500	100-500
Annual cost for maintenance, licences etc.	Insignificant – 100	Insignificant – 100

Source: European Commission targeted consultation on a digital euro, 2022.

Based on the targeted consultation data in Table 3 and considering that end 2021 there were around 13.5 million POS terminals in the euro area (as reported by the ECB[150]), the total one-off costs (both hardware and software) for all merchants already accepting electronic payments could range between EUR 0.8 and 14 billion.[151] As regards annual recurrent costs, for maintenance and licences, calculating with a mid-range average of EUR 50 per terminal would result in annual running costs of about EUR 0.7 billion.

The potential cost for merchants not accepting electronic means of payments can only be roughly estimated. According to the SPACE study of the ECB[152] from 2022, it was possible to pay with non-cash payment instruments in 81% of reported transactions. This means that in slightly less than one in five transactions only cash was accepted. Calculating with 13.5 million POS terminals in the euro area representing 81% of transactions,[153] and a middle of the estimated range one-off cost (terminal plus software) of EUR 850 per terminal[154] for merchants not yet accepting electronic payments, their potential one-off cost would be about EUR 2.7 billion. As regards annual recurrent costs, for maintenance and licences, calculating with a mid-range average of EUR 50 per terminal would result in annual running costs of about EUR 160 million.

As an alternative, the costs of the acceptance infrastructure for merchants was also calculated based on information received from the ECB. According to market experts who consulted with the ECB, the cost of updating existing European terminals for the acceptance of non-proprietary NFC and/or QR codes would range between EUR 40 and EUR 75 per terminal. This includes a partial replacement of some terminals as they cannot be upgraded due to hardware limitations and can only be subject to a partial software update. The estimated costs per terminal also depend on assumptions by the terminal vendor about the number of

[149] Data is based on a small number of heterogeneous respondents.
[150] https://sdw.ecb.europa.eu/reports.do?node=1000001404
[151] Calculating with the middle of the estimated range (terminal plus software) of EUR 530 per terminal, the total one-off cost would be about EUR 7.1 billion.
[152] Source: Study on the payment attitudes of consumers in the euro area 2022
[153] Resulting with a need for an additional 3.2 million POS terminals. This is under the assumption that each terminal processes the same number of transactions.
[154] For consistent methodology, we used the middle of the range, but it is very likely that the per-terminal cost would be much lower for these merchants, especially for small merchants. Micro enterprises or sole entrepreneurs would probably need a very simple POS solution which would likely cost much less than EUR 850, especially considering the fact that merchants can even today accept card payments with their mobile phones. These modern solutions enable to accept payments not only using QR codes but also NFC antennas.

terminals the merchants are going to have, as well as factors such as whether the digital euro would be based on a new card solution or use QR codes, for which no decision has been made yet. Based on this information, the merchants in the euro area that already accept electronic payments can foresee a total cost of about EUR 0.5-1 billion when implementing a new terminal standard. For merchants not yet accepting digital means of payments, the additional one-off cost could range between about EUR 125 million and EUR 250 million.[155]

In addition, the typical POS cycle, i.e. natural replacement of POS terminals by merchants, is about 4 years. Some of the merchants may be able to change their POS terminal with the natural cycle and not extraordinarily – thus minimising any extra cost for these digital euro capable POS terminals. It is possible that merchants that do not yet accept private electronic payments will decide to accept digital euro payments and at the same time also a private electronic payment. To minimise their investment needs and not squeeze out other payment means, the new POS solutions should be able to handle multiple payment means. Interoperability between the digital euro infrastructure and pan-European private payment means could also be ensured via the Regulation.

Respondents to the Commission's targeted consultation expect that with the development of new payment solutions, accepting electronic payments means will become more attractive. The costs of acceptance infrastructure will decrease as a result, especially for SMEs, because payment solutions could be integrated on existing mobile devices, using for example NFC and dynamic QR codes. Others believed that costs should decrease due to technological developments and innovation, as well as economies of scale as electronic payments continue to develop. By adopting these technologies, especially small and minor merchants could substantially reduce the one-off cost of new acceptance infrastructure. However, the same approach would hardly work for medium-size and larger merchants, which typically rely on POS terminals integrated with their cash registers or cash barriers.

For e-commerce and online payments, the acquiring PSP's one-off costs for upgrading the POS/acceptance infrastructure to support the digital euro as an additional payment method should be marginal (with some dependency from design decisions).

Moreover, besides the cost of the acceptance infrastructure, merchants would incur recurrent transaction fees to financial intermediaries who provide acquiring services and process payment transactions similar to current electronic payments. However, considering the uncertainty as regards the technical choices and the future business model it is not possible to estimate them at this point in time. Nevertheless, it is reasonable to assume that they will not be higher than the fees/costs of existing payment means (mostly cash and cards), resulting in zero incremental costs.[156]

[155] The results were calculated using a similar methodology as above, i.e. on the basis of 13.5 million POS terminals, and 81% of electronic payment acceptance rate. It needs to be noted that it is not possible to predict how many such merchant would decide to accept digital euro payments eventually.

[156] Merchants pay merchant service charges (MSC) related to the acceptance of card payments. MSCs has three major components: interchange fees, scheme fees (including processing fees) and acquirers' margins. According to a study by CMSPI & ZEPHYRE, the MSC in EU 28 on average was about 0.48% in 2020. The interchange fees related to intra-EU consumer credit and debit card payments are capped by the Interchange Fee Regulation (IFR) at 0.3% and 0.2% of the value of the POI payment transactions, respectively. This can vary among Member States and be much lower than the cap. According to the study, the average interchange fee was 0.2% in 2020. Acquirers' margins depend on the services provided and the negotiating position of merchants. . According to the study, the average acquirer margin was 0.18% in 2020. Lower scale and weaker bargaining power nonetheless often result in higher acquirers' margins and hence higher MSCs for smaller merchants. Scheme fees on average were 0.09% in Europe according to the study. Source: https://www.bargeldlosblog.de/wp-content/uploads/CMSPI-Zephyre-Scheme-Fee-Study-V3-1.pdf
The caps in the Interchange Fee Regulation (IFR) were based on the so-called 'Merchant Indifference Test', aiming at an interchange fee level that would result in MSCs that makes the merchants indifferent as regards the choice of the payment means by the payer (cash and cards). Hence it is reasonable to assume that acceptance of cash on average has comparable fees/costs of that of cards for merchants.

No significant additional administrative burden is expected to derive from this option for the private sector. Payment reporting to the Eurosystem is mostly done by market infrastructures. PSPs have very limited requirements on payment reporting, which will likely be the same for a digital euro, especially if the Eurosystem would already obtain aggregated information by settling digital euro payments.

Option 1c: Digital euro with legal tender status with some exceptions to mandatory acceptance

Under option 1c, the digital euro would be granted legal tender status with some exceptions to mandatory acceptance.

Under this option, users would still benefit from a wide acceptance network as merchants who are above the thresholds set for microenterprises and already accept other digital means of payment could not benefit from such exceptions to mandatory acceptance and would have to accept digital euro payments. However, merchants could still be temporarily exempted from mandatory acceptance for reasons of good faith. To cater for a certain level of contractual freedom, merchants who have expressly agreed with payers on a different means of payment would also be exempted from the obligation to accept digital euro payments.[157] Exceptions would ensure the proportionality of the acceptance obligation and avoid overburdening merchants for which an obligation to accept payments in digital euro could be disproportionate.

Therefore, the impact of the exception to mandatory acceptance on the effectiveness in meeting the specific objectives compared to Option 1b should be small. A wide acceptance by payees, and in particular merchants, would still be guaranteed, and the proportionate nature of any exceptions should not have a considerable bearing with regard to the objectives.

Depending on the design of the digital euro, some merchants could see larger part of their revenue or profit burdened by the costs described in option 1b related to both one-off and recurrent costs of acceptance, compared to larger merchants, unless these are mitigated by new payment solutions, such as mPOS (see above) requiring limited investments. In any case, while the costs for merchants accepting electronic means of payments would likely be the same under Options 1b and 1c, the latter option would mean no obligatory costs for merchants that are exempted from mandatory acceptance. As presented under option 1b, merchants not accepting electronic means of payments could save the one-off costs related to terminals, which estimated – very roughly – at EUR 2.7 billion in the euro area, as well as the recurrent cost of around EUR 160 million for terminal maintenance and licences, and the currently unquantifiable per transaction fees. As regards costs for PSPs, the analysis under Option 1b applies here as well, the difference being an expected slightly lower demand for digital euro services due to a somewhat lower take-up of digital euro transactions – leading to potentially lower supply and corresponding costs.

[157] If merchants who do not accept electronic means of payment are exempted, digital euro could not be used for 21% of the payment transactions.

Consistency of the different options

Option 1a is not consistent with the legal status of other forms of central bank money (euro banknotes and coins) that have been granted legal tender status in the euro area.[158] It may thus prove complex to communicate to the public why one form of central bank money available to the public (euro cash) is legal tender, while another is not (digital euro). This may become a source of legal and economic uncertainty around the nature and basic characteristics of the digital euro, which would further undermine its acceptance. It could also affect the usability of Article 133 TFEU as a legal basis, which stipulates that the measures shall be necessary for the use of the euro as the single currency.

Option 1b and 1c would be consistent with the legal tender status of euro cash, which is the only central bank money currently available. However, Option 1b and 1c would also have implications for the definition and further regulation of the legal tender status of cash. Although the latter is enshrined in EU law and has been interpreted by the Court of Justice of the EU for banknotes, there is no detailed regulation in Union secondary law. Regulating the legal tender status of the digital euro in secondary law without defining the legal tender status of euro cash would seem inconsistent. In addition, consistency would be further enhanced if the legal tender status of cash and the legal tender of the digital euro would be defined in a similar way (see Annex 7). Measures to improve access to cash (see Boxes E and F, and Annex 7) would also be an appropriate solution to ensure that the central bank money issued by the ECB remains available. However, improving access to cash will only be part of the solution, as euro cash alone is not sufficient to support the EU's economy in the digital age. Therefore, the issuance of the digital euro would allow the central bank money issued by the ECB to support the EU's economy in the digital age, in addition to cash.

Stakeholders' views on the different options

A majority of respondents to the Commission's targeted consultation on a digital euro viewed legal tender status as an important feature and supported regulating legal tender in detail at Union level, including the possibility of exceptions to mandatory acceptance. 69 of professional respondents (56%) supported granting a legal tender status to the digital euro, with unequivocal support from merchants and consumers whereas only a minority of financial institutions favoured this proposal owing to concerns on the digital euro payments competing with private payment means. Views appeared more split on exceptions to the principle of mandatory acceptance: 59 professional respondents (48%), including a large number of financial institutions, supported such exceptions, with an emphasis on merchants that do not yet accept digital means of payment and local exceptions defined by Member States. In contrast, 33 professional respondents (27%), mostly merchants, showed reluctance to exceptions in case the digital euro can be embedded into the existing acceptance infrastructure in a costless way. Consumer associations strongly supported introducing a legal tender with as few exceptions as possible.

Respondents mostly agreed that exceptions should be regulated at Union level while providing for the possibility of defining further exceptions at Member State level, subject to a Union level authorization procedure.

Box F – Impacts of the options on the on legal tender of cash

Acceptance of cash

[158] The notion of legal tender is enshrined in Article 128(1) TFUE as regards euro banknotes. It is enshrined in identical terms for euro coins in Article 11 of Regulation 974/98 on the introduction of the euro. See Annex 7 for further details.

EU action on the acceptance of cash entails a codification and clarification of the jurisprudence of the Court of Justice of the European Union, itself drawing on the Commission Recommendation of 2010 on the key principles of legal tender. Therefore, these clarifications do not entail any direct impact or costs beyond providing greater legal certainty throughout the euro area as to what the scope and effects of legal tender consists of.

Access to cash

As part of the baseline scenario, no separate EU-level action would be taken on access to cash. Under this scenario, the soft law measures that some Member States are likely to take will seek to incite credit institutions to provide adequate cash services to citizens and business customers, with the needed geographical coverage. Such non-coordinated measures risks to create a patchwork of different policies and practices, with some Member States taking significant action, whilst other Member States would not take sufficient action, thereby risking allowing cash access levels to drop below a minimum level. This would exacerbate the heterogeneous situation of cash access on the ground and would be incoherent with the status of the euro as the single currency.

Option 1(b-c).i, a soft law instrument (e.g. a Commission Recommendation) would leave to the discretion of the Member States whether to act and which actions they opt for to promote access to cash in their Member State. This would likely mean that some Member States would take action to ensure sufficient access to cash while others would not. This would not allow for a more uniform interpretation of the key principles of legal tender of cash. The concerns of citizens and businesses about inadequate access to cash would therefore not necessarily be addressed sufficiently across the euro area. This would only partially address the objective of ensuring a sufficient access to cash and tolerating insufficient access in parts of the euro area could erode the effectiveness of the legal tender status of the single currency.

Option 1(b-c).ii, a legally binding obligation on Member States in the proposed Regulation on legal tender of cash, would oblige the Member States to ensure sufficient and effective access to cash on their territory. As a result, all Member States have to make a rigorous assessment of the needs of citizens and businesses in terms of access to cash, and to take further corresponding measures to address those needs if necessary. Member States will have to determine what sufficient and effective access means in their country-specific context (i.e. taking also into account levels of cash access based on common indicators), and what degree of action needs to be taken in order to guarantee it. Should a Member State, based on its analysis, conclude that access to cash is sufficient and effective, it would not be required to take further action. When a Member State concludes that access to cash is not sufficient, or is at risk of deteriorating, action would have to be taken by adopting specific and appropriate measures.

At the same time, by leaving to Member States the scope to adapt the precise content of the appropriate measures to the cash access situation on the ground and the structure of their banking system, this option would avoid imposing an inappropriate 'one size fits all' approach. The measures taken by the Member States would not impose at EU level highly specific requirements on the Member States, such as an obligation to maintain a specified number of bank branches or ATMs per geographic or population unit. Rather, these measures would leave to the Member States the responsibility to assess what *sufficient and effective* access means in their country-specific context (i.e. taking also into account demand for cash access), and what degree of action needs to be taken in order to guarantee it, having only the basis of the common indicators specified by the Commission. If Member States assess that the cash access situation on their territory is already sufficient, then they could impose minimum levels corresponding to that status quo, so that banks would not need to extend their existing branch or ATM presence; but these levels would set a floor below which access levels would not be allowed to fall.

Since Member States would need to further specify their measures taken to ensure cash access, define the sufficient geographic standards for access requirements for ATMs that correspond to their population needs and service level specificities, and assess which payment service providers fall within access requirements and recommendations, the possible cost implications would be determined by the needs on the ground and the corresponding decisions of the Member States. If access to cash remains sufficient in a Member State, measures would not be needed in that Member State so there would not be any additional costs on banks. In Member States where cash access has already

significantly deteriorated there could be costs for banks associated with restoring a sufficient level of access to cash, but the extent of such costs would depend on the decisions of the national authorities on the sufficient and effective levels of access, also in the case that the Commission would adopt an implementing act. The EU Regulation as such would not directly impose costs on banks or retailers.
The recent example of Belgium illustrates how the federal government reached a gentleman's agreement[159] with the banking sector in order to ensure sufficient access to cash for the population, in a country where the number of ATMs is projected to decrease by 50% between 2015 (over 8000 ATMs) and 2025 (around 4000 ATMs foreseen) and where, according to the October 2022 Eurobarometer, one third of the population considers that it is not easy to withdraw cash[160]. This agreement built on plans by the country's main banks to pool together the provision of ATMs and thereby reduce the number and location of ATMs in a planned way. In March 2023, the Belgian government agreed with the banking sector to supplement by 207 the number of planned pooled ATM locations and by 80 the number of ATMs in urban areas planned to be opened by 2025, and to have a minimum of one ATM in each commune. Although this agreement represents an increase of approximately 5% in the planned number of pooled ATMs, this should be seen in the context of the overall reduction of banks' costs over many years through branch and ATM closures and the likely cost savings for individual banks through the pooling of ATMs (costs and savings are not disclosed by the participating banks because this information is confidential).

The designation of one or more national competent authorities with oversight and regulatory powers over the market activities of the cash industry would in most cases not imply that Member States need to set up new authorities. It rather means that it would need to confer regulatory powers on an existing central authority, in most cases the national central bank, which would then have the authority to adopt further measures as they see fit, such as imposing information duties, setting up guiding principles and codes of practice as well as to require or prohibit certain actions taken by cash providers in order to guarantee sufficient access to cash. The outcome of the ELTEG III meetings suggest that several Member States are already undertaking measures aiming at ensuring sufficient and effective access to cash (e.g. monitoring of ATM coverage) without significant extra burden, and they are to an extent able to accommodate these measures within their authorities' existing mandate and range of tasks.

Distribution

Option 1d: Compulsory distribution of digital euro by *all* payment service providers

In a digital context, a default obligation to accept digital euros would be ineffective without a wide distribution infrastructure and services provided by PSPs. As emphasised by the IMF,[161] "*attributing legal tender status to a means of payment that cannot be received by the majority of the population might be legally possible but it raises fundamental questions, including from a fairness perspective*". Obliging PSPs to distribute digital euro upon request would ensure the effectiveness of a possible legal tender status under Option 1b or 1c. It would complement the guaranteed wide acceptance network for users created through the legal tender status by ensuring easy and wide access to digital euro and could therefore also support financial inclusion efforts.

A widely distributed digital euro would benefit **users and merchants** as network effects could reduce costs and increase availability. This is also applicable to option 1e (i.e. compulsory distribution of digital euro by certain PSPs). Option 1d could also support financial inclusion efforts as PSPs would be required to provide basic digital euro services,

[159] https://economie.fgov.be/sites/default/files/Files/Financial-services/accord-atm.pdf
[160] https://europa.eu/eurobarometer/surveys/detail/2666
[161] IMF Working paper (WP/20/254) "Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations", W. Bossu and alii.

such as provision of an account/wallet, payments and funding/defunding operations, to the most vulnerable and unbanked people free of charge (see ECB's report on a digital euro).

The **Eurosystem** would also benefit from a higher use of the digital euro (given the benefits it may gain from seigniorage, and the fact that costs per transaction will be lower than in the option when distribution by PSPs would be voluntary). At the same time, the operational cost of option 1d may slightly increase compared to other options as PSPs would need to be supervised on their digital euro activities in addition to their other payment services activities.

Option 1d would be effective in supporting a general acceptance obligation deriving from legal tender status, subject to possible exceptions, and of the corresponding right to pay with digital euro. However, obliging **all PSPs** to distribute the digital euro, without any considerations for their activities, geographical location or size may be disproportionate to reach the two specific objectives. An obligation on all regulated PSPs to distribute the digital euro would mean that every obliged entity would need to make investments to be able to serve customers with digital euro. Based on the feedback from the public consultation, the exact amount of these investments is not possible to estimate at the current juncture as it would depend on the technical design and implementation. Depending on whether PSPs need to open and manage new accounts for their customers, and on how far existing infrastructure could be reused, the investment cost could be moderate to significant. In line with the basic estimate on the basis of the Commission Impact Assessment on Instant Payments in Option 1b, the one-off adjustments costs for all euro area PSPs to be able to provide digital euro payment services (compulsory distribution) could be estimated to amount to up to EUR 6.8 billion. A more elaborate estimate based on grouping PSPs into two size groups (see Option 1b) leads to an estimate of up to EUR 3.6 billion.[162] However, depending on the compensation model for digital euro payments, PSPs might be able to recoup some of the cost of these investments by receiving fees (e.g. merchant fees) after transactions in digital euro and by providing customers with additional digital euro services and thus generate income. Since the demand for such additional services cannot be reliably predicted, the extent to which the latter can contribute to PSPs' income is highly uncertain. The burden would especially be disproportional for PSPs that have highly specialized business models and are not targeting private individuals. Given the larger one-off costs and smaller running costs, PSPs with smaller customer bases would also bear the costs disproportionately. In combination with Option 1b or 1c, PSPs however could market additional services for a larger digital euro user base.

[162] Both these estimates can be considered as conservative, as an important one-off cost item used for instant payments, the setting up of the 24/7/365 operation would not have to be redone for the digital euro.

Option 1e: Compulsory distribution of digital euro by credit institutions with retail business

Under this option, people and businesses would have the guaranteed possibility to use digital euro services via credit institutions that are already active in retail business services and via all other PSPs that voluntarily decide to distribute the digital euro. This would ensure the effectiveness of legal tender status, while avoiding putting a disproportional burden on PSPs with specialised, non-consumer oriented business models.

Option 1e could be somewhat less effective in supporting a general acceptance obligation deriving from legal tender status compared to Option 1d. At the same time, credit institutions that already have similar services and cover most of the European people and businesses may be sufficient to distribute the digital euro.[163] Therefore, option 1e would also support financial inclusion efforts to a similar extent as option 1d, given that the requirement to provide basic digital euro services to the most vulnerable and unbanked people free of charge would still apply to all credit institutions with retail business.

The adjustment cost on PSPs discussed under Option 1d would be lifted for non-credit institutions and those credit institutions that have no consumer facing businesses. On August 2022, the number of credit institutions in the euro area was 4117.[164] Calculating with a one-off cost estimates for PSPs of maximum EUR 1.3 million,[165] the total adjustment cost for credit institutions could be up to EUR 5.4 billion. A more elaborate estimate based on grouping PSPs into two size groups (see Option 1b) leads to an estimate of up to EUR 2.8 billion.[166] Any costs for non-obliged PSPs would be dependent on their business decision whether they chose to offer digital euro services. Consequently, the general and the two specific objectives could likely be reached more efficiently by obliging only a subset of PSPs, credit institutions, to offer digital euro services while others would have the discretion to join.

Option 1f: No compulsory distribution of digital euro by PSPs subject to a review clause

Under this option, every PSP would make their own business decision whether to offer services related to the digital euro. It can be assumed that only PSPs that are confident to see a return would make the investments and bear the one-time and ongoing costs. Consequently, only PSPs that can reach a higher digital euro customer base and reach profitable and viable operation would likely enter this market.

However, this option would allow the market to decide on the level of use of an official currency and its availability to be used as a means of payment with legal tender. This option therefore carries the risk that the voluntary distribution by PSPs is not sufficient, leading to insufficient network effects. A correction of such a market failure via a review clause would only come with some delay.

Compared to Options 1d and 1e, there is thus less certainty that Option 1f would generate a wide enough user base in the short run and support the general acceptance obligation deriving from the legal tender status. At the same time, a viable business model that would be promoted under option 1f may ensure the success and permanent wide use of a digital euro

[163] By way of example, in China, the six largest banks were originally tasked with the distribution of the digital yuan while other large PSPs such as WeChat and Alipay joined the distribution network later.
[164] https://www.ecb.europa.eu/stats/ecb_statistics/escb/html/table.en.html?id=JDF_MFI_MFI_LIST This figure may still include credit institutions that have no consumer facing businesses.
[165] See under Option 1b.
[166] This is based on the assumption that the size distribution of credit institutions is the same as that of PSPs offering SEPA credit transfers.

for payments for the medium and long run, but this also depends on the design of the digital euro and the remuneration model.

Finally, as the investment needs for PSPs and the impact on their businesses cannot be thoroughly assessed at this stage due to the unknown number of PSPs, the costs of a voluntary distribution cannot be adequately substantiated and assessed against the benefits it will bring in achieving sub-objective 1. Nevertheless, using the same analogy to the Instant Payment Impact Assessment as in Option 1b and considering the fact that after 5 years only around 70% of the relevant PSPs[167] offered instant payments voluntarily to their customers[168], we can roughly put the adjustment costs for PSPs to amount to up to EUR 4.8 billion. A more elaborate estimate based on grouping PSPs into two size groups (see Option 1b) leads to an estimate of up to EUR 2.5 billion.

Consistency

On Options 1d and 1e, compulsory distribution by credit institutions engaging in retail business would be consistent with the approach under the Payment Accounts Directive[169], the overall objective of which is to ensure that every adult citizen in the EU can get access to a payment account with basic features. The digital euro could be provided like a payment account with basic features by credit institutions, supporting the financial inclusion of unbanked individuals. In that respect, the ECB digital euro report suggests offering digital euro basic features for free to all citizens. In this case however, a compulsory distribution may impinge on the PSPs' choices of solely engaging in business deemed profitable, as guaranteed under option 1f. Voluntary distribution with a review clause under option 1f may be insufficient to create a wide use base in the short run, slowing down the uptake of the digital euro.

Compensation model and merchant fees

Option 1g: Merchant fee pricing left to the market

This option would be most market neutral and have the least intervention into the competition between various payment means.

Fees left to market pricing may be the most effective option in terms of incentivising intermediaries to distribute the digital euro as PSPs will make sure their costs are recovered and they make a profit.[170] This option could in turn lead to higher availability of the digital euro and better support specific objective 1.

At the same time, granting the digital euro legal tender status, with the corollary of mandatory acceptance, carries the risk that intermediaries overcharge merchants for digital euro payment services if the pricing is left to the market, given that merchants would have no choice but to accept digital euro payments. In instances where PSPs' competition in providing acquiring services to merchants is limited, merchants may face higher fees, in particular in less competitive areas of the euro area, also taking into account the mandatory acceptance obligation that would come with the legal tender status (if it is granted). While the acquiring market for payments is deemed efficient (about 400 acquirers compete in the euro

[167] Of those that carry out regular SEPA credit transfers in euro.
[168] This 70% voluntary adherence rate is taken as the basis for the current estimation, yet the actual adherence will depend on the actual costs and the customer demand.
[169] Directive 2014/92/EU of 23 July 2014
[170] Of course a mandatory distribution by some of the PSPs may be even more effective.

area) the obligation of merchants to accept digital euro payments may create an uneven negotiation situation.

Furthermore, additional competition concerns may arise as regards any fees to be transferred between PSPs following a similar model as interchange fees for card payments. The risk of overcharging merchants with such inter-PSP fees (e.g. fees transferred by the acquirer PSPs to the distributor PSPs in case of POI transactions) can also be considerable looking at the experiences with the interchange fees on card payments in the past before regulatory intervention. Specifically, merchants, in particular small ones, have a weak countervailing market power as opposed to their acquirers, especially in the context of mandatory acceptance, compounded by their inability to negotiate merchant service charges below the level of inter-PSP fees (floor effect). In addition, inter-PSP (interchange) fees are prone to reverse competition[171], where issuers (the recipients of such fees) favour the issuance of payment instruments with the higher interchange fee levels leading thus to the crowding out of lower interchange fee based payment means (e.g. domestic card schemes or SCTinst-based payment solutions).

Importantly, it may be very difficult for the many PSPs to agree on a single inter-PSP fee. Without any central coordinating party (like a scheme owner) or regulation, the hundreds of acquirer and thousands of issuer PSPs may not be able to come to a multilateral agreement on such a fee[172]. In particular, the opposing interests of the two types of PSPs as regards the interchange fee levels[173], makes coming to an agreement potentially even more difficult. Without an inter-PSP fee and considering the free basic use of digital euro for private individuals, the compensation of issuers for their costs may not be sufficient. If (some of) the issuer PSPs are not required to distribute the digital euro, the lack of an inter-PSP fee may lead to very limited possibility for users to get access to a digital euro. At the same time, merchants could benefit from a possible lack of agreed inter-PSP fee, as their overall charges would likely be lower than those of card payments. Such savings could also be beneficial for users if merchants pass it on by lowering the final prices of their goods and services.

Potential higher market determined fees would lead to higher, and possibly disproportionate, costs for merchants and eventually for users, leading to a less efficient digital euro ecosystem. High fees may also diminish merchants' willingness or motivation to accept digital euro payments eventually (in case legal tender is not granted). Costs might be particularly high for small merchants as they have an even lower bargaining power than medium to large merchants regarding fees imposed by PSPs, on top of covering the one-off and recurring costs of acceptance of the digital euro in case they are not exempted.

PSPs participating in the targeted consultation generally advocated for a pricing left to the market. If priced similarly, PSPs' income from payment transactions would probably not be materially affected as any lost income from private payment means would be compensated by digital euro payments that replace them. At the same time, if more central bank money is used at the expense of private money, this would entail an additional indirect cost for banks as they make profit from interest margins on customer balances ('deposit seigniorage').

[171] It is reverse in a sense that competition leads to higher prices.

[172] The same goes for a network of thousands of bilateral agreements between them.

[173] In principle, distributor PSPs (the recipients) have an interest in higher interchange, while acquirer PSPs (the payer), who just pass it on to merchants, have an easier job in recruiting merchants at a lower interchange fee level. This is however complicated by the two-sided nature of payments, as the intermediaries would have to consider the interaction of the two sides. For instance, too high interchange may lead to low acceptance, leading to low usage of the payment mean, leading to lower interchange fee revenue for the issuers. Another factor influencing the outcome is the extent to which the issuers and acquirers are the same. In some MSs the leading acquirers tend to be specialist PSPs independent from local issuers, while in other MSs acquirers are also still issuers.

Option 1h: Determination of maximum amounts of merchant fees on the basis of a methodology set by the legislature and developed by the ECB

Under this option, the ECB would develop a methodology based on objective criteria set in the legislation to determine the maximum amounts of merchant fees. This should be done on the basis of parameters set in the enabling legislation with the objective of considering intermediaries' costs, considering the Interchange Fee Regulation or the merchant indifference test[174] as benchmarks for inter-PSP fees, considering the two-sided and network nature of payments, avoiding excessive fees for merchants, and avoiding crowding-out of private means of payment.

Regulating inter-PSPs fees would be efficient as this has an advantage in overcoming the difficulties of a large number of PSPs having to agree on its level multilaterally or bilaterally. Inter-PSP fees would enable issuer PSPs to recover at least part of their costs in the presence of an obligation to provide basic services to their private individual customers for free[175], thereby ensuring their incentives to provide quality services. Respecting the set criteria could ensure that reverse competition is prevented, and existing, potentially more efficient payment means are not crowded out, and that the increase of merchant service charges (by the building-in of inter-PSP fees) remains limited.

On the other hand, regulating (capping[176] or fixing) inter-PSP fees would be a challenging exercise due to lack of (e.g. cost) data and observed market developments, especially before the launch of the digital euro. Furthermore, it may prove difficult to fix 'one inter-PSP fee' that works for all digital euro payment situations, given discrepancies across Member States as regards their domestic payment markets and existing competing payment methods (for instance the presence of domestic card schemes). Inter-PSP fees set too low may weaken the incentive for the issuer PSPs to distribute the digital euro in case they are not obligated to do so, as they would prioritise private payment means that yield the highest income. Setting inter-PSP fees too high would harm merchants through high fees and may lead to the crowding out of efficient payment means on the issuer side to the detriment of the society as a whole. This option would also incur costs for the ECB who would need to collect, audit and analyse data for its impact assessment, and for supervisors who would need to check, and ensure that PSPs correctly implement the caps, as they do currently for the IFR caps.

Regulating the merchant fees themselves (e.g. at acquirer costs) could be potentially more advantageous for merchants that already have limited bargaining power, while being coherent with the legal tender status of the digital euro (i.e. acceptance obligation). This could also be done under objective criteria. At the same time, it may be difficult (and costly for the ECB) to identify the specific costs related to the digital euro and update them over time, also considering the great differences among PSPs and their operating costs. Regulating merchant fees is also the most interventionist option that is without much precedence in the payment markets, a measure that even the Interchange Fee Regulation stopped short of in the field of payment cards. It is considered that competition exists in the acquiring markets, at least as

[174] Interchange fees have been subject to antitrust scrutiny by the European Commission and several national competition authorities in the past decades. Lately the European Commission applied the Merchant Indifference Test (MIT) as a benchmark for assessing efficiency justifications of MIFs brought forward by payment card schemes. MIT is a test that was developed in the academic literature and aims at identifying an interchange level which ensures that merchants are on average indifferent whether customers use payment cards or cash to make their purchases. An interchange set at this level would make the payers internalise the potential transactional efficiencies on the payee side, therefore enabling them to make a socially optimal choice when selecting the payment means in a given payment situation.

[175] Would need to consider their cross-selling opportunities and cross-subsidization practices at the same time.

[176] Capping could be implemented in a way that the cap applies as a default inter-PSP fee that applies in the absence of other multilaterally or bilaterally agreed fee levels that in any case may not exceed the cap levels. Card schemes apply similar default interchange fees.

regards the merchant service charge components above interchange, not independent from the fact that specialist acquirer PSPs have entered the market in the last decades.

This exercise furthermore comes with a lot of uncertainty, and appears to be rather costly. It would be consistent with the Interchange Fee Regulation as concerns the inter-PSP fee element, but not as regards the merchant fee itself.

Many respondents to the targeted consultation on the digital euro – in particular consumers and merchants – supported limiting the fees paid by merchants to PSPs for digital euro transactions to their actual costs (and a reasonable margin of profit), as they fear being over-charged.

Option 1i: Pricing recommendations on merchant fees on the basis of criteria set by the legislature

Whether or not regulating merchant fees is ultimately warranted requires analysing costs (across several competing payment instruments) and observation of the market developments. This can only be carried out after the digital euro is issued and distributed by PSPs. Against this background, the ECB could be mandated to issue - before the issuance of a digital euro - price recommendations or guidelines on fees (both acquiring and inter-PSP fees), based on principles/criteria set by the legislature. The ECB‘s fee recommendations could balance between the various considerations: compensation for costs, incentives for PSPs to distribute, no crowding out of private payments in particular the cheaper ones, no overcharging of merchants, different, comparable interchange benchmarks, etc.

ECB recommendations on the inter-PSP fees might provide the necessary certainty for the PSP community to agree on inter-PSP fee levels despite the legal risks as regards competition law. The involvement of the entire PSP community might also help reducing the information asymmetry and can lead to establishing the right inter-PSP fee levels that takes into account both sides and eventual local market conditions. The PSPs would still have to find ways to come to a multilateral agreement, e.g. under the umbrella of an industry body or a scheme. At the same time, the non-mandatory nature of guidance may still imply the residual risk of intermediaries setting higher inter-PSP fees, which would entail the risks of excessive merchant fees and the crowding out of more efficient payment means. Nevertheless, a successful guidance and a resulting agreement on inter-PSP fees could effectively reach the objective of availability and acceptance of the digital euro in retail payments. A guided agreement by the market players could better reflect market realities than an administrative decision and thus serve as a better incentive for PSPs to distribute the digital euro.

As regards the acquiring fees, no agreement between PSPs are necessary, but the regulatory discipline via recommendations may still have a positive effect on the price setting of individual PSPs, lowering the risks for excessive merchant fees, in particular in domestic markets with less intense competition on the acquiring side. Recommendations may be less effective than regulation, but it appears that for the time being no regulation is justified in the acquiring market as it is deemed (at least in certain segments such as that for large merchants) competitive. A competitive acquiring market would ensure pushing down merchant fees (that includes inter-PSP fees) towards the cost level of PSPs, regardless of the acceptance obligation. In any case, the ECB would have to monitor market developments on a regular basis and update its guidelines by subjecting it to regular reviews.

Conclusion

Option 1c combined with option 1e or 1f and 1h are selected as the preferred policy options as they would - to different degrees - effectively and efficiently achieve the specific objectives 1 and 2. The legal tender status would guarantee wide acceptance of a digital euro. Obliging merchants to accept digital euro but providing for proportional exceptions to this obligation would strike the right balance of cost and benefit. Granting legal tender status to the digital euro would also be consistent with the legal tender status of cash, which is the only central bank money currently available. Different legal treatment can create confusion and lower trust in the digital euro among users. Both an obligation on credit institutions with a retail business[177] to distribute the digital euro or voluntary distribution by PSPs subject to a review clause could ensure the availability of digital euro for users and merchants. Irrespective of whether there would be mandatory distribution or not, for financial inclusion purposes, consistency with the Payment Accounts Directive would be ensured so that un(der) banked citizens are provided with digital euro basic use services.

It is preferred that maximum fees amount are determined on the basis of a methodology laid down in the legislature and developed by the ECB The ECB should continuously monitor the market of digital euro payments and the evolution of fees charged. This approach would be consistent with the legal tender status of the digital euro and would be effective in avoiding any over-charging of merchants that would be required to accept digital euro. Merchants would be in a weaker position to negotiate fees, should fees be left to the market under option 1g or only subject to pricing recommendation under option 1i. In the absence of mandatory caps on fees, there is a risk that merchants would be over-charged which would undermine the legal tender status of the digital euro

177 All other PSPs would be free to decide to distribute the digital euro.

Table 4. Comparison of options aimed to ensure that the central bank issued money, the euro can meet the payment needs in the digital age – *Access and usability*

Option	Effectiveness	Efficiency (cost-effectiveness)	Coherence	Overall score
Do nothing – no digital euro	0	0	0	0
Usability				
Legal tender status				
Option 1a - Digital euro without legal tender status	+	+	–	+
Option 1b - Digital euro with legal tender status, including general mandatory acceptance by payees	++	+	+	+
Option 1c - Digital euro with legal tender status with some exceptions to mandatory acceptance	++	++	++	++
Distribution				
Option 1d - Compulsory distribution of digital euro by all PSPs	++	–	–	≈
Option 1e - Compulsory distribution of digital euro by credit institutions with retail business	++	+	++	++
Option 1f: No compulsory distribution of digital euro by PSPs subject to a review clause	+	++	++	++
Compensation model and fees on merchants				
Option 1g: Merchant fee pricing left to the market	≈	≈	+	≈
Option 1h: Determination of merchant fees on the basis of a methodology set by the legislature and developed by the ECB	++	+	++	++
Option 1i: Pricing recommendations on merchant fees on the basis of criteria set by the legislature	+	+	+	+

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal / neutral;

6.2.2 Privacy and data protection

Option 2b: Processing of personal data related to a user's identity, but not to transaction data

This option would provide a high level of privacy and data protection for digital euro transactions. This is in line with expectations of citizens from the targeted consultation.[178]

However, this option is only partially effective in meeting specific objective 1. A high level of privacy and data protection underpins trust and a wide acceptance and usage. This option presents the following disadvantages. First, it would not allow efficient AML/CFT checks. Supervised intermediaries would not be in a position to perform customer due diligence checks on transactions as required under the AML/CFT framework. In particular, transaction data would not be used to comply with customer due diligence or reporting suspicious transactions to financial intelligence units (FIUs). This would mean that the digital euro online transactions would carry greater AML/CFT risks than cash.[179] This could therefore expose the Eurosystem to reputation risks that may undermine a wide usage of the digital euro. Second, this option would not allow intermediaries to perform other activities that

[178] The targeted consultation indicates that EU citizen respondents did not favour the processing of personal data for any activity related to a digital euro. Only 24 out of 188 respondents of EU citizen respondents (13%) thought the processing of personal data for the management of operational security risks appropriate, for example.

[179] See the risk emphasized in FATF Report to G20 on virtual assets, June 2020:

require the processing of transaction data, (e.g. taxation, management of operational ICT risks, payment fraud), including to comply with other legislation applicable to payments. In addition, this option would not enable transaction data sharing (upon request of the payers) which would be needed to provide some added-value services to users.[180]

On the other hand, this option could provide a user of the digital euro with a level of privacy similar to cash. This could be key to promote wide usage of digital euro. This would be in line with expectations of citizens from the targeted consultation. Applying the same the same AML/CFT requirements as to cash would nevertheless not be effective in meeting specific objective 1.

Cash is subject to limits that vary from one Member States to another[181] on AML grounds. While the AML package of July 2021 provides for an upper ceiling of 10,000 EUR for transactions in cash, the AML package follows a minimum harmonization approach and stricter rules are likely to stay after the adoption of the AML package.[182] This means that the digital euro would be subject to diverging rules in terms of payment limits which would undermine its pan European use.

Limiting all digital euro payments to e.g. 10,000 EUR as proposed for cash transactions under the AML package would not provide an efficient means of payment, as certain use cases (e.g. B2B transactions using a conditional euro) do not lend themselves to such limits. Finally, intermediaries would bear cost related to both the onboarding of customers and transactions, however these costs will be minimal in absence of transaction checks for AML/CFT and other purposes, like fraud detection. Based on previous onboarding and due diligence processes, most customers of PSPs would automatically qualify for holding digital euro. Hence, intermediaries are not expected to bear any significant additional cost related to this option.

For these reasons, this option cannot be considered coherent with the applicable rules on payment transactions.

Payments with a digital euro would also bear cyber risks. In the case of the online digital euro, cyber and other operational risks would be similar to existing electronic payments e.g. card payments, instant payments. At the same time, with its centralised nature, the digital euro service platform will face additional threats. Both the Eurosystem and the PSPs have adequate systems and procedures to manage this risk and they are also covered by upcoming new legislations on cyber resilience. For further information, please, see the Section on cyber risks in Chapter 7.2.

Option 2c: Processing of personal data related to a user's identity and transaction data

In contrast to Option 2b, Option 2c corresponds to the baseline scenario of existing digital means of payments. Under Option 2c, the digital euro would provide users with the same level of privacy as current electronic payment solutions (whereby identity and transaction

[180] In the answer to the targeted public consultation, a small majority of respondents (including EU citizens) believed that users of a digital euro should have the possibility to 'opt-in' to additional data-driven services. This would also not be consistent with PSD2 requirements for payment services providers to provide access to payment account data to third party providers based on customer agreement (open banking),
[181] See Impact Assessment accompanying the AML package of 20 July 2021, COM(2021) 420 final. 19 Member States have introduced or are introducing limitations to cash payments181, ranging from EUR 500 in Greece to EUR 10 300 in Czechia, with an average value of about EUR 4 500.
[182] The AML framework only provides for minimum harmonization in that field. This allows Member States to keep stricter rules than the 10,000 EUR ceiling limit.

data are processed by intermediaries), and ensure that supervised intermediaries can meet all necessary AML/CFT requirements, as well with other requirements that may require the processing of transaction data (e.g. taxation, management of operational ICT risks, payment fraud). Option 2c would be consistent with PSD2 requirements for payment services providers to provide access to payment account data to third party providers based on customer agreement (open banking), which is part of the broader objective of creating an open data framework supported by the Commission's Data Strategy for Europe.

Option 2c would be more effective than Option 2b in providing an efficient payment means for the EU's digitalizing economy by allowing – upon customers' request in accordance with GDPR – the use of customers' data in line with PSD2 'open banking' provisions and the Commission's data strategy.

Option 2c may not offer the level of privacy similar to cash that citizens may expect from a public money. This may undermine the acceptance of the digital euro as pointed out by both merchants[183] and users. A report commissioned by the ECB reached nevertheless more nuanced conclusions.[184] More fundamentally, processing by supervised intermediaries of all transaction, irrespective of their amount would risk making an offline digital euro unattractive for users[185]. As a consequence, Option 2c for all transactions would not be effective in meeting specific objective 1 (present, available and accepted by everyone).[186]

Under this option, intermediaries would bear not only the cost of onboarding but also need to carry out transaction checks for AML/CFT and fraud detection purposes. Since they already have automated processes to check similar transactions in commercial bank money (and will develop them further for instant payment services), their cost are not expected to significantly change under this policy option. This has been confirmed by the Commission's targeted consultation. Intermediaries acting as obliged entities expect that the AML/CFT checks of transactions in a digital euro would be similar to today's processes thus on-going costs would also be similar however it would require initial setup costs.

That option is fully consistent with the AML/CFT framework governing funds and means of payments, other applicable rules to electronic payments, as well as PSD2 open banking provisions and the Commission's data strategy.

As for other means of payment, online digital euro may be subject to simplified due diligence which would require a "sufficient monitoring" of transaction data in accordance with AML rules[187], including under the Transfer of Fund Regulation. This means that personal data pertaining to an online lower value/lower risk digital euro transaction may be processed by intermediaries in line with the risk-based approach to conduct AML checks and transaction

[183] ECB, Eurosystem report on the public consultation on a digital euro, April 2021. "Half of professionals (especially merchants) are also of the opinion that a degree of privacy would be necessary for a digital euro to be adopted widely".

[184] Study on New Digital Payment Methods, March 2022, Kantar: "Several participants among the general public, but also the tech-savvy, indicated they do not really think about privacy when making payments. The availability of flexible privacy settings that can be adjusted to suit the payment occasion, however, could be an additional feature to drive adoption. Most respondents would opt for a medium level of financial privacy without special concerns for the visibility of their transactions to their banks as long as they could avoid exposure to bank advertising".

[185] According to ECB public consultation, "When confronted with a specific choice between an offline digital euro focused on privacy, an online one with innovative features and additional services, and a combination of the two, citizen respondents generally opt for an offline solution focused on privacy, while professional respondents consider a hybrid approach more appealing"

[186] An offline digital euro solution is peer-to-peer and therefore does not allow for ongoing transaction monitoring.

[187] The new AML framework would provide for harmonised simplified due diligence (i.e. AMLA Regulatory Technical Standard) for low risk transactions on the basis of a supra-national risk assessment carried out by Commission. According to Article 15 AMLD, even in the event of simplified due diligence, obliged entities shall carry out sufficient monitoring of the transactions and business relationships to enable the detection of unusual or suspicious transactions. A simplified due diligence regime therefore requires transaction monitoring checks.

monitoring, where needed. The transfer of fund Regulation (TFR) includes the possibility to reduce the information accompanying certain digital euro transactions below a threshold. Currently, simplified due diligence (SDD) is not harmonised across the EU and its application differs considerably across obliged entities. The AML package adopted in July 2021 aims at harmonizing simplified due diligence across the EU, which would be of particular relevance for the digital euro as a pan Euro-Area payment instrument.

Option 2d: Processing of personal data related to a user's identity, but not to transaction data for *offline* low value payments – non exclusive

In terms of privacy and data protection, Option 2d goes beyond the current baseline for electronic payments by offering users traceability of offline transactions similar to cash. A higher level of privacy and data protection for offline low value transactions under option 2d could facilitate the acceptance of digital euro that would have more cash-like features (offline functionality, peer-to-peer validation of transactions, and high level of privacy) for lower-value payments. Citizens expressed clear preference for high level of privacy in both the ECB's and Commission's consultations. Indeed, the targeted consultation has shown that EU citizens are in favour of all features that enhance user privacy – with the ability to hide the identity of a payer and payee proving to be the most popular feature.[188]

Money laundering and terrorist financing risks would be lower than under option 2e, as offline low value payments would be limited to proximity (face-to-face) payments, thereby replicating the limitations on portability that come with physical cash. According to the ECB consultation, this type of digital euro is favoured also by merchants.[189]

Option 2d means that low value offline transactions are not monitored unless an AML/CFT investigation mandates inspection, which echoes views expressed by EDPB in its reply to the targeted consultation.[190] Beyond ensuring privacy, an offline solution that replicates more cash-like use could be attractive from a financial inclusion perspective and would facilitate the universal acceptance of the digital euro for all citizens and visitors (due to its ability to be used in remote areas without an online connection and due to the possibility to onboard based on simplified due diligence. Option 2d refers to what the ECB labels a digital euro type 1 (offline payment[191]). An offline digital euro is therefore essential in supporting the acceptance of the digital euro, as pointed out by a study commissioned by the ECB.[192]

An offline digital euro could also increase the resilience of the European payment landscape by ensuring the continuous provision of offline payments in public money amidst

[188] According to the targeted consultation, 152 out of 312 respondents (49%) considered it appropriate to mask the identity of the payer or the payee to each other ('peer-to-peer pseudonymity'). Moreover, (43%) of EU citizen respondents believe that a high level of privacy for low value transactions is either very appropriate or rather appropriate. Further, more than 50% of the professional stakeholders opted in favour of linking the digital euro to the European Digital Identity Wallet

[189] "A quarter support selective privacy under which transactions below a given amount would stay private (mostly credit institutions and PSPs)"

[190] EDPB suggested "no transaction monitoring under a certain threshold, and without upload of the corresponding transaction history from the intermediary. In case unlawful transactions have taken place nevertheless, they would be identifiable by the authorities if public prosecution is launched as they would be only pseudonymous. Therefore, this feature does not seem to raise much challenge in terms of AML/CFT prevention".

[191] Offline payments pertain to transactions that are settled offline between payer and payee in physical proximity. Offline functionality would provide users with private transactions and holdings, as transactions would be person-to-person and would not require an intermediary. See Annex 5 for more details.

[192] See Kantar report on new digital payment methods that surveyed the attitudes of unbanked/underbanked population toward digital payment methods. That survey particularly stressed that a digital euro should be easy to use without requiring technological skills and have the possibility to for offline usage without an internet connection

connectivity outages and in the context of a declining use of cash.[193] This would make payments more efficient in a digitalised economy, in keeping with specific objective 1. Compared to an option where ongoing monitoring is required, due to the offline nature, intermediaries would save costs on the monitoring of transactions.

This option is consistent with the June 2020 report of FATF on virtual currency that noted "at the design stage of the CBDC, the issuer can make design decisions that reflect and mitigate the AML/CTF risks posed by the CBDC. This, for example, could include limiting the ability for anonymous peer-to-peer transactions to occur with the CBDC". Subject to limitations, this approach would appear to be consistent with the risk-based approach underpinning the AML framework.

Offline payments raise questions about operational cybersecurity. For offline payments with a digital euro, the cyber risk is different as for online digital euro holdings and transactions. As once the devices used for offline digital euro are issued and funded, their digital euro holdings and the transactions are not validated in real time by either a PSP or the Eurosystem. Illegitimate change in balances and double spending have to be avoided. To achieve this, a tamper-proof secure hardware solution is required. The corresponding hardware-software solution needs to be developed and procured by actors within the digital euro ecosystem. The cost of this investment cannot be estimated at this stage.

Option 2e: Processing of personal data related to a user's identity, but not to transaction data for *online* low value payments – non-exclusive option

In terms of privacy and data protection, Option 2e goes beyond the current baseline for electronic payments by offering users more privacy for conducting their online low-value transactions. A higher level of privacy under option 2e could facilitate the acceptance of digital euro by people that are not willing to share data about their transactions. This is all the more relevant in a context of growing e-commerce and declining cash usage, in which this option would protect individual right and desire for privacy.

That said, money laundering and terrorist financing risks would be higher than under option 2d, as *online* low value payments would not be limited to proximity (face-to-face) payments. Option 2e would entail reputational risk for the ECB as issuer of a digital currency and undermine the Union policy as the combination of anonymity, portability and mass adoption would be highly attractive to criminals and terrorists.

This policy option would be effective in providing privacy of transactions for users that would further support its acceptance and usage. Nevertheless, online low-value payments may increase AML/CFT risks, as unlike offline low-value payments (option 2d) they would not be limited to proximity payments.

Under this option, compared to other options where monitoring is required, intermediaries would save some but not significant cost on monitoring low value online transactions. For electronic payments, most of the costs are permanent and relate to the IT infrastructure. However, because of fewer number of monitored transactions, compared to other options, the number of potential alerts that may require manual checks would also be fewer, thus implying savings of some costs. On the other hand, machine learning tools used for

[193] However, the offline digital euro, due to the necessary pre-funding step, would need to be sufficiently used in normal times to foster resilience effectively. This is akin to the need of withdrawing cash in advance of the ATM network outage.

monitoring may not be able to improve as much as under options where a larger set of transactions is processed, potentially leading to a relatively larger number of false positives requiring manual checks. Overall, no significant impact on costs is expected under this option.

By not providing the possibility to intermediaries to process low value transaction data, Option 2e does not take into account the particular risk profile of central bank digital currencies. As emphasized by FATF, CBDCs could present greater AML/CFT risks than cash as it would be acting as an instrument with the liquidity and privacy similar to cash but without the limitations on portability that come with physical cash. In addition, that option would not be consistent with the existing AML framework whereby online electronic means of payment are subject to AML/CFT checks irrespective of any threshold in case of suspicion of money laundering or terrorist financing.

Stakeholders' views on all options

Member States expressed broad support to explore a risk-based approach on how to "allow for more privacy in particular in the case of low value transactions which pose less risk in terms of violation of the relevant EU law".[194] There was also support to explore an offline functionality for the digital euro, limited to low value payments in close proximity. Option 2d was supported by the EDPB in its answer to the public consultation.[195]

In their answers to Commission's targeted consultation, PSPs emphasized the need to subject the digital euro to the same privacy and AML framework as private means of payment (i.e. option 2c.[196] On the other hand, the targeted consultation indicates that citizens are in favour of features that enhance user privacy – with the ability to hide the identity of a payer and payee for low-value transactions proving the most popular feature (43%). This suggests support for option 2d.

Answers to the ECB consultation seem to suggest a combination of option 2c and 2d.[197]

Conclusion

By offering more cash-like features and allowing offline use, option 2d would be more effective than 2c (in achieving the specific objective 1 to promote the wide acceptance of the digital euro. Option 2e will provide for online payments the similar level of privacy as option 2d provides for offline proximity payments, which would further support broader acceptance and trust by users. Option 2c will be more effective than option 2e in bringing about an efficient means of payment for online payments to support the digitalized economy (specific objective 1) as option 2c allows, in accordance with EU data protection rules, the sharing and reuse of users' data to intermediaries, in line with PSD2 'open banking' requirements and consistent with the objectives of the European Data Strategy.

[194] See the letter by Eurogroup's President to members of the Eurogroup. Main results of the Eurogroup, 4 April 2022, "A risk-based approach could be followed to allow for more privacy in the case of less risky and smaller transactions"

[195] The EDPB noted «With regard to transaction monitoring […], the EDPB's proposal is the complete absence of checks (and not only simplified checks) under a certain threshold of low value transactions, as it is the case for the cash today, while higher value transactions would remain subject to standard controls. This would be best implemented on the bearer-based modality, available offline. This would not be feasible for the account-based modality.

[196] In its answer to the targeted consultation, the European Banking Federation particularly the need to ensure "a level playing field between different digital means of payment"

[197] According to the ECB public consultation on a digital euro, "when confronted with a specific choice between an offline digital euro focused on privacy, an online one with innovative features and additional services, and a combination of the two, citizen respondents generally opt for an offline solution focused on privacy, while professional respondents consider a hybrid approach more appealing".

As regards the coherence of the above options with other policies of the EU, while option 2c would be more coherent with the Commission's agenda of ensuring an efficient AML/CFT framework than the other options, it would not provide a higher level of privacy than existing means of payment. Given user expectations for high cash-like privacy, this may undermine the effectiveness of option 2c in meeting specific objective 1 (acceptance of the digital euro). On balance, option 2d achieves more coherence with the public policy objectives of the EU by providing a high level of privacy for low-value proximity transactions in a way that is consistent with the risk-based approach underpinning the Union's AML/CFT framework. Options 2c and 2d are more coherent than options 2e in terms of ensuring an efficient AML/CFT framework. Option 2e could entail higher money laundering and terrorist financing risks than option 2d, as online low value payments would not be limited to proximity (face-to-face) payments.

Given the above, option 2d would achieve a better balance between privacy and traceability for lower value offline payments, while option 2c would be the preferred option for online transactions. In keeping with the objective of the AML package adopted in July 2021, the extent of transaction monitoring under option 2d may need to be adjusted, after the issuance of the digital euro based on a review and on the basis of a risk assessment of money laundering and terrorist financing threat. This is consistent with FATF recommendation to design AML regime on the basis of a risk assessment.[198]

[198] According to FATF, both jurisdictions and financial institutions must identify and assess the money laundering or terrorist financing risks that may arise in relation to (a) the development of new products and new business practices, including new delivery mechanisms, and (b) the use of new or developing technologies for both new and pre-existing products, See FATF recommendation 15 on new technologies: https://www.fatf-gafi.org/media/fatf/documents/recommendations/pdfs/FATF%20Recommendations%202012.pdf

Table 5. Comparison of options aimed to ensure that the central bank issued money, the euro can meet the payment needs in the digital age – *Privacy and data protection*

Option	Effectiveness	Efficiency (cost-effectiveness)	Coherence	Overall score
Do nothing – no digital euro	0	0	0	0
Privacy				
Option 2b – Processing of personal data related to a user's identity, but not to transaction data	+	+	– –	≈
Option 2c – Processing of personal data related to a user's identity and transaction data	+	+	++	+
Option 2d – Processing of personal data related to a user's identity, but not to transaction data for offline low value payments – non-exclusive option	++	++	++	++
Option 2e - Processing of personal data related to a user's identity, but not to transaction data for online low value payments – non-exclusive option	+	+	– –	≈

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal / neutral;

6.2.3 Financial stability and credit provision

Option 3a: Digital euro with unrestricted store of value function

If a digital euro can be held without any limits, people and businesses would benefit from a central bank currency that would fulfil all the functions of money, including being a means of payment and a store of value. An unrestricted digital euro could therefore be comparatively more attractive for users and thus also more competitive with newly emerging forms of digital payments (e.g. stablecoins). In addition, the digital euro may be seen as a safety net especially for depositors with balances above the coverage limit of EU deposit guarantee schemes of EUR 100.000.[199] As such, an unconstrained digital euro would seem to be effective in reaching a wide use and thus achieving specific objective 2 aiming to increase the euro's competitiveness vis-à-vis other currencies, foreign CBDCs and stablecoins. At the same time, however, this would come at the expense of creating risks to financial stability which would eventually put the efficiency of this option into question (for further details of the following assessment of options 3a and 3b, please consult Annex 11). If the risks to financial stability and credit provision were to materialize, it would furthermore severely hamper reaching the general objective of ensuring that the euro can support the EU's economy in the digital age.

In case of large-scale deposit reduction in favour of a digital euro, banks could face liquidity stress and increased funding costs that may translate to lower credit provision to the economy. Furthermore, in crisis times, banks would more likely experience funding difficulties putting the stability of the financial system at risk. Banks are currently the only actors able to create money, which enables them to engage in large-scale maturity and risk transformation and thus gives them a central role in credit provision to the European economy. In the absence of sufficiently scaled alternatives to bank lending, bank disintermediation thus implies considerable risk for firms' access to credit and thus for overall economic growth. The aforementioned impacts would affect individual banks

[199] Directive 2014/49/EU on deposit guarantee schemes provides protection to depositors of all credit institutions within a 100.000 EUR limit (all aggregated accounts of a single depositor at a same bank).

differently, where banks that rely to a large extent on deposit funding and with smaller liquidity buffers would be expected to be impacted more strongly.[200]

Whether or not structural disintermediation risks would actually materialize, depends crucially on the take-up of a digital euro and the extent to which a digital euro would substitute cash or deposits, both of which are difficult to forecast, and in any case may significantly vary with economic circumstances such as the interest rate environment. Furthermore, external factors such as the level of excess reserves and collateral availability would play a crucial role in determining whether deposit outflows would translate into lower lending. Similarly, the impact on banks' funding cost is difficult to ascertain a priori and depends inter alia on the interest rate and liquidity environment as well as banks' individual balance sheet position. Possible higher bank funding costs may translate to higher interest rates on bank loans for businesses and households and/or negatively impact bank profitability.[201] Indeed, a static assessment indicates that a large substitution from deposits to digital euro would decrease banks' profitability substantially.

Hence, banks' ability to adjust to the demand for the digital euro should be further assessed as the issuance date gets closer. It should be noted that ultimately, the central bank could also step-in in extreme scenarios, providing additional liquidity by accepting eligible assets as collateral for secured lending.[202] However, a structurally expanded liquidity provision by the central bank beyond certain levels may either lead to shortage of high-quality liquid assets used as collateral and thus impact the efficiency of the interbank market and the central bank's implementation of monetary policy or imply higher risk taking for the central bank. Lastly, risks to bank intermediation may also arise from ongoing and future developments in digital payments independently from a digital euro, for instance if the role of stablecoins as a common means of payment increases.

The increased liquidity risk for banks, especially in crisis times, would also increase the risk of costly government intervention to stabilise ailing banks and safeguard financial stability. At the same time, the US Treasury Department argues[203] that banks' fears that a digital dollar would lead to the loss of depositors and even bank runs is overblown. They argue that a properly designed digital dollar would "stabilize rather than destabilize the financial system." A digital dollar would provide regulators with an early warning system, allowing them to identify weak banks before a run begins.

According to an ECB occasional paper,[204] illustrative demand scenarios suggest possible deposit outflows ranging from EUR 180 billion to EUR 6.3 trillion, accounting for 0.5% to 18% of aggregate euro area bank liabilities. The scenarios designed by the ECB research range from just under €500 billion digital euro take-up in a moderate demand scenario to just over EUR 7 trillion in a large take-up scenario. According to the simulations of the ECB, based on the economic conditions in 2021, euro-area banks could manage the moderate demand scenario with a large leeway. In the large take-up scenario, however, banks would have to rely on central bank funding provided against collateral entailing a significant expansion of the Eurosystem's balance sheet.

[200] Available data suggests that larger banks seem to rely less on deposit funding than smaller banks. This points to a "hub and spoke" structure where wholesale funding is handled preferentially by larger banks, who then redistribute it to smaller banks and/or to individual subsidiaries within groups.

[201] Once again, factors like individual banks' net interest margins and the price elasticity of credit demand would play a crucial role in the eventual outcome.

[202] In a crisis situation, supervisors and resolution authorities could furthermore intervene within the scope of their respective mandates. However, such interventions presume that one or more banks are already endangered.

[203] https://www.financialresearch.gov/working-papers/files/OFRwp-22-04_central-bank-digital-currency.pdf

[204] Adalid et al. (2022), "Central bank digital currency and bank intermediation", ECB Occasional Paper Series 293, May 2022

Expanding the analysis made by the ECB,[205] a study by the Commission's Joint Research Centre assessed the implications of digital euro take-up scenarios ranging from EUR 1,000€ to EUR 14,000 per person on a bank-by-bank and country-by-country basis. In the EUR 3,000 per person take-up scenario, banks representing about 5% of total assets in the euro area would not be able to cover the migration of deposits to digital euro with their free reserves and banks representing about 15% of total assets in the euro area would see their reserves decrease by more than 50%. Considering consolidated balance sheets, in several Member States, over half of banks would have to increase wholesale funding by more than 20% in order to compensate the loss of deposits. At the euro-area aggregate level, 30% of banks would need to increase wholesale funding by less than 10% (in relative terms, compared to current levels), 50% of banks would need to increase it by less than 20%, but 25% of banks would need a large increase of more than 50%. The disparity between Member States is quite marked, even more when considering un-consolidated data. This study also shows that a CBDC might lead to substantial challenges for the profitability of banks, especially for small banks that mostly rely on deposits as a source of funding. Large banks and countries where the banking business is more diversified are less vulnerable to the introduction of CBDC. While the impacts will vary bank by bank, the impact on the financial system and especially on credit provision will depend more on the overall impact. Under this option, PSPs and merchants would not have additional compliance and administrative costs.

This option is consistent with the other form of central bank money (i.e. cash) whose store of value function is not limited. However it may not be consistent with the Commission's and the ECB's respective mandates with regard to ensuring financial stability and maintaining efficient monetary transmission.

Option 3b: Possibility of introducing limits to the digital euro's store of value function

Tools to limit the digital euro's store of value function such as holding limits, conversion limits or remuneration-based disincentives, could mitigate the risks to both credit provision to the economy and financial stability, which would be a significant benefit for credit institutions and the Eurosystem that in turn would benefit consumers and businesses. The possibility to deploy such tools would be provided for in legislation, together with their objectives and clear criteria for their use by the Eurosystem. This includes the requirement that any such instruments should not unduly constrain the digital euro's payment functionality. On the basis of the Regulation, the definition of such tools as well as the decision on their use and their parameterisation would rest in the hands of the Eurosystem as part of its role in supporting financial stability in order not to interfere with the ECB's exclusive competence of defining and implementing monetary policy.

Limits on individual digital euro holdings would imply a maximum possible drawdown amount on the banking sector deposit base both in normal times and during crises. Unfavourable interest rates applied on digital euro holdings above certain thresholds ("tiered interest rates") would have a similar effect, but their effectiveness may be lower in times of crisis.

Option 3b would protect financial stability and safeguard credit provision to the economy while option 3a would pose risks to them. According to the ECB, an individual holding limit of EUR 3000 would limit the overall supply of digital euro to a maximum of EUR 1 trillion and the substitution from deposits would be lower, as some substitution from cash (instead of deposits) can also be assumed. The ECB's simulations suggest that under such a holding

[205] Adalid et al. (2022), "Central bank digital currency and bank intermediation", ECB Occasional Paper Series 293, May 2022

limit, banks would still be able to orderly adjust to the deposit outflows, largely drawing on current excess reserve holdings. This implies that the digital euro's impact on banks' funding costs could be mitigated under option 3b, which may also benefit financing costs for households and businesses. The ECB simulations also suggest that holding limits, remuneration disincentives and conversion limits can lower the scale and speed of simulated economy-wide bank runs and can even have an overall stabilising effect under certain circumstances. A static Commission assessment highlights that capping digital euro holdings would be a way to foster macroeconomic stability and preserve banks' profitability. For these reasons, limits on CBDC holdings may be justified from both a micro and macro prudential viewpoint.[206]

While option 3b would be more protective of the EU's financial stability and the banking sector's intermediation capacity, it might be somewhat less *effective* than option 3a in ensuring acceptance by everyone (part of specific objective 1) and also in achieving specific objective 2 aiming to increase the euro's competitiveness vis-à-vis other currencies, foreign CBDCs and stablecoins, which may not have any use restrictions. Under this option, users might perceive that the digital euro cannot fulfil an important function of money i.e. store of value, and might favour other forms of the euro or other foreign denominated currencies. That is, implementation of limits to the store of value function could negatively influence the overall attractiveness and convenience of the digital euro and could reduce demand and use. Tools to limit the digital euro's store of value function may also add operational complexity, increase compliance costs for intermediaries and make the digital euro cumbersome to use. Lastly, limits to the store of value function would constrain its use as a reserve asset (provided that international access is granted – see Options 4a to 4c) and would also curb the digital euro's potential in use for international trade. Mechanisms that ensure an unconstrained payment function even in the presence of holding limits should apply both in the domestic and international context.

Overall, option 3b can, however, be considered more *efficient* than option 3a, in that it – if well parametrised – reaches the objective of making the digital euro available and accepted, because people could still benefit from an unconstrained payment functionality of a digital euro, while mitigating the risks for the financial system and thus being less burdensome for banks and the Eurosystem. By mitigating risks to the financial system and intermediation, it would also not put reaching the general objective of supporting the EU's economy in the digital age at risk. The trade-offs described in this section would depend crucially on the eventual parametrisation of any such instrument, which would be decided on by the Eurosystem. For instance, a very high holding limit can be considered to have a less adverse effect on the digital euro's attractiveness vis-à-vis other currencies, foreign CBDCs or stablecoins, but would also entail significantly less protection against financial stability risks and bank disintermediation. Conversely, a rather low holding limit would effectively address financial stability concerns but could significantly impact the digital euro's attractiveness and take-up and increase complexity for users. As described above, the digital euro's payment functionality should not be impaired under both scenarios. The above reasoning can be applied to other tools as well, where for instance a low threshold for interest rate disincentives or very unfavourable remuneration would be comparatively more effective in addressing financial stability and disintermediation concerns but would come at the detriment of the digital euro's attractiveness.

[206] For a more detailed discussion of a model-based assessment of the impact of a CBDC on financial stability and the broader macroeconomy, see Annex 11.

PSP's total one-off costs under option 3b would be similar to option 3a since PSPs already run IT mechanisms to handle similar limits (e.g. daily withdrawal or transfer limits), and interest rates. No different, additional administrative burden is expected to derive from this option compared to option 3a for the private sector, as reporting on payments is already a requirement, which would need only some expansion.

As regards consistency, Option 3b is in line with G7 principles on retail CBDC.[207]

Stakeholders' views on all options

53 out of 124 professional respondents (43%), mostly financial institutions and to a lesser extent payment services providers and market infrastructures, considered that limiting the store of value function of the digital euro by introducing holding caps, limitations to transactions, or different interest and/or fees disincentives on large holdings would be rather or very important for financial stability purposes, in order to prevent bank runs in crisis situations or to prevent structural disintermediation of financial intermediaries. Around a third of the banks that supported limiting the store of value function of the digital euro stressed at the same time that maintaining limits could face difficulties in the long-term owing to social and political pressure. 21 out of 124 professional respondents (17%) did not consider important to limit the store of value function of the digital euro or expressed opposition to it. 7 (6%) were neutral and 43 (35%) did not reply. About 20 citizens (11%) supported and 62 (33%) opposed limiting the holdings of digital euro (100 (54%) did not answer and 7 (4%) were neutral).

42 out of 124 professional respondents (34%) considered that a digital euro without limits or disincentives would have a negative impact on the volume of retail deposits, 39 out of 124 professional respondents saw an increased risk of a bank run (31%) and 38, mostly financial institutions, considered that there would be a negative impact on banks' net interest income and revenues from fees (31%). 29 out of 124 of professional respondents (23%) considered that a digital euro without limits or disincentives would have a negative impact on credit provision in the economy.

In the ECB's public consultation, almost half of citizen respondents mentioned a need for holding limits, tiered remuneration, or a combination of the two, to manage the amount of digital euro that would be in circulation. A similar share of professional respondents agreed. Tiered remuneration was especially popular among the research community, while holding limits were favoured by credit institutions.

Conclusion

While option 3a may be more effective in reaching a wide use and acceptance of the digital euro due to the absence of limits, option 3b would be more effective at simultaneously safeguarding financial stability and thus can be considered more efficient as the cost of creating risks to the EU's financial stability and the banking sector's credit provision capacity is substantial without limiting the store of value function of the digital euro. In any case, if properly designed, the digital euro even with limits or disincentives may still facilitate access to payments, reduce transaction costs by increasing competition and preserve financial stability.

[207] Principle 1: Any CBDC should be designed such that it supports the fulfillment of public policy objectives, does not impede the central bank's ability to fulfill its mandate and 'does no harm' to monetary and financial stability.

Table 6. Comparison of options aimed to ensure that the central bank issued money, the euro can meet the payment needs in the digital age – *Financial stability*

Option	Effectiveness	Efficiency (cost-effectiveness)	Coherence	Overall score
Do nothing – no digital euro	0	0	0	0
Financial stability				
Option 3a – Digital euro with unrestricted store of value function	+	–	≈	≈
Option 3b – Possibility of introducing limits to the digital euro's store of value function	++	++	+	++

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal / neutral;

7 Preferred policy option

7.1 Preferred policy option

The general objective of the present initiative is to ensure that central bank issued money can support the EU's economy in the digital age. The introduction of a digital euro would ensure that central bank money remains present, available and accepted by everyone also in the EU's digitalizing economy. It can offer state-of-the-art,[208] efficient payment means, pan-European reachability and increase the euro's competitiveness vis-à-vis other currencies, third countries-issued CBDCs and stablecoins.

As set out in Section 5.1 and 6.1 above, the impact of establishing a digital euro depends - to a significant extent - on how its essential aspects are regulated. In section 6, the impact of different options for these essential aspects has therefore been analysed.

Based on the discussion in section 6, to achieve the objectives in a most effective and efficient way the digital euro established by the Regulation should have the following essential features (preferred policy options):

- The digital euro should be granted legal tender status with an obligation for all payees to accept it, with some justified and proportionate exceptions to avoid overburdening merchants and exclude natural persons acting in a household or personal capacity.
- Both an obligation on credit institutions with retail business[209] to distribute the digital euro or voluntary distribution by PSPs subject to a review clause could make the digital euro adequately available for users and merchants.
- To ensure coherence in the regulatory treatment of the two forms of the euro, the legal tender status of the digital euro would be accompanied by a codification and clarification of the scope and effects of the legal tender of euro cash. The regulation on the euro cash would also provide for an obligation on Member States to ensure sufficient and effective access to cash and where necessary to implement measures to that end.
- To avoid overcharging merchants, maximum mandatory caps should be determined on the basis of a methodology set by the legislature and developed by the ECB. The

[208] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.
[209] All other PSPs would be free to distribute the digital euro if they decide so.

Regulation should include precise criteria for the ECB to make the relevant calculation to determine the maximum caps. e.g. fees oriented to costs or comparable to similar payments' fees, ensure sufficient network effects, no excessive fees for merchants, no crowding out of private means of payment.

- The digital euro should provide for a high level of privacy for low value offline payments which have cash-like features unless further risk assessment carried out after the establishment of the digital euro concludes that a higher degree of traceability should be required. Other digital euro transactions would be treated the same way as other electronic means of payment in terms of privacy and application of AML requirements (and while ensuring harmonised application of customer due diligence across Member States, including the possibility to rely on simplified due diligence for low value online payments with digital euro as a pan-euro-area payment instrument).

- The Eurosystem should have the capacity to reduce the risks to financial disintermediation and stability by defining, applying and parametrising tools to limit the digital euro's store of value function based on the criteria set out in the Regulation. The Eurosystem should implement such tools depending on the financial and monetary environment.

- The digital euro should be first available for residents/businesses of the euro-area and visitors to the euro-area and at a later stage, subject to conditions aiming at mitigating financial stability risks in non-euro area countries, for the residents/businesses of non-euro area Member States and third countries when transacting with euro-area residents/businesses (see Annex 9). The Regulation should allow the international use of the digital euro in the future subject to bilateral agreements/arrangements between the Union and third countries and to bilateral operational arrangements between the ECB and the respective central banks or bilateral agreements between the Union and third countries with non-euro area countries.

On that basis, in this section the overall impact of establishing a digital euro will be assessed.

7.2 Overall impact of preferred option

Effectiveness

Providing a digital euro and its necessary regulatory framework would ensure the euro can support the EU's economy in the digital age in line with the general objective.

First, a digital euro designed based on the preferred options on access and usability will be widely available for citizens and businesses in the EU. It would therefore ensure that central bank money remains usable in the EU's digital economy and can serve as monetary anchor. Preserving the accessibility and usability of central bank money in the digital era is key to protect monetary sovereignty[210] and the well-tested two-layer monetary system based on convertibility of regulated/supervised forms of money into central bank money. The digital euro would thus complement cash in providing a monetary anchor by ensuring that private money can always be converted into safe public money that is usable in the digital economy. This would support confidence in money, the euro and financial stability in the digital age. The legal tender status of the digital euro would significantly support these objectives. The right compensation model will ensure that intermediaries provide quality services, while protecting the users from excessive fees. At the same time, this new form of central bank money in digital form should be seen as a complement to rather than a replacement of euro cash. Therefore, it is vital that acceptance of and access to cash is safeguarded.

Second, a digital euro could offer an additional payment choice for people and increase financial inclusion. A digital central bank money would be designed along public objectives thus catering more for wide accessibility, universal acceptance, privacy and the needs of vulnerable people. For this purpose, a high level of privacy is required for cash-like proximity payments (offline use). When used online, the digital euro, which can be transferred without payer and payee meeting in person, carries higher AML risks than cash (which is more difficult to carry in large quantity), and should therefore be subject to the same level of monitoring like other private electronic means of payment, while including the possibility for harmonised simplified due diligence for onboarding and online low value transactions. This differentiated approach would also be effective in supporting state-of-the-art payment solutions, by allowing the sharing of user's data for on-line transactions in compliance with GDPR and PSD2 requirements.

Third, the digital euro could help the further development and the resilience of the EU's payment system. A digital euro could create synergies with private payment initiatives, as it could offer a better, unified and shared infrastructure to support private pan-European payment solutions. A pan-euro area, and European-governed acceptance mechanism at the POI for the digital euro may be leveraged also for the acceptance of private payment solutions across the euro area once the digital euro has become widely available and usable. In addition, a central bank run digital payment system could serve as a backup or additional facility in times of crisis, natural disaster, war or when private payment means experience operational issues. This would strengthen the operational resilience of the EU's economy.

Fourth, a digital euro can enhance the development of innovative, industry 4.0 services in the EU, complementing private payment solutions.[211]

[210] Monetary sovereignty refers to the ability of public authorities to control the unit of account in their jurisdiction in order to manage the macroeconomy e.g. in the euro area, goods and services need to be priced in euro.
[211] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.

Fifth, the digital euro with appropriate safeguards will avoid excessive financial disintermediation and risk to financial stability. Potential limits on holdings or other disincentives for using it as store of value would be effective to achieve these objectives.

Finally, the international role of the euro would be strengthened over time by a digital euro. Over time, it can serve as a means of payment not only within the euro-area and for visitors but also for residents and businesses of non-euro area Member States and even certain trade transactions with third country businesses subject to conditions aimed at mitigating financial stability risks in non-euro area Member States and third countries.

Efficiency

The preferred option has been designed to effectively achieve the general and specific objectives in the most cost efficient and proportionate way. Most of the implementation costs will fall upon the Eurosystem, PSPs, and merchants. People are not expected to bear significant direct cost as basic use of the digital euro should be free of charge for them.[212]

The Eurosystem would bear the costs of developing the back-end infrastructure as well as its running costs. Given the overall importance, especially of the settlement infrastructure, high costs are expected for the mitigation of cyber risks and to ensure operational continuity under all circumstances (e.g. also the ability to process peak volumes).

Merchants are expected to invest in the acceptance infrastructure and the integration of digital euro payments with their own systems. As confirmed by the targeted consultation, merchants that already accept digital means of payment will face lower adjustment costs than those which currently accept only cash. Standardisation of the acceptance infrastructure and the end user interface would help decrease the merchants' compliance cost. These aspects will be for the Eurosystem to optimise. There is a risk that intermediaries set fees for merchants at such levels that can safeguard their interchange fee revenues for alternative means of payments (cards), due to reverse competition. These fees on merchants would be passed on to consumers ultimately. To avoid overcharging merchants, the ECB will be mandated by the Regulation to develop recommendations on pricing expectations for intermediaries, and also empowered to constrain fees in case the recommendations prove insufficient, pending market analyses.

PSPs will mainly need to invest in the end-user interface and the integration with the settlement systems of the Eurosystem. A key challenge for intermediaries will be to integrate the digital euro into their existing mobile banking applications. They will also bear the ongoing cost of customer identification, fraud detection, AML/CFT compliance and general onboarding costs. These costs can be similar to existing systems and processes and onboarding cost of existing customers would likely be negligible. As the basic services of the digital euro will be free for customers, they may also face lower income from their existing payment services if customers prefer to pay in digital euro over commercial bank money. At the same time, PSPs may receive income from those merchant fees and since merchants generally accept a mix of payment solutions, this should not lead to potential loss of their revenues. They may also offer value-added services building on a digital euro for consumers to generate fee income. The overall impact on PSPs' profitability is hard to estimate at the current juncture, as it crucially depends on the potential loss in market share in the payments market to digital euro transactions, the digital euro remuneration model, as well as on the

[212] Nevertheless, if merchants are faced with high fees for the Digital Euro, these fees will ultimately be passed on to consumers through relatively higher retail prices.

extent to which PSPs would be able to generate fee income via digital euro-related added value services (see Annex 11).

On the other hand, the compensation model for a digital euro in particular if based on interchange fees, might lead to crowding out of cheaper payment solutions, which would impact the level of competition in payment markets, overall merchant acceptance costs and ultimately lead to increased retail prices and lower consumers' welfare.

The proposal will not incur any significant additional administrative costs either, as PSPs and market infrastructure providers already have reporting obligations for payment transactions, which would also apply - with only limited adjustments - to digital euro transactions.

Coherence

The initiative would be fully consistent with the policy objectives of other Commission initiatives laid out in the Commission's Digital Finance Strategy and Retail Payments Strategy for the EU adopted on 24 September 2020, aimed at promoting digital transformation of finance, payments and the EU economy and removing fragmentation in the Digital Single Market:

EU-wide interoperable European Digital Identity Wallet (EUDIW)[213]. In that respect, it will be essential that users can on-board and make payments with the digital euro by using the EUDIW for identification, authentication and payment initiation, on a voluntary basis. This means that electronic identification as set out in the proposal amending Regulation (EU) No 910/2014 introducing a framework for a European Digital Identity should be accepted by intermediaries for the verification for both prospective and existing customers and, where relevant, for the remote performance of customer due diligence. Where intermediaries offer payment transactions with the digital euro, they should also accept the use of European Digital Identity Wallets.

The initiative is also consistent with the framework governing the provision of payment services across the Union:

- PSD2 regulates the licensing requirements for the provision of payment services by payment institutions and the rights and obligations that apply to payment service users and payment service providers (including credit institutions, e-money institutions and payment institutions) when making payment transactions. PSD2 will fully apply to digital euro. Amending the definition of funds in PSD2 to clarify beyond doubt that it also includes the digital euro will ensure that this legal framework also applies to digital euro transactions.
- Data on digital euro payment accounts could, upon the request of the digital euro user, be shared in line with the PSD2 'open banking' framework. This means that PSPs could process personal data linked to digital euro transactions to promote new financial products and services for consumers and firms, in accordance with PSD2 and the GDPR.
- In order to ensure coherence between the legal tender of the digital euro and the legal tender of cash, the legal tender of cash should also be regulated in a coordinated way with the legal tender of the digital euro.
- In terms of financial inclusion, the initiative will be consistent with the approach adopted under the Payment Accounts Directive which aims at ensuring a universal

[213]https://eur-lex.europa.eu/resource.html?uri=cellar:5d88943a-c458-11eb-a925-01aa75ed71a1.0001.02/DOC_1&format=PDF

access to payment accounts with basic features for financially excluded consumers. The digital euro will be offered following a similar approach, ensuring access to basic digital euro payment services.

- By promoting a risk-based approach that underpins the Union AML framework and by excluding full anonymity, the initiative is consistent with the objectives of the AML package adopted by the Commission in July 2021. Digital euro transactions would be subject to the AML/CFT framework. For online transaction, intermediaries would have to conduct transaction monitoring as for other electronic means of payment. A specific transaction monitoring is preferred for low-value offline proximity payment along the lines of the cash treatment (i.e. processing of personal data relating to identity when funding and defunding the offline digital euro as opposed to transaction data). For both offline and online digital euro and consistently with the AML framework, intermediaries, as obliged entities, would have to report suspicious transactions. The new AML/CFT package proposes to harmonise consumer due diligence, across the EU. AMLA, the new EU AML Authority would be tasked with developing regulatory technical standards including simplified due diligence in case of low risk. This would apply to the digital euro, and would help ensure consistent on-boarding conditions across the euro-area. Consistently with FATF recommendations and the new AML package, specific holding and transaction limits would be introduced for the offline digital euro after a risk assessment, by delegated act. In addition, the level of transaction monitoring for the offline digital euro would be subject to a review clause, based on a money laundering and terrorist financing risk assessment.
- Whereas the store of value function of cash is not limited, the potential limitation of the digital euro's store of value function would be consistent with the Commission's and the ECB's respective mandates with regard to ensuring financial stability and maintaining efficient monetary transmission.

Finally, the initiative is consistent with the Commission Communication "Towards a stronger international role of the euro",[214] in which the Commission supported a wider role of the euro to support trade, while being mindful of potential negative impacts on the financial stability of non-euro area countries ("spill-over effects") in line with the G7 principles on retail CBDC, which calls for a staggered and cautious approach. A strong international use of the digital euro could also significantly expand the Eurosystem's balance sheet and affect its monetary policy.

Impacts on the existing market and market actors

The introduction of the digital euro is expected to have an impact on both the EU's retail payment market and the market for savings instruments, particularly deposits. On top of the effects brought by the legal tender status, the extent of this impact will largely depend on the final features and design of the digital euro, which will be determined by both regulation and decisions made by the European Central Bank (ECB). In addition, the reaction and adjustment of market players, including further innovation, will be another factor affecting the dynamics of the EU's payment market after the introduction of the digital euro.

[214] https://ec.europa.eu/info/publications/towards-stronger-international-role-euro-commission-contribution-european-council-13-14-december-2018_en.

While the digital euro should be widely available, there is no quantifiable target market share that it should achieve in either the short or long term. Payments made with the digital euro should strengthen the competitiveness and open strategic autonomy of the European payment market, but should not lead to the displacement of any efficient private payment solutions, nor reduced investment and innovation in this sector. In this regard, trying to maintain level-playing field with other private means of payment in the compensation model will be crucial.

Regarding the EU's retail payment market, payment service providers (PSPs) will face a new competing payment product that may support or challenge their business. On one hand, the digital euro could reduce the market share of existing private electronic means of payments, resulting in lower revenues for certain PSPs. On the other hand, the provision of digital euro services would also mean new revenue for both distributing and acquiring PSPs.

Depending on the overall costs, fee structure and the additional value-added services built on the digital euro, some PSPs may be net beneficiaries of the new market situation, while others may be worse off. Since the ECB may not charge a scheme and settlement fee after payment transactions in digital euro, both PSPs and merchants may face fewer costs than when executing or accepting private means of payments.

Furthermore, the technical rules, standards, and procedures of the digital euro should be developed in collaboration with market participants. Building on existing standards would save implementation and ongoing costs for PSPs and merchants. If PSPs can use standardized solutions and form factors (e.g., QR codes, NFC), they could more easily, quickly, and efficiently expand the geographical reach of their payment product. For example, a national instant payment-based payment solution could market its service at a pan-European level by adopting the standards and procedures developed for the digital euro. This would not only benefit the business of PSPs, but also users who could pay cross-border with their national payment solutions.

Payment service providers, especially deposit taking credit institutions will also face the risk of losing funds and deposits. People may convert not only cash but also deposits or funds held on payment accounts to digital euro. According to an ECB occasional paper,[215] illustrative demand scenarios suggest possible deposit outflows ranging from EUR 180 billion to EUR 6.3 trillion, accounting for 0.5% to 18% of aggregate euro area bank liabilities.

As a result, non-credit institutions may lose any interest income they may gain and also any fee income that they may charge to clients in relation to these funds. Credit institutions losing deposits would see an impact on both their liquidity situations and likely on their net interest income. As explained in Section 6.2.3, in case of large-scale deposit reduction in favour of a digital euro, banks could face liquidity stress and increased funding costs (higher wholesale funding) that may translate to lower net interest income and also lower credit provision to the economy. These impacts would be mitigated by tools which the ECB would have at its disposal for such purposes as set out in that Section, in particular effective holding limits on the digital euro.

The aforementioned impacts would affect individual banks differently, where banks that rely to a large extent on deposit funding and with smaller liquidity buffers would be expected to be impacted more strongly. Whether or not structural disintermediation risks would actually materialize, depends crucially on the take-up of a digital euro and the extent to which a

[215] Adalid et al. (2022), "Central bank digital currency and bank intermediation", ECB Occasional Paper Series 293, May 2022

digital euro would substitute cash or deposits, both of which are difficult to forecast, on the availability and effective use of tools for the ECB to limit the store of value function (see section 6.2.3) and in any case may significantly vary with economic circumstances such as the interest rate environment and the availability of reserves at the central banks.

Other environmental, social and fundamental rights impacts

Environmental impacts are difficult to estimate at this stage as the concrete design of the digital euro is not yet finalised. Nevertheless, since the first issuance of the online digital euro would use similar infrastructure as currently available payment means, the energy consumption and thus environmental impact is expected to be no different than for existing payments (also some existing payments would be replaced by payments in digital euros). Especially in the long-term it is expected that the digital euro would replace some current cash payments. The environmental footprint of bringing digital euros into circulation will be substantially lower than bank notes and coins (printing/coinage, transportation etc.). The energy consumption of a CBDC has been deemed comparable to that of a credit card system.[216] In that respect, the ECB's objective is that "the design of the digital euro should be based on technological solutions that minimise its ecological footprint and improve that of the current payments ecosystem"[217]. It should therefore support progress on UN SDG goals, in particular as concerns lowering energy consumption and CO2 emissions. A detailed assessment can only be done at implementation level.

In terms of social impact, the digital euro would improve financial inclusion by ensuring access to the digital euro payment services to unbanked people in a context where cash becomes less and less useable in a digitalised economy and the use of private means of payments entails costs and requires compliance with sometimes burdensome AML/CFT obligations.

All privacy options (options 2b-2e) respect the fundamental rights to private life and the protection of personal data, enshrined in Article 7 and 8 of the EU Charter of Fundamental Rights of the European Union. Any limitation on the protection of personal data and privacy must apply only in so far as it is strictly necessary, in accordance with Article 52 of the Charter. The processing of personal data should be permitted, while fully respecting fundamental rights, only for the tasks related to the distribution and use of the digital euro as laid down in the regulation establishing a digital euro. These processing activities will respect the principles of necessity and proportionality established in Union data protection law. The regulation establishing a digital euro will ensure full compliance with Union data protection law, in particular Regulation (EU) 2016/679 (GDPR) and Regulation (EU) 2018/1715 (EUDPR) will apply to distribution and use of a digital euro when personal data is processed.

Cybersecurity

Payments with digital euro will face cyber, IT and other operational risks. For online payments with a digital euro, there will be additional risks compared to the ones faced by existing online payment systems e.g. SEPA credit transfers, national debit card payment systems and international debit and credit card schemes. Specifically, while end users will be

[216] "As the legitimacy of CBDC is backed by the trust of central banks, CBDC does not need to prove its legitimacy through its technological structure. Therefore, CBDC does not require the energy-intensive consensus or mining mechanisms used by a cryptocurrency, so its energy consumption is lower (comparable to that of a credit card system)" in "Environmental Implications of a Central Bank Digital Currency, World Bank Group, July 2022, S. Lee and J. Park

[217] ECB Report on a digital euro, October 2020.

exposed to similar levels of risk associated to frauds (e.g., through phishing and account compromise), the Eurosystem will face additional threats by adversaries not necessarily in search for a direct financial gain[218]. PSPs have already systems and processes in place to manage current risks in line with the requirements of the Payment Services Directive (EU 2015/2366, or Payment Services Directive 2). For online payments through digital wallets, the European Digital Identity Regulation will make it compulsory to obtain cyber security certification with at least security level "high" under the Cyber Security Act[219].

For the cyber resilience of the central settlement systems set up by the Eurosystem, the ECB has extensive experience with protecting its existing payment systems, and continuously evolves the reference security framework.[220] Nevertheless, the continuous and instant nature of the settlement service provided by the Eurosystem, combined with the wide audience of served subjects, implies unprecedented challenges to ensure a systematic availability.

The PSPs will be under the scope of the Digital Operational Resilience Act (DORA).[221] DORA creates a regulatory framework on digital operational resilience whereby all firms in the financial sector need to make sure they can withstand, respond to and recover from all types of ICT-related disruptions and threats. PSPs would also need to abide by DORA when they distribute the digital euro.

While the ECB and the Eurosystem would not fall under the scope of DORA, the Eurosystem, is however expected to be subject to the new Cybersecurity Regulation proposed in March 2022 by the Commission,[222] which aims to establish a framework for governance, risk management and control in the cybersecurity area across the European Union institutions, bodies, offices and agencies. They must set up a specific framework for governance, risk management and control in the area of cybersecurity, implement a baseline of cybersecurity measures addressing the identified risks and conduct regular maturity assessments and share incident-related information with CERT-EU without undue delay thus boosting cybersecurity capabilities, and stimulating regular maturity assessments and better cyber-hygiene.

Finally, the Regulation on the digital euro cannot regulate existing supervisory powers of the ECB over payment system, hence this is not part of the impact assessment either.

The offline use of the digital euro can pose additional challenges in terms of operational, cyber and fraud risks. For offline payments in physical proximity, digital euros would be stored on the safe device of a mobile device such as on smartphones or smart watches. By losing the device, or the device being stolen, all funds would be lost as well, like lost wallets containing banknotes and coins. The devices and software used to store digital euro and authenticate payment transactions locally are exposed to high risk of compromise, or damage.

[218] E.g. politically motivated / state sponsored adversaries trying to destabilise the Euro Area financial system.
[219] Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act). http://data.europa.eu/eli/reg/2019/881/oj
[220] The Eurosystem is currently finalizing a consolidated "TARGET Services Cyber Resilience and Information Security Framework"
[221] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014 EUR-Lex - 52020PC0595 - EN - EUR-Lex (europa.eu)
[222] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down measures for a high common level of cybersecurity at the institutions, bodies, offices and agencies of the Union. https://commission.europa.eu/publications/proposal-cybersecurity-regulation_en

The Eurosystem need to ensure that these hardware and software solutions are secure and can withstand tempering. The main risk here is double spending i.e. transferring digital euro while keeping the same amount on the device. This would create additional digital euros for the fraudsters, which would impact the Eurosystem balance sheet.

The safety of a mobile device used for initiating digital euro payments, be it for online or offline transactions, will be key. In this respect, the future cyber certification of mobile devices under the Cyber Resilience Act[223] proposed by the Commission in September 2022 can help address these risks, as for other means of payment. The Act seeks to establish common cybersecurity rules for digital products and associated services that are placed on the EU market. The framework will ensure that manufacturers improve the security of products with digital elements since the design and development phase and throughout the whole life cycle. The Act will ensure a coherent cybersecurity framework, facilitating compliance for hardware and software producers, enhance the transparency of security properties of products with digital elements, and enable businesses and consumers to use products with digital elements securely.

7.3 Impact on small and medium sized enterprises

The initiative is expected to give rise to more competition in the market for payments. Merchants throughout Europe, including many SMEs, would benefit from this in terms of lower costs and increased innovation. While there will be marginal one-off costs in the on-boarding of the digital euro (see Annex 13), the long-term benefits in terms of lower fees arising from increased competition in the EU payment market would outweigh them over time.

Depending on the setup and the possible provision of free P2P and P2B mobile payment applications it could help micro enterprises to offer digital payments next to cash, thereby facilitating a transition to the digital age. Options which would avoid the need for new physical infrastructure (e.g. payment terminals) appear feasible and should be assessed by the ECB. This approach would minimise costs impacts on merchants, including SMEs, and facilitate larger benefits in terms of financial inclusion (also for micro-enterprises). If this should not be possible for technological or stability reasons, it would merit more far-reaching exemptions from the obligation to accept digital euro for certain categories of merchants.

7.4 REFIT (simplification and improved efficiency)

The present initiative is not a REFIT initiative. It concerns a new form of central bank money available to the general public, alongside the euro banknotes and coins that shall be created and regulated in its essential aspects by a new EU Regulation based on Article 133 of the TFEU. Hence, it is not based on an evaluation of any existing Regulation.

7.5 "One In One Out"

The digital euro initiative will be largely neutral from a one-in one-out perspective. There is currently no framework for a digital euro in place, hence there are no existing administrative costs that could be saved in this area.

[223] Commission proposal for a regulation of the European Parliament and of the Council on horizontal cyber security requirements for products with digital elements and amending regulation (EU) 2019/1020, COM(2022) 454 final, SEC(2022) 321 final of 15.9.2022.

While the initiative will involve adjustment costs, which would be kept to a minimum and largely compensated by benefits, it does not impose any new and significant administrative costs, i.e. specific labelling, reporting or registration requirements, which would need to be offset by cost savings elsewhere. Payment reporting to the Eurosystem is mostly done by market infrastructures. PSPs have very limited requirements on payment reporting, which will likely be the same for a digital euro, especially if the Eurosystem obtains aggregated information through settling payments. Payment service providers (PSPs) may need to bear the cost of customer onboarding and transaction verifications, including AML/CFT checks. These are substantive requirements that however will be offset by the fact that already today the payment transactions that the digital euro would replace in the future are subject to the same verifications, and that digital euro users already need to be onboarded by PSPs as part of existing customer onboarding obligations (i.e. opening a bank account). Any reporting related to the compliance with such requirements may be considered administrative costs, but any such costs may not be higher than costs already incurred by PSPs under existing AML/CFT obligations.

8 HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The objective of ensuring that the central bank issued money, the euro can support the EU by meeting the payment needs in the digital age can already be achieved when the digital euro is issued for the first time. Designing the digital euro along the preferred options would also ensure that central bank money remains present, available and accepted and that the euro's competitiveness is increased. While the aim of the initiative is that the digital euro is widely accessible and accepted for retail payments, there is no specific thresholds that can be set as a minimum benchmark for its success. Eventually, the digital euro should be available as an additional choice for people and businesses in addition to cash, private money and private payment means. Therefore, the success of the initiative means take-up by users without strong negative impact on private solutions, hence it will be monitored in this broader context.

The achievement of these objectives can be monitored on an ongoing basis based on data from the PSPs, merchants and the ECB. The total number and volume of retail payments in digital euro and their relative share as compared to other payment means could be the main indicators in monitoring the use of digital euro in the digitalized economy of the EU.

Regarding the specific objectives, the following monitoring indicators could be used:

Objective 1

- For ensuring that central bank money remains present, available and accepted by everyone, the number, the volume and share of retail payments in central bank money (i.e. cash and digital euro), the number of merchants accepting and the number of PSPs providing digital euro services could be monitored. To see whether users pay in digital euro regularly, the payment habits on a weekly or monthly basis could be also surveyed. To assess the impact on merchants, the fees charged by PSPs to merchants and other PSPs could also be surveyed regularly.
- For the state of the art payments, machine to machine payments and the use of DLT or similar technology in digital euro could be measured.

- For pan-European payments, cross border retail payments in digital euro within the euro area could be monitored (number and value, also as share of all retail cross border payments).

Objective 2

- For measuring the competitiveness of the euro vis-à-vis third country issued CBDCs and stablecoins, retail payments in these payment means could be monitored within the euro area and beyond. To measure the international role of the digital euro, trade payments with third countries in digital euro could be monitored.

In all cases the ECB would have statistics on retail payments in digital euro. The information on the digital euro payments would come primarily from the Eurosystem's own IT systems and PSPs. The ECB conducts regular payment surveys where other payment methods including cash is monitored. Regular ECB surveys would have to collect data on fees. Eurostat would have information on trade with third countries. The exact reporting and timing should be developed by the Eurosystem.

Table 7. Monitoring of the digital euro

Objectives	Indicator	Source of information
General objective		
Ensure that the central bank money issued by the ECB can support the EU's economy in the digital age, while safeguarding the role of cash	Amount of digital euro and cash in circulation Number and volume of digital euro transactions and their share of all electronic transactions in the euro area Number and volume of cash transactions and their share of all transactions in the euro area	ECB, PSPs, Merchants
Specific-objectives		
Reinforce the euro's monetary anchor in the digital age by ensuring that central bank money in both its physical and future digital form is widely available to and accepted by all euro-area residents/businesses and tailored to their needs, while preserving financial stability.	Retail payment transactions in central bank money i.e. cash and digital euro in the euro area (P2P, P2B, P2G) versus in commercial bank money Weekly, monthly use of digital euro by people and businesses Level of fees charged by acquirer PSPs to merchants and level of inter-PSP fees paid to distributing PSPs Machine-to-machine payments with the digital euro in the euro area Cross border payments with the digital euro in the euro area (number and value, and also as share of all cross border electronic payments) Number of people with online and offline digital euro Number of merchants accepting digital euro Number of PSPs distributing the digital euro and providing acquiring services	ECB, PSPs, Merchants
Strengthen the EU's open strategic autonomy by increasing the euro's competitiveness vis-à-vis other currencies, third country CBDCs and stablecoins not denominated in euro.	Pan-European retail payments in digital euro outside the euro area Retail payments in third countries-issued CBDC and non euro denominated stablecoins in the euro area Payments for trade (goods and services) in digital euro with third countries	ECB, PSPs, Merchants, national central banks, Eurostat

The Regulation would be reviewed 3 years from the date of application and every three years thereafter. The Commission would present a report to the European Parliament and to the Council on the application of the Regulation.

By 6 months from the date of application of the Regulation, the Commission would present a report to the European Parliament and to the Council on the developments of retail central bank digital currencies in Member States whose currency is not the euro and the impact of this Regulation on the internal market, accompanied where appropriate by proposals for amending legislative acts governing the use of retail central bank digital currencies across the Union.

By 3 years from the first issuance of the digital euro, the Commission would present a report to the European Parliament and to the Council on whether there is a sufficient and effective access to the digital euro in the euro area.

Annex 1 - Procedural information

LEAD DG, DECIDE PLANNING/CWP REFERENCES

This Impact Assessment Report was prepared by Directorate B "Horizontal Policies" of the Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA) and Directorates A and C of the Directorate General for Economic and Financial Affairs (DG ECFIN), in cooperation with Directorate F of Directorate General for Communications Networks, Content and technology (DG CNECT).

The Decide Planning reference is:

- PLAN/ 2021/13199

The initiative on the digital euro was included in the 2023 Commission Work Programme published on 18 October 2022.

ORGANISATION AND TIMING

Three Inter-Service Steering Group (ISSG) meetings were held, chaired by SG, on 25 March 2022, 17 June 2022, 5 October 2022 and a written procedure in January 2023 to discuss the draft impact assessment. The fourth ISSG meeting on 27 April 2023 discussed the draft legislative text. The ISSG consisted of representatives from various Directorates-General of the Commission: COMP, JUST, CNECT, ECFIN, GROW, TAXUD, TRADE, and SJ.

The contributions of the members of the Steering Group have been taken into account in the content and shape of this impact assessment.

CONSULTATION OF THE RSB

The Impact Assessment report was examined by the Regulatory Scrutiny Board (RSB) on 16 November 2022. The RSB gave a negative opinion on 18 November 2022. The IA Report was resubmitted to the RSB on 23 March 2023. The RSB gave a positive opinion on 25 April 2023.

The principal areas in which this Impact Assessment was reinforced following the RSB negative opinion of 18 November 2022 are the following:

RSB comments	How they were addressed
(1) The report should more clearly identify and substantiate with evidence the specific problems it aims to tackle. It should better discuss how likely it is that stable coins and third country CBDCs will challenge ECB monetary policy. It should better assess in the main report why private (digital) payment alternatives are not sufficient in meeting the needs of industry 4.0, web 3 and other digital applications and use cases as well as how this may critically affect the competitiveness of EU industry and the euro. It should also clarify to what extent the legal tender character of money is essential in the payment decisions of both business and consumers	In the baseline scenario, it is explained more clearly that private solutions lack interoperability, fungibility and reliability to support the tokenised economy of industry 4.0 and web 3 absent a public alternative. Leaving the development of payment solutions entirely to the private sector, without a digital euro as monetary anchor, would carry the risk of a fragmented outcome across the euro area. While private alternatives (e.g. private tokens, instant payments) address some of the needs of the digital economy and society, only a central bank digital currency can provide a monetary anchor for private digital money, guarantee

(including by the vulnerable and financially excluded users). It should better substantiate to what degree alternative measures to the digital euro (both in the financial services regulatory as well as in the monetary policy areas) can tackle the problems.	financial stability, avoid market fragmentation and safeguard European monetary sovereignty. The monetary policy instruments of the ECB can address some of the problems and objectives but lacking a digital euro, a possible wide acceptance of a means of payment or store of value not denominated in euro in the future could weaken or even impair the transmission of monetary policy in the euro area. The Regulation on crypto assets, MICA will reduce risks related to global stablecoins, but is not aimed at addressing the problem set out in this impact assessment.
(2) The report should better explain the link to and the expected impacts of the parallel legal tender of cash initiative and other baseline measures, such as the ECB 2030 cash strategy, in ensuring adequate presence and availability of central bank money. On this basis, the report should better outline how the scale of the problems will evolve under the dynamic baseline scenario and whether this makes the establishment of the digital euro a necessity with a view to provide the ECB all the tools it may need to effectively address emerging challenges.	The specific aspects of the legal tender of cash initiative, and in particular on access to cash, are better explained in the corresponding boxes and annex, including further details on the problems to be addressed, legal basis and subsidiarity, policy options and their impacts (in particular clarifying the discretion left to Member States regarding access to cash). he link between the initiative on the digital euro and the one on the legal tender of cash is strengthened in the general objective and in the first specific objective. This link is clarified throughout the impact assessment, and in particular in the boxes dedicated to the cash initiative. It is explained more explicitly that the Regulation is 'enabling' in nature i.e. it provides the possibility, but not an obligation, for the ECB to issue the digital euro. Depending on the developments and risks described in the problem definition, the ECB can decide to issue the digital euro in line with its mandate.
(3) The specific objectives are currently formulated in rather general terms, some appear only in the description or assessment of options without being clear on their interaction and relative importance. The report should present a sharper set of specific objectives linking them clearly to the revised specific problems with a view to present a clear and consistent intervention logic and rationale for action. In this context, it should clarify to what extent strategic autonomy considerations may motivate this intervention. Given the enabling and preparatory character of the initiative the report should also clarify whether there is a need to reflect a broader set of specific objectives to provide the ECB with the necessary flexibility allowing balanced measures to emerging challenges and making a potential digital euro sufficiently future proof.	As regards the first specific objective, it is explained that privacy is a fundamental right also in payments, which will be critical also for the wide use of a digital euro. Reference to financial stability in this objective was also added. In the second specific objective, a reference to the EU's open strategic autonomy was added and more explicitly explained in the corresponding second problem driver. It is explained how the trade-offs (including level playing field, privacy, financial stability, international use) link with the policy options and specific objectives.
(4) The report does not clearly outline how, by	It is clarified that the definition and use of tools

whom and at what stage the measures on limits to the digital euros store of value, offline low value payments and exceptions to mandatory payments will be determined. It should be clear on the objectives and criteria for their operational use and better highlight the significance of these option elements with regards to the effectiveness, efficiency and coherence of the intervention. I	to limit the digital euro's store of value function for financial stability reasons will be in the hands of the Eurosystem, as issuing entity and in the context of its role in preserving financial stability. The IA now includes a description of trade-offs to be taken into consideration by the ECB when making this decision.
(5) The report should better present the options regarding regulating the merchant fees, including by being more specific on the objectives and criteria that should frame the selection and specification of the preferred option. It should more thoroughly assess the impacts and present clearly the pros and cons of the considered options (including on governance). It should pay particular attention on the impacts on the functioning and (price) competition of (digital) payment services markets. In view of the envisaged free basic digital euro services, the report should clarify how this will be reflected in the merchant fee design or broader remuneration package.	As regards the compensation model including the regulation of merchant fees, policy options have been developed, presented and analysed. It is clarified that the Regulation would mandate the ECB to publish price expectations and/or guidelines, based on the principles that fees should follow.
(6) In more general terms the report should better describe how the digital euro is 12 expected to fit into in a competitive existing market and explain how the existing market actors are likely to be affected by the initiative. . It should clarify to what extent the digital euro will challenge cash and private payment alternatives and how a proper balance between public and commercial money will be ensured. The report should also, in more detail, explain the impact on smaller payment service providers and merchants, in particular merchants not currently providing electronic payment services	It is better described how the digital euro is expected to fit into a competitive existing market. In this context it was clarified that the digital euro would co-exist, complement and to some extent compete with private payment solutions on the EU's payment market. Private payment solutions include domestic and international payment cards, instant payments, and any other payment solutions that build on them e.g. digital wallets. They provide substantial benefit for both people and businesses by offering a fast, reliable and efficient payment in both physical (shops, restaurants, etc.) and online (e-commerce) environment.
(7) The report should in more detail outline what the cyber risks are when introducing a digital euro, how significant the cyber risks are for CBDCs in comparison to the alternative digital payment means, and what mitigating measures should be taken to ensure that the security expectations of business and consumers are met. It should explain how the balance between privacy and security will be addressed and how consistency with existing policies on anti-money laundering and on combatting terrorist financing will be ensured.	It is clarified that the cyber, IT and other operational risks of the digital euro payment system are relevant and important. The consistency with other Commission initiatives (DORA, Cybersecurity Act, Cybersecurity Regulation, Cyber Resilience Act) were also explained in this regard. Consistency with the AML/CFT framework is better explained.
(8) The impact assessment should better present views (including divergent views) throughout the report of different stakeholder groups.	Additional information on the results of the targeted consultation was provided in the report and in Annex 2.
(9) The report should clearly present the	Monitoring and evaluation arrangement has been

monitoring and evaluation arrangements. It should present in more detail how the success of the initiative will be measured.	supplemented with relevant indicators that would show the evolution of the use of digital euro. It was clarified that while the aim of the initiative is that the digital euro is widely accessible and accepted for retail payments, there is no specific thresholds that can be set as a minimum benchmark for its success. Eventually, the digital euro should be available as an additional choice for people and businesses in addition to cash, private money and private payment means.

Following the positive opinion of 25 April 2023, in light of the comments attached to the opinion, further clarifications were introduced in the report:

RSB comments	How they were addressed
(C) What to improve	
(1) The report should better explain the identification and role of intermediaries and how the technical rules, standards and procedures will be developed together with market participants.	In Section 5 it was clarified that the main categories of PSPs that would be best suited to distribute the digital euro are credit institutions, payment institutions and electronic money institutions. Acquiring services to merchants would likely provided by the same PSPs that currently offer such services in relation to private payments e.g. card payments. It was also inserted that in January 2023, the ECB set up a Rulebook Development Group (RDG). The RDG consist of a maximum of 24 members and composed by 10 representatives from the public and 14 representatives from the private sector. The private sector representatives come from consumer organisations, corporate treasurers, small and medium sized business, retailers with a physical presence, online retailers, acquirers, the European Payment Council, credit institutions, payment institutions. It was further explained in Section 7 that to minimize the impact on already available payment methods, the technical rules, standards, and procedures of the digital euro should be developed in collaboration with market participants. Building on existing standards would save implementation and ongoing costs for PSPs. If PSPs can use standardized solutions and form factors (e.g., QR codes, NFC), they could more easily, quickly, and efficiently expand the geographical reach of their payment product.
(2) While the report clarifies the complexity of precisely estimating the aggregate recurrent fee costs for merchants, it also states that the costs are not expected to be higher than the costs of current payments means. Based on examples on current payment means, the report should discuss and provide examples of the current costs to give a more precise indication of the likely	In Section 6.2.1, it was added that merchants pay merchant service charges (MSC) related to card payments. MSC has three major components: interchange fees, scheme fees (including processing fees) and acquirers' margins. According to a study by CMSPI & ZEPHYRE, the MSC in EU 28 was on average about 0.48% in 2020. The interchange fees related to intra-EU consumer credit and debit card payments are capped by the Interchange Fee Regulation (IFR) at 0.3% and 0.2% of the value of the POI payment transactions, respectively. This can vary among Member States and be much lower than the cap. According to the study, the average interchange fee was 0.2% in 2020. Acquirers' margins depend on the services provided and

magnitude of the cost per provider.	the negotiating position of merchants. According to the study, the average acquirer margin was 0.18% in 2020. Lower scale and weaker bargaining power nonetheless often result in higher acquirers' margins and hence higher MSCs for smaller merchants. Scheme fees on average were 0.09% in Europe according to the study.
(3) Regarding the ECB mandate to issue pricing expectations/guidelines on merchant fees, the report should provide more details on the foreseen impact assessment process, including by clarifying how competition authorities and stakeholders will be involved. It should also elaborate on the criteria and foreseen process of the enabling regulation that could be triggered in case the guidance proves to be insufficient and clarify who will be empowered.	In section 6.2.1, it was clarified that when designing the price expectations, the ECB should carry out an impact assessment. Relevant authorities such as national competition authorities and the European Commission as well as relevant private sector stakeholders may need to be consulted before the issuance of the price expectation and the impact assessment. The Regulation could also include a review clause that would foresee further mandate for the ECB to regulate fees if the guidance proves to be insufficient. Mandatory capping the fees may prove to be necessary if the fees charged to merchants (either inter-PSP or acquirer's margin) prove to be excessive and may lead to overcharging merchants when they mandatorily accept payments in legal tender. The ECB should continuously monitor the market of digital euro payments and the evolution of fees charged.
(4) The existing market and market actors are explained in the problem section, but the report should explain how the preferred option is expected to fit into in a competitive existing market. Taking the combination of the preferred options into account the report should better discuss what the expected usage and uptake will be, both from a short-term and long-term perspective. It should also clarify how coherence of any digital euro store of value limits with the situation as regards euro cash will be ensured.	In Section 7, it was clarified that the introduction of the digital euro is expected to have an impact on both the EU's retail payment market and the market for savings instruments, particularly deposits. Depending on design of the digital euro especially the overall fee structure and remuneration, some PSPs may be net beneficiaries of the new market situation, while others may be worse off. While the digital euro should be widely available, there is no quantifiable target market share that it should achieve in either the short or long term.
(5) While the access to cash options as such would not directly impose costs on banks or retailers, the report should still exemplify the significance of cost of potential EU measures such as re-introducing ATMs.	In dedicated box F on the impact of measures on access to cash, the example of a Belgian agreement between the Ministry of Finance and the banking industry on ATM infrastructure was used. Although this agreement represents an increase of approximately 5% in the planned number of pooled ATMs, this should be seen in the context of the overall reduction of banks' costs over many years through branch and ATM closures and the likely cost savings for individual banks through the pooling of ATMs (costs and savings are not disclosed by the participating banks because this information is confidential).
(6) The report should better describe the evaluation arrangements of the initiative, clarifying at what point a future evaluation would be carried out once the digital euro is introduced. The proposed monitoring should	In Section 8, it was clarified that the Regulation would be reviewed 3 years from the date of application and every three years thereafter. The Commission would present a report to the European Parliament and to the Council on the application of the Regulation. Indicators that can monitor fees have been added.

also account for how the newly added options on merchant and inter-PSP fees will be monitored.	

EVIDENCE, SOURCES AND QUALITY

A number of inputs and sources of data were used in the preparation of this impact assessment, including the following:

- Evidence supplied in the context of the various consultations by the ECB and the Commission described in Annex 2.
- Focus group analyses conducted by the ECB in 2021 and 2022.
- ECB working papers and staff working documents
- Commission and Joint Research Center (JRC) simulations and research (see in Annex 11)

With regard to quality of evidence, the following observations can be made:

- The public and targeted consultations by the ECB and the Commission are not representative of the whole EU population and businesses due to their methodology (no sampling).

- Information received in the targeted consultation on costs for PSPs and merchants came from a few respondents and could not be independently verified. Many PSPs and merchants declined to provide cost information.

- The various simulations carried out by the JRC are in line with academic standards. Given that advanced economies have no experience with CBDCs, there is no data basis for purely empirical analyses. The simulations therefore are based on a number of assumptions and the scenario analyses are subject to uncertainty associated with the respective assumptions made, in particular as regards the CBDC demand (which is also a function of CBDC design), demand distribution and substitution with cash and deposits. The macroeconomic analyses do not consider the possible negative consequences of inaction e.g. in the presence of emerging alternative means of electronic payments, and do not explicitly evaluate possible efficiency gains for the economy from introduction of a CBDC. The bank profitability analysis should be considered as a static assessment of the effects of a CBDC induced reduction in deposits as it does not provide a modelling of banks' possible reaction function.

Annex 2 - Stakeholder consultations

I. Results of the ECB's public consultation on the digital euro[224]

The ECB public consultation on a digital euro

On 2 October 2020 the Eurosystem published its "Report on a digital euro". The report formed the basis for seeking wider views on the benefits and challenges of issuing a digital euro and on its possible design. The report was followed by the "Public consultation on a digital euro", which was launched on 12 October 2020 and ran until 12 January 2021. The consultation included 18 questions aimed at collecting the views of both citizens and professionals. The first part was aimed mainly at citizens in their role as users, while the second targeted primarily financial, payment and technology professionals with specific knowledge of the economics, regulation and technology of (retail) payments. However, respondents were invited to provide feedback on the full set of questions. This report sets out the results of the analyses of the 8,221 responses submitted by participants in the public consultation.

Overview of respondents

94% of the respondents identified themselves as citizens and 6% as professionals. The sample of respondents is biased in terms of gender, industry and country of residence. Men account for 87% of citizen respondents. A third of the professionals identify themselves as tech companies. Most contributions originate from three countries: 47% from Germany, 15% from Italy and 11% from France. Five other European countries provided 1-5% of replies, with the rest accounting for less than 1% each. When reading this report, it should be taken into account that these biased demographic characteristics do not represent the euro area population. The replies from both citizens and professionals do, however, provide valuable input to the Eurosystem's reflections on a digital euro.

Possible features of a digital euro

Privacy is considered the most important feature of a digital euro by both citizens and professionals participating in the consultation, especially merchants and other companies (often self-employed professionals). When identifying the whole possible package of most preferable options, citizens participating in the consultation consistently opt for privacy, security, usability throughout the euro area, absence of additional costs and usability offline. When confronted with a specific choice between an offline digital euro focused on privacy, an online one with innovative features and additional services, and a combination of the two, citizen respondents generally opt for an offline solution focused on privacy, while professional respondents consider a hybrid approach more appealing. Among the main challenges associated with a digital euro, citizen respondents identify those related to privacy and, especially when considering accessibility, simplicity in its use as a means of payment. Professional respondents identify similar challenges, as well as additional ones related to poor internet connectivity in some areas.

[224] https://www.ecb.europa.eu/pub/pdf/other/Eurosystem_report_on_the_public_consultation_on_a_digital_euro~539fa8cd8d.en.pdf

Provision of digital euro payment services

Both citizens and professionals in the sample generally agree that the digital euro should be integrated into existing banking and payment solutions. All types of respondents favour licensing and oversight of the intermediaries to ensure that digital euro services include appropriate user protections, especially with regard to possible misuse of data and concerns about the safety of services related to a digital euro. Notwithstanding the attention to privacy, both citizen and professional respondents support the requirements to avoid illicit activities, and only less than one in ten citizens are in favour of anonymity. Although many suggest that some identification of users should be facilitated, the privacy of payment data is considered the most important feature, ranging from full privacy of transactions to the possibility that only low-risk small transactions are private. Most citizen and professional respondents believe that digital euro payments should be integrated into existing payment solutions or products and that additional services should be provided on top of basic digital euro payments, with conditional payments as the most popular choice. They suggest a number of solutions for preventing counterfeiting and technical errors, and to ensure that the amount of digital euro in circulation is equal to that issued by the central bank, including blockchain, cryptography and licensed software or hardware.

Technical solutions

According to a quarter of the citizen respondents, hardware end-user solutions comprising (smart) cards or a secure element in devices such as smartphones are the best technical option to facilitate cash-like features. Of professional respondents, a third consider that end-user solutions (i.e. either software solutions like wallets and apps and/or hardware solutions like cards, a secure element in a device and a dedicated storage or device) are the best way to support cash-like features, while another third prefer a combination of end-user solutions with the back-end infrastructure, many referring to decentralised infrastructures. Many respondents believe that all available hardware and software solutions for electronic payments could be adapted for a digital euro, provided that their level of protection is sufficient to support trust in safety and security as a key feature of a digital euro.

Tools to avoid macroeconomic consequences

Almost half of citizen respondents mention a need for holding limits, tiered remuneration, or a combination of the two, to manage the amount of digital euro that would be in circulation. A similar share of professional respondents agree. Tiered remuneration is especially popular among the research community, while holding limits are favoured by credit institutions. At the same time, about a third of citizen respondents and professionals classified as merchants reject any tool aiming to avoid the circulation of excessive amounts of digital euro as a risk-free form of investment. In order to avoid tiered remuneration having a negative effect on the usability of a digital euro, both citizen and professional respondents state that the limit or first tier should be large enough for retail payment needs. Besides delayed settlement of transactions, few respondents suggest any specific solution for making tiering compatible with offline use. Where holding limits are imposed, respondents agree that the best way to allow incoming payments above that limit is by automatically transferring the excess digital euro to an account held with a private institution.

International payments

When questioned about cross-currency payments, citizen respondents value speed of cross-border payments (mentioning that instant payments should be possible), cost and transparency of exchange rates. At least a third of them mention one of these three aspects. A large majority of citizen respondents consider that the use of digital euro outside the euro area should not be limited, provided that safety and security are ensured, which is also the view of most professional respondents. Nevertheless, one in ten citizens consider that it could be used cross-border but with limits. Additionally, with regard to cross-border payments professional respondents focus mostly on the issue of interoperability (around a third of respondents) and the role of intermediaries (a fifth of respondents) either as settlement agents or, to a lesser extent, gatekeepers.

II. Summary of a ECB commissioned study on new digital payment methods[225]

The most desirable features of a future digital payment method for the majority of participants in the general public and the tech-savvy groups are:

- Universal acceptance: widely accepted in all kinds of physical shops and online across Europe, for all types of amounts.
- Contactless and instant person-to-person payments: no matter what system the recipient is using.
- A one-stop-solution: integrating multiple payment methods, quick and easy to use, with contactless payments or customisable financial reporting functions.
- Safe and secure: biometric verification, protection from fraud and hacking, with authentication of payments.
- Cost-efficiency: no cost or low fees.
- Financial privacy (a digital wallet specific feature): while financial privacy is not top of mind, when probed, flexible privacy settings that can be adjusted to suit the payment occasion were preferred.
- Funding (a digital wallet specific feature): customisable manual funding with payment reminders when the balance of the digital euro wallet is getting low, and an option for automatic top-ups.

Merchants would seek the following features from a new digital payment method:

- High demand from customers is an overarching key driver for merchants to accept a new payment method.
- Low fees: once there is a high demand from customers and as long as fees are not higher than other current payment methods merchants are more likely to accept a new payment method.
- Speed of transactions: instant payments were very attractive for merchants. The element of instantaneity in payment was seen a strong point and a motivating factor for usage. It makes cash flow management easier. Merchants perceive the possibility of immediate payment, which could be one of the features of this new payment instrument, as a significant advantage.

[225] https://www.ecb.europa.eu/paym/digital_euro/investigation/profuse/shared/files/dedocs/ecb.dedocs220330_report.en.pdf

- Technically reliable and backed up by good customer service: easy to receive such payments, for instance by scanning something with their phone (QR code, etc.) or using their existing technology, intuitive and easy to use.
- Good integration with their day-to-day business activities: integration of accounting tools, cash back, bonus points, marketing activities in connection with the introduction of a new payment service.
- Security and safety assurances for both merchants and their customers are particularly important features.

The unbanked, underbanked and offline population look for the following features in a new digital payment method:

- Easy to use without requiring technological digital skills: having the same elements as their current payment methods – to be able to pay cash, withdraw money with a card, make automatic payments and have a monthly statement; the possibility of offline usage without an internet connection.
- Safe and secure: personal information to be kept secure, protection against misuse in the event of loss and theft.
- Free: low or no fees, no maintenance costs and the possibility of borrowing a certain amount of money for more difficult months.
- Backed up by a robust customer support system: supported by personal contact with a preference for face-to-face support to set-up and start using the device or payment method. Known channels, such as their existing bank contacts, and backing from the banking system and public financial institutions will help win over some underbanked and offline participants.

III. Results of the Commission's targeted consultation on the digital euro

Disclaimer: *The contributions received to the targeted consultation on the digital euro cannot be viewed as the official position of the Commission on the topics covered and thus does not bind the Commission. Contributions received to this targeted consultations cannot be considered as a representative sample of the views of the EU's population, businesses or else.*

Introduction

On 5 April 2022, the European Commission launched a targeted consultation on a digital euro. The consultation closed on 16 June 2022.

The purpose of the targeted consultation was to complement the ECB's public consultation on a digital euro with further information gathered from industry specialists, payment service providers (including credit institutions, payment and e-money institutions), payment infrastructure providers, developers of payment solutions, merchants, merchant associations, retail payments regulators, and supervisors, anti-money laundering (AML) supervisors, financial intelligence units, and other relevant authorities and experts as well as consumer organisations, in order to feed in the impact assessment prepared by the European Commission in view of the upcoming Regulation on a digital euro.

Respondents' views were collected upon 7 topics:

1. Users' needs and expectations for a digital euro
2. The digital euro's role for the EU's retail payments and the digital economy
3. Making the digital euro available for retail use while continuing to safeguard the legal tender status of euro cash
4. The digital euro's impact on the financial sector and the financial stability
5. Application of anti-money laundering and counter terrorist financing (AML-CFT) rules
6. The privacy and data protection aspects
7. International payments with a digital euro

Overview of respondents and responses

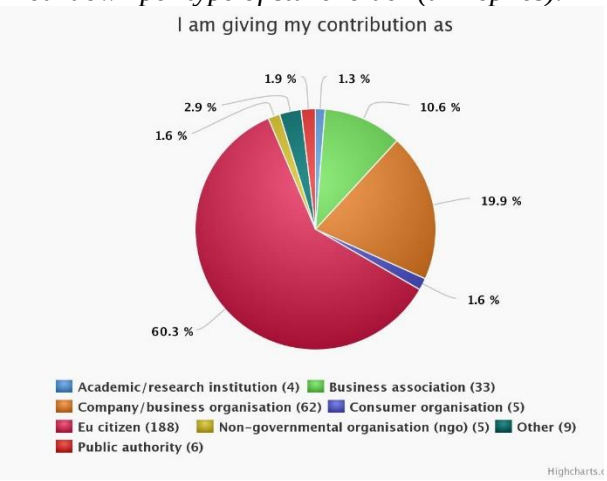
The Commission received 312 responses. While the consultation was targeted at experts and professionals 188 contribution also came from individuals and 124 came from the targeted professional respondents.

Individuals replied from almost all Eurozone Member States, including 37% from Slovakia, 14% from Belgium, 12% from Germany, 6% from Italy, 6% from Netherlands, 5% from France and 4% from Spain. Few replies came also from outside of the Eurozone.

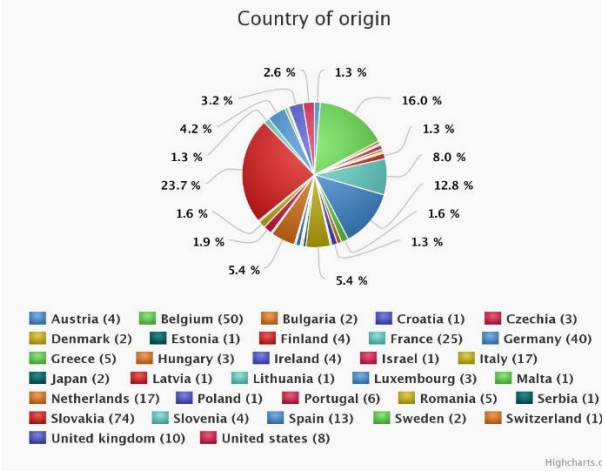
Most professional respondents (all respondents except individuals or citizens) were payment services providers. Out of the 124 professional respondents, half of them were companies (62), a quarter were business associations (33). There were 20 financial sector associations, 19 credit institutions, 14 payment service providers (PSPs) other than banks, 6 PSPs associations, 5 merchants and 7 merchant organizations. Answers from 15 technology service providers and 10 IT solution providers for payment services were also received. Additionally, 7 crypto asset services providers and 4 market infrastructure operators provided

answers. 5 consumer organizations replied to the consultation. In addition, 4 academics, 6 public authorities, 5 NGOs and 9 other respondents provided answers.

Breakdown per type of stakeholder (all replies):



Breakdown per Member State/country (all replies):



In the absence of a sampling technique, answers cannot be considered representative, also considering that a significant number of respondents either did not answer or showed no opinion on almost all questions (sometimes above 50% e.g. on AMLCFT). One explanation could be that not all respondents may have sufficient knowledge or show interest in all topics.

Summary of respondents' feedback[226]

1. Users' needs and expectations for a digital euro

As far as people are concerned, fast, private, cost free and widely available digital euro would be most desired. Almost half of **EU citizens** ranked instant settlement (86 out of 188, 46%), flexible privacy settings (85 out of 188, 45%), cost free use (85 out of 188, 45%), wide availability and easy on-boarding (84 out of 188, 45%) as top features. Slightly more than half of EU citizens (99 out of 188, 53%) subsequently considered preserving privacy and data protection in payments as a main policy objective. EU citizens also ranked ability to pay offline (81 out of 188, 43%), ability to pay anytime, anywhere to anyone (76 out of 188, 40%), and easy to use (65 out of 188, 35%) as prominent design options. **Most professional respondents** considered wide availability and easy onboarding (91 out of 124, 73%), easy to use (86 out of 124, 69%), ability to pay anytime, anywhere to anyone (86 out of 124, 69%), and instant settlement (86 out of 124, 69%) as the most important aspects to be offered to the general public. Professional respondents also regarded cost free use (78 out of 124, 63%) as a prominent feature. They also deemed flexible privacy settings and offline payments as important (65 out of 124, 52%). Specifically, **consumer associations** emphasized cost free use and preservation of privacy as essential elements of a digital euro although they appeared sceptical about flexible privacy settings. They also considered anonymity and security as crucial elements.

[226] When calculating percentages we always used the total number of individual (188) and professional respondents (124) as denominators, even if the actual number of respondents to a particular question was less than that. This methodology was chosen to avoid giving too much weight to a few answers in cases where only few participants responded. Conversely, the presented percentages may give too much weight to the non-respondents, which should be considered when reading these results.

Other desired benefits for the digital euro highlighted by respondents from different categories include the protection of funds from any government intervention, the compatibility with private blockchains, the competitiveness with cards schemes, cash like features and international payments.

People-to-People (P2P) and offline payments would benefit people the most. Many **EU citizens** attributed high importance for paying in digital euro in a low connectivity environment - offline (61 out of 188, 32%), paying to another natural person both face to face (62 out of 188, 33%) and remotely (56 out of 188, 30%). They (52 out of 188, 28%) also considered e-commerce as a payment situation where the digital euro would bring value added whereas fewer respondents (43 out of 188, 23%) shared similar views as regards POS payments. The majority of **professional respondents** considered that offline payments peer-to-peer payments would bring most value added for people (69 out of 124, 56%). At the same time many of them also considered that the digital euro would add significant value to shops (55 out of 124, 44%) and e-commerce (57 out of 124, 46%). Specifically, **consumer organisations** saw the digital euro as a digital equivalent to cash: consequently, the priorities should be firstly payment in shops, second P2P payments and, third online payments.

Payment services providers stressed that commercial banks' payment offer fulfils almost all needs already and that the added value of a retail digital euro to EU citizens would be limited. They advocated targeting payment segments that are insufficiently served by the private sector. Some suggested developing an offline digital euro while others called for innovative payments, including machine-to-machine and micro-payments. Some **consumer organisations** on the other hand supported the digital euro owing to the fact that more and more people were using electronic payment options: they feared that without a digital euro other non-European payment solutions, CBDCs or stablecoins might take the lead.

Respondents attached importance to providing access to public money in a digital form for everyone. **EU citizens** valued the objective of providing access to public money for everyone (75 out of 188, 40%) and for the unbanked people (73 out of 188, 39%) as very important or important. Some EU citizens also regarded lower payment cost (66 out of 188, 35%), pan European payments (66 out of 188, 35%), helping people with disability and less digital skills (64 out of 188, 34%) and monetary sovereignty (63 out of 188, 34%) as important or very important. Most **professional respondents** believed that providing access to public money in digital form to everyone (80 out of 124, 64%), and preserving privacy and data protection in payments (79 out of 124, 64%) were important or very important. Protecting monetary sovereignty (76 out of 124, 61%), enabling pan-European payments (76 out of 124, 61%), providing an alternative to emerging stablecoins and foreign CBDCs (74 out of 124, 60%), fostering the development of the EU's digital economy (68 out of 124, 55%), strengthening the open strategic autonomy for the EU (68 out of 124, 55%) were also deemed important or very important. **Consumer organisations** emphasised the need for a broad access to the digital euro.

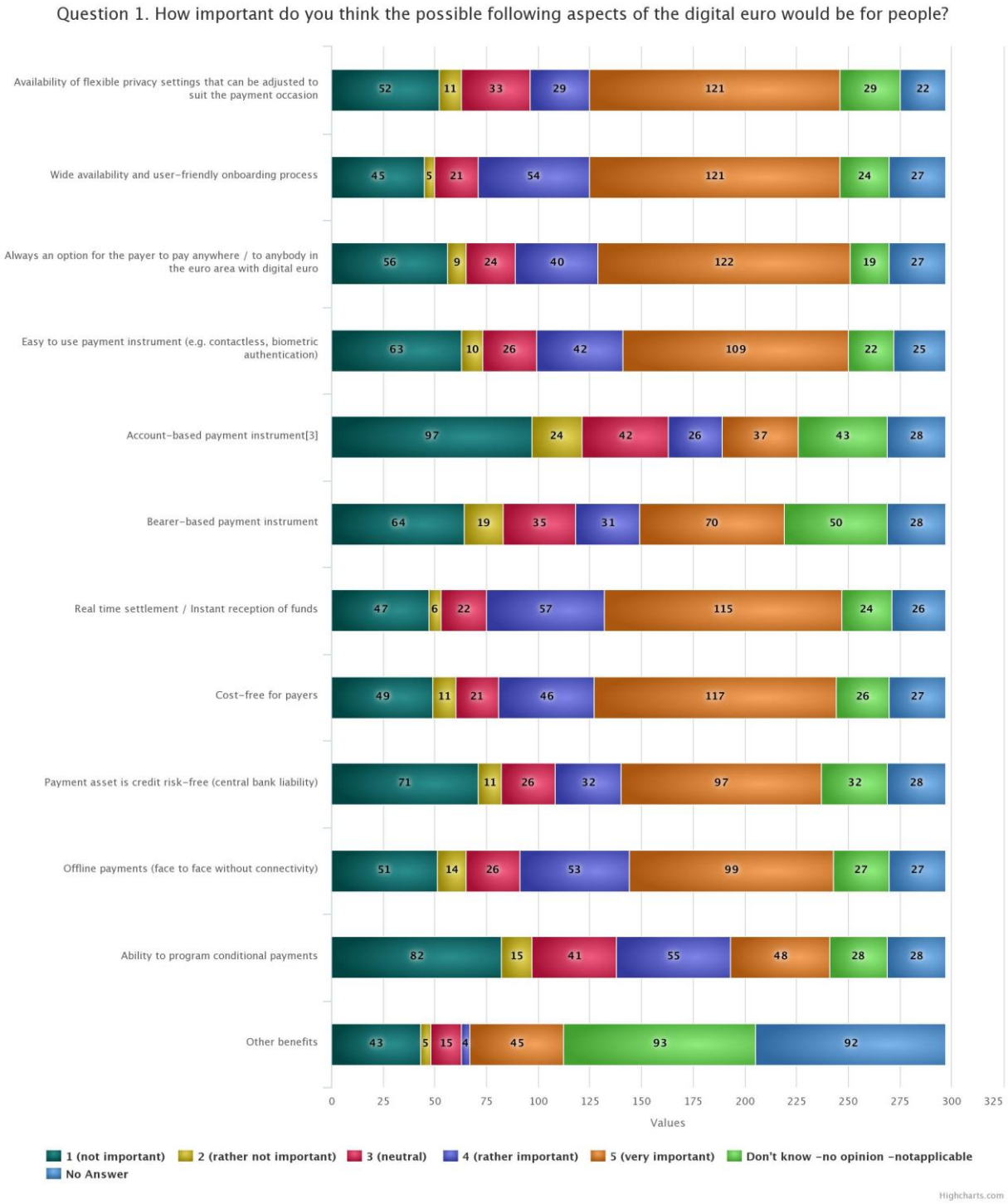
Easily accessible digital euro without any bank account was viewed as a way to support financial inclusion. In this context, **EU citizens** believed that there should be no need to open a bank account (75 out of 188, 40%). Offline peer-to-peer payments (72 out of 188, 38%), easy onboarding (71 out of 188, 38%), easy payment (65 out of 188, 35%) and easy to use devices (e.g. chipcards) (61 out of 188, 32%) were also deemed as important or very important by some EU citizens. **Professional respondents** thought that easy onboarding (90 out of 124, 73%) and easy payments (89 out of 124, 72%) were the two most important features to support financial inclusion. The vast majority of professional respondents also

regarded offline payments, accessible devices, and no need for a bank account as strong features. **Consumer organisations** advocated for an easy onboarding process and accessible devices.

Real time settlements and standards for an EU-wide acceptance infrastructure were particularly favoured by merchants. Professional respondents in general believed that for merchants the most important aspects of a digital euro would be real time settlement (83 out of 124, 67%), standards for EU-wide acceptance infrastructure (82 out of 124, 66%), low acquiring fees (74 out of 124, 60%) and offline payments (70 out of 124, 56%). They did not think that the digital euro could lead to better services for merchants. They could not decide whether the digital euro should be an account or bearer-based instrument. **Merchants and their organizations** shared this view. They saw low costs (close to zero) as the most important features, followed by standards for EU-wide acceptance infrastructure, offline payments and real time settlement.

According to professional respondents, the digital euro may bring benefit to businesses/merchants in all payment situations. Respondents took the view that offline payments would bring significant value added (40 out of 124, 32%) and trade finance the least (21 out of 124, 17%). About 50-55 out of 124 professional respondents (40% to 44%) considered that the digital euro would bring some or significant added value in POS and e-commerce.

Some professional respondents rated machine-to-machine (M2M) payments in the context of industry 4.0 and Internet of Things as an added value for people (51 out of 124 respondents; 41%), **merchants and businesses** (52 out of 124 respondents, 42%). Professional respondents described M2M payments as an "important driver of payment innovation in the digital economy", and as a "useful tool" representing a growing market currently "underdeveloped in Europe".



The chart above shows the aggregated replies of both people and professional respondents.

2. The digital euro's role for the EU's retail payments and the digital economy

The digital euro's role in supporting pan-European payments and strengthening Europe's open strategic autonomy

A widely available digital euro is expected to support the EU's open strategic autonomy. According to the majority of professional respondents, the most important feature of a digital euro to strengthen EU's open strategic autonomy would be to offer a public digital means of payment through all available payment solutions (76 out of 124 professional respondents, 61%). The majority of professional respondents (74 out of 124, 60%) also considered offline peer-to-peer transactions in digital format as very important or important for EU's open strategic autonomy. Similarly, a new form of pan-European instant payment complementing the existing offer at the points of sale with a (quasi) universal acceptance in both physical and online shops was deemed important (70 out of 124, 56%). Interestingly, without (quasi) universal acceptance, such a payment was only seen as important by 24 out of 124 respondents (19%) while 48 out of 124 (39%) saw it as not important. Professional respondents doubted that without (quasi) universal acceptance usage the digital euro would take-up rapidly. They also noted however, that (quasi) universal acceptance would not be sufficient to drive consumer adoption, given that, from a retail customer perspective, currently available solutions were universal as well. Credit institutions believed that offline and conditional payments and a public digital means of payment through all available payment solutions would support most the EU's open strategic autonomy. Most consumer organisation mentioned universal acceptance and offline payments as most important. Merchants ranked 'a public digital means of payment through all available payment solutions' as the most important in this aspects.

A digital means of payment allowing for online third party validation of transactions received mixed opinions among professional respondents. 42 out of 124 (34%) perceived it as important to support pan-European payments and to strengthen EU's open strategic autonomy, whereas 18 out of 124 (15%) assessed it as not important and 24 out of 124 (19%) stayed neutral. Professional respondents pointed to the existing well-developed payment ecosystem (SEPA, credit transfers and direct debit, international cards and wallets) and to the ongoing initiatives (EPI, instant payments) to improve it further. It was also noted that people could mix digital euro with instant payment solutions offered by the private sector, which already incurred implementation costs for PSPs and merchants.

Professional respondents also mentioned the following aspects, which might strengthen further the EU's open strategic autonomy:

- To compete with foreign CBDCs and crypto-assets, the digital euro should take advantage of the potential of DLT.
- Key infrastructures as well as the initiation of most digital euro transactions should not be left to non-European players.
- European players from the private sector should be involved in the maintenance and operations of the digital euro.
- Digital euro infrastructures should adapt to future market and technological developments as well as to new functionalities.
- The model used for the introduction of the digital euro should be resilient; for example, it should not create single points of failure.

- Promoting an open payment and data policy agenda should be key to EU's open strategic autonomy.
- The digital euro should be modelled on the existing intermediated system and designed to allow banks as well as non-bank PSPs to build innovative payment solutions.
- End user solutions should be simple and user friendly to guarantee the uptake of the digital euro.
- The digital euro should interoperate with the private sector infrastructure and payment solutions. The digital euro should be offered through payment solutions that are already available.

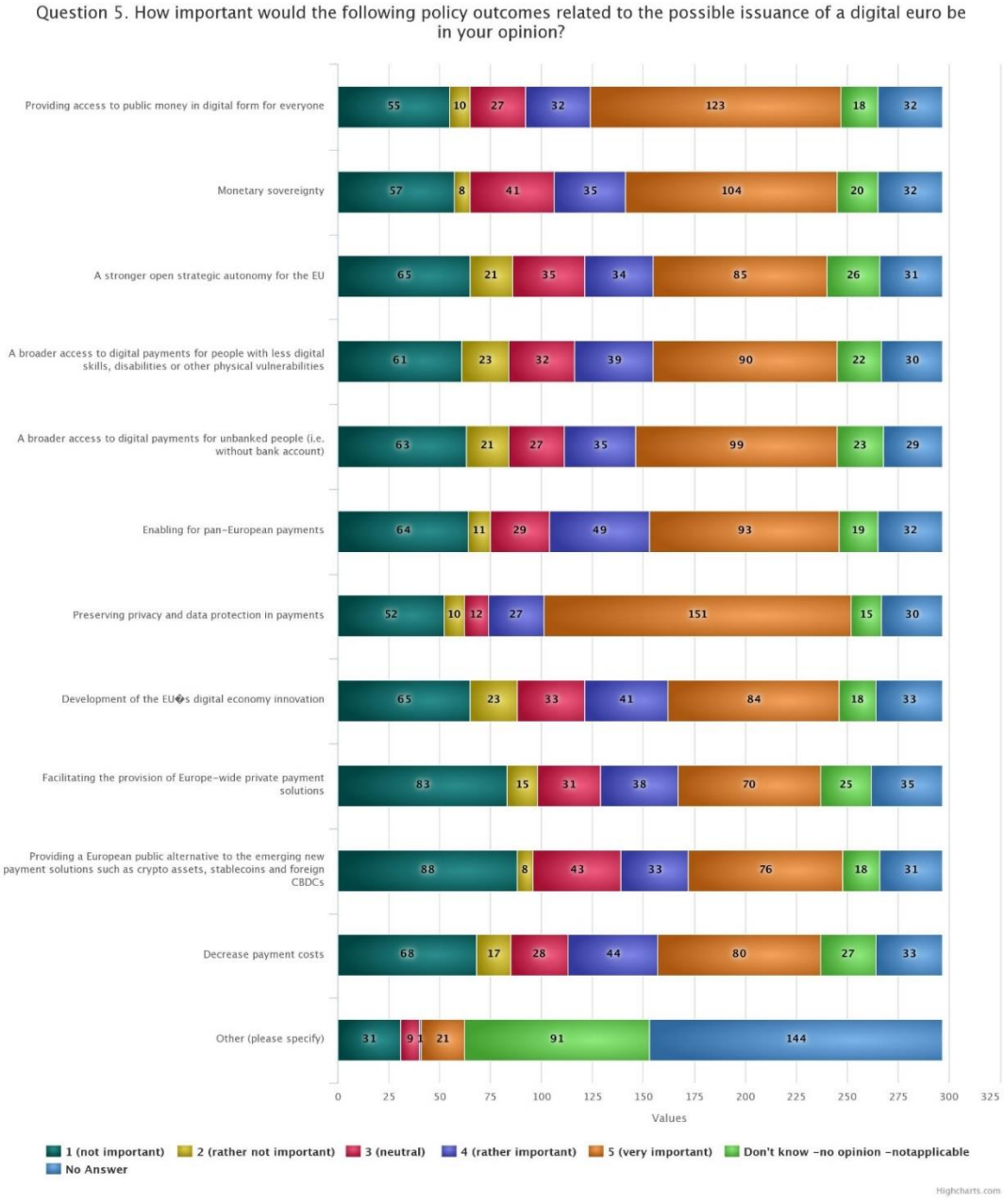
An intermediated digital euro could contribute to the development of the EU's retail payment market. According to professional respondents, the best way to support a diversified and competitive retail payment market where a variety of payment providers offer a broad range of payment solutions would be to ensure that the digital euro is distributed via regulated financial intermediaries such as PSPs. 80 out of 124 professional respondents (70%) believed that this distribution model would positively impact the EU's retail payment market, whereas only 10 out of 124 (8%) thought it would have a negative impact and 9 out of 124 (7%) stayed neutral. Nevertheless, some professional respondents warned that distributing the digital euro via financial intermediaries might hinder its take-up as the digital euro would compete with private sector solutions provided by these same intermediaries, which would have no incentive to promote the digital euro. Some professional respondents also suggested that a diversified and competitive EU's retail payments market would be significantly fostered by the coexistence of private and public intermediaries, which could have complementary actions, for instance public intermediaries would be better suited to serve currently financially excluded populations. Others recommended that non-bank PSPs should also have access to the digital euro system as they could build added-value payment solutions on top of it. Eventually, it was suggested that the digital euro should be interoperable with both the existing traditional financial sector, as well as the crypto-asset service provider sector, at the European and the international levels alike.

Offering another form of central bank money in the context of a declining use of cash for payments was also deemed to positively affect the diversification and competitiveness of the EU's retail payment market. 70 out of 124 professional respondents (56%) supported this view. In addition, professional respondents requested avoiding too favourable conditions that could strongly influence the EU's retail payments market at the detriment of private means of payment, (i.e. free of charge, mandatory acceptance), and would result in unbalanced competition. For instance, a free digital euro should be limited to cash-like payments such as small offline peer-to-peer payments. It was stressed that distribution models whereby significant costs and risks would be placed onto the intermediary layer without commensurate compensation may only attract intermediaries with business models that depend on extracting maximum economic value from user data, such as BigTech providers.

Using the digital euro acceptance network to foster pan-European private sector initiatives may also positively affect the retail payment markets' competitiveness. 69 out of 124 professional respondents (56%) thought it would have a positive impact. Reusing existing front and back-end infrastructures should reduce implementation costs and accelerate the deployment of a digital euro.

Holding caps or interest and fees on large holdings to limit the store of value function of a digital euro was seen in a mixed way. 38 out of 124 professional respondents (31%)

thought that it would have a positive impact on the EU's retail market development whereas 30 out of 124 (24%) thought it would negatively affect the diversification and competitiveness of the EU's retail payment market. Some professional respondents believed that limits on holdings/transactions would not hamper the uptake of a digital euro, as limits on individual transactions already existed in different member states for different payment methods, such as cash and instant payments. In addition, the EU regulation provided for limits on prepaid cards on the ground of AML/CFT. Other professional respondents cautioned against the high probability that in crisis times, any limit may be lifted owing to political and societal pressure.



The chart above shows the aggregated replies of both people and professional respondents.

The digital euro's role for the digital economy

According to professional respondents, the most important option for a digital euro supporting the development of the EU digital economy would be the possibility to integrate it with other payments solutions, independently of the technology used. 73% of professional respondents (91 out of 124) marked it as either very important or important. Professional respondents (64 out of 124, 52%) also widely supported **the possibility for micro and stream payments**[227] using the digital euro. 38 of them (31%) assessed it as very important and 26 (21%) as important.

Offering conditional payments functionalities through the digital euro gathered the support of about 55% of professional respondents (68 out of 124), which pointed to a series of arguments such as:

- Technically innovative setup
- Offer of value-added services
- Speed/efficiency in the processing of cross-border payments between intermediaries
- Automation of securities settlement through digital delivery versus payment
- Tokenisation of digital assets would need "cash on ledger" solutions
- Micro-payments or pay-per use models

The possibility to program conditional payments was quoted by professional respondents as a "crucial" and "attractive feature", particularly for later developments of the digital euro. However, in some occurrences, professional respondents questioned the urgency to offer M2M, considering that conditional money was not necessarily a prerogative of central bank money, and could also be achieved through private sector solutions or a combination of public and private developments.

A digital euro was seen as important for providing a European public alternative to emerging new payments solutions such as crypto-assets, stablecoins and foreign CBDC. 74 out of 124 professional respondents (60%) flagged this as a positive outcome, while 57 assessed EU public money as an alternative to private solutions and foreign CBDCs as a very important goal, and 17 (14%) as important. One professional respondent flagged that "If the digital Euro was not designed with programmability features, it would bring less added value especially in case of paying for goods or service "at a point of sale" or in e-commerce due to the existence of different and efficient payment methods that have been specifically developed for these sectors".

On the importance of digital means of payment offering conditional payment features for the EU's open strategic autonomy, 48% of professional respondents (59 out of 124) found it as either very important (33 respondents; 27%) or rather important (26 respondents; 21%), whilst only 12% of respondents (15 out of 124) assessed it as either not important or rather not important.

Almost half of the professional respondents (56 out of 124, 45%) saw the inclusion of M2M payments for industry 4.0 and Internet of Things as a positive factor to support the EU's digital economy , while only 9% of professional respondents (11 out of 124) saw it as a rather negative factor.

The integration with platforms relying on distributed ledger technology (DLT) for smart contract applications beyond payment use cases was considered as a positive

[227] Stream payments are continuous execution of micro payments in parallel with the use of a service such as internet, electricity, media etc.

factor by 51% of professional respondents (63 out of 124), whilst 10% saw it as a rather negative factor (12 out of 124).

The interconnection with the European Digital Identity Wallet was requested by about half of professional respondents (59 out of 124, 48%). Only 12% of professional respondents (15 out of 124) expressed a negative opinion.

3. Making the digital euro available for retail use while continuing to safeguard the legal tender status of euro cash

Possible introduction of legal tender for the digital euro

69 out of 124 professional respondents (56%) supported granting the digital euro a legal tender status, with unequivocal support from merchants and consumers whereas only a minority of financial institutions favoured this proposal. Many respondents viewed legal tender as a necessary instrument to ensure legal certainty and wide acceptance of the digital euro across the EU, although the specific design of the digital euro was also acknowledged to be a key driver to make it an attractive means of payment. 14 out of 124 professional respondents (11%) were opposed to such a measure, mostly financial institutions and payment service providers/market infrastructures. They highlighted that attractiveness of the digital euro as a means of payment would mostly depend on its design and cautioned against creating an uneven level playing field with other private payment solutions, as well as against creating disincentives to innovation. 15 out of 124 professional respondents (12%) appeared neutral, mostly financial institutions. They also highlighted that attractiveness of the digital euro as a means of payment would mostly depend on its design and cautioned against creating an uneven level playing field with other private payment solutions, calling towards exceptions to the principle of mandatory acceptance. One respondent stated that the legal tender status might be justified for use cases that are not already covered by the private sector. 24 (19%) did not answer.

70 out of 124 professional respondents (56%) appeared in favour of regulating legal tender in detail at Union level, with wide support from merchants and consumers whereas a majority of financial institutions and service providers/market infrastructures also favoured this proposal, including some respondents who claimed a neutral stance or opposed granting the digital euro a legal tender status, owing to the necessity to provide transparency and legal certainty on the meaning of the legal tender status, define harmonise rules and prevent fragmentation across Member States, and guarantee consumer choice between different means of payment. A few respondents cautioned against the definition of too complex rules that may render the digital euro unattractive compared to cash or private means of payment. 10 out of 124 professional respondents (8%) were of the opposite view. One professional respondent commented that no legal tender regulation for cash existed at the EU level. It is worth mentioning that several financial institutions did not form an opinion, partly as a consequence of their neutral or negative stance on the question of granting the digital euro a legal tender status. 42 (34%) did not answer.

66 out of 124 professional respondents (54%) considered that the legal tender status of the digital euro should take inspiration from the current legal tender status of banknotes and coins, with wide support from consumers whereas a majority of financial institutions and service providers/market infrastructures also favoured this proposal, to ensure wide adoption and sound business models, while providing for some adaptations (e.g. gradual implementation, exceptions for merchants that do not offer digital means of payment). Some

professional respondents advocated for ensuring a level playing field in terms of acceptance of other digital means of payment, cautioning against the risk of creating a competitive distortion. 14 out of 124 professional respondents (11%) showed reluctance to align legal tender regimes, mostly merchants who were of the view that exceptions to mandatory acceptance were not justified in the case of a digital euro under specific conditions. Several other professional respondents highlighted the absence of harmonised rules on legal tender for euro cash. Again, it is worth mentioning that several financial institutions did not form an opinion, partly as a consequence of their neutral stance on the question of granting the digital euro a legal tender status. 42 (34%) did not answer.

59 out of 124 professional respondents (48%), with wide support from financial institutions, supported exceptions to the legal tender status of the digital euro with a preference for exceptions on merchants that do not accept digital means of payment (also backed by BEUC) and exceptions further specified by Member States. Other exceptions included unanticipated technical, operational or other disabilities (e.g. no internet connexion), as well as legal considerations (freedom of contract). Very few respondents supported exceptions for small merchants. Several professional respondents proposed to set-up exceptions on a temporary basis (e.g. gradual update of the acceptance infrastructure). 33 out of 124 professional respondents (27%) showed reluctance to granting exceptions owing to the principle of mandatory acceptance, mostly merchants. 30 (24%) did not answer.

51 out of 124 professional respondents (41%) considered necessary that exceptions proposed by Member States are subject to approval by the European Commission after consulting the ECB, highlighting considerations such as legal certainty and level playing field issues, potential barriers to the adoption of the digital euro, complexity for end-users, fragmentation of payment systems, or increases in costs. 19 out of 124 professional respondents (15%) considered unnecessary to ask for prior approval, with some of them commenting that they were against local rules. A handful of professional respondents were of the view that local rules could apply without being subject to prior approval. No explanation was given however. 52 (42%) did not answer.

41 out of 124 professional respondents (33%) rejected any provision for administrative sanctions in case of digital euro non-acceptance, among them an important number of financial institutions (e.g. European Banking Federation), who insisted on the need to align with the regime for cash. Other recurring arguments pointed to the freedom of contracts, the need to render the digital euro attractive, and the disproportion of imposing administrative sanctions at this stage (e.g. gradual implementation of the digital euro). 33 out of 124 professional respondents (27%) were of the opposite view, among them prominent merchant and consumer representatives (e.g. Eurocommerce, BEUC), with arguments related to the need to foster the use of the digital euro to counteract the spreading of foreign central bank currencies, the importance of enforcing rules via the capacity to apply sanctions, and the need to align on the regime for cash. A few professional respondents pointed to differences in sanction regimes for cash across countries. A few professional respondents also stated that sanctions could not apply to private individuals. 48 (39%) did not answer.

76 out of 124 professional respondents (61%) were of the view that governments should always propose the digital euro as a means of payment. 66 (53%) also highlighted a similar concern for utilities providers, 61 (49%) for large companies and 59 (48%) for merchants that accept a private electronic means of payment. A few professional respondents suggested including other entities e.g. small merchants to allow for a wide acceptance of the digital euro, international companies trading with Europe, or non-professionals. Whereas merchants mostly supported imposing the digital euro as a means of

payment in all transactions, views appeared split within the financial sector, with several credit institutions cautioning against inefficiencies and possible impacts on the acceptance of cash, or showing hesitation to abandon the principle of contractual freedom despite acknowledged benefits of such a measure. Consumers appeared in favour of imposing merchants that accept a private electronic means of payment to also offer the digital euro as an option. Consistency with the legal tender status, wide acceptance, and European strategic autonomy were reported as reasons to impose the digital euro as a means of payment. About 44 (35%) did not answer.

Estimation of costs

In a context where technological and business developments might radically change the current way of payment acceptance, irrespective of the digital euro, 44 out of 124 professional respondents (35%) considered that, despite still high investments, the cost of acceptance infrastructure might decrease in the short or medium term, owing to technological developments (e.g. use of mobile terminals), economies of scale (e.g. reuse of the existing acceptance infrastructure), and competition supported by proper regulation. Conversely, **26 out of 124 professional respondents** (21%), mostly financial institutions (e.g. Electronic Money Association, European Digital Payments Industry Alliance, European Savings and Retail Banking Group), **considered that the cost of acceptance infrastructure might increase in the near future**. The need to adapt systems to technological and business innovation, to comply with regulations such as the PSD or MICA, to upgrade systems on cybersecurity, and to train staff were most often quoted by respondents. In particular, while smaller merchants might find it very expensive to on-board a completely new POS terminal with limited consumer demand to start with, larger merchant might struggle with bandwidth and tech resource required for large scale implementation of a new payment system across their footprint. The multiplication of means of payment at the POS or online might also generate new costs. Depending on its design, several professional respondents viewed the digital euro as a source of additional costs in the near term. The extension / adjustment of existing infrastructures for a digital euro will require development of IT infrastructure, changes of devices in store, etc. This will require significant investment, while the existing infrastructure will still need to be supported. Much will depend on the selected form factor for a digital euro NFC/contactless or QR based.

Regarding the digital euro specifically, professional respondents reported a large variety of additional one-off and recurrent costs merchants might face in case they accept digital euro payments, including IT systems, customer management, training of staff, legal support and marketing. Merchants reported that it was impossible to predict future costs of the acceptance of payments in digital euro as the details of the design of the digital euro are still unknown. Cost is also very dependent on the individual merchant profile. Most professional respondents stated that a digital euro with legal tender might entail a higher overall cost owing to the number of businesses that may be imposed mandatory acceptance. No major differences in the types of cost were reported although several professional respondents pointed to possible differences in amounts in case of a digital euro with legal tender owing to economies of scale. Merchants suggested that the final design of the digital euro should permit the utilisation of existing infrastructure for digital payment acceptance. Implementation should also fit with current hardware replacement and/or certification cycles.

For merchants to be equipped to accept the digital euro, new POS terminals, new software or new app-based POS solutions may be needed which will involve additional

cost. In particular, several professional respondents – whether merchants already offering or not digital means of payment – reported moderate one-off costs either to replace/upgrade payment terminals or software, as well as moderate annual costs for maintenance, licences, etc.

Respondents provided an estimate of the incremental costs necessary to accept payments in digital euro:

	Merchants already accepting electronic payments	Merchants not yet accepting electronic payments
	In EUR per terminal	In EUR per terminal
One off costs related to (new) POS terminals for accepting payments in digital euro :	EUR 50-500	EUR 100-1000
One-off costs related to software:	EUR 10-500	EUR 100-500
Annual cost for maintenance, licences etc.	Insignificant - 100	Insignificant – 100

Other costs were quoted such as licenses, training, and marketing. Yet, companies that already accept digital means of payments might face lower one-off costs. A few professional respondents advocated for a gradually change in acceptance infrastructure, taking into account the lifecycle of payment terminals. Yet, quantitative estimates should not be considered as representatives owing to the very limited number of respondents and reported uncertainties on the design of the digital euro, whose_cost will also depend on individual merchants' profile.

Professional respondents did not have clear views as to whether account or bearer based solutions might entail more costs for merchants. 18 out of 124 professional respondents (15%) were of the view that costs to merchants may be lower in case of an account-based digital euro, owing to the possibility to reuse the existing payment infrastructures and processes in spite of account and servicing fees, whereas a bearer-based digital euro might entail higher setup investments (e.g. installation of a hardware component). Conversely, 8 out of 124 professional respondents (6%) were of the view that those costs may be lower in the medium to long term in case of a bearer-based digital euro, especially in the domain of transaction processing. 15 out of 124 professional respondents (12%) considered that there was broadly no difference, pointing to similar costs or a balanced distribution of costs between an account-based or a bearer-based digital euro. Other professional respondents did not know (most of them highlighted major uncertainties on the design of the digital euro or asked for further explanation on the concepts of account-based vs bearer-based digital euros) or did not provide an answer.

Professional respondents highlighted several options to allow merchants to counterbalance one-off costs related to payment terminals or software. 53 out of 124 professional respondents (43%) were of the view that merchants should be given the possibility to accept other private payment solutions using the same rather than new POS terminals purchased for digital euro payments, also as a way to ensure a level playing field with private digital means of payment. A similar proportion of professional respondents (51 out of 124 - 41%) also considered important that merchants should be given the possibility to

accept digital euro payments from payers using a variety of devices. Respondents often referred to QR Codes and NFC as possible cost-saving solutions. Possible savings on the transaction costs of digital euro payments were highly valued as well by 42 out of 124 professional respondents (35%). Yet, several professional respondents – mostly credit institutions and payment service providers – challenged the possibility to lower transaction costs on the digital euro for the following reasons: i) merchants would be expected to pay fees to financial institutions for setting up the payment infrastructure and processing transactions; ii) most merchants are already equipped with multi-solutions POS terminals. Merchants (e.g. Eurocommerce) were supportive of all these options, although they insisted on the need to put in place standardised interfaces for exchanging transaction data across SEPA. Additionally, one merchant considered that a digital euro bringing EU digital authentication may be used for different use cases and add extra-value to merchants.

Merchant fees

39 out of 124 professional respondents (32%) favoured applying boundaries to the fees charged to merchants by intermediaries, whereas 38 out of 124 respondents (31%) preferred unregulated merchant fees. All merchants and merchant associations favoured a regulated fee structure, referring to the mandatory acceptance obligation and limited competition in the EU retail payment market. On the other hand, PSPs and financial sector associations opposed boundaries to fees. PSPs highlighted the preference for a competitive market price formation and referred to the uncertainty regarding the actual costs of digital euro payments and the necessary support infrastructure, which could result in distortionary effects if fees were to be regulated. They argued that since the digital euro represents a new form of currency but not necessarily a new payment system, the fees associated with payment acceptance should be set by market participants and depend on the costs incurred by PSPs as well as added-value services provided by them. The business model related to the introduction of the digital euro should be market driven, transparent, and pricing of these services should be competitive. In their opinion, price regulation would stunt innovation, create adverse incentive structures and decrease the strength of the digital euro compared to other CBDCs in development. PSPs suggested that governments may consider granting merchant subsidies to upgrade their hardware, to promote digital euro acceptance. Consumer associations called for a price regulation. In particular, it was stressed that if the access to the digital euro is done by existing PSPs, rules on fees are necessary, otherwise these institutions will use higher prices to favour their own electronic payment solution.

As regards the design of possible merchant fees, 60% of professional respondents agreed with a merchant fee based on real costs and reasonable margin of profit.[228] Interestingly, this agreement was spread across respondents' fields of activity, including all participating merchants. Credit institutions, payment service providers and financial sector associations agreed furthermore overwhelmingly with the option of fees based on the volume or value of transactions (insofar this has an impact on the real costs of intermediation) and with the option of a fee structure that takes into account in the initial calibration multilateral interchange fees consistent with the Interchange Fee Regulation. Merchants and merchant organizations disagreed with all options but fees -based on real costs and a reasonable profit

[228] 54 respondents (60%) strongly agreed or rather agreed with this option. The number of positive replies was lower for the other options, with 38 respondents (43%) replying positively to volume- or value-based fees, 30 respondents (33%) agreeing with taking into consideration multilateral interchange fees consistent with the Interchange Fee Regulation, and 11 respondents (19%) showing approval for alternative means of designing merchants fees.

and in particular strongly disagreed that fees on digital euro payments could be based on the volume or value of transactions. In that context, one respondent argued that a volume-based fee would make already dominant large/global operators in e-payments even more dominant, and possibly lead to the prevention of any other form of competition. They stressed that full transparency of pricing is key including reviews at periodical intervals. While many professional respondents acknowledged that the interchange fee model was well established and accepted, it was also remarked that the interchange fee regulation was designed to respond to specific competitive issues in the card market and would not necessarily cater for the digital euro ecosystem.

60 out of 124 of professional respondents (48%) were of the view that surcharges on payment with the digital euro should be prohibited, including most merchants, pointing to a variety of arguments e.g.: support the legal tender status of the digital euro, extend the scope of PSD2 provisions on surcharging, protect consumers against unreasonable and hidden fees, foster digital euro attractiveness, ensure a level playing field with cash and other payment instruments. Conversely, 18 out of 124 professional respondents (15%) were of the opposite view, arguing that the formation of prices should be left to the market and that competition would naturally prevent high fees to be applied to customers. Surcharges were also seen by one professional respondent (Wordline) as a means to compensate for the higher operating costs of various specific use-cases or innovative services that may not necessarily reflected in the standard service price (e.g. P2P transactions).

The legal tender status of euro cash

Out of the 124 professional respondents, the ones which answered this question expressed mixed views regarding legislative action at EU level to enhance legal certainty and enshrine the legal tender status of euro cash in secondary law, with 26 out of 124 professional respondents (21%) supporting EU legislative action and 24 out of 124 professional respondents (19%) of the opposite view, while the majority of professional respondents did not have any view on that. Consumer organisations, including BEUC, appeared to strongly support EU legislation action on the legal tender status of cash. The supporters of legislative action, including several business associations (e.g. ESTA), consider that the legal status of cash needs to be clarified in the sense that cash has legal tender and has to be universally accepted, and that the current situation leaves too much room for interpretation and needs a more strict legal frame. One argument in favour brought up by several respondents is the need to have similar approaches for the digital euro and cash with respect to their legal tender status. Of a different opinion were the majority of responding financial institutions and merchants, which did not support legislative action and considered that the current legislative framework complemented with the CJEU case law is adequate.

35 out of 124 professional respondents (28%) considered that there was no need for a further definition of justified exceptions to the general principle of mandatory acceptance, grounded on reasons related to the good faith principle, including the responding merchants and the majority of responding financial institutions (e.g. the European Payments Council, the European Banking Federation)., which commented that the good faith principle is sufficient to ensure flexibility and freedom of choice. **18 out of 124 professional respondents (15%) were in favour of such justified exceptions**, including most consumer organisations (e.g. The Federation of German Consumer Organisations, BEUC) and several business associations (e.g. ESTA), which also consider that these exceptions have to be very well specified in order to prevent loopholes. One respondent which did not provide a clear choice (Cash Matters) mentioned the need to address the situations when merchants refuse to accept cash, the right to contractual freedom beating the right to pay cash.

Proposals to further define possible exceptions to the general principle of mandatory acceptance in relation to the legal tender of cash were accordingly received with reservation. In general, respondents suggest that the practical considerations should be considered when allowing exceptions, and that proper attention should be given so that exceptions would not create false incentives and invite moral hazard with the outcome that merchants could easily refuse cash payments. Exceptions related to (1) the situation where retailers have no change available received no support from most professional respondents, including consumer organisations, financial institutions and merchants. Most professional respondents also did not support exceptions related to the case where (2) there would be not enough change available as a result of that payment for a retailer to carry out its normal daily business transactions, but in this case the views of the financial institutions and merchants are balanced. Exceptions related to (3) the situation where no party shall be obliged to accept more than 50 coins in any single payment (except for the issuing authority and for those persons specifically designated by the national legislation of the issuing Member State) or (4) if the value of the banknote tendered is disproportionate compared to the value of the amount to be settled were backed by consumer organisations, with merchants having balanced views related to the latter exception.. There were mixed views regarding the exception related to (5) a refusal in case of security reasons among professional respondents although one consumer organisation showed opposition to it.

41 out of 124 professional respondents (33%), including the majority of responding financial institutions and merchants, are not in favour of additional exceptions to the mandatory acceptance principle proposed by Member States and subject to approval by the European Commission after consulting the ECB, one of the arguments being the resulting potential fragmentation within the EU. **22 out of 124 professional respondents (18%) were in favour of such additional exceptions** (e.g. ESTA, the Asociación Española de Banca, the International Currency Association), based on duly justified exceptional and overarching reasons related to public policy. Consumer organisations presented mixed views. It is likely that the scope of the possible provision which was the subject of this question, which would be restricted to specific measures of a monetary law nature and would not cover exceptions in areas of national or shared competence, was misunderstood.

Professional respondents appeared to have mixed views regarding the provision of administrative sanctions for cash non-acceptance. 35 out of 124 professional respondents (28%), including the majority of the responding financial institutions and all responding merchants (e.g. EuroCommerce), declared that they did not support such a provision, one of the opinions being that there should be no need for administrative sanctions when payments are based on the freedom to contract.32 out of 124 professional respondents (26%), including all responding consumer organisations (e.g. BEUC), supported this provision and generally considered that administrative sanctions will contribute to the enforcement of the principle of mandatory acceptance of cash. One respondent (Cash Matters) considered that the legislation for cash acceptance could be ignored by retailers in the absence of sanctions.

Overall and in each relevant stakeholder group, most professional respondents (54 out of 124, 44%) supported to confirm the prohibition on surcharges on payments with euro banknotes and coins in case of a EU regulation, with the main argument being that the existence of such surcharges would contradict the legal tender status of cash (namely the acceptance of cash at face value). **Only 13 out of 124 professional respondents (10%) did not support this.**

Overall and in each relevant stakeholder group except financial institutions, most professional respondents (49 out of 124, 40%, including the wide majority of responding

merchants) also supported a provision to guarantee the availability of cash, such as an obligation on Member States to adopt rules to ensure sufficient access to cash and report these rules to the Commission and the ECB, in case of a EU regulation. These respondents considered that adequate availability of cash should be maintained especially for the people who use only cash for payments, and that merchants should not be legally obliged to issue cash to citizens (no default cash back obligation). One business association (ESTA) had a more practical approach, saying that cash is a volume driven activity and it will become unsustainable once a critical mass of cash is circulation will no longer be secured. **21 out of 124 professional respondents (17%), including the majority of responding financial institutions, did not support the suggested provision.** In general, their views are that the access to cash should be the responsibility of the Member States.

4. The digital euro's impact on the financial sector and the financial stability

Answers to the targeted consultation pointed to mixed views regarding the potential impacts a digital euro may have on the business of financial intermediaries. **Credit institutions** reported many positive impacts such as the deployment of innovative services to consumers, leveraging the existing or upgraded banking and payment infrastructure and processes. On the other side, they pointed to strong disintermediation risks, endangering financial stability and the economic growth through lending channels. Several respondents also highlighted risks of an eviction of private payment solutions and lower innovation. **Other payment services providers** mostly insisted as well on the opportunity to develop innovative services and the increase in competition due to the adoption of a new payment method, while acknowledging that a digital euro may lead to an eviction of private payment solutions and lower innovation. **Crypto-assets service providers** considered that a digital euro may foster the deployment of innovative services and the adoption of crypto-assets by end-users. However, it could also reduce the attractiveness of crypto-assets as a payment instrument in cross-border transactions.

53 out of 124 professional respondents (43%), mostly financial institutions and to a lesser extent payment services providers and market infrastructures, **considered that limiting the store of value function of the digital euro by introducing holding caps, limitations to transactions, or different interest and/or fees disincentives on large holdings would be rather or very important for financial stability purposes, in order to prevent bank runs in crisis situations or to prevent structural disintermediation of financial intermediaries.** The overwhelming majority of PSPs (15 out of 21 who replied 71%) and about half of the merchants found important to limit the store of value function of the digital euro. Around a third of the banks that supported limiting the store of value function of the digital euro stressed at the same time that maintaining limits could face difficulties in the long term owing to social and political pressure. 21 out of 124 professional respondents (17%) did not consider important to limit the store of value function of the digital euro or expressed opposition to it. 7 (6%) were neutral and 43 (35%) did not reply A few professional respondents, both banks and non-banks, expressed themselves against the introduction of limits, and some proposed that the ECB rather intervenes in support of banks. Around a tenth of the professional respondents, mostly banks, expressed themselves openly against the introduction of interest on digital euro. Interestingly, some banks supported the introduction of negative rates only. About 20 citizens (11%) supported and 62 (33%) opposed limiting the holdings of digital euro (100 (54%) did not answer and 7 (4%) were neutral).

Professional respondents mostly did not consider that holding limits or disincentives to the store of value function would affect the usability of the digital euro, even if the risk was assessed differently depending on the type of payment concerned, with P2P and

M2M payments assessed as potentially the least affected and B2B payments the most affected. Some of them were of the view that the usability of the digital euro would be slightly or largely unaffected for M2M (31 out of 124 professional respondents, 25%) or P2P (49 out of professional 124 respondents, 40%) payments. On the contrary, around 45% of professional respondents (56 out of 124) considered that B2B payments would be slightly or largely affected whereas around 40% that considered that holding limits or disincentives would slightly or significantly increase its usability in B2B payments as well. PSPs were of the view that limits would affect more B2B payments than P2B or P2P payments. Merchants were more worried that limits could reduce the digital euro's usability in P2B payments than in the others. Overall, professional respondents identified the impairment of limits with the impossibility of carrying over large payments, referring on the contrary to the low value of average daily payments by individuals (less than 100€ in the euro area). Positive aspects of introducing holding limits were, in particular, stressed by banks, which for instance considered that holding limits were easy to understand and would help users to control their spending. Yet, more than half of financial institutions assessed that holding limits or disincentives would affect the digital euro. Banks reiterated their opposition to interest remuneration, especially with different tiers, as this would be confusing and disincentivise broad adoption. Arguments against the introduction of holding limits brought by several respondents, also outside the financial sector, were that they limited the usefulness of the digital euro as a digital payment instrument, putting the digital euro at a competitive disadvantage with stablecoins.

Many professional respondents, banks in particular, were in favour of introducing a waterfall mechanism, whereby payments would be paid on a commercial bank account for the amount above the holding limit.

42 out of 124 professional respondents (34%) considered that a digital euro without limits or disincentives would have a negative impact on the volume of retail deposits, 39 out of 124 professional respondents saw an increased risk of a bank run (31%) and 38, mostly financial institutions, considered that there would be a negative impact on banks' net interest income and revenues from fees (31%). 29 out of 124 of professional respondents (23%) considered that a digital euro without limits or disincentives would have a negative impact on credit provision in the economy. Only 15 out of 124 the professional respondent (12%) considered that the ability to comply with AML/CFT and other obligations would be affected negatively. Some respondents cautioned in particular against the possibility of a loss of deposits or unfair competition with the private sector payment solutions.

In the scenario of a successful stablecoin used as a payment tool, credit institutions considered that the non-issuance of a digital euro could have disruptive effects on their business model as well as on monetary policy, financial stability, competition and economic growth**.** Nevertheless, the exact nature and level of impacts might depend on several factors related to the design of the stablecoin (e.g. issuing entity, currency, backing assets, interoperability between systems, transaction costs convenience, programmability). Most credit institutions advocated for a proper regulation of stablecoins (e.g. issuance limited to credit institutions, issuance limitations, prohibition of foreign stablecoins used as payment instruments). A few banking and non-banking respondents underlined that a digital euro without limits would have similar harmful impacts than a stablecoin, or that a stablecoin bore no risk, or also that the impact on credit institutions was unclear.

A high share of professional respondents saw a strong role for financial intermediaries in the digital euro distribution. Intermediaries' experience in KYC and AML checks had the highest share of positive ratings (72%, 76 out of 124 respondents), the use of existing IT

systems for customer, front and back office services the lowest (64%, 68 out of 124 respondents). Other areas included consumer protection (fraud, disputes, refunds, chargebacks or data misuse), cybersecurity support, and synergies with commercial bank account (funding/defunding). Many professional respondents saw a role for banks, payment institutions and other entities along the lines of the functions they fulfil today for commercial bank money (i.e. settlement agent, processor of payments, distributor of means of payment, and maintaining customers' balances). Credit institutions and payment service providers saw the most potential for intermediaries' services in the digital euro distribution. They highlighted in particular the synergies between a robust and flexible core infrastructure developed by the ECB and private solutions that can use existing knowledge and infrastructures and might provide added services on top. Market incentives would also ensure that value-added functionalities evolve along with users' demands. It was also mentioned (e.g. by PayPal, Meta) that the distribution of digital euro and the ability to provide services should not be limited to regulated banks but should also be open to regulated non-bank PSPs. Lastly, surveyed merchants and merchant organisations strongly favour a cost model where basic digital euro services are at close to zero cost of acceptance and additional services are optional and not mandatory.

44 out of 124 professional respondents (35%) anticipated a significant increase in one-off costs whereas 14 (11%) anticipated a similar trend for recurrent costs. Costs incurred by the introduction of a digital euro mostly relate to the deployment of new distribution channels, IT connections to the ECB and legacy systems, account management, customer support, scheme and transaction fees, transaction processing, KYC/AML, fraud management, payment guarantee, accounting, back-office, training, marketing, as well as the ability to provide non-free services. Most professional respondents pointed out to difficulties in estimating future costs owing to large uncertainties on the design of the digital euro and the possibility to reuse existing banking and payment infrastructures. Several professional respondents advocated for a clear change management framework (e.g. early planning of evolutions regarding the design of the digital euro), on the model of Target 2 or SEPA schemes, in order to better anticipate evolutions and future costs.

The additional services financial institutions could potentially offer to customers in relation to the digital euro mostly relate to payment services e.g. splitting transactions among friends/family. Professional respondents also quoted – although to a lesser extent – other types of services such as account management services e.g. overview of accounts, regulatory services e.g. dispute resolutions, and lending services e.g. instalments. Ultimately, the capacity of financial institutions to provide additional services would depend on the underlying infrastructure and technology, the design and ecosystem of the digital euro, the interoperability of digital euro solutions, as well as the access to personal data.

5. Application of anti-money laundering and counter terrorist financing (AML-CFT) rules

Overall, professional respondents[229] were of the view that a bearer-based digital euro would lead to an increase of AML/CFT compliance costs, while an account-based digital euro would comparatively be the least costly solution in terms of AML/CFT compliance. The

[229] For the purposes of this section, respondents were limited to business companies, firms and public authorities.

abstention rate was high, which indicates that many respondents are unsure of future compliance costs (abstention rate for these questions is on average 52%).

A bearer-based digital euro available offline was considered a costly solution as 31 out of 124 professional respondents (25%) considered it would lead to a high or very high increase in AML/CFT compliance costs. On the other hand, an account-based digital euro was considered the least costly solution, with 31 out of 124 professional respondents signalling that it would lead to no increase or a small increase in AML/CFT costs (25%). An additional 18 professional respondents out of 124 (15%) suggested and account-based digital euro would lead to only a 'regular' increase in AML/CFT compliance costs.

Asked about the specific challenges a digital euro would pose for AML/CFT compliance, many professional respondents answered that it would depend on the specific design adopted for the digital euro. While a minority answered that they saw no impact on AML/CTF compliance by the implementation of a digital euro, most professional respondents feared that a too anonymous/pseudonymous design would challenge the combat of money laundering. Therefore, they demanded that payment processors should retain access to transaction data. Two professional respondents referred to the current SEPA Request to Pay Scheme (SRTP) as a data sharing system that could be harvested in an equivalent manner for the digital euro. Only 9 out of 124 professional respondents (7%) suggested that the current AML/CFT regulations for cash would also be applied for the digital euro.

Most professional respondents warned that offline functionality could, dependent on the design, be considered high risk for AML/CTF purposes. Hence, they were of the view that limits should be imposed (e.g. a maximum amount of offline transactions per person and timeframe or a maximum accumulated value). Some also said that for the low-value transactions, intermediaries should be exempted from AML/CTF responsibilities.

Professional respondents had varying views on whether **low-value offline digital euro transactions would represent equal or less ML/TF risks** relative to other means of payment (cash, online commercial bank money, and an online digital euro). 41 out of 124 professional respondents (33%) believed that low-value offline digital euro transactions had equal or less risks than online digital euro payments; 65 out of 124 professional respondents (52%) believed that the ML/TF risk would be as the same as cash's. Only a minority of 31 out of 124 professional respondents (25%) thought that the risks of offline functionalities would be equal or less than the one of online payments in commercial bank money.

6. The privacy and data protection aspects

Around half of respondents, including EU citizens, supported features that enhance user's privacy and grant the user a high level of data protection:

- 152 out of 312 respondents (49%) considered appropriate the ability to mask the identity of the payer or the payee to each other ('peer-to-peer pseudonymity');
- 142 out of 312 respondents (46%) believed appropriate the ability to mask the identity of the payer or the payee to the other party's intermediary ('intermediary-to-intermediary pseudonymity');
- 153 out of 312 respondents (49%) were of the view that the ability to limit the knowledge on the identity of the payer or the payee to the central bank, and/or other third party intermediaries not involved in the transaction, was appropriate;

- 144 out of 312 respondents (46%) supported the ability to completely hide the identity of the payer and payee for low-value offline transactions.

EU citizens are in favour of all features that enhance user privacy – with the ability to **hide the identity of a payer and payee for low-value transactions proving the most popular feature -** 81 respondents among EU citizens (43%) believed that a high level of privacy for low value transactions is either very appropriate or rather appropriate.

106 out of 312 respondents (34%) believed that users of a digital euro should have the possibility to 'opt-in' to additional data-driven services. **However, a sizeable minority, 96 out of 312 respondents (31%), believed that this should not be the case**, suggesting that opinions on data-driven services should be assessed on a case-by-case basis and are dependent on which specific innovative services being considered.

The right to process personal data for a number of potential activities was highly contested between citizens on the one hand, and other professional respondents on the other hand.

- 72 out of 124 professional respondents (60%) mostly believed that the processing of personal data is very or rather appropriate for the fight against money laundering, organised crime and terrorism, compared to 35 out of 188 EU citizens respondents (19%).
- 43 out of 124 professional respondents (35%) favoured the processing of personal data for the enforcement of tax rules. On the other side, only 23 out of 188 EU citizen respondents (12%) deemed this appropriate for this purpose while 53 out of 188 respondents (28%) thought it not at all appropriate.
- 49 out of 124 professional respondents (40%) also believed that personal data processing was very or rather appropriate for payment settlement purposes, while only 22 out of 188 of the EU citizen respondents (12%) believed the same; 52 out of 188 (28%) however thought it not at all appropriate.
- 55 out of 124 professional respondents (44%,) thought the processing of personal data for the management of operational security risks appropriate. Only 24 out of 188 respondents of EU citizen respondents believed the same (13%).
- 46 out of 124 professional respondents (37%) believed that processing of personal data would be rather or very appropriate to enforce potential holding limits. This belief was shared by 12 out of 188 EU citizen respondents (6%), while 32% think it rather not or not at all appropriate.
- Only on the issue of whether processing of personal data is appropriate for additional innovative online services and functionalities both groups seemed to agree at least somewhat. Only 33 out of 124 professional respondents (27%) and 20 out of 188 EU citizens and consumer organisations (11%) thought the processing of personal data for this reason rather or very appropriate.

Respondents did not believe central banks should be able to access personal data.

- 153 out of 312 respondents (49%) believed that central banks should not be able to process personal data for the purposes of payment settlements. (Compared to only 34 respondents (11%) in favour.)

- 149 out of 312 respondents (48%) were of the view that central banks should not be able to process personal data for the purposes of operational resilience. (Compared to only 43 respondents (14%) in favour.)
- 119 out of 312 respondents (38%) believed that central banks should not be able to process personal data for the purposes of AML/CFT compliance. (Compared to 71 respondents (23%) in favour.)
- 118 out of 312 respondents (38%) of respondents believed that central banks should not be able to process personal data to combat fraud. (Compared to 75 respondents (24%) in favour.)

While professional respondents (including PSPs) did not believe central banks should be able to access data for the purposes of payment settlements or operational resilience, a small majority believed central banks should be able to process personal data for AML/CFT purposes (38%, 47 out of 124 respondents) and to combat fraud (39%, 48 out of 124 respondents).

7. International payments with a digital euro

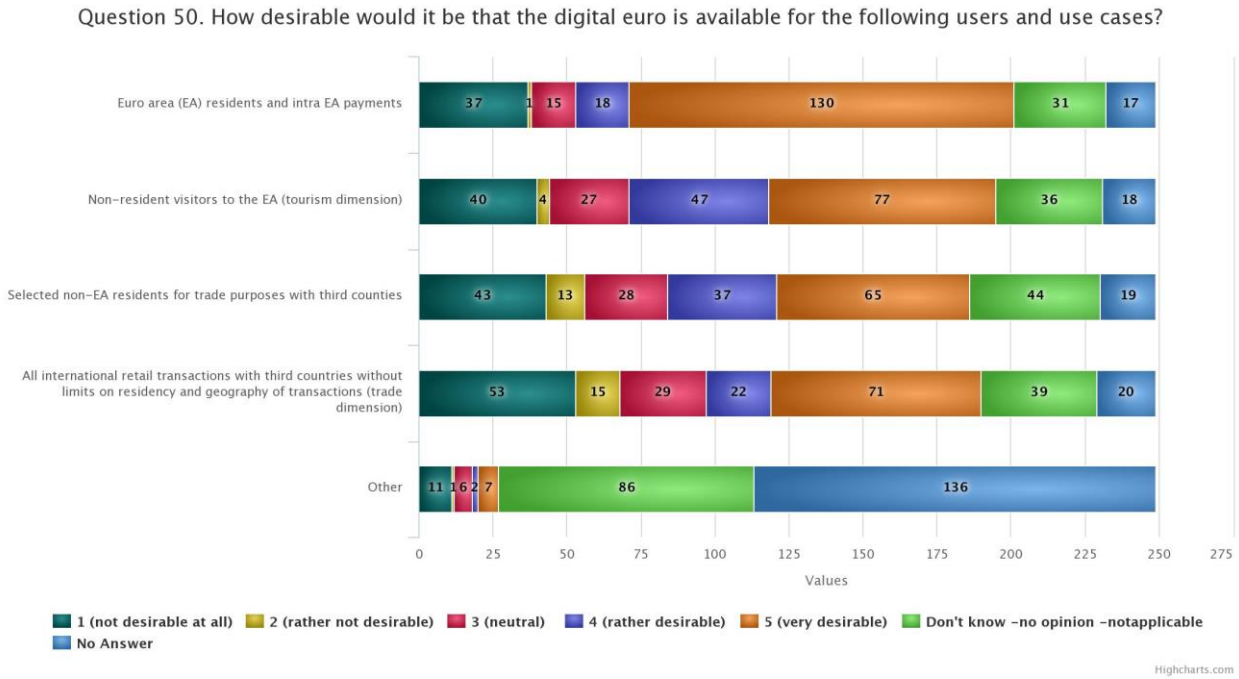
Both citizens (54 out of 188, 28%) and professional respondents (94 out of 124 found, 76%) were mostly supportive of a digital euro available only for euro area citizens and for intra euro area transactions. 47 citizens (25%) and only 1 professional were against. 85 citizens (45%) and 26 professional (21%) did not reply. 49 out of 188 EU citizens (26%) supported that tourist visiting the euro area should also be able to pay with a digital euro and 28 (14%) were against (86 (45%) did not reply. The same question received support from 75 professionals (60%) and 31 (25%) did not reply.

The potential use of the digital euro outside the euro area attracted less support. 49 out of 188 EU citizens found that international use would be very desirable or rather desirable (26%). About 39-42 citizens (21-22%) were against the use of a digital euro outside of the euro area and 85 (45%) did not reply. Transactions with selected third country residents or businesses was supported by 53 out of 124 professional respondents (43%), against 14% that opposed it (41 did not reply (33%)). Furthermore, 49 out of 124 (40%) professional respondents found unlimited transactions with third countries desirable, against 21% that opposed it. (37 did not reply (30%)) A respondent commented that companies based in Europe (SMEs, corporates and large corporates) should be able to use the digital euro for the settlement of commercial transactions with the possibility of offering value-added services thanks to its programmability (i.e., smart contracts). It was also suggested that beyond euro area residents, a digital euro should be available for any person physically present on the euro area territory independently of its situation including migrants, asylum seekers or refugees. PSPs suggested that the use of the digital euro in the international context should be assessed by considering the existing and developing private sector standards and solutions (e.g. ISO20022, SWIFTgpi) that allow efficient payments across borders in commercial bank money.

Banks and their associations emphasised the potential of a wholesale CBDC as opposed to a retail CBDC. For trading purposes, a wholesale digital currency suited for large value cross-currency payments would be better suited than a retail focused digital euro. Finally, it was stressed that the ECB should take part in the development of global standards in order to avoid that the initial design decisions hinder a potential future interoperability of a digital euro with other CBDCs. Interoperability could support remittances and trade.

Some respondents stressed the risks to financial stability in non-euro area countries. 19 out of 124 professional respondents (15%) believed that unfavourable capital movements would be the most significant impact on non-euro area countries, followed by monetary autonomy (17 out of 124 professional respondents, 14%), financial stability (14 out of 124 professional respondents, 11%). Only 11 out of 124 professional respondents (9%) assessed the risk of financial disintermediation as significant. Professional respondents also added that money laundering would also be an issue in international transactions. In the opinion of some of the banks and banking associations, stronger currencies could take over in countries with weaker economies. From this perspective, an extensive use of the digital euro in non-euro-area Member States could affect their economies and monetary systems and may lead to disintermediation especially in crisis situation. Therefore it was suggested to limit the usage of the digital euro outside the euro area e.g., through limits or a limitation of eligible holders. In the opinion of a non-euro area central bank, conditional on the final design of the digital euro, easy access to digital euro for retail and wholesale users outside the Euro area could be detrimental for the local financial system and the conduct of the sovereign monetary policy, especially in crises. Therefore, this respondent proposed to open this possibility only for transactions related to tourism or other short-term transactions, and design the accessibility of digital euro for cross-border use within the EU with far more restriction e.g. in terms of remuneration, account balance and possible maturity of holdings, or potentially limiting its use primarily to euro area residents.

Respondents overall supported a staggered approach. Due to unforeseeable risks, it was advised that the digital euro project focused on a first phase exclusively on citizens of the euro area and when a stable regime of widespread use has been attained, study potential expansion to other sets of users if necessary. Issuing CBDC for non-euro-area residents would raise operational issues such as onboarding of non-residents, fraud and AML/CFT, servicing or closing of the wallet.



The chart above shows the aggregated replies of both people and professional respondents.

IV. Results of the call for evidence on the digital euro

Introduction

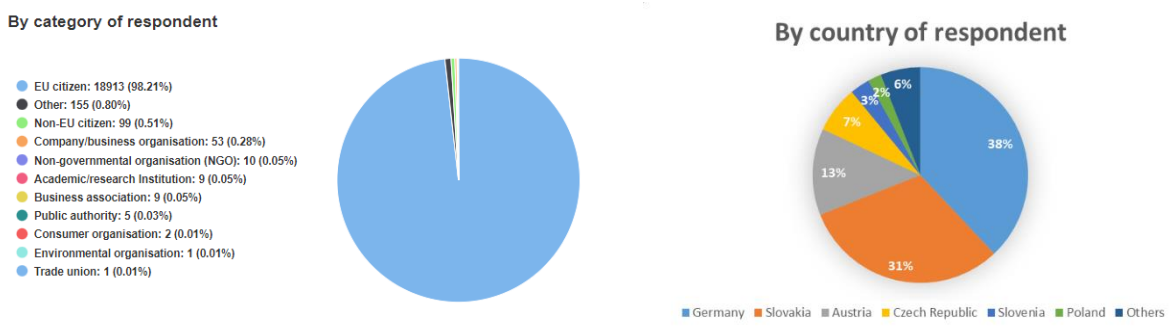
On 5 April 2022, the European Commission launched a call for evidence on a digital euro. The campaign for collecting answers closed on 16 June 2022.

The purpose of the call for evidence is to complement the European Commission's targeted consultation on a digital euro with further information gathered from all categories of stakeholders on any topic related to the digital euro.

The European Commission received 19.258 comments.

Overview of respondents and responses

By far, most comments came from EU citizens, with the largest groups of the respondents belonging to Germany and Slovakia.



Summary of respondents' feedback

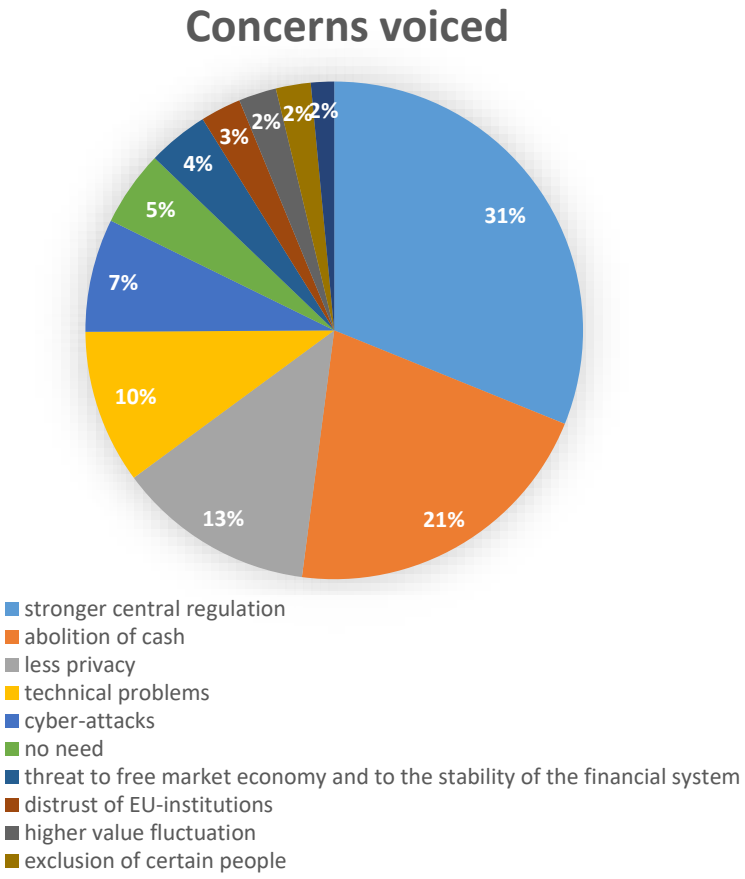
Respondents' feedback was mostly negative but this result is not representative and likely significantly biased.

The concentrated participation and the results may hint to a very large bias among the respondents, whereby those people who saw the digital euro as a threat, took the opportunity to answer the call for evidence, while people with positive, neutral or no opinion might not have made time and effort to contribute. It cannot be excluded that organized crowd contributions, so called campaigns, could have also contributed to the large number of biased, negative responses especially from the Member States with the two largest number of respondents (Germany and Slovakia).

In this context, and considering the absence of sampling, responses cannot be considered as representative to the EU's population. They are nevertheless useful to explore to better understand people's reaction about the digital euro.

Based on a random sample of about 900 responses, positive comments came from professional respondents (banks, economic organisations) for one half and EU citizens for the other half. Those positive comments mostly stressed the safety and efficacy of a digital currency. Most respondents nevertheless voiced concerns about the digital euro.

Here we present the most typical opinions voiced by people:



1. **The digital euro would lead to stronger centralised control over the people.**

The argument voiced most often was that the introduction of the digital euro would give the EU or the ECB central control over the users. Respondents feared that all their monetary transactions using the digital euro would be traceable.

Many were afraid that with the introduction of the digital euro EU citizens could be scored and the accounts of certain users blocked.

A corresponding argument was the reduction in privacy stemming from the use of digital payment methods. The predominant fear concerned governmental/EU control, while only very few comments also mentioned control by private businesses, in particular, measures to counter the risk of money laundering that would need to be taken into account in the digital euro design, considerations that digital euro are construed into the surveillance of all monetary transactions.

This argument was often supported by general mistrust in EU or governmental institutions. Some comments from central European Member States, especially from Slovakia, Czech Republic and Poland, stated a general distrust in official institutions. Other comments, especially from Germany and Austria, linked the digital euro to a step towards high control.

2. **The digital euro would lead to the abolition of cash.**

Almost all commentators directly or indirectly assumed that the digital euro would substitute cash as the only legal tender. Abolition of cash was universally rejected.

Even those rare commentators, who understood that the digital euro would be implemented in addition to cash, assumed that this was only an asserted argument, while according to them the envisaged plan was to slowly replace cash until the digital euro becomes the only used currency. They were of the view that a growing number of businesses would require digital payment methods.

Many reasons were stated for keeping cash. Most importantly cash payments were considered anonymous compared to electronic payment methods. The physical form appeared for these respondents to give a real substance to money, while digital or electronic money was considered too abstract to have the same value. Some people feared to be cheated out of their wages, if they were paid in digital euros. Many people, especially from Germany, emphasised the better control over their own expenses when paying in cash instead of digital payment methods. Also, people argued that the digital euro would hinder certain transaction types, such as monetary presents of grandparents to grandchildren, donations to homeless persons on the streets, tipping of waiting staff in restaurants, paying at flea markets, farmers markets or other small-scale consumer to consumer or consumer to small business transactions.

Some supported this argument with the fear that certain groups of people would be excluded by the requirement of using digital money. Those would be especially elderly persons, children, homeless, persons with disability, poor people.

Many people also voiced their unease that a digital currency would make them dependent of technology, such as smartphones, while cash payments were more direct.

An often-stated fear was that the digital euro would be vulnerable to technical problems. Especially, it would not be usable during power outages or when there is no connection to the internet available. Some were even afraid to lose their entire digital credit if there is a blackout.

A perceived danger were also cyber-attacks on the ECB, the digital euro system or the individual accounts.

3. **There would be a higher fluctuation of value.**

A few people feared that the value of the digital euro would have a higher fluctuation, making it difficult to use. These people were split in two groups.

The bigger group believed that the introduction of digital currency would make it easier for the ECB to devalue the euro leading to a higher inflation rate. Many of those people favoured to base the currency on gold reserves.

The smaller group thought that the digital euro would behave like Bitcoin, the value depending on the trust in the currency. Since they themselves mostly would not trust the digital euro they also feared a loss of value in this way.

Connected to the worry of inflation some believed the introduction of digital currency could threaten the free-market economy and the stability of the financial system.

4. **There is no need for the digital euro.**

Another often voiced opinion is that there was no need for the digital euro. Those people were content with the online banking and card payment options already available. They believed the digital euro would just be an attempt of the EU to monitor cash flows through government institutions instead of letting them choose their own private bank.

5. **Climate crisis**

Because a digital currency was dependent on electricity, a few argued that the implementation would be irresponsible in view of the climate change. Some of them also drew a connection to the gas and oil shortage due to the war in Ukraine, arguing that no energy could be spent on a digital currency.

6. **Other reasons**

A lot of people claimed that the introduction of a digital currency would violate their freedom and human rights without substantiating this point. Some commentators believed the use of the digital euro would stand in contradiction to their religion.

Annex 3 - Who is affected and how?

1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

The objective of this Annex is to summarise how the combination of options 1c, 1e/f, 2c, 2d, 3b, and 4c (assessed as preferred option) addresses the identified problem and to set out the practical implications for the main stakeholders affected by this initiative. The initiative aims to address the problem described in Chapter 2, namely that physical central bank/ECB money is not sufficient in the digital age and thus the objective of the initiative is to ensure that the central bank money issued by the Eurosystem can support the EU's economy in the digital age by also meeting digital payment needs in parallel with the use of cash. In doing so, the preferred option would, in relation to the digital euro:

- provide legal tender status with an obligation for all payees to accept it, with justified and proportional exceptions (Option 1c) and adequate distribution arrangements (1e/f),
- provide for a high level of privacy for low value offline payments by processing personal data related to users' identity but not transactions data, unlike for online payments where both personal and transaction data are processed in line with AML/CFT requirements (Option 2c, 2d),
- the Eurosystem to reduce the risk to financial disintermediation and stability by applying tools to limit its store of value function (Option 3b),
- make it at first available for residents/businesses of the euro area and visitors (Option 4c), but possibly expand it at a later stage for transactions with non-euro area Member States and third countries (Option 4b).

The costs of the initiative are, on the one hand, one-off implementation costs, which fall on the Eurosystem, merchants and PSPs. The Eurosystem would have to invest in setting up the digital euro scheme (both online and offline), including the network and settlement infrastructure. PSPs' one-off costs include adapting front-end systems (apps, online banking, ATMs), back-end systems (including both the payer and payee (acquiring) side and integration with settlement and account management systems), and adapting AML/KYC, anti-fraud, accounting and other business processes. Merchants would have to pay the hardware and software costs of making their terminals capable of accepting digital euro payments as well. However, there would be an exception for some categories of merchants (it being understood that merchants accepting other electronic means of payment would in any event have to accept digital euro payments) in line with the provisions of Option 1c, for whom the individual adaptation costs would anyway be relatively higher. There might be also some learning costs for consumers, similarly to the learning costs associated with online banking or new apps, but the technical solutions necessary to transact would be provided to them free of charge.

The initiative would also trigger operating (recurrent) costs. The Eurosystem is expected to incur costs in relation to e.g. running the digital euro scheme, marketing the initiative, educating consumers and merchants, and operating the IT back-end infrastructure. PSPs in particular would have to bear the costs of their operation, including customer onboarding and support, and pay the fees for the communication network, AML/CFT and fraud checks, and

transaction management. Merchants in particular would have to pay the transaction fees and the annual maintenance and license fees of their POS terminals. However, it is reasonable to assume that they will not be higher than the fees/costs of existing payment means (mostly cash and debit cards). The other users, businesses and consumers could use the digital euro basic services for free and pay fees for additional services.

In terms of benefits, consumers would have more choice in their payment decisions and can chose to use central bank money in their everyday digital payments. Merchants might also enjoy the increased choice and competition on the pan European payment market especially when negotiating with private payment providers.

It cannot be excluded that the digital euro, if being less costly and more efficient, could take over a share of the existing payment business currently intermediated by PSPs. If the digital euro were indeed to reduce the resources needed for performing payment services required for a given level of economic activity, replacing them would be an overall benefit for the society as a whole. Over time, this might more than compensate the one-off implementation costs, which may be limited. In addition, PSPs would have the possibility of innovating and introducing value added services on the digital euro and generate fee income. Increased efficiency in payments would also strengthen the role of the euro vis-à-vis the third country currencies, CBDCs and private stablecoins and provide a stimulus to innovation in payments markets.

The online digital euro would provide less privacy when compared with cash. Privacy is an important feature for ensuring that people can behave freely without control by authorities or by the society at large. However, society has to ensure that the digital euro is not used for illegal or criminal purposes. Thus, it seems proportional that online payments, which can be more relevant in terms of AML risks, face a higher level of control when compared with offline payments, which has cash-like features (i.e. proximity payment). The offline digital euro for small amounts would provide a high level of privacy. Thus, for those payments, the digital euro would largely replicate the anonymity function of cash.

As regards financial stability, the ECB would have the tools to ensure that there is not a disproportionate degree of disintermediation and to maintain financial stability. They would aim to restrict the store of value function of a digital euro, so that an excessive conversion of bank deposits to digital euro that would endanger financial stability and monetary policy can be prevented. In any case, the Eurosystem and the EU would benefit from the maintained trust in the monetary system that is provided by a digital monetary anchor, which ultimately also supports the conduct and effectiveness of its monetary policy and thus contributes to a more stable macroeconomic environment.

A digital euro would also enhance the open strategic autonomy of the EU. It would create a payment system which is fully under the control of EU authorities and thus more robust against external disruption. This benefit would not be visible in the short term, but could prove essential in case such an emergency were to occur.

In relation to the international role of the euro, Option 4c would not achieve a major internationalisation of the euro in a direct way. Nevertheless, there is the possibility to enact Option 4b at a later stage, for transactions with non-euro area Member States and third

countries, provided financial stability risks are sufficiently contained. This would then promote trade for euro area residents, and also reduce exchange rate risk.

Overall, the many benefits outlined in relation to Options 1c, 1e/f, 2c, 2d, 3b, would also make the euro more attractive in an indirect way.

2. SUMMARY OF COSTS AND BENEFITS

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
	Direct benefits	
Availability of Eurosystem issued money in digital form	Not quantifiable	The people would have access to a credit risk free money issued by the Eurosystem in digital form. The Eurosystem would benefit from maintained confidence in the monetary system and thus financial stability. Under certain circumstances, it could receive increased seignorage revenue from issuing a digital euro[230] The PSPs, especially credit institutions, would benefit from the stabilisation effect of central bank money on the privately issued forms of money (monetary anchor)
Additional choice on the pan-European payment market for people and businesses including merchants	The digital euro will provide for first time a pan-euro area (free) P2P service. For POI payments, - as they are currently perceived to be free of charge for citizens, there is no direct benefit to the end-user. - For merchants: we expect no major impact; merchants might benefit from increased competition. Fees are expected to be framed. However, no serious estimation of direct benefits for citizens and merchants (in terms of fees reduction) can be made at this stage.	People would enjoy an additional payment means that is also a legal tender in digital form without cost for basic use. Through issuance of digital euro as pan-European means of payment, the Eurosystem would help further integrate the market for payment services in euro. PSPs could generate additional income by distributing the digital euro and providing value added services; they could likely also benefit from increased competition Subject to the distribution model, merchants may benefit from increased competition on the payments market that may lower transaction fees especially if framed.
Ensuring privacy of payments	The investigation phase is still ongoing and no decisions on implementation of the specific design features have been made yet. Therefore, no quantifiable assessment can be given. Furthermore, benefits in this area would be mostly intangible (e.g. possibly improved privacy compared to current electronic	Online digital euro would offer similar privacy protection as current private payment means. The offline digital euro would provide high privacy for small value proximity payments, thus combining level of privacy

[230] To the extent that digital euro do not substitute banknotes, reserve remuneration is above digital euro remuneration, or issuing a digital euro leads to an expanded central bank balance sheet.

	payments).	that is similar to that of cash with convenience of electronic payments Digital euro, as pan-European means of payment, would help ensure that the level of privacy is provided to Europeans in a harmonised way across Member States.
Increased financial inclusion	The onboarding process should be comparable to today as AML and KYC requirements are comparable and also applicable in the Directive on payment accounts. While harmonised onboarding process may have a positive effect, no major cost saving for supporting financial inclusion compared to the base scenario are expected.	Easy onboarding, cost free and easy use including offline payments would increase financial inclusion in the digital age when cash is less usable.
Reduction in ecological footprint of payments	The benefit will depend on the technological setup chosen by the ECB as well as the extent to which the digital euro will replace cash transactions.	The digital euro may exhibit small advantages in terms of energy consumption compared to current digital payment channels. This will depend on the technological design and structural setup of the payment network. It will have a substantially lower ecological footprint than cash given energy and chemicals needed for printing/coinage and the fuel required to transport bank notes and coins.
Indirect benefits		
Support of innovation	Creation and reinforcement of European expertise in the payment sector would give a boost to European payments industry at global level.	Support of advanced functionalities in the digital euro infrastructure (e.g. conditional payments) could enable novel use cases and provision of additional services, thus fostering innovation in the European payments market.
Increased competition in domestic and pan European payments	A quantitative estimate of benefits from increased competition in Europe may be made in terms of HHI index improvement, assuming e.g. the digital euro could get some xx% retail payments market share in 5 year-time.	The digital euro infrastructure available for new market participants can increase competition especially at pan European level. A digital euro is well placed to compete with third country issued CBDCs and stablecoins, in particular through provision of functionalities that are at least as attractive as those of the payment solutions available in foreign currencies or through unregulated entities. This would preserve the global reputation of the euro, not least if other major foreign central banks press ahead with issuing CBDC.
Increased resiliency (including vs. geo-political risks) of European retail payments infrastructure	A digital euro would increase the resilience of the European payment landscape. In particular, an offline digital euro would ensure the continuous provision of electronic payments in public money amidst connectivity outages and in the context of a declining use of cash.	However, the offline digital euro, due to the necessary pre-funding step, would need to be sufficiently used in normal times to foster resilience effectively. This is akin to the need of withdrawing cash in advance of the ATM network outage.

(1) Estimates are gross values relative to the baseline for the preferred option as a whole (i.e. the impact of individual actions/obligations of the preferred option are aggregated together); (2) Please indicate which

*stakeholder group is the main recipient of the benefit in the comment section;(3) For reductions in regulatory costs, please describe details as to how the saving arises (e.g. reductions in adjustment costs, administrative costs, regulatory charges, enforcement costs, etc.;); (4) Cost savings related to the 'one in, one out' approach are detailed in Tool #58 and #59 of the 'better regulation' toolbox. * if relevant*

II. Overview of costs[231] – Preferred option							
		Citizens/Consumers		**Businesses**		**Administrations**	
		One-off	**Recurrent**	**One-off**	**Recurrent**	**One-off**	**Recurrent**
Digital euro available for retail payments within the euro area	Direct adjustment costs	Learning costs such as those associated with online banking or new apps, but the technical solutions necessary to transact would be provided to them free of charge.	No direct cost is expected as basic services are expected to be provided free. Additional funding/defunding means and payment services above the basic offer can be charged.	Cost for merchants are not possible to precisely calculate due to lacking information on key design features. Based on data from the ECB i.e. the cost of updating existing European terminals for the acceptance of non-proprietary NFC and/or QR codes would range between EUR 40 and EUR 75 per terminal and calculating with 13.5 million POS terminals in the euro area (as reported by the ECB for end 2021[232]), the merchants in the euro area that already accept electronic payments can foresee a total cost of about EUR 0.5-1 billion when implementing a new terminal standard. For merchants not yet accepting digital means of payments, the additional one-off cost could range between EUR 125 million and EUR	Merchants would also incur annual maintenance cost and transaction fees. These costs are not expected to be higher than the costs of current payments means. PSPs would incur network service fees and operational costs, including AML/CFT and fraud checks, and transaction management, customer onboarding and support. These fees are expected to be similar to the costs of current similar functions. At the same time, they will benefit from economies of scale and scope resulting from reutilisation of existing services and processes. These costs cannot be		

[231] Cost of the Eurosystem was not analysed here as the ECB will do its own assessment as part of its mandate.
[232] https://sdw.ecb.europa.eu/reports.do?node=1000001404

				250 million. PSPs would bear one-off cost including in relation to adapting front-end systems (apps, online banking, ATMs), back-end systems (incl. acquiring/issuing and integration with settlement and account management systems), and adapting AML/KYC, anti-fraud, accounting and other business processes. Most of these are in place already for other payment services. These cost for the PSPs cannot be estimated at this point lacking key information about the design, however based on the IA on Instant Payments, a basic estimate for one-off costs for PSPs indicates costs of up to EUR 5.4 billion (1e) and EUR 4.8 billion (1e) (or up to EUR 1.3 million per PSP), while a more elaborate estimate[233] suggests costs up to EUR 2.8 billion (1e) and EUR 2.5 billion (1f).	estimated at the moment due to uncertainties as regards design elements and future demand.		
	Direct administrative costs	None	None	None	No incremental costs are expected on top		

[233] The share of two size groups of PSPs were estimated based on a sample of 2,886 PSPs that adhere to the SEPA credit transfer scheme, and whose total assets data was available in the ORBIS database. As a result, it was assumed that 53.6% of the relevant institutions had total assets below 1 billion euro. As per the Commission Impact Assessment on Instant Payments, for the lower bucket, the range of one-off compliance costs reported was EUR 10 000 to EUR 143 000, while for the upper bucket the range was EUR 100 000 to EUR 1.3 million. Please also see Section 6.2.1.

					of current reporting requirements.		
	Direct regulatory fees and charges	None	None	None	None		
	Direct enforcement costs	None	None	None	None		
	Indirect costs	None	None	None	None		
Costs related to the 'one in, one out' approach							
Total	Direct adjustment costs	Learning costs	None	Implementation costs in the ranges given above	Cannot be estimated at the moment due to uncertainties, but not expected to increase substantially as compared to the costs of current payments means that the digital euro would replace.		
	Indirect adjustment costs	None	None	None	None		
	Administrative costs (for offsetting)	None	None	None	No incremental costs are expected on top of current reporting requirements.		

(1) Estimates (gross values) to be provided with respect to the baseline; (2) costs are provided for each identifiable action/obligation of the preferred option otherwise for all retained options when no preferred option is specified; (3) If relevant and available, please present information on costs according to the standard typology of costs (adjustment costs, administrative costs, regulatory charges, enforcement costs, indirect costs;). (4) Administrative costs for offsetting as explained in Tool #58 and #59 of the 'better regulation' toolbox. The total adjustment costs should equal the sum of the adjustment costs presented in the upper part of the table (whenever they are quantifiable and/or can be monetised). Measures taken with a view to compensate adjustment costs to the greatest extent possible are presented in the section of the impact assessment report presenting the preferred option.

3. RELEVANT SUSTAINABLE DEVELOPMENT GOALS

III. Overview of relevant Sustainable Development Goals – Preferred Option(s)		
Relevant SDG	**Expected progress towards the Goal**	**Comments**
SDG no. 12 –	Especially in the long-term it is expected that the	The ECB's objective is that "the

responsible consumption and production and SDG no. 13 – climate action	digital euro would replace some current cash payments. The environmental footprint of bringing digital euros into circulation will be substantially lower than bank notes and coins (printing/coinage, transportation etc.). The energy consumption of a CBDC has been deemed comparable to that of a credit card system.	design of the digital euro should be based on technological solutions that minimise its ecological footprint and improve that of the current payments ecosystem"[234]. It should therefore support progress on SDGs no. 12 and 13, in particular as concerns lowering energy consumption and CO2 emissions. A detailed assessment can only be done at implementation level.

[234] ECB Report on a digital euro, October 2020.

Annex 4 - Analytical methods

Impact on European banks' balance sheets (JRC)

The aim of JRC's analysis is to look at possible demand scenarios for a retail-only digital euro and assess their impact on bank's balance sheets. Replicating the approach presented in an article from the ECB,[235] JRC built a set of demand scenarios at Member State level. These scenarios are based on data about households, deposits, and cash holdings. The demand for digital euros ranges from 1 to 10 thousand euros per person. In line with the assumptions made in the ECB's article, JRC assumed that up to half the current amount of cash held by individuals is substituted for the digital euro before people convert their bank deposits for digital euros. In a static analysis, JRC then highlights how these demand scenarios would translate in terms of banks' total liabilities, reserves, wholesale funding and lending. This allows the analysis to assess the extent to which banks balance sheets may be affected by the different demand scenarios.

Bank profitability (JRC)

This analysis aims at investigating the link between the adoption of a digital euro and banks' profitability. The introduction of a CBDC is simulated as a shock to banks' deposit ratios and based on the three demand scenarios highlighted in the ECB's article.[236] The analysis then assesses the probabilistic impact of these shocks on banks' profitability through quantile regressions with fixed effects.

DSGE analysis (JRC)

A dynamic stochastic general equilibrium model (DSGE) comprising a banking sector is used to assess how the presence of a CBDC changes an economy's dynamic Reponses to macroeconomic shocks. In the model, money can either take the form of cash or CBDC, which are considered imperfect substitutes, with cash carrying storage costs.

[235] (Adalid et al., 2022
[236] (Adalid et al., 2022)

Annex 5 - Technical glossary

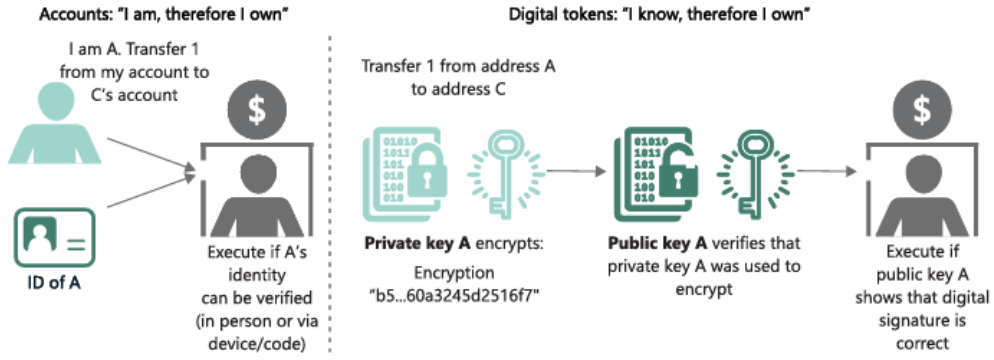
1 What are the main design options for a CBDC from the user perspective ("front-end")?

An intermediary is an entity (probably a payment service provider, a category that includes banks) that distributes to its clients the CBDC* issued by the central bank. It is responsible for ensuring customer services and the "know your client" and other anti-money laundering procedures. In the (theoretical) model of a direct CBDC*, the task of intermediaries would be directly performed by the central bank. Intermediaries are not the legal counterparts of the clients' CBDC claim, otherwise the "CBDC" would no longer be a central bank liability but a form of commercial bank money*.

Account-based vs. bearer-based

Bearer instruments, for example certain tokens* stored on hardware secure elements*(similar to a SIM card in a cell phone), are assets than can be exchanged on a pure peer-to-peer basis, i.e. without any intermediary* settling, recording or intervening in the transaction. This is not the case of most crypto-assets, which are account-based as their distributed ledgers are indeed storing lists of holdings. This is tantamount to accounts whose central bookkeeper is replaced by a network of notaries and for which tokens play the role of ID identifier. Importantly, the latter does not exclude the former: developing bearer-based solutions in a CBDC project is compatible with an architecture functioning principally with accounts.

Account-based access compared with token-based access — Graph 4



In an account-based CBDC (left-hand side), ownership is tied to an identity, and transactions are authorised via identification. In a CBDC based on digital tokens (right-hand side), claims are honoured based solely on demonstrated knowledge, such as a digital signature.

Source: Authors' elaboration.

Source: Auer and Böhme (2020), Bank of International Settlements

Offline use. Offline digital euro is a use of a CBDC in absence of connectivity to the main communication network.

A peer-to-peer offline digital euro is a digital euro whose transactions are settled offline (i.e. with payer and payee in physical proximity) and where the rules set by the Eurosystem

(including settlement finality and tools to avoid money laundering and excessive use of digital euro as form of investment) are enforced without the operational intervention of a third party.

This digital euro type is more suitable to preserving traditional uses of cash in the digital age, particularly relevant for resilience, financial inclusion and a high level of privacy. It would likely be seen as a complement to an online digital euro (see below), since it cannot offer advanced functionalities and remote payments (e.g. e-commerce).

An offline digital euro would provide users with a contingency option in times of a network services outages and would improve the resilience of the retail payments infrastructure in the euro area. This role is currently fulfilled by cash. Similarly to cash, the digital euro holdings that would be available offline need to be prefunded and stored on user devices before the network outage materialises. An offline digital euro could act as a backup only as long as the amount prefunded by users in their devices is sufficient to satisfying their payment needs until the network connectivity will be restored. To withstand potential network outages and provide resilience an offline digital euro should be enabled by its wide accessibility, use, and sufficient holdings during the normal times.

Online digital euro. A Third-party validated online digital euro is a digital euro solution where transactions between payer and payee would be settled online (i.e. without the necessity for transacting parties to be in physical proximity) and with the operational intervention by a third party. A third-party online digital euro would particularly help foster the provision of innovative digital services (e.g. value-added services with digital euro inside) and PSPs (e.g. new business models through provision of value added services), while having the potential to be relatively easily integrated with the existing payment infrastructures (with other online payments).

In case of a third-party validated online digital euro, transactions of any size would be recorded, providing a third party (i.e. intermediary) the possibility to conduct checks.

A token is, in general terms, something physical or digital that a person possesses, controls, and uses to authenticate his or her identity. Passwords or cryptographic keys can be used as tokens or generated by a physical token. In the crypto-assets* universe, cryptographic tokens are generally the unique way to prove the holding of assets. By extension, tokens have been assimilated to the assets they represent.

2 What are the main design options for a CBDC from the IT perspective ("back-end")

a) The underlying IT infrastructure

Distributed Ledger Technology (DLT) consists in an IT architecture that validates and stores information in a decentralised way. Compared to other forms of information validation and storage, it does not recognise a parent ledger but uses a consensus algorithm to which all servers participate playing the role of nodes in the DLT network When any computer can participate to the network as a validator node, the DLT is "permissionless". When the network is operated by a list of authorised computers, it is "permissioned".

Blockchain is a form of DLT*, which refers to the technological infrastructure and protocols that allows simultaneous access, validation, and record updating in an immutable manner across a network that spreads across multiple entities or locations. Developed to store time-stamped information about transactions, blokchain is considered the most appropriate tool in the DLT universe to constitute a crypto-asset* ledger, but can also be used, for instance, to

create a secured repository of diploma or digital artwork ownership certificates. This technology can be (and has been) used as a ledger for a CBDC*: all DLT-based CBDC projects have opted for a blockchain solution, such as the Bahamian sand dollar. Since blockchain processes transactions not one after another but grouped in blocks, it eases the simultaneous treatment of certain transactions such as atomic settlements* and smart contracts*. Contrary to traditional databases, blockchains do not record data using a central controller whom users must trust, such as a bank. If used for a CBDC, the blockchain technology would hence in theory allow for more innovative uses.

Target Instant Payment System (TIPS) a market infrastructure service launched by the Eurosystem in November 2018. It enables payment service providers to offer instant fund transfers to their customers around the clock. It was developed as an extension of TARGET2 and settles payments in central bank money. TIPS settles so far payment transfers in euro but could be extended to other currencies: as of May 2022, TIPS will settle instant payments in Swedish krona. TIPS could be used as an instrument to settle digital euro transactions. However, it was not conceived to enable more innovative features such as atomic settlements* and smart contracts*. Such features could work with TIPS only if interoperability* is ensured with blockchain*-based solutions through appropriate oracles*.

A secure element is a hardware device ex ante homologated to run IT operations in isolation from the rest of a larger device it is inserted in. It is a probable requirement for hosting bearer's instrument* and allowing offline use.* SIM-cards in smart phones can be compared to a secure element. It should not be confused with a "trusted execution environment", which is a secured storage or applicative facility on an IT device that still relies on the main processor to run.

b) Interaction between infrastructures

Interoperability is the ability of an IT system to exchange data with other systems in order to process information. For a CBDC*, interoperability matters to ensure a proper communication between clients' and merchants' devices. This is especially important for offline use* (where all the communication, including security checks should be performed between the two devices) and for a possible non-domestic use (technical standards at point of sale may be different across jurisdictions). Interoperability also matters for connecting the CBDC with banking accounts and/or interbank operations. For instance, a potential DLT*-based CBDC* could be interoperable with TIPS* thanks to appropriate oracles*.

Oracle is an IT programme that connects a blockchain with traditional IT systems in order to make interoperability* possible in a way comparable to applicative interfaces (API) between two or more traditional IT systems. Oracles would be the likely the technical solution to ensure the transition between a CBDC* run on a DLT* and legacy systems, or between a CBDC run on a traditional ledger and private solution offering commercial bank money* on a blockchain*. We can expect that the conception and functioning of oracles will be one of the cornerstones of the innovation agenda.

A multiple CBDC bridge is an interoperability* platform developed to ensure an efficient system of cross-border payments between different CBDCs. Several central banks (including the PBoC) are conducting a joint experimentation with the BIS under the acronym of mCBDC. The ECB is sceptic regarding the ability of such projects to deliver any scalable output in the short run. If an international standard resulted from these tests, they could ensure a first mover advantage to jurisdictions that structured these platforms based on the distinctive features of their own CBDC projects.

3 What kind of digital innovation could a CBDC (indirectly) support?

a) Solutions for conditional payments[237] primarily developed within DLT environments

A "smart contract" is not a contract in a legal sense but an IT programme to be executed on a blockchain* that describes complex transactions involving for instance conditional operations, delivery-versus-payment features or auction mechanisms. A smart contract can be defined as "an event-condition-action stateful computer programme, executed between two or more parties that are reluctant to trust each other unguardedly"[238]. Smart contracts promoters assert that the potential of this tool widely exceed what programming features of legacy payment systems can deliver. Even though several CBDC projects run on blockchains*, it is hardly conceivable that a blockchain* developed by a central bank directly runs smart contracts. Indeed the central bank blockchain* is to ensure a robust backbone of a CBDC and should not made vulnerable through the execution of programmes developed by third parties. However, that being said, it is conceivable to link a DLT-based CBDC to smart contracts on distributed ledgers of third-parties, without storing the smart contract on the blockchain of the central bank. The possible contribution of CBDC to innovation in regards of conditional payments could lie in enabling the settlement of machine-to-machine payments with smart contracts on private distributed ledgers in central bank money and thus facilitate the emergence of innovative payments solutions.

An atomic settlement is a blockchain*-based approach to settlement consisting in executing in the same block (i.e. in perfect synchrony) a payment and other operations bundled in a smart contract*. Atomic settlement can reduce the risks associated to the settlement of securities to virtually zero. Atomic settlement can also improve delivery-versus-payment processes of digital as well as physical assets.

Decentralised finance (DeFi) is an umbrella term for crypto-assets* solutions aimed at offering services on a blockchain* that reproduce financial services like lending, saving, arbitraging and trading without an identified unique counterparty such as a bank. It builds on smart contracts* and the properties of atomic settlement*. Tailoring a CBDC to support actively the emergence of DeFi would raise similar IT integrity risks and policy concerns as hosting smart contracts, especially before a clearer regulation framework has emerged. However, DeFi would highly benefit of any improvement of its interoperability* with existing systems.

b) Solutions requiring cheap and instant digital payment solutions

Micropayments are payments, typically invoiced for pay-as-you-go services (such as for using an infrastructure for a certain mileage or time period), that are too small to be profitably processed in the current infrastructures.

Stream payments are payments instantly invoiced on a continuous basis as long as a service is used.

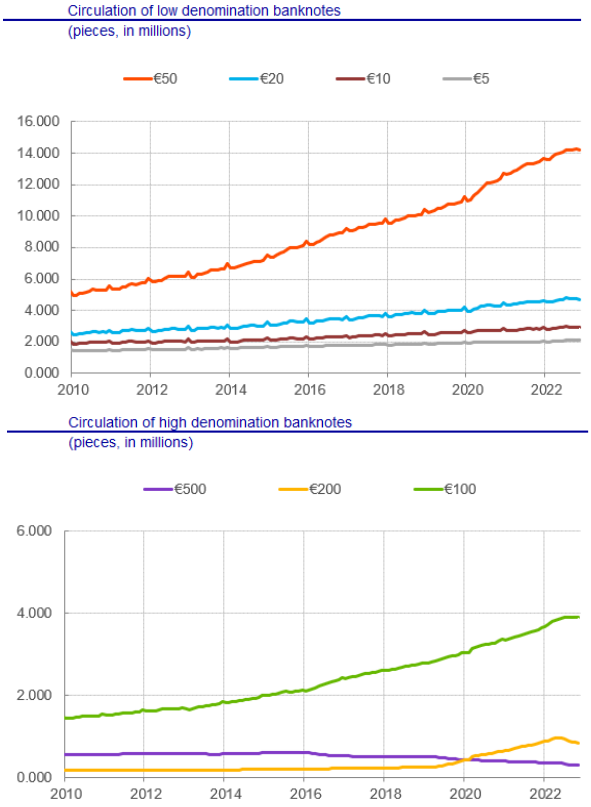
Machine-to-machine payments are payments automatically triggered when autonomous systems (a self-driving car, a robotised production line) perform certain actions. Some of these use cases require micropayments, stream payments or smart contracts to be executed.

[237] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.
[238] Definition provided in C. Molina-Jimenez, E. Solaiman, I. Sfyrakis, I. Ng, J. Crowcroft, On and Off-Blockchain Enforcement of Smart Contracts, in Euro-Par 2018 International Workshops, Turin, 2018, pp. 342-354.

Introducing a CBDC is not per se a game changer but could offer new interoperability* solutions.

Annex 6 - Cash usage

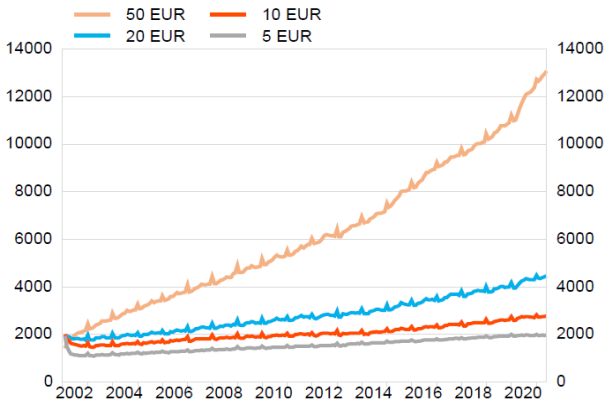
In a fast-changing payment landscape, the role of cash is "paradoxically"[239] changing. While its demand has increased during the pandemic and its use as a store of value has increased, its use as a means of payment has been declining. According to the ECB's recent study on the payment attitudes of consumers in the euro area, consumers still predominantly use cash for Point-of-Sale (POS) and Person-to-person (P2P) payments, but its share is declining everywhere. It is estimated that less than one-third of banknotes in circulation[240] are used for transaction purposes. Meanwhile the demand for high denomination notes not commonly associated with payments, has been sustained or has even slightly increased.



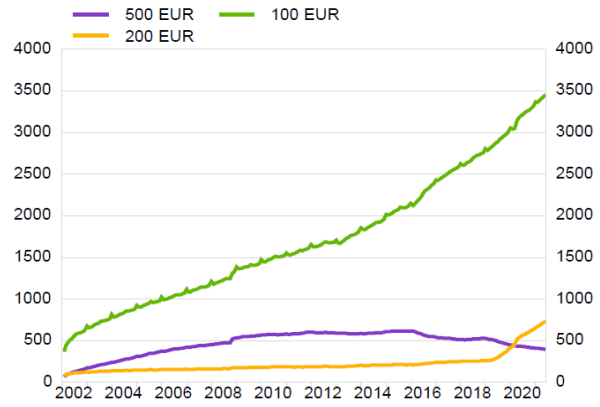
[239] European Central Bank (2021), "The paradox of banknotes: Understanding the demand for cash beyond transactional use". The ECB estimates that the vast majority of cash, around one trillion euro, is held as an asset (store of value function) and used only sporadically for payments or is circulating outside the euro area.

[240] According to the ECB (« The paradox of banknotes: understanding the demand for cash beyond transactional use », ECB Economic Bulletin, Issue 2/2021), between 13% and 30% of the value of banknotes in circulation was held for the purpose of euro area transactions, yielding a central estimate of 21,5% (EUR 280 billion).

1.1.1 Circulation of low denomination banknotes
(millions, end of period)



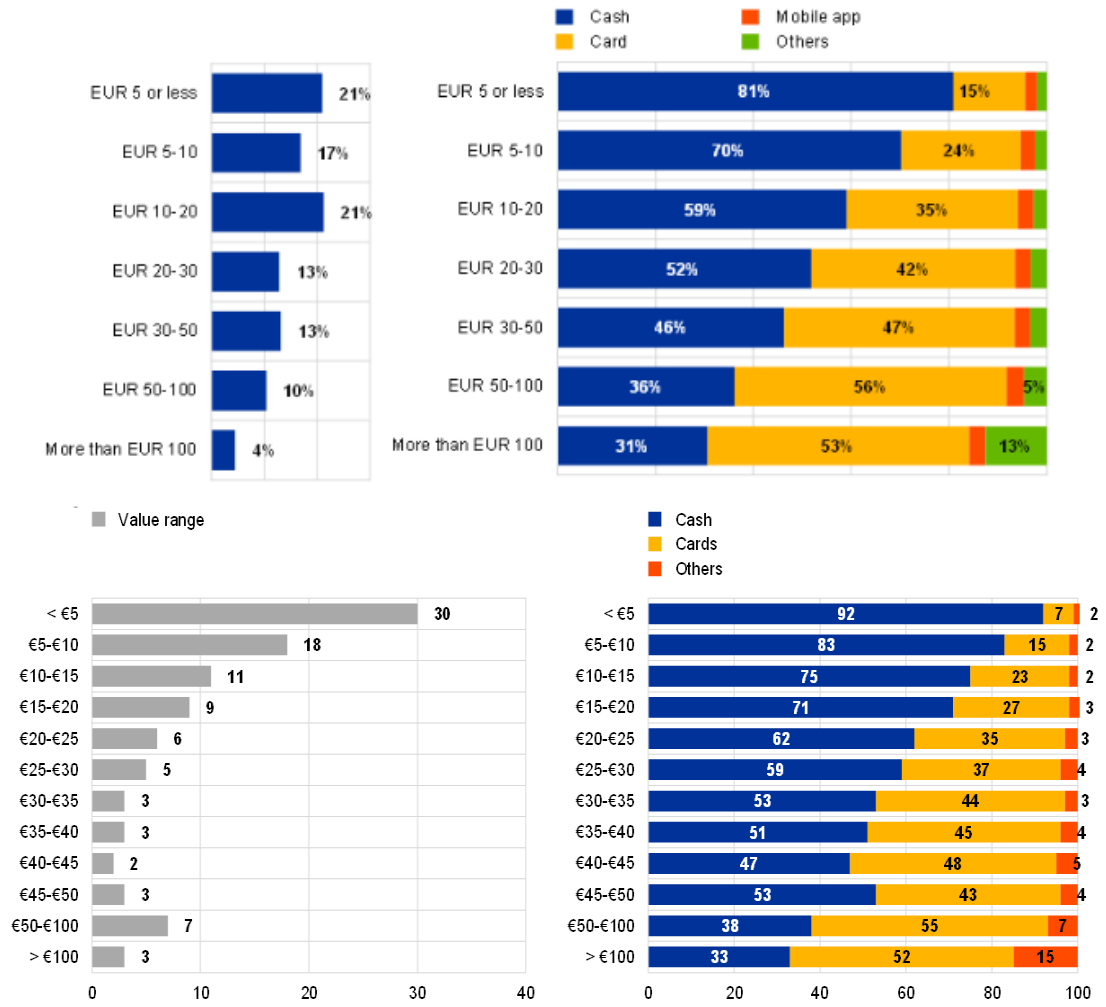
1.1.2 Circulation of high denomination banknotes
(millions, end of period)



Source: ECB.

Cash is predominantly used for low value payments. The significant difference between the number and value of cash transactions (59% in number, 42% in value) is due to the more frequent use of cash for low-value transactions. For payments below €5, the share of payments using a card went from 7% in 2019 to 15% in 2022. Similarly, for payments between €5 and €10, the share of card payments went from 15% in 2019 to 24% in 2022 In addition, the share of cash transactions decreases significantly as transaction value increases. Cards were the most used payment method at the POS for purchases over €30. Nonetheless, nearly one-third of POS payments over €100 were still made in cash.

Use of payment instrument in the euro area at POS, by value range (2022)



Sources ECB (2022), including calculations based on De Nederlandsche Bank and the Dutch Payments Association (2022) and Deutsche Bundesbank (2022).

The COVID-19[241] pandemic has accelerated this shift toward digital payments[242], largely on the back of increased e-commerce.

According to the SPACE survey, in 2022 more than half (55%) of consumers explicitly stated their preference for cards or other cashless payment instruments.

In the most recent SPACE survey from the ECB (2022), respondents were asked to evaluate how and why their payment habits had changed in the two or three years preceding the outbreak of the pandemic:

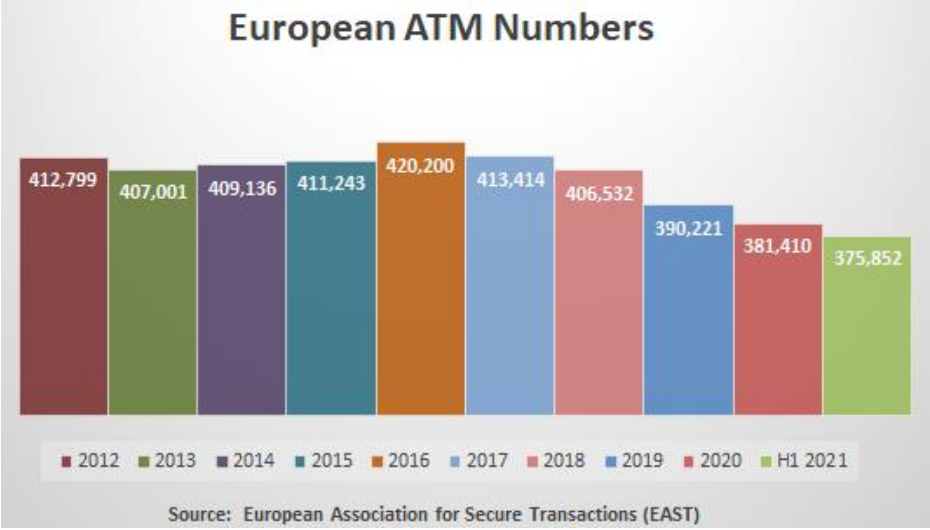
- 54% of respondents say that they did not change their payment behaviour with regard to using cash at physical locations due to the pandemic. 31% said that they used cash less often than before the pandemic and 14% said they used it more often.

[241] Bank of International Settlements (2021), "Covid-19 accelerated the digitalisation of payments
[242] Auer, Raphael, Cornelli, Giulio and Frost, Jon, (2020), "Covid-19, cash, and the future of payments", No 3, BIS Bulletins, Bank for International Settlements.

- The most frequently mentioned reason (mentioned by more than half of those who reduced their use of cash during the pandemic) was that paying electronically has become more convenient.
- 37% of consumers were buying goods online more frequently than before the pandemic, while 41% said there had been no change.

Nonetheless, differences in cash usage habits are significant across Member States. Consumers' and retailers' preferences and probably the absence of harmonisation so far on legal limits for cash payment have contributed to the different levels of cash usage. For instance, the highest shares in terms of number of cash payments were observed in Malta (77 %), Slovenia (73 %), Austria (70 %) and Italy (69 %), and in terms of value of payments in Malta (65 %), Lithuania (61 %) and Slovenia (59 %). Compared to 2019, the number of cash payments decreased in most euro area countries. [243].

The decreasing use of cash as a payment means has also coincided with increasing barriers to have access to cash. As reflected in fact-finding exercises of the Euro Retail Payments Board (ERPB) and the Euro Legal Tender Experts Group (ELTEG III), access to cash seems to have remained easiest in those Member States which were already cash intensive, but the situation in other Member States reveals a gradual but structural deterioration of effective access possibilities, reflected in various issues such as the reduction of the ATM withdrawal and depositing infrastructure, and the imposition of (high) withdrawal fees. ATMs form part of a nation's critical cash cycle infrastructure for distribution and for round-the-clock self-service banking. The European Association for Secure Transactions estimated that there were 375,852 ATMs in Europe in 2021, a 9% decrease from the 2012 total.



These two aspects, in turn, have had direct and indirect impacts on the use of cash payments in the consumer economy, including on budgeting, savings and finances for households and families. Therefore, a reduction in the ATM infrastructure, often related to the cost considerations of maintaining such a network and efficiency gains, significantly impairs access to cash by the general public. This in turn also negatively affects the public's possibilities to use cash as a payment means, eroding the capacity to use it as an official

[243] European Central Bank (2020), Study on the payment attitudes of consumers in the euro area (SPACE)

currency with legal tender status. Moreover, the closure of bank branches as an alternative to ATM's forms an additional barrier.[244] A wide range of national initiatives are being undertaken, from studies that closely monitor access to cash, to covenants and stakeholder agreements in order to guarantee cash availability. Nevertheless, the situation on the ground regarding cash access is becoming increasingly heterogeneous, with several Member States asserting that EU-level action regarding cash access is warranted now or in the short-term future.

Acceptance of cash is another aspect that affects its usability. As set out in a recent judgment of the Court of Justice of the European Union[245] and the Commission Recommendation 2010/191/EU of 22 March 2010 on the scope and effects of legal tender of euro banknotes and coins, one of the key principles of legal tender is its mandatory acceptance. Therefore, the status of legal tender of euro banknotes and coins implies, in principle, an obligation to accept them, whilst at the same time not precluding national sectoral legislation outside of the scope of monetary law (which is an exclusive Union competence) that may stipulate exceptions to this rule for reasons of public interest (for example, as a matter of tax policy, public administration, or criminal law). Recommendation 2010/191/EU also mentions that the acceptance of cash as means of payments in retail transactions should be the rule. A refusal thereof should be possible only if grounded on reasons related to the 'good faith principle' (for example, if the retailer has no change available).

In practice, and in the absence of a detailed regulation of the legal tender of euro cash, the application of legal tender on the ground may vary between the euro area Member States. This has led to a divergent situation regarding cash acceptance across the euro area. For example, whilst in some Member States sanctions exist for cash non-acceptance by retailers, in others, due to the freedom of contract, the payer and the payee can agree not to use cash if informed in advance. Therefore, in some countries cash may not be refused, whilst in others refusal to accept cash is seen as part of contractual freedom, if the parties agree on another form of payment. Evidence gathered by the Euro Retail Payments Board (ERPB)[246] and in the context of the Euro Legal Tender Experts Group (ELTEG III)[247] points out that, whilst cash acceptance remains generally high throughout the euro area, cases of non-acceptance do exist in practice. For example, a study undertaken in the Netherlands indicates a cash non-acceptance incidence rate of 7% in urban areas versus 3% rural areas.[248]

[244] ELTEG III questionnaire report on cash availability
[245] Judgment of 26 January 2021 in joined cases Johannes Dietrich and Norbert Häring v Hessischer Rundfunk, (C-422/19 and C-423/19, ECLI:EU:C:2021:63).
[246] As gathered by the Euro Retail Payments Board (ERPB) in its Report of the ERPB Working Group on Access and Acceptance of Cash 0-68 2021
[247] ELTEG III Questionnaire report on acceptance of cash
[248] 'Dutch retailers continue to accept cash' (https://www.dnb.nl/en/actueel/dnb/dnbulletin-2020/dutch-retailers-continue-to-accept-cash/) and 'Who decides the way we pay – retailer or customer?' (https://www.dnb.nl/en/actueel/dnb/dnbulletin-2020/who-decides-the-way-we-pay-retailer-or-customer/)

Annex 7 - Legal tender for cash

Background

The Commission has convened three times an expert group of Member States' representatives (ELTEG I, II and III) in order to discuss what legal tender of cash means. A Commission Recommendation, adopted in 2010, outlined a common definition of the concept of legal tender.[249] Point 1 of the 2010 Recommendation defines the concept of legal tender of euro cash as entailing a general obligation in principle of the acceptance of cash by the creditor for the settlement of the monetary debt by a debtor *('mandatory acceptance'*, *'acceptance at full face value'* and *'power to discharge from payment obligations'*). The 2010 Recommendation also mentions two other important principles that follow from the status of legal tender of euro banknotes and coins. First, the acceptance of cash as means of payments in retail transactions should be the rule. A refusal thereof should be possible only if grounded on reasons relating to the 'good faith principle' (for example the retailer has no change available).[250] Second, no surcharges should be imposed on payments in cash.[251] These principles have been cited in the Hessischer Rundfunk judgment of 26 January 2021. In its judgment in the legal tender cases[252], the Court of Justice held that the concept of 'legal tender' of euro banknotes enshrined in Article 128(1) TFEU is a concept of Union law that must be given an autonomous and uniform interpretation throughout the European Union. That interpretation is that a means of payment denominated in a currency unit signifies *'that means of payment cannot generally be refused in settlement of a debt denominated in the same currency unit, at its full face value, with the effect of discharging the debt'*[253]. Therefore, the concept of legal tender as interpreted by the Court of Justice for euro banknotes implies: (i) mandatory acceptance, (ii) acceptance at full face value and (iii) effect of discharging payment obligations,[254] as set out by Point 1 of the 2010 Recommendation.

Problem definition: legal tender of cash, acceptance of and access to cash

Given that the 2010 Recommendation is a non-binding act that, in addition, has not been widely followed, legal uncertainty remains in the euro area concerning the scope of legal tender for euro cash. Moreover, revising this Recommendation would be unlikely to result in a common application and interpretation of legal tender principles, whilst the continued fragmentation of the situation across the euro area would not be coherent with the EU's exclusive competence for monetary policy and its decision to opt for a regulation of legal tender of the digital euro. In particular, the principles set out in the ELTEG III final report, confirm that if legislation on the digital euro were to regulate its legal tender status, it would be in the interests of coherence and better law-making to also regulate the legal tender status of cash. The targeted consultation on the digital euro[255], which included a section on the

[249] Commission Recommendation 2010/191/EU of 22 March 2010 on the scope and effects of legal tender of euro banknotes and coins.
[250] See Point 2 of Commission Recommendation 2010/191/EU.
[251] See Point 4 of Commission Recommendation 2010/191/EU.
[252] Judgment of 26 January 2021 in joined cases Johannes Dietrich and Norbert Häring v Hessischer Rundfunk, (C-422/19 and C-423/19, ECLI:EU:C:2021:63).
[253] See judgment of 26 January 2021 in joined cases Johannes Dietrich and Norbert Häring v Hessischer Rundfunk (C-422/19 and C-423/19, ECLI:EU:C:2021:63, § 46).
[254] See judgment of 26 January 2021 in joined cases Johannes Dietrich and Norbert Häring v Hessischer Rundfunk, (C-422/19 and C-423/19, ECLI:EU:C:2021:63, § 49).
[255] The analysis of the results of this targeted consultation are presented in annex 2.

implications of the possible granting of legal tender status to the digital euro for the definition of legal tender of cash, also shows that if legal tender was granted to the digital euro, the majority of targeted stakeholder groups consider that legislative action at EU level is needed to enhance legal certainty and enshrine the legal tender status of euro cash.

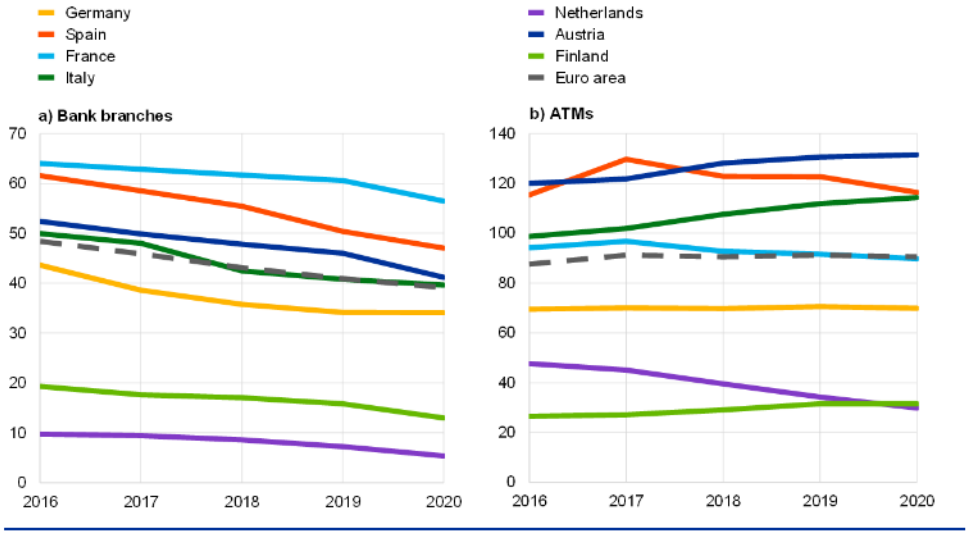
The outcome of the ELTEG III discussions confirm the legal uncertainty regarding the legal tender of euro cash and differing application of its principles in the euro area, and identified a range of issues of acceptance and availability of cash on the ground.[256] Regarding cash acceptance, several Member States reported an increase in the number of retailers not accepting cash. In the Netherlands, for example, whereas 96% of physical retailers still accepted cash in 2020, 9% of physical retailers indicate that they expect not to accept cash in 5 years' time. Furthermore, non-acceptance is already more prevalent in the entertainment (6%), hospitality (5%) and retail pharmacy sectors (10%).[257] The 2022 ECB SPACE study confirms a generally high level of euro area wide cash acceptance for now, but the start of a declining trend in acceptance in most Member States can be seen.[258] In fact, the euro area average masks the fact that some Member States seem to have experienced a more significant decline in cash acceptance between 2019 and 2022, with six Member States reporting a percentage point decrease of 5 points or higher, including two Member states which reported a 9 percentage point decrease.[259] This points to a situation where limited or circumstantial private restrictions on cash payments could evolve, because of their volume, into structural restrictions or exclusions of cash acceptance. This negatively affects the ability for cash to be used as an effective means of payment.

The findings of the ELTEG III report, EPRB report and ECB studies also point to a rather heterogeneous and sometimes problematic situation regarding cash access amongst the Member States. Cash access seems to remain strongest in those Member States which are already cash intensive, whilst others point to a gradual but structural deterioration of access, reflected in various issues such as the reduction of the ATM infrastructure and the imposition of withdrawal fees.[260]

[256] See the final report under the 5th meeting of ELTEG III.
[256] The Euro Legal Tender Experts Group convened 5 times in 2021 and 2022 and adopted its report in July 2022.
[257] See the final report under the 5th meeting of ELTEG III.
[258] ECB, Study on the payment attitudes of consumers in the euro area (SPACE) – 2022 – Consumer access to and acceptance of means of payment, p57.
[259] LV, FI, BE, MT, IE and EE reported a percentage point decrease of 5 points or higher in the change in the share of POS transactions where cash would be accepted. Most significantly, LV reports a decrease from 93% to 84% in acceptance, and FI from 94% to 85%, see ECB, Study on the payment attitudes of consumers in the euro area (SPACE) – 2022 – Consumer access to and acceptance of means of payment, p57.
[260] See also ''Guaranteeing freedom of payment choice: access to cash in the euro area'', Alejandro Zamora-Pérez, Published as part of the ECB Economic Bulletin, Issue 5/2022.

Chart 1

Cash access points per 100,000 inhabitants in selected euro area countries, 2016-20



Sources: ECB and World Bank.

Notes: ATMs include all types of customer-operated cash machines (cash dispensers and machines with deposit functionality, some of which also recycle banknotes deposited by customers in previous transactions after conducting mandatory authenticity checks). Data on bank branches and ATMs (the numerator) are from the ECB, while population data (the denominator) are from the World Bank.

Analysing the cash access points (bank branches + ATM's) available to citizens and businesses is key to assessing access to cash in a territory. Chart 1 shows the number of traditional cash access points (bank branches and ATMs) per 100,000 inhabitants in selected euro area countries, from 2016 to 2020, before the pandemic. In the euro area, the overall number of cash access points is starting to show decreasing trends, although trends vary across Member States, confirming the heterogeneous situation on the ground. Although there seems to be a clear declining trend in the number of bank branches per 100,000 inhabitants on average in the euro area, this is partially offset by the number of ATMs per 100,000 inhabitants, especially in some countries that are resisting a downsizing of their ATM network (e.g. Germany) or even increasing it (e.g. Italy and Austria). On the other hand, Some Member States like the Netherlands and Belgium are clear examples of reductions in both bank branches and ATMs, which are projected to continue in the near future. For example, in Belgium, the number of ATMs is expected to decrease from 6912 (in 2020) to 4037 (in 2025).[261] Furthermore, the share of the population covered by cash access points is uneven across countries, with the share of people living within 5 km of the nearest cash access point ranging from 77% in the country with the lowest coverage to 100% in the country with highest coverage.[262] Finally, the declining cash access point network can also be found back in the ECB study on the payment attitudes of consumers in the euro area (SPACE), showing a doubling of the people that expressed concerns about access to ATMs

[261] PARLEMENT DE LA RÉGION DE BRUXELLES-CAPITALE PROPOSITION DE RÉSOLUTION demandant une juste répartition des distributeurs de billets au sein de la Région de Bruxelles-Capitale; images.pdf (irisnet.be)

[262] https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_02~74b1fc0841.en.html

between 2016 (when only 5% of the people in euro area were not satisfied with access to ATMs) and 2022 (when 10% considered that access to an ATM is fairly or very difficult).[263]

Content of a regulation on the legal tender of cash: codification and clarification of the jurisprudence pertaining to cash acceptance

In terms of the content of a possible legislative proposal on the legal tender of euro cash, there is broad support from all euro area Member States that its baseline should be the codification of the case law of the Court of Justice of the European Union on the key principles of legal tender as set out above. Furthermore, the analysis undertaken in the context of ELTEG, the ELTEG principles set out in the ELTEG III report and the targeted stakeholder consultation results also suggest that the following legal clarifications should be considered in the legal proposal to ensure added-value and legal certainty whilst respecting the Court of Justice jurisprudence.

- **A non-exhaustive specification of possible exceptions to the principle of mandatory acceptance based on the 'good faith' principle.** This list would seek to address the findings of ELTEG III that, although cash acceptance is generally still widespread across the euro area, preventive action, such as a further definition of justified exceptions, could be needed to avoid problems from evolving, as cash refusal could grow very quickly. *Good faith* exceptions, by their very nature, can be abused if they are applied in bad faith, but this does not limit the value of having such exceptions overall. An adequate level of specification of these exceptions would therefore limit the risk of *moral hazard*, whilst at the same time leaving necessary room for flexibility, freedom of choice and case by case basis application, the importance of which was emphasised by responding merchant and financial institutions in the targeted stakeholder questionnaire.

  The list could include some of the exceptions already stated in the 2010 Recommendation as examples, namely *if the value of the banknote tendered is disproportionate compared to the value of the amount to be settled* and *if a retailer has no change available*. As for the latter, given that there is the aforementioned risk that *no change available* could lead to a situation in which retailers will not make an effort to ensure sufficient change, it would need to be further specified. Therefore, the exception could be further specified to include *'in exceptional cases, if the business has no change available at the moment were the cash is tendered in payment, or if there would be not enough change available as a result of that payment for a business to carry out its normal daily business transactions'.*

- **A provision empowering the Commission to adopt by a delegated act additional exceptions of a monetary law nature to the principle of mandatory acceptance**,

[263] https://www.ecb.europa.eu/stats/ecb_surveys/space/shared/pdf/ecb.spacereport202212~783ffdf46e.en.pdf

insofar as they are justified by a public interest objective and proportionate to that aim.;

- **A provision requiring Member States to monitor cash acceptance levels in their territory and the prevalence of unilateral ex ante exclusions of cash and to take measures if acceptance of cash is not ensured.** These cases of non-acceptance erode, without an acceptable justification, the capacity of consumers to pay with cash and compromise the legal tender status of cash.

  Six Member States (FR, ES, IT, EE, LU, SI) report that they already have national provisions penalising refusal of payment with legal tender notes/coins. Unilateral refusal of acceptance can entail breaches of the criminal code (FR, LU), the Euro Introduction Act (SI), consumer protection acts (EE, ES), or the Civil Code (IT) and can in some cases lead to administrative sanctions and fines (ranging from 30 to 120.000 euro). In the targeted stakeholder questionnaire, all 5 responding consumer organisations (e.g. BEUC) and all 4 responding NGOs are of the opinion that there should be a provision for administrative sanctions for cash non-acceptance, which is instead opposed by 12 of 19 responding business associations (e.g. EuroCommerce) and 16 of 29 companies.

  Five Member States (FR, DE, IE, IT and NL) expressed concerns that a prohibition of ex-ante unilateral imposition of exclusion by retailers in physical transactions of payments in euro cash could interfere with national contract law. It could be perceived to have a fundamental rights impact, concerning the right to conduct business, and restricting citizens/parties to a contract and to freely agree on a particular payment method. However, this rather concerns those occasions where a citizen/consumer would not be able to freely agree on a payment method, as the method of cash payments has already been excluded unilaterally by the retailer, so these occasions actually preclude parties from entering freely into a contract in the first place.

  These limited private restrictions on payment method by cash could evolve, because of their increasing volume, into structural restrictions or exclusions of cash acceptance. This makes it necessary and proportionate to introduce a requirement on Member States to monitor cash acceptance levels and, if necessary, to take the appropriate measures to ensure that the fundamental legal tender principle of mandatory acceptance is not undermined by widespread cash non-acceptance levels through the unilateral and ex ante exclusion of cash by enterprises..

As the above matters relate to the scope, effects and exceptions to the key principles of legal tender which are covered in the jurisprudence of the Court, legislating on these matters would be largely a matter of clarification and codification in the interests of coherence and better law-making, with little margin for policy choice. These aspects are therefore not further assessed.

Content of an EU initiative on the legal tender of cash and access to cash

While the issue of acceptance of cash and its exceptions is covered in the Court jurisprudence, issues concerning problems with access to cash have been raised by Member States and stakeholders and are not covered by the Court ruling. In order for cash to be used as an effective means of payment, access to various cash services should be ensured, in particular cash withdrawals and cash deposits. These services enable cash to circulate between different actors in society. By extension, the willingness and ability of retailers to accept cash is directly linked to the consumers' use of cash as a payment means. This in turn requires consumers to be able to make cash withdrawals from their accounts with the institutions, whilst it is also necessary for retailers to be able to access deposit services in order to convert cash into funds held by institutions. It is through this system of withdrawals and deposits of the institutions that cash is mainly circulating in society. Thus, ensuring the access to cash is a necessary pre-condition for the effectiveness of the legal tender of cash.

If access to cash continues to decline, cash could lose its role as an effective means of payment. As a result, there is a risk that it will not be possible to ensure that everyone in the euro area has access to basic cash services at a reasonable price and distance, in particular for cash withdrawals and daily cash deposits. Such a development could pose serious problems for society at large, as it could lead to exclusion of vulnerable groups with a dependency on cash payments, as well as to the erosion and gradual loss of the status of cash as meaningful and effective legal tender, but also as a possible contingency payment method in crisis situations. Moreover, it should be noted that cash is seen by many as a payment method with social benefits, providing a clear overview of expenses, with high degrees of ease of use, speed, safety and anonymity. Indeed, surveys also show that a majority of citizens in the euro area would still like to have the option to pay with cash, even if some of them report that they have a preference for digital means of payment in most cases.

The heterogeneous reality of cash access on the ground also seems to result in a divided opinion on whether EU-level action on access is warranted. Nine Member States (AT, CY ES, FR, FI, LV, LT, SK, PT) affirm that EU-level action to protect access to cash is warranted, IE is not opposed to EU action, whilst eight Member States (BE, DE, EE, GR, IT, LU, MT, SI) do not feel EU-level action is warranted yet, with some of them urging caution in the light of important cross-country differences. Yet several Member States do emphasise that while action might not be acutely needed now, this could change as the situation could evolve relatively rapidly in the future. Moreover, the results of the stakeholder consultation confirm wide support for a provision which aims to guarantee the access to cash by a majority of respondents in most stakeholder groups (11 of 19 responding business associations, 21 of 31 companies, all 5 consumer organisations and all 5 NGOs). These respondents considered that adequate availability of cash should be maintained especially for the people who use only cash for payments, and that merchants should not be legally obliged to issue cash to citizens (no default cash back obligation). The majority of responding financial institutions, did not support the suggested provision. In general, their views are that the access to cash should be the responsibility of the Member States.

The discussions with Member States experts in ELTEG III show that the main types of actions needed to address issues with regard to access to cash concern requirements for

banks, recommendations for non-banks and monitoring of ATM coverage. These actions could in principle be addressed in one of two ways, as set out below.

Option 1(b-c)i: A soft law instrument (e.g. a Commission Recommendation)

Option 1(b-c)ii: A legally binding obligation on Member States in the proposed Regulation on legal tender of cash to be implemented by Member States

As explained in the analysis of the impacts of the above options in chapter 6 of the Impact Assessment, option 1(b-c)ii forms the preferred option, both in terms of effectiveness and legal coherence. The proposed Regulation would provide for a legally binding obligation on Member States to ensure sufficient and effective access to cash To comply with this obligation, Member States would be required to designate one or more competent national authorities with oversight and regulatory powers over the market activities of the cash industry, which could be an existing authority such as the national central bank. This duty of the Member States to assign one or more national competent authorities (i.e. the central bank) with oversight and regulatory powers over the market activities of the cash industry (including credit institutions) would be key to ensure an effective and sustainable system. This would give these institutions the authority to set up information duties, guiding principles and codes of practice as well as to eventually require or prohibit certain actions taken by cash providers in order to guarantee sufficient access to cash if deemed necessary.

In order to assess whether access to cash is ensured, these designated national competent authorities would be obligated to monitor access to cash on the basis of a set of common indicators. To this end, the Commission would be able to adopt an implementing act in order to specify a set of common indicators, which will allow the Member States to assess the access to cash in their territory and in all their different regions and urban areas. Indeed, this would respond to the concern raised by some stakeholders[264], that there is a need for more detailed measurement indicators that can more accurately and granularly measure the cash access situation on the ground. The standard measurement of the number ATM's per x people or x km2 does not always fully and sufficiently highlight potential access problems as there are many other factors that affect access, such as withdrawal/deposit fees, the existence of different networks with different access modalities for customers, urban-rural and socio-economic variations, and access difficulties for certain population groups.[265] Therefore, the Commission and Member State authorities should cooperate and aim to define the appropriate common indicators taking into account the various national and regional modalities of the ATM/cash service point network, to be able to measure and monitor overall cash access on the ground more accurately. Thereby it would allow the Member States to then define the appropriate measures to guarantee sufficient and effective cash access. These indicators would also allow them to assess the vulnerability of access to cash and the robustness of the current network of bank branches and ATMs in order to anticipate which measures might need to be taken in the future.

[264] This concern was raised by several stakeholders in the context of ELTEG, as well as by one consumer organisation.
[265] See ''Guaranteeing freedom of payment choice: access to cash in the euro area'', Alejandro Zamora-Pérez, Published as part of the ECB Economic Bulletin, Issue 5/2022.

The Member States would have to notify the results of their monitoring and analysis of the situation as regards access to cash in an annual report to be addressed to the Commission and the European Central Bank. This report should assess whether there is sufficient and effective access to cash throughout the national territory and in all regions and urban areas, giving grounds and objective data for its assessment. If a Member State concludes that access to cash is sufficient and effective, it would not be required to take action. Conversely, if a Member State concludes that access to cash is not sufficient and effective in all or part of its territory, or is at risk of deteriorating in the absence of action, appropriate measures, to be specified by the Member State, would have to be taken to remedy the situation. These measures could include the setting of geographic access requirements on credit institutions to maintain cash services at a sufficient number of their branch offices where they conduct business, or through an appointed agent for online only credit institutions, and/or maintain a sufficient density of ATMs where they conduct business taking into account a good geographic spread in relation to population.[266] Member States could also designate those cash providers that would be within the scope of the aforementioned cash access requirements (such as the requirement to continue providing adequate access to deposit and withdrawal facilities), so that the requirements can be targeted at the largest and most spread out payment account providers and can be proportionately applied. In addition, recommendations could be issued for those cash service providers that would not fall within the cash access requirements (i.e. independent ATM operators and retailers that provide cash-back services), encouraging these actors to complement the cash services of banks. Further, post offices have traditionally had an important role when ensuring access to cash through its branch network enshrined in the national law in several Member States. This role may be strengthened by the Member States concerned, following their assessment of adequate number of cash access points. As the ELTEG III final report notes, solutions such as cash-back and cash-in-shop services need to be considered to provide for a comprehensive provision of cash services. These solutions, however, do not relieve banks from their social role to provide adequate cash services to citizens and business customers, with the needed geographical coverage. The provision of cash services by merchants and other non-banking entities would remain voluntary, based on their own business decisions and profit models. These other channels for cash withdrawals and deposits outside the banking sector are mainly to be seen as making access to cash more convenient and easier for consumers. Other measures could include a regulation of fees, if necessary.[267]

Finally, the proposed Regulation could provide that if Member States deem necessary to adopt remedial measures such as those indicated above in order to ensure sufficient and effective access to cash, they should notify them to the Commission and ECB on an annual basis, before they are adopted. Then, the Commission would examine the annual reports in close consultation with the European Central Bank. The Commission and the European Central Bank would have the possibility to review these measures, to make sure that they

[266] See also ‘’Guaranteeing freedom of payment choice: access to cash in the euro area’’, Alejandro Zamora-Pérez, Published as part of the ECB Economic Bulletin, Issue 5/2022.
[267] See ‘’Guaranteeing freedom of payment choice: access to cash in the euro area’’, Alejandro Zamora-Pérez, Published as part of the ECB Economic Bulletin, Issue 5/2022.

correspond to the basic requirement of ensuring access to euro cash and respect the effectiveness of its legal tender and -if needed- to provide comments, and also to take stock of the measures in place on an EU-wide level. If the measures proposed by a Member State appear insufficient, or if the Commission considers that access to cash in a Member State is not sufficient in spite of the findings of the annual report, the Commission would be able to adopt implementing acts providing for adequate and proportionate measures that need to be adopted by the Member State concerned.

Conclusion

In light of the above, given the EU's exclusive competence for monetary law and in the interests of legal certainty and better law-making, the Commission should bring forward a proposal for a regulation based on Article 133 TFEU to regulate the scope and effects of, and access to, the legal tender of euro cash, to ensure coherence with the preferred option to regulate the legal tender status for the digital euro. The legal tender of euro cash proposal should be made by the Commission at the same time so that it can be considered by the co-legislators in parallel. Moreover, the level of detail provided in the regulation of the legal tender status of the digital euro and euro cash should aim to be broadly consistent and coherent with another. The Regulations do not need to be identical, since the concrete implementation of the key principles of legal tender can differ for physical and digital forms of money (e.g., the availability of change is not applicable in a digital context), but a level of parallelism is preferable for the sake of clarity and consistency.

Annex 8 - Payments in web 3.0 and industry 4.0; the need for "conditional payments"; stable coins

1 The next stage in the development of the internet

This Annex offers an overview of the key steps in the historical unfolding of the World Wide Web, leading to web 3, insights on future trends like the "Internet of Senses", as well as on the related payments need of industrial ecosystem transitioning towards a tokenised economy. Such needs could be fulfilled in several ways, and public money such as CBDCs could play a pioneering role in providing use cases catering for the emerging needs of citizens and businesses.

Technology-enabled changes drive profound changes in our economy, society and daily lives. Applications of emerging technologies such as artificial intelligence and machine learning, big data, data automation and robotics are driving competitiveness and productivity, allowing for the provision of goods and services which seemed unimaginable just a decade ago. The online behaviour of users has also been revolutionised accordingly, entailing new user needs in the online economy, particularly in terms of payments solutions.

The digital transition entails transformations in the way in which the World Wide Web itself is organised. The evolution of the internet has been labelled according to the functionalities offered online, the products and services marketed with the underlying business models, and the way users interact with each other. Experts have classified the evolution of the internet into successive phases, or waves, as presented in the illustration in Figure 1.

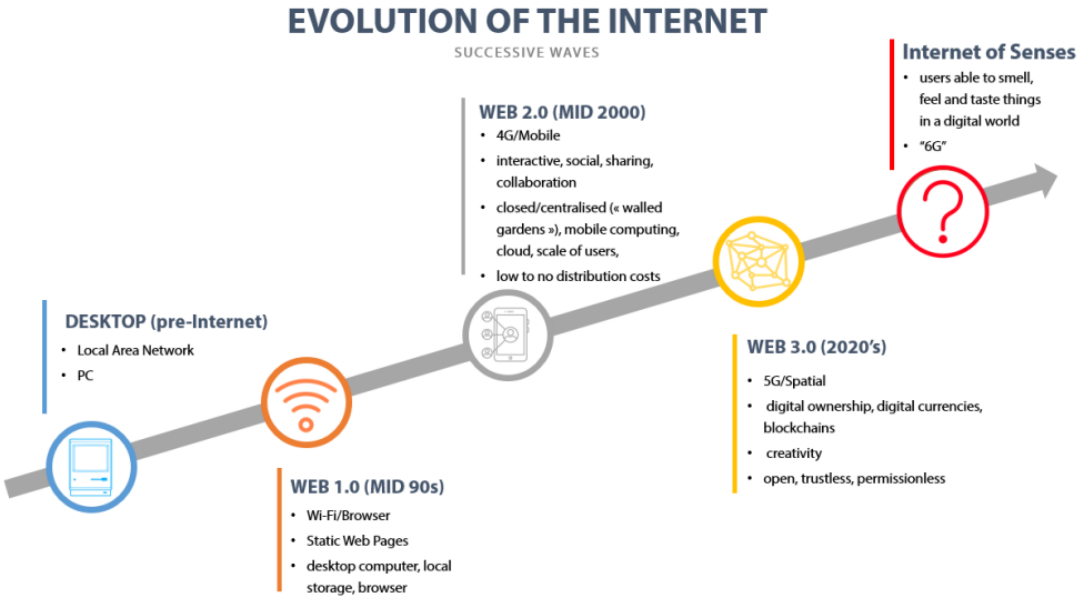


Figure 1 – Evolution of the internet

Source: ART – Analysis and research team, Council of the EU, March 2022

The first step of World Wide Web evolution was represented by web 1 from the early 90s, consisting mainly of static web pages and local storage, which could be reached and consulted by typing in the page URL or through a browser and search engine. After more than a decade, in the mid-2000s, the evolutions of web 2 unfolded, made of interactive pages

embedded in mobile computing and cloud, which tiered down distribution costs allowing global sharing of user-generated contents. Such transition entailed a paradigm shift towards an enhanced participatory culture, with the modelling of social networking and virtual communities. However, the access to online content, and the data harvesting linked to the transaction remained often controlled by or through centralised intermediaries/platforms.

The 2020s are widely considered as a turning point in the evolution of the internet, with the emergence of web 3, which uses a stack of technologies, for example based on decentralized blockchains that enable new business and social models. Web 3 consists of a new trust model in exchanges among users, for it enables peer-to-peer interactions transferring value without centralized platforms and intermediaries. It is a transition to more decentralised internet, in connection with the decentralisation of data storage (edge computing, increase of data), where participants in the web have a greater degree of power and control over their interactions[268]. Users own their data, identity, content and algorithms and participate as "shareholders" in this new economic model by owning digital assets.

Looking ahead at the next decades, experts look at the evolutions of the newly established web 3 paradigm, imagining a future internet enabled by new technologies like 6G, building on technical advancements such as 3D videos in the form of virtual reality. Visual, audio, haptic, and other technologies allow human beings to have digital sensory experiences similar to the ones we experience in the physical world. It is the "Internet of Senses" or "Internet of Touch", constituted of multisensory experiences transmitted over future network, delivering virtual experiences which are almost inseparable from reality. Some companies claim they have started work on a next generation of an immersive internet made of multisensorial digital experiences[269].

2 Immersive experiences in the Metaverse

In connection with the paradigm shift represented by the "Internet of Senses" announced in connection with 6G technology, the public debate is characterised by an emphasis on the so-called "Metaverse": the space where virtual and physical reality merge. The Metaverse is a digital virtual world, mapping the real world and becoming more and more real, allowing for immersive audio-visual experience. The development of the Metaverse relies on technological developments such as virtual and augmented realities (AR/VE), head-mounted displays (HMDs), blockchain, 5G and 6G, cloud, AI, Internet of Things (IoT), and a continuing increase in computing power. This increase, allowed by next generation of supercomputers, is not only about greater processing volume in terms of operations per second, but it is also about qualitative changes in the way data are processed, with graphics chip developments at the forefront of this accelerated innovation.

The Metaverse is the product of converging trends in a decentralised economy, the expansion of digital social life, rapidly expanding technical capacity and massive investment from key players. The Metaverse has become a new macro-goal of world tech giants. Major tech companies are scaling up their metaverse activities, including through mergers and acquisitions. It has been estimated that by 2026, 25% of the population will spend at least one hour a day in the Metaverse for work, shopping, education, social interaction and entertainment[270]. The word 'Metaverse' is composed of 'meta' (beyond) plus 'universe', a

[268] See Gartner "What is Web3". https://www.gartner.com/en/articles/what-is-web3.
[269] The company Ericcson argues that "the Internet of Senses will transform our digital experiences to fully immersive by making them multisensory". https://www.ericsson.com/en/6g/internet-of-senses
[270] See forecasts from Gartner https://www.gartner.com/en/newsroom/press-releases/2022-02-07-gartner-predicts-25-percent-of-people-will-spend-at-least-one-hour-per-day-in-the-metaverse-by-2026

label “Metaverse” being increasingly used by various companies trying to reap the opportunities of this evolution, such as Microsoft or Walmart in their initiatives[271], or such as Facebook which rebranded to Meta[272]. The Metaverse could become the next generation of the Internet over the next 20 years, involving new immersive forms of entertainment, social interaction, playing games, and holding business meetings. The current consensus is that the Metaverse requires six supporting technologies, including network and computing technologies, AI technologies, and blockchain technologies with their underlying architecture, to which we will dedicate the next sections of the Annex.

In the Metaverse, users share a collective virtual shared space, created by the convergence of virtually enhanced physical and digital reality[273]. People would interact by means of an avatar to carry out a wide range of activities, from leisure and gaming to professional and commercial interactions, financial transaction or event health consultation and interventions. Though the specific characteristics of the Metaverse are difficult to predict, its core attributes can be identified as in the visual in Figure 2.

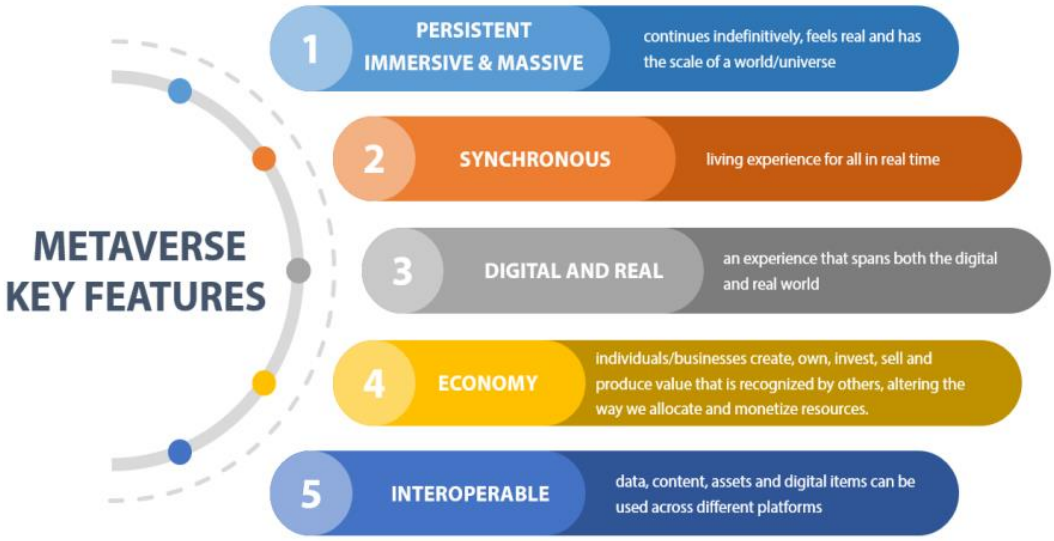


Figure 2 – Core attributes of the Metaverse.

Source: ART – Analysis and research team, Council of the EU, March 2022

The impact of these developments is difficult to predict and probably is not limited to the virtual world, but could also affect employment, education, healthcare, economic development as well as political influence in the real world. Recent research papers were issued by the Research Service of the European Parliament[274] and by the Research Team of the Council[275] to provide an overview of the main characteristics of the Metaverse, as well as the key policy risks stemming from it.

[271] https://www.cnbc.com/2022/01/16/walmart-is-quietly-preparing-to-enter-the-metaverse.html
[272] https://about.fb.com/news/2021/10/facebook-company-is-now-meta/
[273] Gartner https://www.gartner.com/en/newsroom/press-releases/2022-02-07-gartner-predicts-25-percent-of-people-will-spend-at-least-one-hour-per-day-in-the-metaverse-by-2026
[274] Metaverse: opportunities, risks and policy implications, ERPS – European Parliament Research Service, June 2022. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733557/EPRS_BRI(2022)733557_EN.pdf
[275] Metaverse: – virtual world, real challenges, ART – Analysis and research team (General Secretariat of the Council of the EU), March 2022. https://www.consilium.europa.eu/media/54987/metaverse-paper-9-march-2022.pdf

The metaverse will impact every business that consumers interact with every day. Enabled by virtual reality (VR) and accessed with VR headsets or similar devices, the Metaverse is persistent, providing enhanced immersive experiences. The Metaverse is expected to constitute a virtual economy enabled by digital currencies and non-fungible tokens (NFTs): businesses will revert to such instruments to commercialise experiences as unique digital assets. Consequently, the Metaverse will require new forms of frictionless payment tools to allow users to consume such immersive audiovisual experiences.

Audiovisual experiences are intensifying only if they are scarce. To satisfy users' needs in that context, means of payments need to be blockchain-native, or interoperable with blockchain. As will be set out hereunder, these technologies enable businesses to distribute content in a digital format that is unique. Audiovisual content that is unique has an intrinsic value that can be marketed. And to market this audiovisual content in the Metaverse, that content must be paid in a form that is frictionless. It is in this context that the important policy question arises whether public money or only forms of private money should become a means of payment in the Metaverse. This has implications both for market stability and privacy.

We have examined the developments of internet and the emerging needs in the Metaverse, which will require new forms of payments offering frictionless functions through payments means that allow for scarcity. We now move to analyse payments need from and industry perspective, with a focus on conditional payments and smart contracts.

3 Industrial ecosystems towards a tokenised economy

The transition to a digital economy in the European Union evolves jointly with the development of industry 4.0, which conceptualises the rapid transformation of industrial ecosystems based on the advanced application and integration of information and communication technologies in product life cycles (design, manufacturing, operation and service). The objective is to digitally connect all elements in and around manufacturing operations as well as the services needed for them, including suppliers, the plant, distributors, and even the product itself. Bringing digital and physical systems together provides highly integrated value chains with emphasis on interconnectivity, automation, machine learning, and real-time data.

Enhanced interoperability between different technologies and convergence between the Internet of Things (IoT) and value systems is an enabler for innovative, competitive and integrative business models for companies of all sizes, including SMEs. Specifically regarding finance, digitalisation offers innovative payment solutions by means of transaction through smart devices or wearables, triggered e.g. by biometrics and voice commands. It also enables investors, including retail investors, to provide finance to entrepreneurs more flexibly and faster by better matching supply and demand for capital based on crypto-assets.

Industry 4.0 will unleash its full potential with the rise of a machine-to-machine (M2M) economy, where machines and sensors autonomously transfer data and lead production processes without human interaction based on digital infrastructures and smart contracts. The increased automation of payments processes improves efficiency while reducing human error and lowering operational risk. In particular, M2M payments introduce automated actions performed entirely between machines. This creates new business models and use cases, which go much beyond increases in productivity or cost savings. For example, autonomous vehicles, such as cars or trucks, or other industrial machines could pay for their own energy, maintenance and insurance and accept payments for their services. Moreover, automated M2M transactions are a major step to generate real-life data insights. Pay-per-use business

models will make short-term rental of capital-intensive goods profitable and thus help optimise the use of the capital stock in the EU.

The increased digitalisation of sectors such as manufacturing and energy through IoT applications brings opportunities for machines paying for goods and services under instructions by their owners. Machines will be enabled to execute routine payment transactions themselves, without seeking human intervention each time a payment is made. Autonomous electric cars will be enabled to rent out battery capacity to grid operators for storing overflow electricity in power grids at times of overproduction (solar / wind). They will also be enabled to source electricity from the cheapest renewable provider when docking to general-purpose loading stations. Manufacturing machines will be enabled to detect malfunctioning and act on it, e.g. by ordering their own spare parts. Algorithms in supply chains can be enabled to transfer micropayments for renting sensors or to insure cargo by the mile driven.

The EU will therefore need payment solutions that give industry high flexibility for programming use case-specific payment logic. From a conceptual perspective, there are consistent requirements for digital value transfer solutions in order to reap the benefits these opportunities offer. Industrial ecosystems and their industry 4.0/M2M use cases depend on solutions that have four main characteristics:

1. They must allow for micropayments, i.e. the possibility to pay in fractions of a cent;
2. The speed in which transfers of value are executed and finalised must be maximised, with virtually zero delays to allow for immediate settlement;
3. The safety and integrity of value transfers must be optimised, with no exposure to systemic risk inherent in centralistic structures; and
4. Machines, autonomous organisations etc. need to possess digital identities as a basis for digital wallet-based autonomous transactions.

Conditional payments would address all four requirements in a consistent manner.

4Conditional payments

The evolving needs in industry 4.0 and in web 3 may necessitate changes in the current payments landscape and require both new innovative payment means and payment infrastructures, which are challenged in their core structures and business models. In particular, the cash flow associated with digital settlements will need to reflect the emerging innovation trends and as such it should be synchronised with flows of services. One innovation that can play a significant role in the future of the digital economy is the combined use of smart contracts and Distributed Ledgers. Together, these technologies allow for new advanced forms of digital money enabled by software, which the user can program to follow an inherent logic for a predefined purpose, based on the attributes of the digital money itself: in short, “conditional payments”. Conditional payments are transfers of money for which conditions are specified in advance, and not set ad hoc during the payment process. The general requirements for conditional payments are interoperability, ability to innovate, and mitigation of cyber risks and data protection.

Decentralised Ledger Technologies (DLT) are technologies with distributed forms of governance that serve the maintenance of electronic ledgers without a central entity that verifies payment claims. Since 2014, these technologies also combine, in different forms, software that serves the automated execution of payment transactions, so-called “smart contracts”: computer programs operating on DLT. Their execution automatically binds two or more parties based on previously determined parameters. The term “contracts” is not to be

understood in a legal sense. While "smart contracts" may under specific conditions meet the civil law requirements of a contract between two parties, which is often not the case. In many instances smart contracts simply execute arrangements that two parties have concluded previously. For more information, see the definition of "smart contract" provided in Annex 5 "Technical glossary".

Research on "executable contracts" can be traced back to the mid-80s[276] and early 90s[277]. In 1997[278], the term "smart contract" was used to refer to contract that can be converted into computer code and executed. The decisive step in the evolution of smart contract happened only in 2008, after the publication of the Bitcoin paper by Satoshi Nakamoto,[279] and the Etherium white paper in 2014.[280] The term "smart contract" took off when Vitalik Buterin extensively used the term in order to show the advantages of Ethereum. After that the term has became well known.

The traditional centralised approach to payment verification, based on contributors and users interacting via business platforms, can be complemented by an alternative approach based on the distributed solution that Distributed Ledgers and smart contracts jointly offer, where contributors and users interact within "thing to thing networks"[281]. The core function of smart contracts using blockchain as platform is to capture contractual agreements as soon as the predefined conditions are fulfilled[282]. Blockchain is instrumental for the execution of smart contracts since it is a distributer ledger that is able to efficiently record transaction in a permanent way (resistant to modifications of data). Through blockchain, the contractual agreement agreed by both parties is able to take place independently and without human intervention. In summary, smart contracts using blockchain are characterises by self-execution, immutability, and digital performance[283]. The advantages of smart contracts are increased speed and safety, traceability, as well as reduction of costs and operational risks.

Traditional payment technologies can also enable the "programmability" of payments. These solutions rely on Application Programming Interfaces (APIs) which connect software to a centrally controlled database. Such solutions enable programmability through an API layer on top of some combination of underlying technology. In fintech payment solutions such as Paypal, for instance, customers are using an interface of Paypal that allows of P2P payments between individuals, Paypal authorises the transaction after verifying the credentials of a payer and then connects through an API to the payer's bank account or credit card account. Beyond a fair amount of flexibility, benefits of APIs include established design patterns and general familiarity among system developers, which may not be the case with newer technologies associated with DLT[284]. However, because the API is an abstraction of the system that it provides an interface for, DLT could in fact be used behind an API as well. The use of traditional payment infrastructures for payment automation has a fundamental

[276] See N. H. Minsky and A. D. Lockman, "Ensuring integrity by adding obligations to privileges," in Proc. 8th Int'l Conf. on Software Engineering, 1985, pp. 92–102.
[277] See L. F. Marshall, "Representing management policy using contract objects," in Proc. IEEE First Int'l Workshop on Systems Management, 1993, pp. 27–30.
[278] N. Szabo, "Smart contracts: Formalizing and securing relationships on public networks," First Monday, vol. 2, no. 9, Sep. 1997.
[279] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," http://nakamotoinstitute.org/bitcoin/.
[280] https://ethereum.org/en/whitepaper/
[281] See C. Molina-Jimenez, E. Solaiman, I. Sfyrakis, I. Ng, J. Crowcroft, On and Off-Blockchain Enforcement of Smart Contracts, in Euro-Par 2018 International Workshops, Turin, 2018, pp. 342-354.
[282] See E. Karen, C. Levy, "Book-smart, not street-smart: blockchain-based smart contracts and the social workings of law, Engaging Science, Technology, and Society, 2017.
[283] See G. Dobrauz-Saldapenna and M. A. Schrackmann, "Economics of smart contracts: efficiency and legal challenges", in Disintermediation economics: the impact of blockchain on markets and policies, Palgrave Macmillan, 2021, pp. 33-45.
[284] See FEDS Notes – Board of Governors of the Federal Reserve System, What is programmable money?, June 2021.

downside. Namely, the payments leg and the settlement leg of a transaction remain separated. For example, payer A initiates a payment by sending an order to Paypal to transfer funds to payee B. That order is not directly settled on the bank account of either payer A or payee B. rather, Paypal as middleman stands in between A and B as intermediation platform and absorbs a settlement risk. If the payer's credit card company cannot honour the payment, (e.g.: upon verification payer A exceeded a credit limit), Paypal incurs a loss after transferring funds to payee B. For bearing such a risk and for handling transactions with two banks of A and B, Paypal earns a fee.

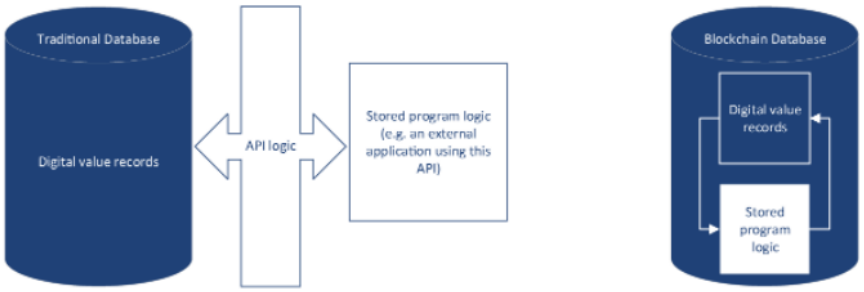
In industry 4.0 and web 3 applications, this intermediated payment solution is unsatisfying. Distributed Ledger and smart contracts allow companies to create digital twins for machines, robots, intellectual property rights. This process, also referred to as the "tokenisation of assets", leads to the creation of a fungible or non-fungible token that owners can transfer or rent, entirely or in part, to others. Tokenization is the process of converting rights – or a unit of asset ownership – into a digital token on a blockchain. Key benefits of tokenization include increased liquidity, faster settlement, lower costs and bolstered risk management. One example for this trend can be found in capital markets where basic types of securities are being tokenised to facilitate their issuance and remittance.

Significant efficiencies can be reaped if not only the asset (security, a machine, an intellectual property right) but also the payment instrument (a digital euro) are "tokenised". In this hypothesis, it would no longer be necessary to rely on a middleman like Paypal to act as intermediary between payer and payee[285]. Then, it would be possible to program a "smart contract" to release in the same second the digital ("tokenised") payment instrument as ownership over the ("tokenised") digital asset is being transferred. This "automatic swap" of tokenised asset against tokenised payment instrument would help payer A and payer B to save the intermediation fee of the middleman and eliminate counterparty risks involved in the traditional staggered approach.

Importantly, this can only work if both payer A and payee B have certainty that the "smart contract" will actually release tokenised asset against tokenised payment instrument. The terms of the transfer must be guaranteed such that none of the two parties could unilaterally alter them after A and B have agreed on the transfer. This "immutability" of the agreement can be achieved by recording the "smart contract" into a Distributed Ledger. That integration creates a cryptographic guarantee which none of the two parties can break on its own. The contract remains immutable, unless – hypothetically – one of the parties were able to convince a majority consensus of all server operators maintaining the distributed network to change, retrospectively, the smart contract in a block of the Distributed Ledger. This embedding of the code into a DLT is illustrated in the figure below.

[285] The absence of a middleman is also one of the key characteristics of the set of transformation in the world wide web known as web 3. See Annex 8 on the evolution of the internet and payment needs of industry 4.0.

Figure 1. Simplified visualizations of a traditional database using an API for programmability, and a programmable blockchain



A traditional database connected to an API that exposes basic programmable logic (left) enables stored program logic in the form of applications to interact with database records. A blockchain database (right) can store both value records and program logic in the same database, with some intrinsic mechanism enabling interaction between the two.

Source: FEDS Notes – Board of Governors of the Federal Reserve System, What is conditional money? June 2021.

It is important to highlight that "conditional payments" can be configured in different ways, for there are different approaches to implement smart contracts ranging from centralised to decentralised. Research has shown the advantages and disadvantages of these approaches, indicating the benefits of hybrid solutions, which combine the centralised and decentralised approaches[286]. Centralised and decentralised (or distributed) approaches to smart contracts can be distinguished depending on the number of instances (copies) of the smart contract employed to monitor and enforce the contract. A centralised approach involves, for example, a centralised application that uses a single instance of the smart contract, relying on a single node provided by a trusted third party. Centralised approaches are relatively simpler, but they entail disadvantages as they display a single point of failure and they presuppose the trust in a trusted third party. Conversely, decentralised approaches rely on a set of untrusted nodes that are used to run several identical instances of the smart contract. Though decentralised approaches do not need a node by a trusted third party, they need to run a consensus protocol to verify that a given operation has been executed correctly, and to keep the states of the instances identical. In many cases, the decentralised approach is made unsuitable due to excessive cost of the protocol used, in terms of computational, communication and performance degradation costs[287]. Decentralised approached were originally conceived after the 2008 Bitcoin paper by Satoshi Nakamoto, who demonstrated they were possible. Blockchain technologies offer promising features to implementing smart contracts as decentralised. However, there is a large class of applications where blockchain is inadequate

[286] See C. Molina-Jimenez, E. Solaiman, I. Sfyrakis, I. Ng, J. Crowcroft, On and Off-Blockchain Enforcement of Smart Contracts, in Euro-Par 2018 International Workshops, Turin, 2018, pp. 342-354.
[287] *Ibidem.*

due to performance, scalability, and consistency requirements, and also due to language expressiveness and cost issues that are hard to solve[288].

This concept of "conditional payments", nurtured in the decentralised space, could also be considered in realising a Central Bank Digital Currency (CBDC). For instance, Sveriges Riksbank, the Bank of Sweden has taken the decision of issuing e-krona, starting a pilot to test technical functionality already in 2020, and developing phase 2[289] of the project from February 2021 to May 2022. Phase 2 of the project investigated whether and how an e-krona might function off-line, whether the performance of the tested solution is adequate, and how banks and other payment service providers could be integrated into an e-krona network. The e-krona project has now entered phase 3, which includes technical work focused on the area of conditional payments, as announced in the report issued on April 2022[290]. Phase 3 will continue to test specific parts of the technical solution, but also focus on preparing the vision and requirements for an issuable e-krona. It will explore how conditional solutions can be used to create new payment services, and how they would be more effective than traditional technologies. Bank of Sweden aims at allowing for market participants to create innovation without the central bank as issuer of the e-krona to be directly involved.

5Private vs public solutions

In the previous section, a comparison has been conducted between traditional payment solutions building on APIs and innovative solutions based on DLT/smart contracts. Both solutions – traditional and innovative – can be developed by the private sector, or the public sector, or a combination of the two. Some commentators have highlighted that public-private collaboration is arguably the most advantageous way to reap the benefit of conditional payments[291]. The current section analyses the key characteristics of private and public solutions, including advantages and disadvantages, describing different governance structures to achieve conditional payments functions.

Traditional solutions are based on conventional settlements using existing payment instruments, such as direct debit, credit transfer or instant payment, which require payers and payees to be known to each other and addressable via IBAN. They allow for simple programmability requirements to be met, as they only require timely execution without having to meet complex conditions. Innovative solutions include conditional payments such as M2M, payments on the internet of things, pay-per-use payments, or trigger solutions, paving the way for the integration of the settlement of smart contract-based transactions.

Conditional payments can be developed relying on different approaches and technologies, so to achieve an innovation ecosystem in support of industry 4.0. Depending on the need, such approaches can consist of private sector-led solutions, such as (i) the use of conventional payment systems in combination with DLT/Smart contracts using a "trigger"; or (ii) stablecoins issued by private issuers; (iii) tokenised commercial bank money. Or, alternatively, the public sector can drive developments, in the case of (iv) central bank digital currencies, including the digital euro. Therefore, conditional payments can be achieved either by private or public solutions.

[288] *Ibidem.*
[289] E-krona report phase 2 (riksbank.se).
[290] E-krona report phase 2 (riksbank.se).
[291] See D. A. Disparte, "Privately issued digital currencies", in Disintermediation economics: the impact of blockchain on markets and policies, Palgrave Macmillan, pp. 173-191.

Conventional payment systems can be combined with DLT-based applications such as smart contracts, by means of a "trigger": a technological bridge that acts as a contract execution system. The trigger enables the DLT application to initiate a payment in the conventional payment system by passing on the required information. Conditional payments would take place outside the payment infrastructure but rely on web-based APIs, which in turn would trigger a payment on an account-based system. Unlike other types of conditional payment, the "trigger" solution does not require tokenised monetary units that can be used within the DLT environment. Depending on the use case, conventional payment systems in combination with DLT/smart contracts can be developed by the private sector, or by a close cooperation with the public sector. For example, in March 2021, Deutsche Börse, Deutsche Bundesbank and Germany's Finance Agency developed and successfully tested a settlement interface for electronic securities[292], in cooperation with a range of other market participants. Their proof of concept demonstrated that a bridge between DLT technology and conventional payment systems can be established, so to settle securities in central bank money with no need to create a central bank digital currency.[293] The proof of concept for securities trading did not, however, involve a use case for retail payments.

A different approach to achieve programmability consists of stabilised cryptocurrencies – known as stablecoins – not issued by a central bank but developed and distributed by private organisations and entities with substantial network effects. Stablecoins constitute blockchain-native units of account, and they are caught the interest of the market as a tool for cheaper cross-border payments offering instant access to a wide array of financial products and instant currency conversion. They particularly hold potential to be used in innovative payments (e.g. M2M payments). Aiming at enhancing liquidity across decentralised finance exchanges, and at simplifying settlements in the crypto ecosystem, stablecoins claim to address the volatility of price typical of crypto-assets through a peg to an official currency, backed by liquid asset reserves. However, as shown in Annex 8 "The evolution of the internet and payment needs of industry 4.0", stablecoins present significant concerns for financial stability. Due to the limited ability of private entities to issue stablecoins and ensure liquidity, in comparison to central banks' capacity, the emergence of stablecoins can hardly be compared to the potential stability gains that can be achieved with a public money alternative.

Another approach for programmability is offered by tokenised commercial bank money. Commercial banks as private entities can issue tokens that can be used for smart contract transactions. Tokens are conditional digital right on either a physical or digital asset recorded on a decentralized ledger which can be directly possessed, owned and transferred without using an intermediary[294]. Tokenization can act as a game changer for the European economy by enabling the adaption of new technologies, digitization of business processes and creation of new business models. Commercial bank money solutions could contribute to the creation of an ecosystem with a high share of digital transactions based on tokens, or on several open transaction systems for the storage and transfer of tokens. The benefits for using commercial bank tokens include access to and alternative solution for document-based payments, as commercial bank money introduces functionally actionable money amounts using smart contracts. Furthermore, commercial bank money can reduce transaction costs and accelerated value date in cross-currency payment transactions.

[292] Securities settlement using DLT is performed with the aid of a "trigger" solution and a transaction coordinator in TARGET2, the Eurosystem's large-value payment system. https://www.bundesbank.de/en/press/press-releases/dlt-based-securities-settlement-in-central-bank-money-successfully-tested-861444.
[293] DLT-based securities settlement_Blockbaster IV (deutsche-finanzagentur.de).
[294] Roland Berger, Tokenize Europe 2025.

Such benefits of tokenised commercial bank money also apply to CBDCs, digital representations of fiat currency which offer a liability of the central bank in the same way as physical currency. Depending on its technological infrastructure and availability, a CBDC, and in particular the Digital euro, can accommodate for trends that will define the future of payments and finance.

As opposed to central bank issued money, private solutions (i) will carry credit risk, (ii) are prone for concentration and less competition due to the existence of network effects, (iii) are thus more susceptible to large-scale operational failures and (iv) are not fully inclusive (i.e. no commercial interest for serving most vulnerable people).

6 The role of stablecoins

The rising role of non-cash payments and the quick adoption at a global level of private solutions for crypto-assets and stablecoins reveal a growing demand for immediacy and digitalisation. In the context of the digital euro, the question therefore arises, whether existing forms of public money in the form of banknotes and coins alone can satisfy that demand or whether it should be left to private forms of digital money to address it.

The Bank for International Settlement (BIS) set out in a working paper of 2020[295] that so-called *stablecoins* represent an opportunity but also a risk to monetary policy. On the one hand, this form of private money has the potential to grow in importance almost like traditional fiat currencies and become a regular means of tender in commerce. Issued by private parties, the number of stablecoins in circulation is not under direct central bank control. On the other hand, contrary to fiat money, stablecoins offer opportunities for regulatory oversight, too. They are a form of software, which is conducive to "embedded regulation"[296].

A point of attention is that stablecoins with the most significant capitalisation are pegged to the USD, and not to the Euro. These stablecoins represent a form of private digital money that can *dollarise* e-commerce outside the USA, too. USD pegged stablecoins include, for instance, USD Tether, USD Coin, Binance USD or DAI. Collectively they have achieved a global market capitalisation (issuance value) exceeding $175 billion, and a global monthly trading and transaction volume regularly approaching or even exceeding $ 500 billion. More recently, thought, US company circle issued a stablecoin called the Euro Coin or Euro-C which is said to be redeemable 1:1 for Euros in bank accounts. [297]

Stablecoins may pose specific challenges to financial stability and monetary sovereignty[298]. As stated by ECB's Executive Board Member Fabio Panetta: "By creating further dependencies on non-European providers, it could increase risks to Europe's strategic autonomy and threaten monetary sovereignty if central bank money is no longer at the heart of the payment system."[299] This consideration is among those which the European Central Bank highlights in the context of a digital euro project. As concluded by the European Central bank's Fabio Panetta, "If the "official sector" – central banks and supervised intermediaries – does not satisfy this demand, others will.[300]." A Central Bank Digital

[295] https://www.bis.org/publ/work905.pdf.
[296] https://www.bis.org/publ/work905.pdf.
[297] https://www.circle.com/en/euro-coin.
[298] ECB Crypto-Assets Task Force (2020), "Stablecoins: Implications for monetary policy, financial stability, market infrastructure and payments, and banking supervision in the euro area", Occasional Paper Series, No 247, ECB, September.
[299] Keynote speech by Fabio Panetta, Member of the Executive Board of the ECB, at the National College of Ireland, Dublin, 16 May 2022. https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220516~454821f0e3.en.html.
[300] Keynote speech by Fabio Panetta, Member of the Executive Board of the ECB, at the National College of Ireland, Dublin, 16 May 2022.

Currency not guaranteeing a support to innovative applications would lead a gate open to private money solutions, particularly from third countries. Hence the importance of a digital euro for the competitiveness of the EU businesses and the safety of EU citizens.

BOX: Concrete emerging use cases that could be supported by a digital euro

Enabling M2M Payments: Machines with IoT sensors can be enabled through algorithms to pay for products or services (e.g.: predictive machine maintenance, cooperative decentralized forms of manufacturing, etc.).

Delivery Based Payment Automation: Programmability of payments with smart contracts and non-fungible tokens can create new opportunities for the commercialization of intellectual property rights. The resale of digital works of art can trigger payments to the artist long time after the artist has sold the work of art to the first buyer. In trade finance, the delivery of a digital letter of credit could trigger automatically the payment for goods with digital money[301] in an escrow account.

Atomic Swaps: Tokenised securities, utilities, certificates and currencies can be exchanged "atomically", which means that each of the steps of the transaction (however complex) is executed simultaneously and indissolubly. When one leg of a transaction is settled on DLT, a cash leg should be executed also on DLT. In general, a digital euro would ease such solutions; in particular, IOSCO principles[302] require that security settlements occur in central bank money. A cash leg of a security transaction on DLT would thus require a DLT-compatible digital euro. Tests are being piloted with success in several large jurisdictions already (e.g. Project Jura), involving non-euro denominated central banks and banks.[303]

Data Pooling: Programmability of a digital euro could support the European Union's Data Strategy as a tool to remunerate data and underpin data transfers on smart contracts. By combining in one go data transfers and software accompanying data with a digital euro, novel use cases for federated machine learning could be enabled and funded.

Combining Payments with Tax Reporting: Programmability of a digital euro could innovate VAT payments and combine it with reporting. A merchant could agree to opt-in to an automated VAT settlement system. The system could be implemented in various ways. Merchants could automate their VAT payments and governments could automate refunds.

[301] Digital money refers to any means of payment that exists in a purely electronic form including but not limited to bank deposits, CBDCs, e-Money, tokenized assets and crypto-assets.

[302] Item 10 of *CPSS-IOSCO Task Force Recommendations for Securities Settlement Systems* (2001).

[303] Although this example is relevant for so called "wholesale" which is outside the scope of the D€, similar techniques could be used for less valuable items.

Annex 9 - International use of a digital euro

1. Description of policy options

Option 4a: Digital euro is available for all EU residents/businesses and third countries' residents/businesses

Under this option, all EU residents, wherever located (in the euro area or in other Member States) and residents in third countries would in principle have access to the digital euro and make payments in digital euro.

For non-euro area EU Member States, the digital euro would be distributed in the context of arrangements between the ECB and the respective central banks. For third countries, the international use of the digital euro might take place in the context of bilateral agreements between the Union and third countries. The distribution of digital euro by intermediaries would take place on a voluntary basis (as there is no legal tender outside the euro area except in the case of SSCs[304], which use the euro).

Option 4b: Digital euro is available for visitors to the euro-area and under conditions for non-euro area Member State residents/businesses and third countries residents/businesses

Under this option, any resident/business from non-euro area jurisdictions would have access to the digital euro under specific conditions aiming at safeguarding the monetary sovereignty of non-euro-area countries and mitigating financial stability risks.

For non-euro area EU Member States, the digital euro would be distributed in the context of arrangements between the ECB and the respective central banks as well. This would include tools to prevent an excessive use of digital euros on financial stability and monetary sovereignty grounds. Non-euro area central banks may for instance further restrict any holding limits that the Eurosystem may apply. Tools should be in place to monitor usage in non-euro area Member States in order to avoid that the digital euro becomes, *de facto*, the predominant currency in a non-euro area Member State, practically replacing the national currency, as this could have a negative impact on the incentives of those Member States to follow the adoption procedure enshrined in Article 140 TFEU.

For third countries, the international use of the digital euro would might take place as well in the context of bilateral agreements between the Union and third countries that would govern the distribution of the digital euro (i.e. supervised entities) and the conditions of their use (i.e. potential holding limits). .

[304] Small Sized Countries (San Marino, Monaco, The Vatican and Andorra) are subject to monetary agreement and use the Euro as legal tender.

Option 4c: Digital euro is available only for visitors to the euro-area

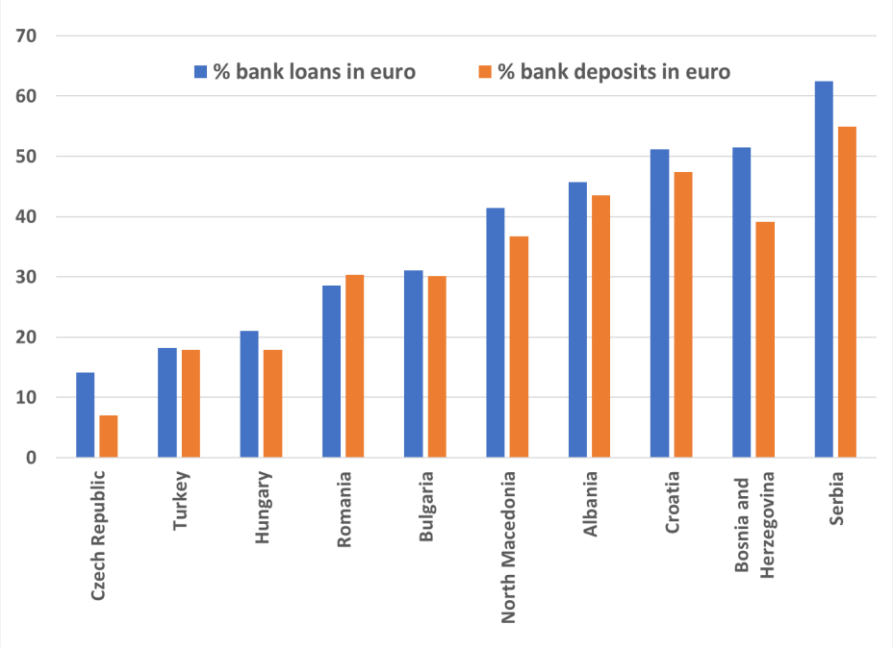
Under this option, the digital euro would only be made available to EU and third-country residents/businesses (e.g. tourists) visiting the euro area. The digital euro would not be available for e.g. trade outside the euro area.

2. Analysis of policy options

Option 4a: Digital euro is available for all EU residents/businesses and third countries' residents/businesses

Option 4a would benefit non-EA residents/businesses and support the euro area economy as a whole by facilitating cross-border payment transactions with non-euro area countries, and as such would mirror the existing use of commercial bank money in euro by non-euro area residents/businesses who may open a bank account in euro in non-euro area Member States or in third countries. Bank deposits and loans in euro already feature predominately in some countries, as illustrated below.

Euroisation of bank deposit and loans

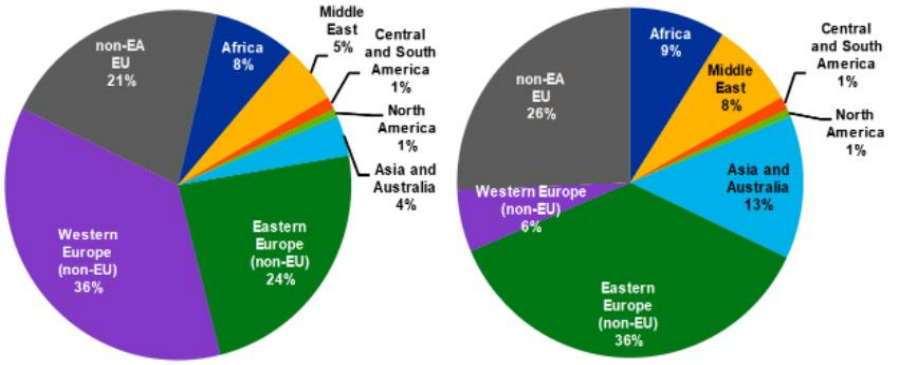


Source: ECB International Role of the Euro report, Statistical Annex

In 2020 euro banknotes were mainly exported to, and imported from, euro area neighbouring regions

Sales (exports, left panel) and purchases (imports, right panel) of euro banknotes to/from regions outside the euro area – breakdown by destination

(percentages)



Source: ECB calculations based on data from international banknote wholesalers.
Note: The data are for 2020.

In addition, a broad international use of the digital euro would be commensurate with the existing use of euro cash outside the euro-area. Euro banknote circulation is growing continuously, even though cash usage is declining.[305]. The significant demand from these regions stems from cross-border transactions, tourism and the search for safe haven assets during periods of economic or political stress.

Benefits include:

- Support of trade. The December 2018 Commission communication "Towards a stronger international role of the euro" identified a number of benefits of an increased international use of the euro. While that communication predated the digital euro project, benefits identified in the Commission communication could be of similar relevance if the digital euro was used internationally[306]. An unconstrained access to digital euro for non-euro area residents could support trade, provided that payment transactions are facilitated notwithstanding the existence of holding limits are fulfilled: by enhancing the euro's role as a reserve currency, which may benefit euro invoicing, by lowering the transaction cost and risks for trade with euro area entities as well as by enabling more efficient and faster cross-border payments compared to the currently dominant correspondent banking-based cross-border transactions. Importantly, an international use of the digital euro would allow EA intermediaries to offer innovative payment services attractive for global players. This may prove particularly important in the context of industry 4.0.
- International use of the digital euro. In many non-euro area countries and especially in the absence of domestic digital currencies, the use of a digital euro could have a

[305] This phenomenon has been referred to as the "paradox of banknotes" (Bailey, 2009) or the "cash paradox" (Williams, 2012; Jiang and Shao, 2020), see Foreign demand for euro banknotes Occasional Paper (ECB, January 2021) for more details. Other European currencies, such as the Swedish krona or the Danish krone, do not show the same pattern.

[306] Lower cost and lower risk of trading internationally for European businesses. This would happen for a decrease in currency conversion costs, assuming that an increased use of euro in trade invoicing will remove the exchange risk and other related costs, especially for small and medium-sized European businesses; stronger autonomy of European consumers and businesses, allowing them to pay or receive payments for their international trade, and finance themselves with reduced exposure to geopolitical risks; Improved resilience of the international financial system and economy, making them less vulnerable to exchange rate shocks.

strong appeal to potential users. This could altogether create a positive feedback loop supporting the digital euro's international use and strengthening its visibility.[307]

- Competitiveness of the digital euro. As emphasized by ECB, in a scenario where China allowed for a general international use of the e-yuan, or if the US decided to launch a CBDC to promote the use of the dollar at the expense of the euro, the issuance of a digital euro outside the euro area could be motivated in part by the need to support the international role of the euro.[308] It is nevertheless too early to assess the need to issue a digital euro on competitiveness ground. Third countries have refrained from promoting a wide use of CBDC[309] outside their own jurisdiction.
- Efficiency of cross-border payments. Benefits may include efficient and cheaper cross-border payments[310], particularly important for countries with a high share of trade with the euro area.

Option 4a would be effective in bringing about a state-of-the-art, efficient payment means for the EU's digitalizing economy (specific objective 1). More generally, people and businesses would be in a position to use it outside the euro-area to support trade. Whether option 4a would make the euro more competitive and support specific objective 2 mainly depends on potential future developments taken by major jurisdictions that have taken so far a cautious approach.

Option 4a carries financial stability, macro-economic and political risks that would make it inefficient in view of the costs that option would entail. They include:

- Financial stability. Option 4a may negatively impact non-EA countries in terms of monetary autonomy and financial stability ("spill-over effects"). As pointed out by the G7 principles for retail CBDC, significant use or holdings of any particular CBDC by residents/businesses of a foreign country could lead to currency substitution and loss of monetary sovereignty in that foreign country. An international use of the digital euro may also bring about bank disintermediation in banks outside the Euro area. According to an IMF working paper[311] the presence of a foreign CBDC which acts as an international safe asset may increase the risk of financial disintermediation in the domestic banking sector, which can be accompanied by higher and more volatile capital flows.
- Risks to the Eurosystem. Digital euroisation could eventually increase demand for euro liquidity lines[312] and increase the likelihood of calls for ECB interventions.
- Negative macro-economic impact of an international use. There are also costs from an increased use of the euro internationally ("exorbitant duty"), meaning that the euro

[307] European Central Bank (2021), The international role of the euro.
[308] Report on a digital euro, ECB, October 2020, scenario 6: "the issuance of CBDCs by major foreign central banks could enhance the status of other international currencies at the expense of the euro. In such a situation, the Eurosystem might consider issuing a digital euro in part to support the international role of the euro, stimulating demand for the euro among foreign investors". In its public consultation on a digital dollar of 20 January 2022, the US Fed clearly outlined the need to preserve the dominant international role of the U.S. dollar in support of a US-issued CBDC.
[309] See PBoC, White Paper Progress of Research & Development of E-CNY in China, July 2021 which noted that "Through technically ready for cross-border use, e-CNY is still designed mainly for domestic retail payments at present", given financial stability and monetary sovereignty issues and ongoing international work on these issues.
[310] Costs of cross-border payments have increased recently due to the retreat of the US-centred correspondence banking system. Though the US dollar is the globally dominant currency in trade invoicing, the euro may be regarded as a regionally dominant currency in Europe and some parts of Africa (See Boz et al. "Patterns in Invoicing Currency in Global Trade", IMF Working Paper 20/126).
[311] https://www.imf.org/en/Publications/WP/Issues/2022/05/06/Cross-Border-Central-Bank-Digital-Currencies-Bank-Runs-and-Capital-Flows-Volatility-517625
[312] See the Special Feature on "The benefits and costs of the international role of the euro at 20" In IRE (2019).

would be subject to appreciation in global stress episodes, with negative impact on trade.[313]

- Technical challenges posed to the digital euro settlement infrastructures. Intermediaries distributing the digital euro outside the Euro-area would have to adapt their systems and infrastructures in order to acquire digital euro payment instruments;
- Supervisory challenges. Intermediaries distributing the digital euro would be supervised intermediaries, which may call for supervisory arrangements with third countries.

More fundamentally, this option has far-reaching implications as this would imply opening a digital euro account/wallet to any non-EU residents/businesses that wants to be part of a digital euro transaction (as payer or payee). It would have direct consequences on the conduct of the monetary policy by the ECB. Preliminary analyses by the ECB indicate that total digital euro holdings between one trillion and one and a half trillion euro (18% of the ECB balance sheet) would avoid negative effects for the financial system and monetary policy[314]. Assuming that euro-denominated bank deposits were converted into digital euro[315], they will represent 3% of the ECB balance sheet. Where demand for digital euro is similar to demand for euro cash abroad, they could amount to 6% of ECB balance sheet[316]. This option would therefore result in significantly lower holding for euro-area residents as the same amount of digital euros provided by the Eurosystem would need to be divided between users from both within and outside the euro area.

The embedding of features into the digital euro wallet to cater for non-euro area users is expected to imply only marginal implementation costs (e.g. for including those features when developing a mobile app). Maintaining those features, and enforcing for instance a specific cap on holdings, is not expected to have any significant impact on running costs. Most of the additional effort will be geared towards setting up the necessary agreements with institutions and intermediaries from non euro area Member States and third countries.

The risks outlined above are commonly identified as spillovers that central banks want to minimise. A wide international use of the digital euro would come up against principle 7 of the G7 Public Policy Principles for retail CBDC[317]. International work is ongoing to further study these effects in the context of the Financial Stability Board[318]. In addition, a wide use of the digital euro in non-euro area Member States potentially raises legal issues if it results in a unilateral "euroisation" that may be deemed incompatible with the Treaty[319].

Moreover, in certain scenarios, respect for data protection includes strict compliance with the rules on international transfers of personal data as set out in the EU data protection framework. In particular, when transferring personal data outside the EU, supervised intermediaries shall comply with the rules on international data transfers set out in Chapter V

[313] See the Special Feature on "The benefits and costs of the international role of the euro at 20" In IRE (2019).
[314] "The digital euro and the evolution of the financial system" Introductory statement by Fabio Panetta, ECON Committee, 15 June 2022
[315] Data of the International Role of the Euro 2022 report on EU neighbouring countries
[316] Data of the ECB occasional paper "Foreign demand for euro banknotes", January 2021. Estimates of foreign demand or euro cash is 30-50% of total euro cash.
[317] "CBDCs should be designed to avoid risks of harm to the international monetary and financial system, including the monetary sovereignty and financial stability of other countries"
[318] Building Block 19 of the G20's roadmap for enhancing cross-border payments, October 2021. As a next step, the CPMI in collaboration with BIS Innovation Hub IMF and World Bank will identify and analyse options for access to and interlinking of CBDCs that could improve cross-border payments
[319] Report by the ECOFIN Council to the European Council in Nice on the exchange rate aspects of enlargement, 8 November 2000: "it should be made clear that any unilateral adoption of the single currency by means of "euroisation" would run counter to the underlying economic reasoning of EMU in the Treaty, which foresees the eventual adoption of the euro as the endpoint of a structured convergence process within a multilateral framework".

GDPR. To the extent Union institutions and bodies are involved in a transfer of personal data to a third country, Chapter V EUDPR shall apply.

Option 4b: Digital euro is available for visitors to the euro-area and under conditions for non-euro area Member State residents/businesses and third countries residents/businesses

Option 4b frames option 4a to mitigate financial stability risks that an exorbitant use of the digital euro may pose in non-euro area Member States or in third countries and to mitigate any adverse effects on the Eurosystem. At the same time it would still allow for some positive effects on trade and cross-border payments, e.g. by lowering the transaction cost and risks of cross-border payments and increasing their speed and efficiency.

The effectiveness of Option 4b in facilitating international trade and in terms of providing state-of-the-art payment will depend on agreements with third countries. This makes the effectiveness of this option more uncertain than option 4a. We can expect that the staggered approach would lead to a staggered impact. Various countries (either Member States or third countries) may conclude an agreement with the ECB at various times and thus the impacts – both benefits and risks – would materialise over different timelines. This option would entail costs (negotiation and implementation of agreement) and has implications in terms of design. Digital euro distribution models would need to embed features that would allow various limits (e.g. cap on holdings) requested by non-euro area countries to cater for financial stability risk and bank disintermediation locally. Similar to option 4a, the embedding of features into the digital euro distribution model to cater for non-euro area users is expected to imply only marginal implementation costs (e.g. for including those features when developing a mobile app). Maintaining those features, and enforcing for instance a specific cap on holdings, is not expected to have any significant impact on running costs. Most of the additional effort will be geared towards setting up the necessary agreements with institutions and intermediaries from third countries.

Option 4b is consistent with the G7 principles that asked for both benefits and risks of an international use of CBDC to be adequately balanced. In that respect, the G7 recommended a cautious approach and further work given the potential implications of an international use, in particular in terms of higher capital flow volatility that may amplify spillovers and cause spillbacks, and in terms of the supply and demand of global reserve assets and the composition of international reserve currencies. By making the international use of the digital euro subject to agreement with third countries, that option will fit in with the ongoing international work at FSB level.

Option 4c: Digital euro is available only for visitors to the euro-area

Under option 4c, international use of a digital euro would not be achieved by allowing access to digital euro to non-euro area residents/businesses. It would nevertheless support inbound tourism in the euro area. Tourists tend to use more cash than residents mostly to reduce their exchange rate fees. They could be therefore more affected i.e. face higher transactions costs when paying abroad than euro area residents by a de facto decline of the availability of cash. Using the digital euro may save them from having to store a large amount of cash. This international use has been supported in other jurisdictions implementing or piloting CBDC [320].

[320] The Sand Dollar issued in Bahamas was officially launched in October 2020 and the authorities grant access only to foreign visitors (tourists) with limitations. A large pilot of the e-yuan was launched during the Winter Olympics in China in February 2022, when foreigners were also allowed to access it. However, the take up by foreigners at that time was small.

Under this option, the digital euro would not be able to facilitate international trade via cross-border digital euro payments. In an extreme adverse scenario, where other foreign-denominated means of payment are instead increasingly used for trade purposes, this could come at the disadvantage of euro area firms engaged in international trade. However, it should be noted that a digital euro that does not allow for international use besides inbound tourism purposes can still facilitate cross-currency payments if it is interoperable with other jurisdictions' CBDCs. However, interoperability cannot be treated as a policy option in the context of this Impact Assessment, also given that this would depend on decisions of other jurisdictions outside of the euro area.

Option 4c will be less effective in promoting a wide usage of digital euro for transactions between euro area residents/businesses and residents and businesses outside the euro-area. This option would not bring about a state-of-the-art, efficient payment means for the EU's digitalizing economy (specific objective 1) as e.g. supply chains outside the euro-area would not be integrated in conditional payments, and more generally people and businesses would not be in a position to use it outside the euro-area to support trade.

In terms of meeting specific objective 2, a limited geographical use of the digital euro under Option 4c would not increase the euro's competitiveness vis-à-vis other currencies, third countries-issued CBDCs and stablecoins that may be used for payments outside the euro-area.

Under this option the Eurosystem would bear the least cost compared to other options in this section. Overall, conditions for providing the digital euro would be the same than for euro area residents, except for some specificities in onboarding conditions and design features such as the expiration date of accounts/wallets opened to visitors to the euro area – which may even be provided without need for prior agreement with third-country institutions and intermediaries.

This option is consistent with the territorial scope of the euro cash, which has legal tender only in the euro-area, but is not consistent with the existing use of bank accounts in euro or with the holding of euro cash outside the euro-area. This option is not consistent with the Commission policy objective of supporting an international role of the euro.

Stakeholders' views on all options

Both citizens (54 out of 188, 28%) and professional respondents (94 out of 124 found, 76%) were mostly supportive of a digital euro available only for euro area citizens and for intra euro area transactions. 47 citizens (25%) and only 1 professional were against. 85 citizens (45%) and 26 professional (21%) did not reply. 49 out of 188 EU citizens (26%) supported that tourist visiting the euro area should also be able to pay with a digital euro (26%) and 28 (14%) were against (86 (45%) did not reply. The same question received support from 75 professionals (60%) and 31 (25%) did not reply. Other use cases received less but still significant support from professional (see Annex 2). Professional respondents warned that the use beyond the euro area may come with a series of significant operational issues: e.g. onboarding of non-residents, how to perform KYC functions, fraud and AML, servicing and closing of the wallet. For trade purposes, professional respondents believed that a wholesale-oriented digital currency suited for large value cross-currency and innovative payments

(smart contracts[321], conditional payments) would be better suited than a retail focused digital euro.

Professional respondents agreed that the use of a digital euro outside of the euro area may bring risks for non-euro area countries (e.g. unwanted capital flows) especially if their currency is less competitive than the euro although they showed moderate concerns about them. In non-euro area Member states, a widespread use of the digital euro could be detrimental for the local financial system and the conduct of the sovereign monetary policy, especially in crises. Therefore it was suggested to limit the use of the digital euro internationally and potentially open this possibility only for transactions related to visitors.

Conclusion

While option 4a is more effective than option 4b and 4c in meeting specific objective 1, option 4b is more efficient to address macro-economic, financial stability and political risks that option 4a would entail.

In terms of meeting specific objective 2, while a competitive advantage of the euro would mainly depend on whether other jurisdictions promote an international use, option 4a would not necessarily be more effective than option 4b as an unfettered international use may lead to political tensions.

As regards the coherence of the above options with other policies of the EU and G7, while option 4a would be coherent with the Commission's agenda of promoting the international use of the euro, that option is deemed not fully compatible with international standards that aim at limiting spill-over effects from CBDCs and, therefore, in that respect, is less coherent than option 4b. Option 4c is not coherent with Commission policy promoting the international role of the Euro.

On the basis of this analysis, options 4b and 4c are selected as preferred policy options in terms of achieving the specific objectives 1 and 2 in a consistent way with other policies of the EU and G7. An international use would be achieved in a gradual way, starting with option 4c (access to visitors to the euro area) as suggested in the public consultation, and extended, subject to agreements with non-euro area Member States and third countries to mitigate financial stability risks (option 4b).

Table - Comparison of options aimed to ensure that the central bank issued money, the euro can meet the payment needs in the digital age

Option	Effectiveness	Efficiency (cost-effectiveness)	Coherence	Overall score
Do nothing – no digital euro	0	0	0	0
International use				
Option 4a - Digital euro available for all EU residents/businesses and third countries residents/businesses	++	– –	–	–
Option 4b - Digital euro available for visitors to the euro-area and under conditions for non-euro area residents/businesses and third	+	+	+ +	+

[321] See Annex 8 on the evolution of the internet and payment needs of industry 4.0.

countries residents/businesses				
Option 4c - Digital euro available only for euro-area residents/businesses and visitors to the euro-area	+	++	+	+

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal / neutral;

Annex 10 - Third countries and non-Euro area CBDCs

Around the world, 87 countries representing over 90 percent of global GDP are speeding up efforts in exploring CBDCs according to the Atlantic Council.[322] In addition, international institutions and inter-governmental political authorities are contributing to the area through policy principles, applied technology research, proofs of concepts and prototypes mostly in close coordination with central banks and/or the private sector. While both advanced and emerging economies are engaging in CBDC projects, their respective stage of engagement – research, development, pilot, or launch – depends greatly on the country. Currently, 9 countries have fully launched a digital currency which include the Bahamas, seven Eastern Caribbean countries and Nigeria as Africa's first CBDC. In terms of pilots, over a dozen countries are potentially preparing for a launch including China and Sweden among others and the rest are either in development or in research. Although motivations, purposes, and policy goals for issuing a CBDC vary significantly across advanced and emerging countries, most central banks are exploring a retail CBDC, followed by a wholesale CBDC and a number of central banks are exploring both.[323] In addition, the Bank of International Settlements is actively engaging in, and coordinating multiple CBDCs (mCBDCs) linking developments and pilots from several central banks into projects such as project Jura, Helvetia and Dunbar among others. [324]

In March 2022, the US Administration placed 'the highest urgency' on research and development efforts surrounding a US CBDC following the issuance of the Executive Order. The Administration expects regulators to submit a joint research assessment on a US CBDC implication by September 2022.[325] Alongside this Executive Order, the Federal Reserve Bank of Boston is collaborating with the Massachusetts Institute of Technology to develop a multiyear research project exploring the technical challenges and opportunities of a US CBDC entitled project Hamilton. While the Federal Reserve has made no decisions on whether to pursue or implement a US CBDC, it has been exploring its potential benefits and risks from a variety of angles with a key focus lying on whether, and how a CBDC could improve on an already safe and efficient U.S. domestic payments system. For that purpose, the Fed issued a discussion paper in January 2022 in an effort to understand whether and how a US CBDC would improve its domestic payments system.

In the United Kingdom, HM Treasury and the Bank of England published a consultation in 2022 setting out their assessment of the case for a UK CBDC, including the merits of further work to develop an operational and technology model.[326] On 07 February 2023, the Treasury and the Bank of England announced a consultation[327] on a potential digital pound, or central bank digital currency (CBDC). A digital pound would be issued by the Bank of England and could be used by households and businesses for everyday payments in-store and online. If introduced a digital pound would be interchangeable with cash and bank deposits, complementing cash. A digital pound is likely to be needed in the future according to a consultation paper published today by HM Treasury and the Bank of England. Nevertheless, no decision has been taken at this stage to introduce one. The Bank of England will take

[322] Central Bank Digital Currency Tracker - Atlantic Council
[323] Ready, steady, go? - Results of the third BIS survey on central bank digital currency
[324] BIS Innovation Hub work on central bank digital currency (CBDC)
[325] Executive Order on Ensuring Responsible Development of Digital Assets | The White House
[326] UK central bank digital currency | Bank of England
[327] https://www.bankofengland.co.uk/news/2023/february/hm-treasury-and-boe-consider-plans-for-a-digital-pound

forward further research and development work. The public were invited to give their views on the scheme to be taken forward. The consultation is being launched because both HM Treasury and the Bank want to ensure the public have access to safe money that is convenient to use as our everyday lives become more digital, while supporting private sector innovation, choice and efficiency in digital payments.

In Sweden, the case for a CBDC is stronger provided that the use, and role of cash is rapidly declining and is the lowest in Europe. As such, the Riksbank started their research on the e-krona project in 2017 and the central bank entered the pilot phase in 2020. Currently in Phase 3, the e-krona project aims to construct a possible technical platform for the e-krona, in collaboration with the private sector, with the objective to learn more about how a technical solution could work. More specifically, the Phase 1 focused on a token- and blockchain-based technical solution within a distributed network. During Phase 2, the technical tests have included investigating whether and how an e-krona could function offline, whether the performance of the tested solution is adequate and how banks and other PSPs could be integrated within the e-krona network. At last, Phase 3 will continue to test specific parts of the technical solution, with a focus on preparing for an issuable e-krona, although the political decision is an inquiry in progress.

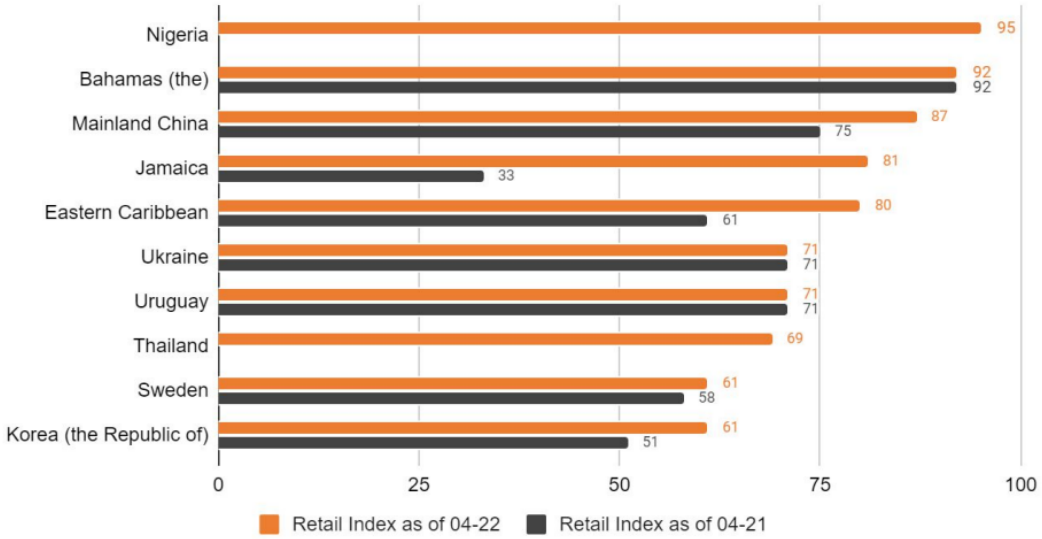
In China, research surrounding CBDC started in 2014 and the People's Bank of China (PBoC) started to pilot it in 2020. The PBoC is currently partnering with state-owned commercial banks, online banks, telecom operators and internet service providers with the aim of improving convenience, efficiency and resilience of its current retail payment system. During the 2022 Winter Olympics, China's Digital Currency Electronic Payment was made available to visitors from third countries on a trial basis and in March 2022, various selected pilots were running in major cities including Beijing and Shanghai, with plans to expand gradually in several other cities. It has been estimated in January 2022 that over 260 million users have already access to China's official digital yuan app, the e-CNY.

Beyond individual countries, the G7 finance officials endorsed public policy principles for retail CBDC in 2021 stating that a "strong international coordination and cooperation on these issues helps to ensure that public and private sector innovation will deliver domestic and cross-border benefits while being safe for users and the wider financial system."[328]

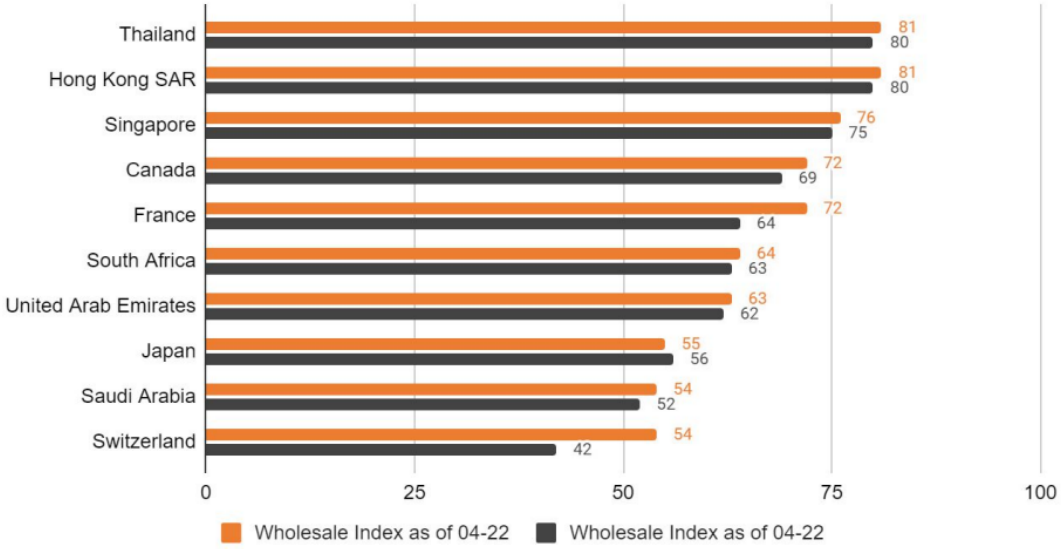
The Bank of International Settlements is at the forefront of research and development of mCBDCs and is currently involved with a number of central banks around the world. Project Helvetia is a multi-phase investigation on the settlement of tokenized assets in central bank money[329], Project Dunbar developed two prototypes for a shared platform that could enable international settlements using digital currencies issued by multiple central banks[330], and Project Jura explores cross-border settlement using a wholesale CBDC.[331] In addition, the BIS has studied throughout Project Aurum the benefits and challenges of tiered architectures for the distribution of retail CBDC through commercial banks and PSPs[332] and the Inthanon-LionRock Project aims at buildings a multi-CBDC platform for international settlements.[333]

[328] G7 Public Policy Principles for Retail Central Bank Digital Currencies - G7 UK Presidency 2021
[329] Project Helvetia: A multi-phase investigation on the settlement of tokenised assets in central bank money
[330] Project Dunbar: international settlements using multi-CBDCs
[331] Project Jura: cross-border settlement using wholesale CBDC
[332] Project Jura: cross-border settlement using wholesale CBDC
[333] Multiple CBDC (mCBDC) Bridge

Top 10 retail CBDC projects



Top 10 wholesale CBDC projects



Source: PwC Global CBDC Index and Stablecoin Overview 2022

Annex 11 - Financial stability and macroeconomic impact

1. Overview: How an unconstrained digital euro can impact financial stability and credit provisioning to the real economy

A digital euro could erode banks' deposit base. The digital euro increases choice of users and has the potential to take some market share from existing means of payments, including from cash and commercial bank deposits. The extent to which households and firms may prefer using and holding digital euros instead of commercial bank deposits will depend the features of digital euro. These are both of financial (i.e. credit risk, interest rates and transaction fees) and non-financial nature (e.g. availability, acceptance, safety and convenience). Especially the zero credit risk nature of a digital euro can motivate depositors (especially with holdings above the EUR 100.00 not covered by the deposit guarantee scheme) to shift deposits in large amounts from commercial banks to the ECB.

In certain circumstances, a digital euro may arguably also increase the likelihood, scale and speed of bank runs, although the extent of this is unclear due to lack of precedents. Compared to a cash bank run, a digital bank run looks more likely and may happen more rapidly because of lower transaction costs for converting deposits (from a website or an application) and because digital euros would likely imply lower holding costs, in particular storage costs, and risks than banknotes, given the relative facility of keeping large amounts of digital euros compared to banknotes. At the same time, depositors already have the possibility to transfer their deposits to another bank quickly and easily if they are in possession of multiple accounts. Hence, the potential heightened probability of bank runs should mainly apply to the case of systemic banking crises, in which an electronic transfer to another bank account does not eliminate a depositor's risk. Indeed, Rainone (2021) shows that in idiosyncratic bank stress episodes deposits are mainly shifted to large domestic banks generating a size premium and that under a fixed-rate, full allotment regime, the liquidity drain is mostly offset through open market operations[334]. In the euro area, such systemic withdrawals of bank deposits have only been observed in case of perceived redenomination risks connected to concerns over an exit from the common currency area. It should be noted that some arguments have also been brought forward that suggest that CBDC could actually stabilise the financial system[335]: first, by providing supervisory authorities with a new source of real-time information that could enable timely intervention adding to tools that the ECB has to monitor instant payments and second, by lowering banks' maturity mismatch, which would reduce their exposure to depositor runs.

Deposits play an important role in euro area bank funding, both in quantitative and qualitative terms. As a relatively stable and cheap source of funding (taking collateral costs into account), deposits enjoy preferential regulatory treatment (see below). Currently, they account for roughly 40% of banks' total liabilities on aggregate, with 32% from households and non-financial corporations. However, this aggregate figure masks heterogeneity both on a country level and also in relation to banks' business models. Among the euro area's four largest countries, deposits represent more than 50% of banks' liabilities in Spain and Italy, 44% in Germany but only 28% in France. At the same time, bank-level data also illustrates how diverse bank funding models can be: at the euro area level, deposits play a

([334]) Rainone E., (2021), Identifying deposits' outflows in real-time, Bank of Italy WP 1319.

[335] See for instance Keister, T. and C. Monnet (2022), "Central Bank Digital Currency: Stability and Information", Office of Financial Research (OFR) Working Paper, July 2022.

comparatively small role in a non-negligible share of banks, while representing more than 60% of bank debt in the most deposit-dependent institutions. It is this category of banks, highly reliant on retail funding, that is more likely to be put under pressure should an unrestricted CBDC design be chosen.

The extent of the issue and its impact on banks' intermediation capacity is a-priori unclear, owing to a number of uncertainties. First and foremost, the demand for digital euro is unknown and will in any case also depend on digital euro design features that are still to be decided and on the environment prevailing at the time of its introduction, including the level of interest rates but also the existence of alternative forms of money. Furthermore, it is unclear to what extent digital euro demand would substantially replace cash or deposits. Lastly, abstracting from digital euro demand, the impact of deposit outflows on bank intermediation and financial stability would also depend on the way banks react to such deposit outflows and their capacity to do so (see Box 1). At the same time, changes in the financial landscape (e.g. the emergence of decentralised finance solutions, stablecoins, and big tech firms providing payment services) might disrupt banks' intermediation capacity anyway.

Box 1: Possible bank adjustment mechanisms to deposit outflows

Generally speaking, banks can adjust to large-scale deposit outflows caused by digital euro conversion via prices or via balance sheet adjustments, with potential negative effects on banks' intermediation capacity and profitability.

In the former case, banks would try to compete with the digital euro by offering higher interest on deposits, which could have a variety of (ambiguous) effects. It could squeeze net interest margins and therefore bank profitability, with the consequence of decreasing loan supply or increasing bank risk taking[336]. Alternatively, higher funding costs could be passed through to lending rates, which should have a contractionary effect on bank lending. However, the results from the literature point also to the possibility of positive effects, for instance if a digital euro fosters competition into an oligopolistic banking system.[337]

Alternatively, banks could adjust the size and composition of their balance sheets, where as a starting point, any conversion of deposits into digital euro would be mirrored by an equivalent decline in reserves, similar to what happens in the case of conversion to cash. Banks could then react to this in various ways: in first instance by drawing down their excess reserve holdings with the Eurosystem, which constitutes an attractive option particularly in the current environment with high excess liquidity and negative deposit facility rates. Taking into consideration individual banks that might have less excess reserves or a possible future environment with lower aggregate reserve holdings, banks could also obtain the necessary reserves via loans from the Eurosystem or, individually, via the interbank market. Lastly, banks could theoretically sell assets to the Eurosystem in exchange for reserves. In theory, if these different funding sources were perfect substitutes or if banks could draw down reserves in excess of their voluntary liquidity buffers, there should be no impact on banks' intermediation capacity. However, beyond that in practice, there are a number of constraints and frictions that would need to be taken into account, such as collateral constraints, frictions on interbank markets, regulatory liquidity requirements or banks' liquidity preferences, all of

336 It is also conceivable that banks expand lending to compensate for lower net interest margins.

337 Chiu J., Davoodalhosseini M., Jiang JH., Zhu Y. (2019), Central bank digital currency and banking, Bank of Canada Staff Working Paper, N° 2019-20.

which imply a less seamless adjustment and should translate into higher funding costs and thus likely impact bank lending.

Constraints and frictions can be expected to be more prevalent in crisis and bank run situations, where any adjustment mechanism, including through prices, would be severely impaired, leading to financial stability risks.

Besides deposit outflows, banks could be adversely impacted by the digital euro if they were to be crowded out from the payments market. It is difficult to ascertain the role of fee income connected to payments for banks' overall profitability, but according to 2009 Capgemini data[338], payments represented about 20% of banks global retail revenues and more than 50% of core banking fees charged to clients in the euro area, with large heterogeneity across Member States. It is not possible to estimate the potential impact of the digital euro on banks' fee revenue from payment services lacking key inputs and decisions on the design at this stage. In the public consultation, PSPs did not provide concrete estimates either. Nevertheless a digital euro that is distributed by banks and for which they provide front-end solutions would likely partly ameliorate such concerns. While a free digital euro use for basic services, including initiating basic transactions, could be considered, banks would in any case be able to charge for value-added services.

In the bank-centric European economy, bank disintermediation implies considerable risk for firms' access to credit and thus for overall economic growth, at least during an adjustment phase. Banks are currently the only actors able to create money, which enables them to engage in large-scale maturity and risk transformation. The euro area economy relies on the banking sector for credit provision, more so than for example the US, where market financing is more common. In order to avoid adverse effects of large-scale deposit outflows on credit provision to the economy, one would either need to ensure that banks have access to sufficient replacement funding (see Box 1), or that other financial actors take over (part of) the credit provisioning role. A financial system in which investment banking and credit provision is largely separated from deposit-taking institutions could theoretically be envisioned, akin to some form of "narrow banking".[339] Both options could lead to the loss of some of the transformation functions of the banking sector and negatively affect credit growth. While it is a priori unclear whether an alternative system, in which other financial actors partly replace banks in their credit provisioning role, is inferior to the current state, it would in any case imply substantial transition costs. While non-bank financial intermediation has overall increased since the global financial crisis, it is unclear whether it could replace a substantial part of the banking sector's dominant role in credit provision to the economy going ahead. In any case, any transition towards a more diversified funding landscape for the real economy would likely be a long-term process, whereas the digital euro, if unconstrained, may pose risks to bank intermediation capacity as soon as it is issued.

2. Results from ECB simulations

Illustrative demand scenarios suggest possible deposit outflows ranging from €180 billion to €6.3 trillion, accounting for 0.5% to 18% of aggregate euro area bank liabilities. A recently published ECB paper[340] analyses how euro area banks' balance sheets

[338]https://www.ecb.europa.eu/events/pdf/conferences/integr_innov/Monday_Presentation_1_Lavayssiere.pdf

[339] Depending on the stringency of the model, deposit-taking institutions would be required to match the maturity of their assets and liabilities or place the deposits only in highly liquid and safe assets.

[340] Adalid et al. (2022), "Central bank digital currency and bank intermediation", ECB Occasional Paper Series 293, May 2022

and activity might be affected by the adoption of a digital euro. In view of the significant degree of uncertainty surrounding the design of a potential digital euro, its demand and the prevailing environment in which it would be introduced, it calculates illustrative digital euro take-up scenarios of the non-financial sector, based on assumptions about the degree of substitution between different forms of money in normal times. These scenarios range from just under €500 billion digital euro take-up in a moderate demand scenario to just over €7 trillion in a large take-up scenario, with an assumed substitution of deposits of €180 billion (0.5% of aggregate bank liabilities) to €6.3 trillion (18% of aggregate bank liabilities) in the respective scenarios. They also include a scenario in which individual digital euro holdings are capped at 3000€ and residents collectively exhaust their limits (leading to a total demand of €1 trillion, of which €647 billion are assumed to be converted from deposits).

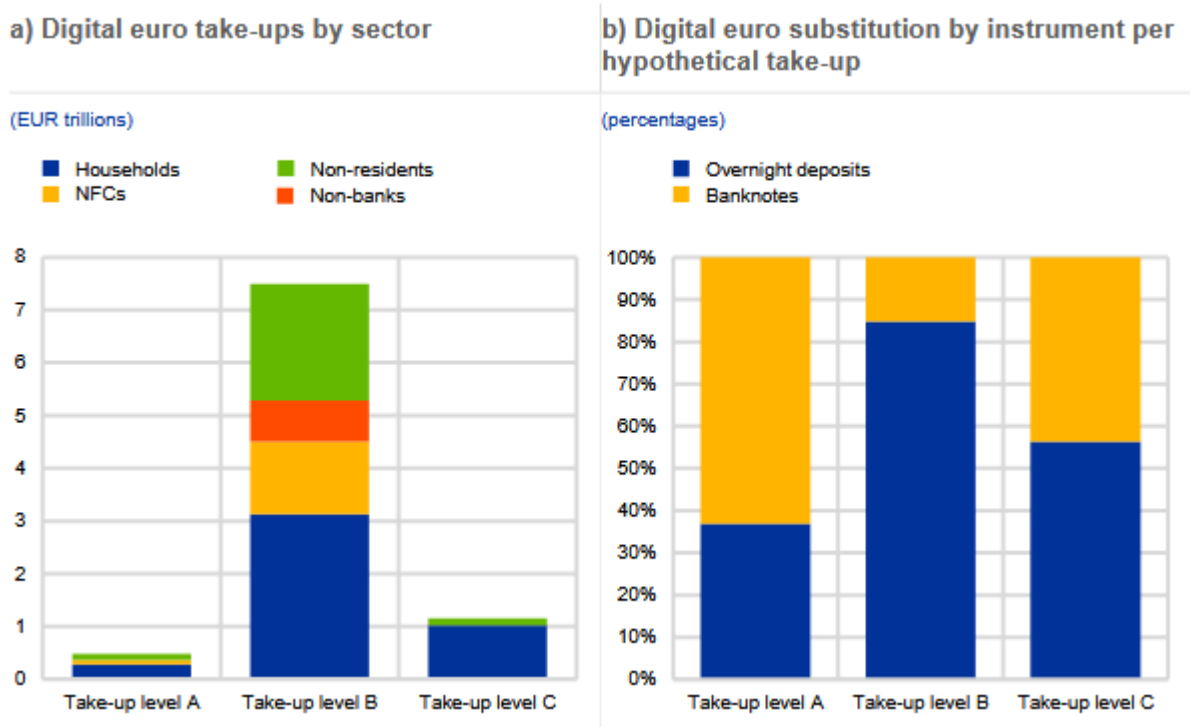


Chart 1: ECB hypothetical digital euro demand scenarios

Source: ECB occasional paper 293

Note that different assumptions are made by the ECB on the take up by the different institutional sectors, with households having the largest take-up, followed by non-financial companies ("NFC") and non-banking financial operators.

Matching the demand scenarios with bank balance sheet data suggests that the banking sector could easily accommodate the moderate demand scenario in quantitative terms, whereas under the large unconstrained demand scenario, the Eurosystem would be required to step in to a significant extent. Whereas under moderate deposit outflows, banks could absorb the associated reserve reduction on aggregate through its excess reserve holdings (and via interbank lending on an individual level), under the large demand scenario, those buffers would be exhausted, requiring significant reserve provision through the Eurosystem. Under current circumstances, it is estimated that enough unencumbered collateral would be available to the banking sector as a whole to provide Eurosystem financing. The rough estimations linked to the "capped" scenario suggest that an optimal combination of available adjustment channels could still be compatible with an orderly

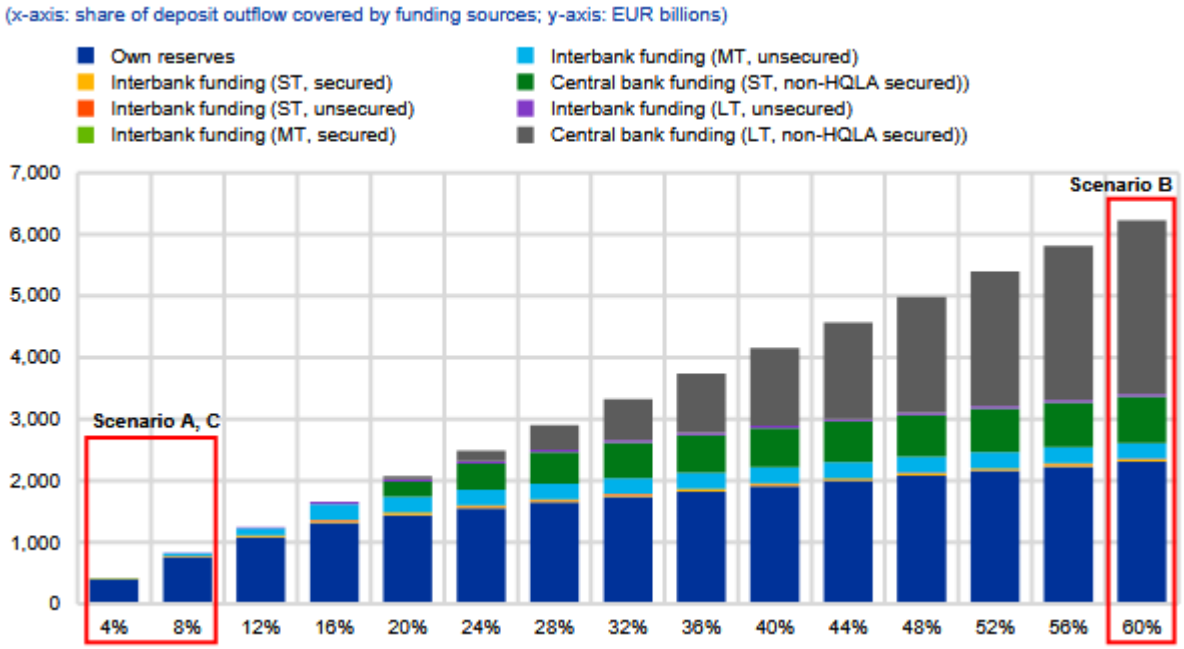
adjustment process, although the distance to the overall feasible adjustment limit would be reduced. It should be noted that the simulations are predicated on the current environment of high excess reserves, which should ease adjustment in all possible scenarios as the banking sector could accommodate a large amount of deposit outflows by drawing down excess reserve holdings.

However, the presence of frictions and constraints in the adjustment process needs to be taken into account and would imply higher bank funding costs in most demand scenarios. The lack of perfect substitutability between banks' funding sources may affect bank funding costs. Such constraints and frictions concern inter alia interbank markets (e.g. higher money market rates associated with lower levels of excess liquidity and increased interbank borrowing) or Eurosystem borrowing (e.g. stigma, collateral scarcity or liquidity requirements).

A simulation of optimal bank responses to different digital euro demand scenarios confirms that a moderate take-up would be easily accommodated by banks, whereas a large take-up would force banks' to rely on Eurosystem funding. Individual banks face a trade-off between balancing their profitability and liquidity risks when deciding about the relevant adjustment channels. For instance, secured funding is generally cheaper than unsecured funding but will impact banks' liquidity position. Similarly, there is a trade-off between the costs associated with the maturity profile of funding and roll-over risks. The ECB paper simulates banks' optimal adjustment under the different demand scenarios using an optimisation model in which a bank is expected to minimise its funding costs, subject to liquidity-, collateral- and reserve constraints. Concurrent with the static balance sheet analysis, the simulation suggests that for low levels of digital euro demand, most banks would be able to accommodate deposit outflows through their own reserves without excessively drawing down their voluntary liquidity buffers.[341] For the high demand scenario, banks would need to rely on central bank funding as excess reserves would be exhausted, with a large amount of central bank funding having to be met by using long-term central bank funding secured by non-High Quality Liquid Assets ("HQLA"). Under the "capped" scenario, outflows would also overwhelmingly be met by excess reserve reductions, with an estimated 6% of demand met via interbank funding.

Chart 2: ECB simulation of banks' balance sheet re-optimisation following deposit outflows into CBDC

[341] Only 2% of digital euro demand would be accommodated via interbank funding, reflecting individual banks' reserve constraints or liquidity preferences.

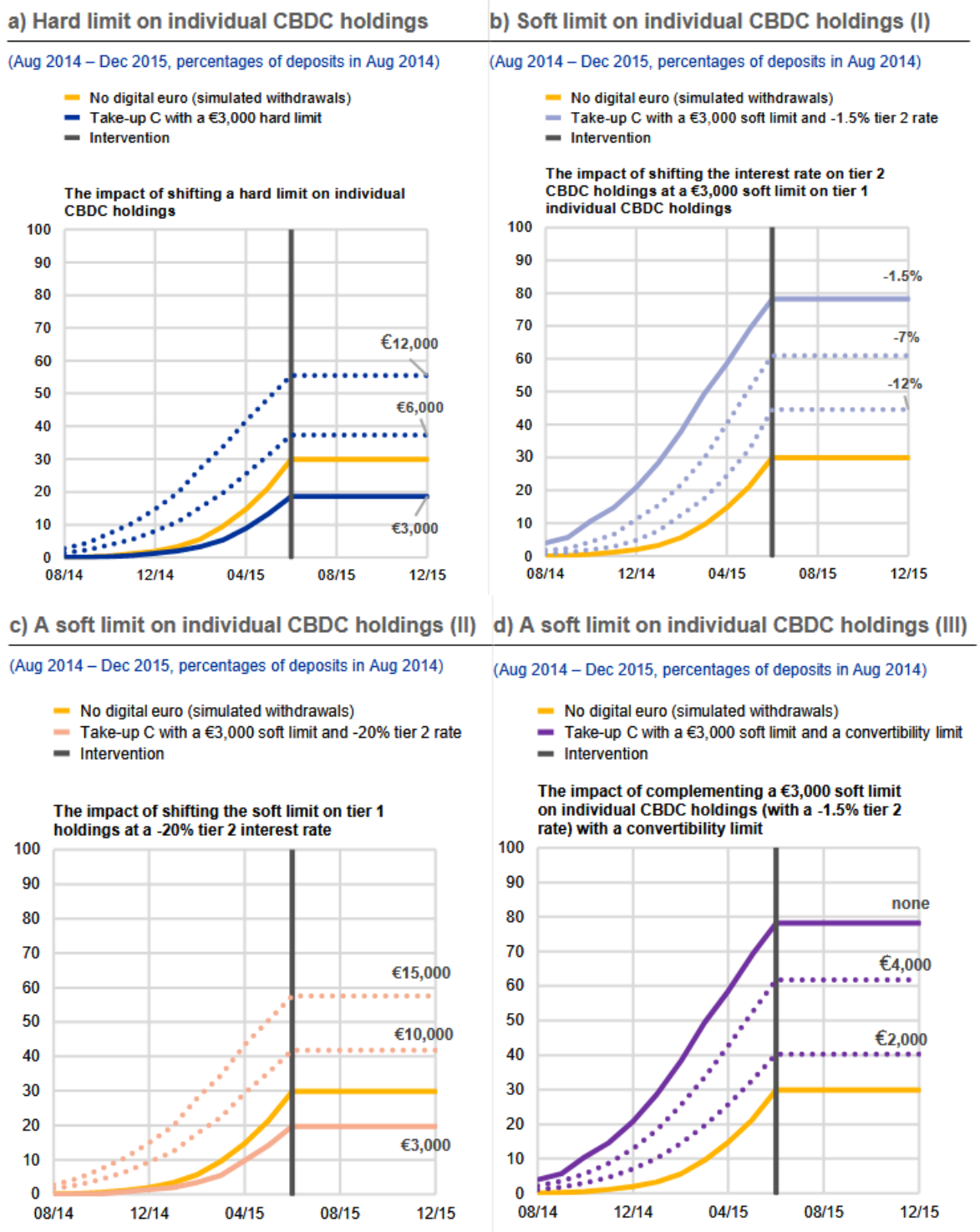


Source: ECB occasional paper 293
Scenario A refers to the moderate demand scenario, Scenario B to the large demand scenario, and Scenario C to the scenario with individual holdings capped at €3000, which are collectively exhausted.

Bank run simulations suggest that an unconstrained digital euro could increase the scale and speed of economy-wide bank runs. Using the historic precedents of systemic bank runs in Greece (2015) and Cyprus (2013), banks runs are simulated in the presence of a digital euro under the various digital euro take-up scenarios discussed above. Given that a digital euro would provide citizens with a credit risk-free asset at comparatively low storage costs, the simulations show that it would lead to an increase in the scale and speed of a (simulated) system-wide bank run compared to the no digital euro scenario. Specifically, whereas in the 'no digital euro' scenario, 30% of Greek banks' August 2014 deposits had been withdrawn at the intervention time in June 2015, the withdrawals at intervention amount to 40% and 90% in the large-demand scenario and the moderate-demand scenario, respectively. Both scale and speed of the bank run would be larger under the moderate take-up scenario (compared to the large-take up scenario), owing to the fact that a smaller substitution from bank deposits into digital euro would have taken place under this scenario in normal times, before the bank run occurs.

Holding limits, remuneration disincentives and conversion limits can lower the scale and speed of the simulated economy-wide bank runs. The overall effect in comparison with a no digital euro scenario, however, depends on the calibration of these tools. A €3,000 individual holding limit for instance would more than compensate any negative impact a digital euro could potentially have on the scale and speed of simulated economy-wide bank runs, given that the aggregate level of available deposits that can be withdrawn in the event of an economy-wide run is lower than under the no digital euro scenario. For remuneration-based tools, the simulations suggest that adverse interest rate incentives would need to be very strong to have a similar effect. For instance, for a €3000 tier-1 threshold, even tier-2 remuneration of -12% would not achieve an improved outcome to the no digital euro scenario. Finally, limits on CBDC convertibility are tested as complements to limits on individual holdings, with lower convertibility limits leading to less severe bank runs.

Chart 3: ECB simulated cumulated deposit withdrawals in Greece under various limits to digital euro store of value function



Source: ECB occasional paper 293

4. Commission internal analysis (COM-JRC)

4.1. Macroeconomic analysis

The possible macroeconomic impact of introducing CBDC was analysed with a dynamic stochastic general equilibrium (DSGE) model developed within the Commission by the JRC. The model builds on an estimated DSGE model for the euro area (Kollmann et al., 2013),[342] featuring a banking sector, where money in the form of cash and CBDC is introduced in a calibrated way. These two instruments, which are considered to be imperfect substitutes, provide liquidity and payment services to households in a money-in-utility framework, with cash having the inconvenience of carrying storage costs. Non-liquidity constrained households also have access to deposits, which are primarily a means of saving.

The presence of CBDC (in addition to cash) generally produces only small changes in an economy's dynamic responses to standard macroeconomic shocks. As regards the most noticeable differences deriving from the presence of CBDC, the response to a permanent positive shock to total factor productivity (TFP) leads to a higher demand for money, of both the physical type and of CBDC. In fact, with CBDC present, money provides better services to households, which are therefore more willing to increase holdings in order to transact the TFP-induced consumption boost. Likewise, the reaction of money demand to a positive public consumption shock is somewhat more pronounced in an economy endowed with CBDC. As regards a policy rate increase, it tends to lower money demand by raising its opportunity cost and by decreasing consumption and related transactions. This effect is concentrated on cash demand in the case where CBDC supply is subject to an active constraint. Overall, fluctuations of money in the economy can be driven to an important extent by CBDC if the supply of the latter is unconstrained; otherwise, these fluctuations tend be somewhat weaker, being driven mainly by changes in cash holdings.

A bank run is always detrimental to the economy, whether CBDC is present or not. In case the supply of CBDC is constrained, the macroeconomic impact of a deposit run is similar to the case of a cash-only economy. A bank run negatively impacts growth, consumption, investment, lending and bank profits. It tends to be deflationary in the model and leads to an increase in the interest rate on deposits, as well as in real interest rates more generally. In case CBDC holdings are constrained (and household balances are already close to, or at maximum limits), deposits cannot be substituted for CBDC, implying that the macroeconomic impact of a bank run is similar to that in a cash-only economy.

Turning now to the case where households increase their relative preference for holding CBDC, this leads to an increase in CBDC at the expense of cash and to a modest depressive effect on activity, under the assumption that the increased demand for CBDC is accommodated by the monetary authority. Given that total money demand also increases in the model (as CBDC is more efficient by not carrying storage costs), this has a modest negative effect on aggregate consumption, investment, output and inflation, as households redirect a part of their disposable income to increase their CDBC stock.

As regards transition dynamics from a cash-only economy to one endowed with a limited amount of CBDC, the expected introduction of the latter instrument at a point in the future has a minor impact on agents' behaviour. There is a small increase in economic activity and a small reduction in cash balances ahead of the introduction of CBDC, with most of this reduction occurring only at the moment when CBDC is made available. Bank deposits also show very muted dynamics. These simulations compare with the case where the supply of CBDC is increased unexpectedly from an initial constrained position. Although CBDC holdings rise in both cases, the unexpected nature of the increase in CBDC

[342] Kollmann, R., Ratto, M., Werner, R., and in't Veld, J., 2013. "Fiscal policy, banks and the financial crisis", *Journal of Economic Dynamics and Control*, Volume 37, Issue 2, 2013, Pages 387-403, https://doi.org/10.1016/j.jedc.2012.09.007.

has a small depressive effect on economic activity as agents immediately redirect resources towards CBDC holdings.

It should be noted that the DSGE analysis presented in this section does not consider the possible negative consequences of inaction, as mentioned in this impact assessment. Other limitations of the analysis include the fact that no international effects are considered (i.e., there is no foreign demand for, nor cross-border supply of a European CBDC) and that possible efficiency gains from digitalisation are not explicitly evaluated (although the storage costs associated with cash mean that efficiency gains are not entirely disregarded either).

4.1.1. Macroeconomic analysis in the literature

In assessing the macroeconomic implications of a CBDC, a recent and growing literature makes use of DSGE modelling, mainly focusing on the trade-off between its potential benefits, as an easy and safe means of payment competing with cash and deposits, and its bank disintermediation risks, which can materialise through deposit substitution. Some examples of this literature include Burlon et al. (2022),[343] Ferrari et al. (2022),[344] Schiller and Gross (2021)[345] and Barrdear and Kumhof (2021).[346]

Burlon et al. (2022) develop a DSGE model able to replicate some of the empirical evidence on the impact of digital euro-related news on bank stock prices and lending behaviour. The model features imperfect substitutability between CBDC, cash and deposits, and incorporates key transmission mechanisms through which CBDC can affect the banking system and the real economy. The model also explores alternative welfare maximizing policy rules to obtain a range of values of the optimal amount of CBDC issued. The paper also analyses the cyclical consequences of supplying CBDC under these optimal policy rules. The relevant results are as follows. First, a proper design of CBDC issuance is crucial to limit the impact on the banking system. Second, CBDC issuance generates bank disintermediation through the corresponding expansion of the central bank balance sheet and profits. Third, the optimal CBDC rules are effective in mitigating the trade-off between liquidity services and the risk of bank disintermediation, therefore generating significant welfare gains across consumers.

Ferrari et al. (2022) construct a two-country DGSE model to analyse the international macro-financial implications of the introduction of CBDC. The model relies on Eichenbaum et al. (2021)[347] and is modified to include CBDC as a monetary asset competing with cash and deposits. In this model, CBDC is a hybrid instrument: it is both a means of payment (with no storage costs and easily scalable) and a remunerated asset (like bonds and deposits). Importantly, the CBDC can be traded internationally. This implies that the CBDC issued in the domestic economy can be used in the foreign economy. They find three main results. First, the presence of CBDC induces stronger international spillovers, thereby increasing international linkages in a significant manner. Second, the CBDC design is crucial in

[343] Burlon, Lorenzo, Montes-Galdon, Carlos, Muñoz, Manuel A. and Smets, Frank, 2022. "The optimal quantity of CBDC in a bank-based economy," CEPR Discussion Paper 16995.
[344] Ferrari Minesso, Massimo, Mehl, Arnaud and Stracca, Livio, 2022. "Central bank digital currency in an open economy," *Journal of Monetary Economics*, Elsevier, vol. 127(C), pages 54-68
[345] Schiller, Jonathan and Gross, Jonas, 2021. "A Model for Central Bank Digital Currencies: Implications for Bank Funding and Monetary Policy," VfS Annual Conference 2021: Climate Economics 242350, Verein für Socialpolitik / German Economic Association.
[346] Barrdear, John and Kumhof, Michael, 2021. "The macroeconomics of central bank digital currencies," *Journal of Economic Dynamics and Control*.
[347] Eichenbaum, M. S., Johannsen, B. K. and Rebelo, S. T., 2021. "Monetary Policy and the Predictability of Nominal Exchange Rates," *Review of Economic Studies*, Oxford University Press, vol. 88(1), pages 192-228.

magnifying these effects. Third, the presence of CBDC has significant effects on the optimal monetary policy in the two economies, and is able to strengthen asymmetries across countries.

Schiller and Gross (2021) build a DSGE model with CBDC and a financial sector to study the CBDC dynamics and the relevant transmission effects during a financial crisis, as well as the disintermediation potential for the financial sector. The model relies on the original Gertler and Karadi (2011)[348] model but includes CDBC in household preferences, bank deposit risks in crisis times and the possibility of central bank refinancing of banks. In particular, they consider two alternative forms of CBDC issuance: interest- and non-interest-bearing CBDCs in the context of financial crises and in the presence of an effective lower bound for policy rates. They find that the presence of CBDC substantially reduces bank funding, leading to bank disintermediation. Nonetheless, they find that this result is conditional on the presence of an effective lower bound and on the role on the central bank, which could compensate deposit losses by providing banks with additional funds.

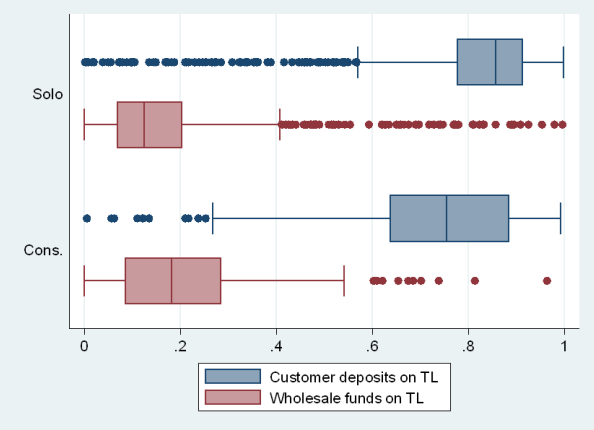
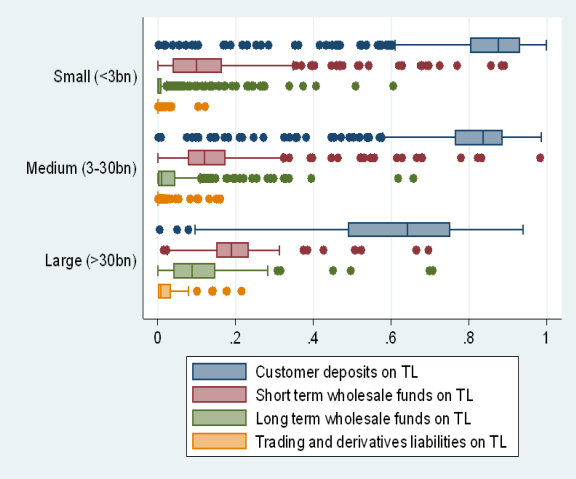
Barrdear and Kumhof (2021) study the macroeconomic effects of introducing a CBDC by constructing a DGSE model designed to capture most of the relevant real and financial transmission channels. These key features include imperfect substitutability between CBDC and bank deposits, the endogenous creation of bank deposits through collateralized loans, CBDC issuance arrangements that prevent direct runs from bank deposits into CBDC, and the conduct of monetary policy through separate channels, such as the standard risk-free policy rate on reserves, and the interest rate on, or the quantity of CBDC. They find that the injection of CBDC in the economic system might yield sizable output gains provided that CBDC issuance is well designed. Furthermore, countercyclical CBDC issuance would improve the central bank's ability to stabilise the business cycle.

[348] Gertler, Mark and Karadi, Peter, 2011. "A model of unconventional monetary policy," *Journal of Monetary Economics*, Elsevier, vol. 58(1), pages 17-34, January.

4.2. **Banks balance sheet analysis**

Expanding the analysis made by the ECB (Adalid et al. 2022), the study by the JRC assesses the implications of take-up scenarios ranging from 1,000€ to 14,000€ per person on a bank-by-bank and country-by-country basis. The assumption is that half the current amount of cash held by individuals in substituted with digital euros before individuals exchange deposits to digital euros.

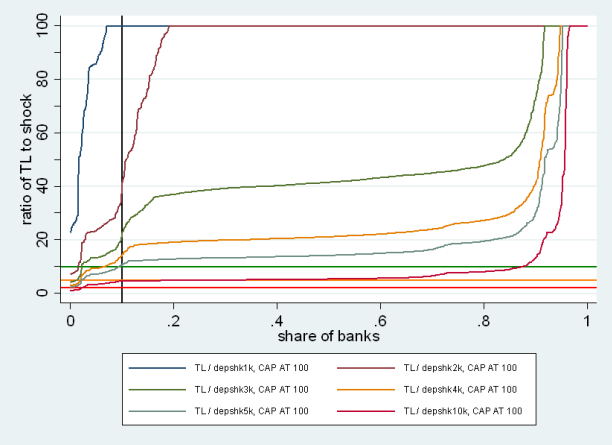
Chart 4: Share of customer deposits and wholesale funding in banks' total liabilities (TL)

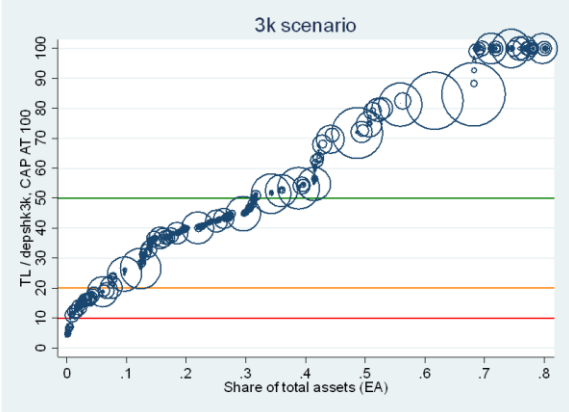
Euro-area banks, non-consolidated and consolidated balance sheets	*Euro-area banks, ratios per banks' size group*
	

Deposits are a very important source of funding for banks: the median of deposits funding across the whole sample of banks for the euro area stands at around 75% of banks' liabilities. Larger banks seem to rely less on deposit funding than smaller banks, with a median of about 65%, versus a median of about 80% and 90% for medium and small sized banks respectively. The study shows that the share of total deposits that would be substituted for digital euros would differ widely across Member States. For instance, the 3,000€/person take-up scenario would lead to the substitution in a range between less than 1% and 24% of deposits across euro area members.

Chart 5: Distributions of the ratio of Total Liabilities to the deposit conversion shock in different take-up scenarios

Euro-area banks, as a share of the number of banks in sample, unconsolidated balance sheets





This chart shows the cumulative distribution of banks compared to the Total liabilities/deposit withdrawal ratio in different take-up scenarios, each scenario being represented by a curve.

Reading: in the 3k€ demand scenario (dark green line), total liabilities amount to less than 20 times the deposit shock for 10% of banks while 90% of banks have total liabilities of over 20 times the deposit shock. This is equivalent to saying that the deposit shock represents less than 5% of total liabilities for 90% of banks.

This chart shows the cumulative distribution of euro-area banks' total assets compared to their Total liabilities/deposit withdrawal ratio in the 3k take-up scenario. Each bank is represented as a circle whose size is proportionate to the bank's total balance sheet size. The horizontal lines represent three different thresholds in terms of total liabilities (10 times, 20 times and 50 times the deposit shock).

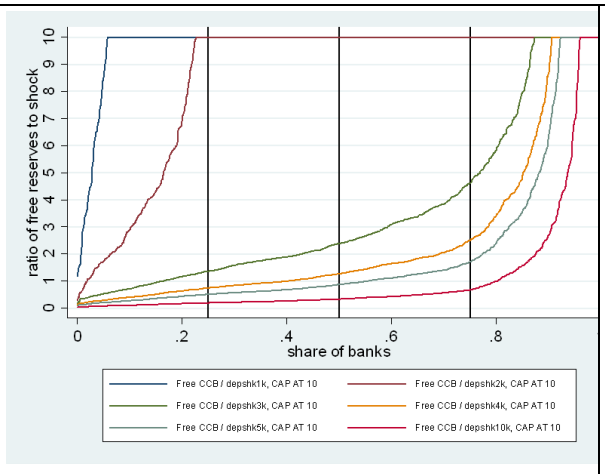
Reading: banks representing around 10% of euro-area banks' total assets have liabilities of less than 20 times the deposit shock that would occur in a 3k€ take-up scenario. In another way, in the 3k€ take-up scenario, the shock to banks' deposits would represent more than 5% of total liabilities for banks representing 10% of euro-area banks' total assets.

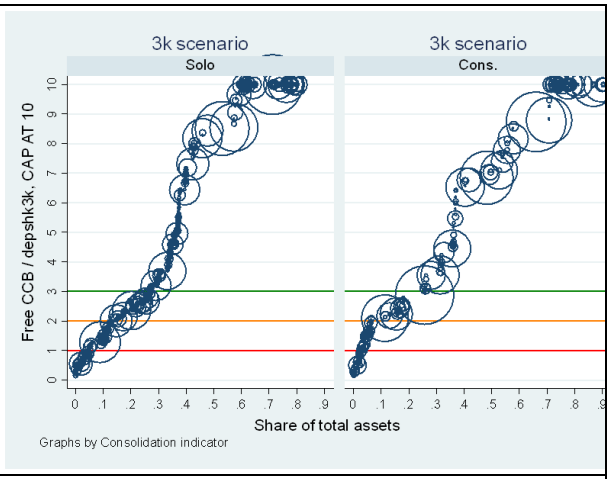
The analysis also highlights the impact of the substitution from deposits to digital euros on banks' balance sheets. In the case of the 3,000€/person take-up scenario, made for comparability with the ECB analysis presented above, the shock to deposits would amount to less than 5% of banks' total liabilities for 90% of the euro area banks, with a maximum impact of less than 25% of liabilities. For the 5,000€ and 10,000€ take-up scenarios, 10% of banks would face a shock bigger than 25% and 50% of their total liabilities, respectively. In the latest scenario, only about 10% of all banks would face a shock amounting to less than 10% of their total liabilities. In aggregate terms, it should be noted that, in the scenario in which the average take-up is 3000 euros, the banks potentially facing a shock to deposits larger than 10% of their total liabilities hold less than 1% of total assets in the banking sector

in the overall sample considered, while banks potentially facing a shock to deposits between 5% and 10% of their total liabilities hold less than 10% of all total assets in the overall sample. However, it should be stressed that banks facing larger shocks seem to be relatively concentrated in a small number of countries.

Regarding banks possible reactions and room for manoeuvre for coping with a withdrawal of deposits, the study highlights the extent to which banks would be able to use their reserves or wholesale funding. In the 3,000€/person take-up scenario, banks representing about 5% of total assets in the euro area would not be able to cover the shock with their free reserves and banks representing about 15% of total assets in the euro area would have in their balance sheet an amount of free reserves, which is less than twice the shock.

Chart 6: Distributions of the ratio of banks' reserves to the deposit conversion shock in different take-up scenarios
Euro-area banks, as a share of the number of banks in sample, unconsolidated balance sheets





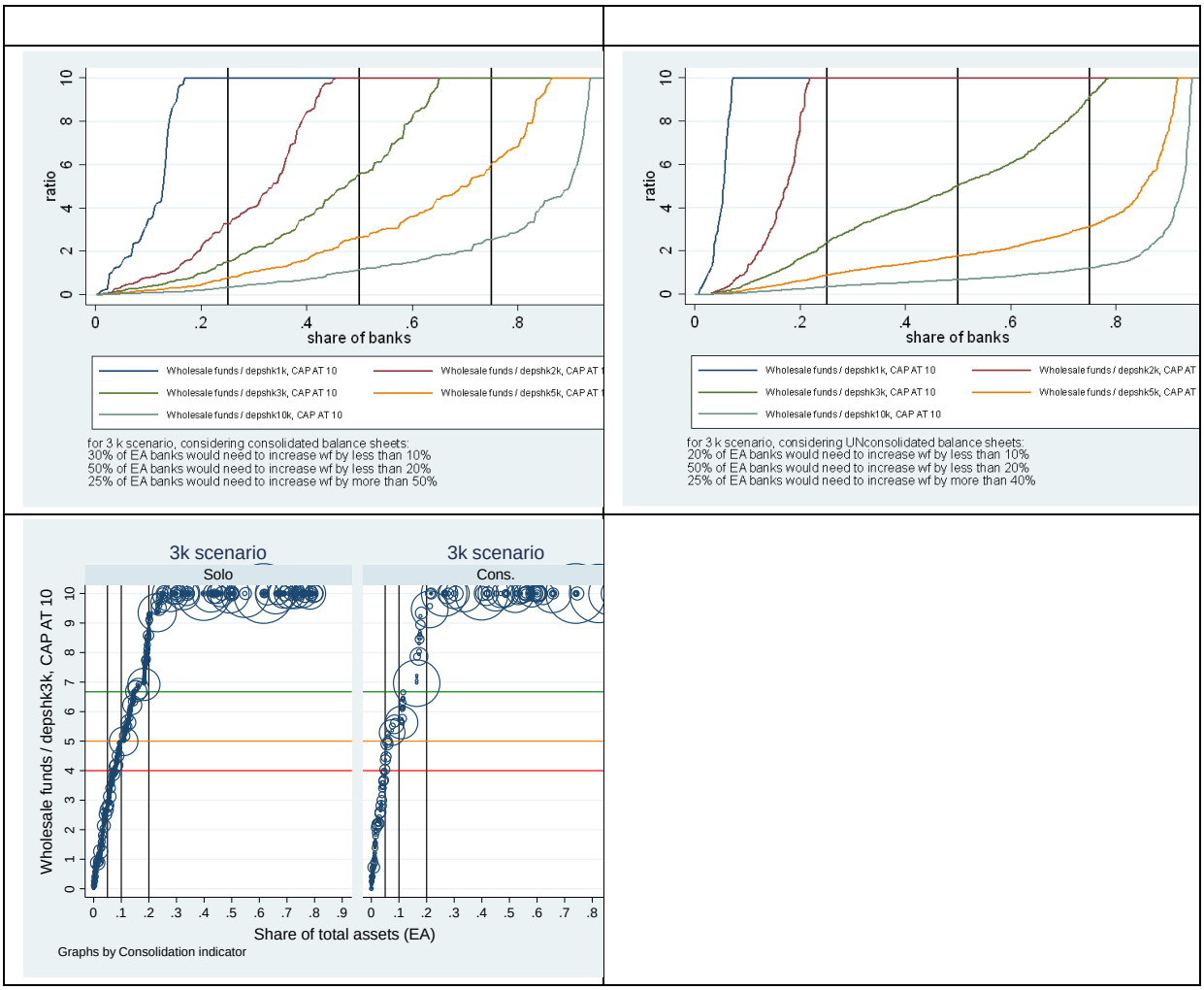
This chart shows the cumulative distribution of banks compared to their reserves/deposit withdrawal ratio in different take-up scenarios, each scenario being represented by a curve.

Reading: in the 3k€ demand scenario (dark green line), banks' reserves amount to less than twice the deposit shock for 15% of banks.

Considering consolidated balance sheets, in several Member States, over half of banks would have to increase wholesale funding by more than 20% in order to compensate the loss of deposits. At the euro-area aggregate level, 30% of banks would need to increase wholesale funding by less than 10% (in relative terms, compared to current levels), 50% of banks would need to increase it by less than 20%, but 25% of banks would need a large increase of more than 50%. The disparity between Member States is quite marked, even more when considering un-consolidated data. This was to be expected given the possible structure of the interbank market as a hub-spoke network. Hence, the analysis points to considerable heterogeneity across countries, size classes and institutions. While the overall shock could not be large in the scenarios where the take-up is limited, the full dynamic effect of changes in

the liability side to shocks following the introduction of a digital euro could be nuanced and more complex than the first round impacts, leading to the formation of position rents and the exchange of income streams across banks in different size classes or countries.

Chart 7: Distributions of the ratio of banks' wholesale funds to the deposit conversion shock in different take-up scenarios
Euro-area banks, as a share of the number of banks in sample, unconsolidated balance sheets



3.3 **Bank profitability analysis**

The analysis, conducted by the JRC, shows that a digital euro might lead to substantial challenges for the profitability of banks, especially for small banks that mostly rely on deposits as a source of funding. Large banks and countries where the banking business is more diversified are less vulnerable to the introduction of the digital euro.

In order to investigate the link between the adoption of the digital euro and banks' profitability, the study assesses the extent to which banks rely on deposits as a source of profits. Banks are largely funded by deposits, which represent the cheapest alternative to wholesale funding or capital markets. However, the importance of deposits in bank funding varies across Member States and depends on banks' sizes. The median amount of deposit per household varies substantially across Europe, from more than 20K EUR for Luxembourg, to less than 300 EUR for Latvia. Hence, even with a relatively small take-up of 2,000 EUR per

household, banks from certain small euro area members would experience a drop in deposits of more than 10%.

The assessment of a shock to deposits on bank profitability is based on quantile panel regressions with fixed effects. A shock is introduced in the deposit to asset ratio in order to mimic the effect of the introduction of the CBDC as a substitute for deposits. The study replicates the three demand scenarios of the ECB's paper quoted above (Adali et al. 2022) and assesses how profitability indicators, namely the return on assets (ROA) and the return on equity (ROE), react to these shocks.

The moderate take-up scenario leaves the ROE distribution of the panel of euro area banks substantially unaffected. The 3,000€ capped scenario leads to a decrease of the ROE of the representative large euro area bank from 4.3% to 4.1%. Under the large take-up scenario, the average value for the ROE decreases substantially, up to 2.7% for a large bank. Small banks appear to be the most penalized. Their ROE in the large take-up scenario would decrease from an average value of 3.7% to 2.4%. Hence, the "capped" scenario appears to be a good compromise to preserve, to some extent, both the stock of deposits and the inherited profitability that comes from their (cheaper) funding for the banks. Findings are similar, albeit with a different magnitude, when considering the ROA.

As a caveat, this analysis should be considered as a static assessment on what might happen when banks face a reduction of deposits due to a substitution with digital euro. It does not provide a modelling of banks' possible reaction to the introduction of a digital euro.

Annex 12 - Applying Union data protection law to the digital euro

Section 1: Introduction

The regulation establishing a digital euro must ensure full compliance with Union data protection law and the protection of fundamental rights, as enshrined in the Charter of Fundamental Rights of the European Union.[349] Regulation (EU) 2016/679[350] (GDPR) and Regulation (EU) 2018/1715[351] (EUDPR) will apply to the distribution and use of a digital euro when personal data is processed.

Irrespective of the design of a digital euro, strict adherence with applicable data protection rules remains a core feature and condition when personal data is processed.[352] The regulation establishing a digital euro will embed the principles of data protection by design and data protection by default in accordance with Article 25 of the GDPR. Strong data protection safeguards will be established, particularly concerning the principles of purpose limitation, data minimisation, storage limitation and integrity and confidentiality pursuant to Article 5 of the GDPR.

Assigning the tasks of a controller and processor:

The regulation establishing a digital euro will lay down the respective roles and responsibilities of the involved entities in issuing and distributing the digital euro from a data protection perspective, most notably those of the ECB/Eurosystem and supervised intermediaries. This will be done taken into account the respective purpose(s) and/or the tasks in the public interests.

Data protection legislation use the concepts of a controller, joint controller and processor[353] to assign responsibility to comply with EU data protection requirements, and make it clear vis-à-vis whom data subjects can exercise their rights.

- A **controller** means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member States law, the controller or the specific criteria for its nomination may be provided by Union or Members States law.

- A **processor** means a natural or legal person, public authority, agency or other body which process personal data on behalf of the controller.

[349] The regulation must respect the principles enrhsined in the Charter, in particular Articles 7 and 8 on the right to respect for private life and the right to the protection of personal data.
[350] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016, p. 1–88.
[351] Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC, OJ L 295, 21.11.2018, p. 39–98.
[352] Recital 15 'In order to prevent creating a serious risk of circumvention, the protection of natural persons should be technologically neutral and should not depend on the techniques used.' EUR-Lex - 32016R0679 - EN - EUR-Lex (europa.eu)
[353] See EDPB guidelines 07/2020 on the concepts of controller, joint controller and processor in the GDPR.

Determining the respective roles and responsibilities of the relevant entities is essential to ensure that the personal data processing in regards to the activities of a digital euro comply with applicable EU data protection legislation.

In the context of a digital euro, the ECB/Eurosystem and supervised intermediaries could act as controllers, joint controllers and processors depending on the task in public interests as per Article 6(1)e of the GDPR attributed to them, or when necessary for the compliance with a legal obligation as per Article 6(1)(c) of the GDPR. In this view, several possibilities could be considered. Part 2 of this Annex provides an overview of the main activities for which the controller could be assigned by Union law. Other activities related to a digital euro may rely on other lawful grounds for processing as defined in Article 6(1) GDPR, for example when processing is necessary for the performance of a contract. To the extent necessary for this impact assessment these activities are also outlined to in Annex 12 (see for example Section 2.7).

Purpose of processing/tasks in public interests:

Article 5(2) of the EUDPR and Article 6(3) of the GDPR require Union law that lay down the lawful ground for processing identify the purpose of processing, or the task in public interests for which the processing is necessary. Certain tasks or obligations related to the distribution and use of the digital euro will involve the processing, including storage and sharing of personal data.

The processing of personal data may be necessary, while fully respecting the requirements of the Charter, for the purposes or tasks laid down in the regulation establishing a digital euro. Such tasks or purposes which are considered essential include:

- Payment settlement (incl. funding and defunding)
- Combating payment fraud
- Ensuring holding limits and/or conversion limits
- Combatting money laundering and terrorist financing (AML/CFT)
- Taxation and combatting tax avoidance
- Managing operational and security ICT risks
- Enabling data-driven ancillary services

Part 2: Activities established in the Regulation which may require processing of personal data

2.1. Provision of payment services and settlement

Purpose of processing:

Personal data may be processed for the proper functioning of payment services related to a digital euro, notably purposes of conducting and settling transactions between end users (payer and payee).[354] This includes funding and defunding digital euro wallets and accounts. Pseudonymised transaction data may be processed for the purpose of protecting the integrity of digital euro issuance as a direct liability of the ECB/Eurosystem. Such processing would be necessary in order to safeguard the amount of digital euro in circulation.

Personal data transfers:

[354] The digital euro would be treated as funds under Article 4(25) PSD2, which would regulate the processing of personal data. EUR-Lex - 32015L2366 - EN - EUR-Lex (europa.eu)

To the extent that international data transfers would take place in the context of payment services (Policy Options 4a-b), respect for data protection also involves strict compliance with the rules on international transfers of personal data as set out in the EU data protection framework. In particular, supervised intermediaries transferring personal data outside the EU shall comply with the rules on international data transfers set out in Chapter V GDPR. To the extent ECB/Eurosystem is involved in a transfer of personal data to a third country, Chapter V EUDPR shall apply.

Controllers:

If payments are validated online (as discussed in Option 2c), payments activities could be managed by supervised intermediaries, and settled by the ECB/Eurosystem. Supervised intermediaries, acting as payment service providers for end users (the payer and payee), would determine the means of processing as the controller at the *front-end* of the payments process. Supervised intermediaries would act as controllers for user-facing activities related to payment services. This includes opening digital euro accounts and managing transactions of users, as well as the funding and defunding digital euro wallets and accounts. For the provision of payment services linked to funding and defunding of a digital euro account or wallet, personal data may be processed to carry out AML/CFT checks, upon the instruction of supervised intermediaries. On this see more under Section 2.4.

The Eurosystem as the provider of the settlement infrastructure may process transaction data necessary to validate and record transactions of digital euro as part of the *back-end* of the payments process (i.e. settlement). For these purposes, the ECB/Eurosystem would determine the means of processing as the controller. Privacy enhancing techniques (PETs) would ensure that personal data is pseudonymised so that data processed cannot be directly attributed to an identified or identifiable digital euro user by the ECB/Eurosystem. Moreover, clear segregation of data between the supervised intermediaries and the ECB/Eurosystem would effectively delink the ECB/Eurosystem from users of a digital euro to render it impossible for the ECB/Eurosystem to attribute personal data to individual users of digital accounts and holdings.

If payments are validated offline (as discussed in Option 2d), payment-processing activities could be managed and settled at the level of user devices (e.g. smartphone or cards). Transactions of offline digital euro would take place without internet connectivity on a person-to-person basis (between payer and payee) and settlement would rely on local storage without the involvement of a third party. Payment settlement may therefore occur without intermediation by a supervised intermediary or the ECB/Eurosystem to manage or validate the transaction. Neither the ECB/Eurosystem nor intermediaries would directly process personal data for this purpose. Offline validation would be developed by the ECB/Eurosystem, which would bear the responsibility that these means comply with data protection by design and by default, including by implementing principles of data protection as per Article 5 GDPR.

Categories of personal data processed:

Personal data processed for the provision of payment services and the purposes of payment settlement may include those in the interbank payment dataset (IBAN, name of originator, name of beneficiary, numerical value of transaction, settlement date).[355]

[355] European Payments Council, SEPA Credit Transfer Scheme Rulebook, March 2020.

2.2 Payment fraud

Purpose of processing:

The processing of personal data may be necessary for the purposes of the prevention of payment fraud (see also Article 94 of PSD2[356]).

Controllers:

Supervised intermediaries, acting as payment service providers for end users (the payer and payee), could be tasked with the prevention, investigation and detection of payment fraud related to a digital euro.

Categories of personal data processed:

Personal data processed for the provision of the prevention of payment fraud will include information about the customer's past and present transactions, including the amount spent, time of the transaction, payment methods used, and location of the transaction.

2.3 Enforcing holding limits and/or conversion limits

Purpose of processing:

The processing of personal data for the purposes of enforcing holding limits related to a digital euro would be necessary to protect financial stability and the banking sector's intermedia ration capacity, notably to prevent excessive shifts of commercial bank money into digital euro.[357]

Controllers:

Holding limits would be enforced by supervised intermediaries acting as payment service providers. This may include having access to a repository of end user data (personal data of a user related to transactions referred to in Section 2.1), to verify if a user already possesses holdings in digital euro. Alternatively, holding limits could be programmed and enforced at the level of the user device itself.

Categories of personal data processed:

Personal data processed for the provision of the enforcement of holding limits will be a user's identity data, and a user's transaction data (personal data of a user related to transactions, as referred to in Section 2.1).

[356] This includes malicious or fraudulent activity and security incidents. As per Article 94 PSD2 EUR-Lex - 32015L2366 - EN - EUR-Lex (europa.eu)

[357] The financial stability purpose of holding limits is discussed in the Eurosystem's report on a digital euro, p. 28 Report on a digital euro (europa.eu)

2.4 AML/CFT

Purpose of processing:

The processing of personal data for the purposes of the prevention of money laundering and terrorist financing is recognised as a matter of public interest for which processing may be necessary.[358] In the context of a digital euro, the processing of personal data may be necessary for the activities currently required under the AML/CFT framework[359], such as carrying out the appropriate level of customer due diligence, reporting unusual and suspicious transactions, and the sharing of information by competent authorities as well as by credit and financial institutions and other obliged entities.

Controllers:

Digital euro accounts may be opened ('onboarding') and managed by supervised intermediaries acting as obliged entities. In such a situation they would be responsible for the processing necessary for AML/CFT checks and not the ECB/Eurosystem.[360]

Categories of personal data processed:

Personal data processed for AML/CFT purposes, notably, customer onboarding and verification, differs based on simplified, standard, enhanced customer due diligence.[361] Personal data could include:

- Natural person data: name, photo, address, date of birth, nationality, occupation, tax and fiscal residence
- Legal entity data: which may include personal data (Beneficial Owner identity, source of funds).

The collection and subsequent processing of personal data by obliged entities should be limited to what is already necessary for the purpose of complying with the requirements of the AML/CFT framework. The storage retention period will follow the periods set in Article 30[362], Article 40[363] of the AML/CFT framework.

CDD processes for customer identification and identity verification may take place online (remotely). Any integration of electronic identity solutions for AML/CFT purposes must be in line with data protection by design and by default, in particular in full respect of data minimisation principle.[364] Personal data processed through electronic identification means and relevant trust services as set out in Regulation (EU) No 910/2014 will respect the storage

[358] Article 43 AMLD5 "The processing of personal data on the basis of this Directive for the purposes of the prevention of money laundering and terrorist financing as referred to in Article 1 shall be considered to be a matter of public interest under Regulation (EU) 2016/679 of the European Parliament and of the Council."

[359] AMLD5 EUR-Lex - 32018L0843 - EN - EUR-Lex (europa.eu), and future AMLR EUR-Lex - 32015L0849 - EN - EUR-Lex (europa.eu)

[360] To note however that where personal data becomes available through national registers or through the system of interconnection of registers, public authorities in charge of national (and EU) registers may determine the means of processing as the controller.

[361] Articles 10-24 AMLD5, EUR-Lex - 32018L0843 - EN - EUR-Lex (europa.eu)

[362] Article 30 AMLD: in the case of customer due diligence, a copy of the documents and information which are necessary to comply with the customer due diligence requirements, may be retained for a period of five years after the end of the business relationship with their customer or after the date of an occasional transaction. Member States be consider it justified to further retain relevant data for five additional years.

[363] Article 40 AMLD5, beneficial ownership information 'shall be available through the national registers and through the system of interconnection of registers for at least five years and no more than 10 years after the corporate or other legal entity has been struck off from the register.'

[364] The current AMLD recognises the use of electronic identification solutions to identify and verify a natural person's identity (Article 13.1a of AMLD). The proposed AML Regulation aims to facilitate the use of electronic identification in the financial sector, notably by harmonized list of CDD attributes for the purposes of electronic identification for standard, simplified and enhanced customer diligence, in the form of an RTS on CDD, will be established (AMLR proposal Article 22). Proposal for a Regulation amending Regulation (EU) No 910/2014 as regards establishing a framework for a European Digital Identity EUR-Lex - 52021PC0281 - EN - EUR-Lex (europa.eu)

periods set in AML/CFT framework.[365] Appropriate safeguards should be in place to govern the use of electronic identity schemes in the context of digital euro, in particular measures against unauthorised or unlawful processing of personal data and against accidental loss, destruction or damage.

2.5 Taxation and combatting tax avoidance

Purpose of processing:

A digital euro would be treated as a currency for tax purposes.[366] The proper implementation of Union and Member State taxation law is important to ensure the functioning of the internal market, to ensure fair tax competition, and to combat challenges such as tax avoidance.[367]

Controllers:

The controllers would be supervised intermediaries acting as payment service providers.[368] If payment service providers manage digital euro transactions, they will need to report under taxation rules, including on cross-border payments, as with any other currency.[369]

While public authorities (e.g. central banks) do not qualify as taxable persons[370], digital euro activities provided by intermediaries could be taxed.[371]

Categories of personal data processed:

Personal data may be processed as part of the reporting requirements to ensure compliance with tax law and combat tax avoidance.

- Digital euro payments may be subject to the reporting obligation introduced by Directive (EU) 284/2020 and Regulation 284/2020 with regards to requirements for payment providers to fight e-commerce VAT fraud.
- Digital euro payments may be subject to the reporting obligation specified in Article 243d of the VAT Directive. The data to be collected and transmitted to Member States includes the name or business name of the payee, any VAT identification number or other national tax number of the payee; the IBAN or any other identifier which unambiguously identifies the payee, and the address of the payee.[372]

2.6 Managing operational and security ICT risks

[365] Article 40(1)(a) AMLD5

[366] For VAT purposes, the digital euro would in principle be treated as a currency provided that it performs the functions of a currency and it is accepted as such by the parties involved in a transaction. The supply of any good and service remunerated by way of digital euro would be treated for VAT purposes in the same way as any other supply remunerated by way of existing euro.

[367] This includes both direct taxation and indirect taxation law at both EU and Member State level.

[368] Certain data processing operations may see tax authorities of member states fulfil the function as controllers. Where required, such as to monitor cross-border payments to fight VAT fraud, the Commission may be a controller.

[369] Directive 283/2020 and Regulation 284/2020 on VAT fraud are applicable to the payment service providers defined in point (a) to (d) of Article 1(1) of the PSD2, which provide the payment services set out in point (3) to (6) of the Annex I to the PSD2. These services include transfer of funds, money remittance, issuing of payment instrument and acquiring of payment transaction.

[370]. Given this, central banks including the ECB are not in scope of Directive 283/2020 and Regulation 284/2020, even though they can be payment service providers under the PSD2. Under Article 13 of the VAT Directive (Council Directive 2006/112/EC), public bodies governed by public law (such as National Central Banks) cannot be regarded as taxable persons in respect of the activities that they perform, even against remuneration, unless their treatment as non-taxable persons would lead to significant distortions of competition

[371] From a VAT perspective, activities related to digital euro should not be treated differently from any activity related to a traditional euro in so far as they replicate the same functioning. New or novel activities related to a digital euro will need a case-by-case assessment on the basis of the general VAT principles. Financial services are in principle exempt from VAT. Since the exemption from VAT must be interpreted strictly, services not having a financial nature, such as mere technical and administrative services, would in principle be taxed.

[372] Article 243d VAT Directive EUR-Lex - 02006L0112-20200101 - EN - EUR-Lex (europa.eu)

Purpose of processing:

Processing personal data for purposes related to operational resilience is essential for the stability of the digital euro and will ensure that supervised intermediaries abide by sound and well-managed ICT risk management frameworks. The objective is to ensure a high level of security while also positively affecting the freedom of companies to conduct business.

Controllers:

The controllers would be the supervised intermediaries in charge of the distribution of a digital euro. Furthermore, the ECB/Eurosystem may need to process personal data to ensure the integrity of the issuance of the digital euro (see Section 2.1), and the security of the underlying payment infrastructure.

Categories of personal data processed:

IP addresses, operational data (i.e. data points of unusual network traffic bundles of data, signs of DDoS activity etc.) could contain personal data. Principle indicators of compromise (IoC) could also contain personal data.

2.7 Enabling data-driven ancillary services

Purpose of processing:

The proposal establishing a digital euro should allow for processing that furthers innovation and meets the needs of consumers in payment sector, as already outlined in existing and proposed EU regulation. This includes existing PSD2 'open banking' provisions, as well as data access and sharing and principles of the proposed Data Act, the Data Governance Act, and the Digital Markets Act[373]. Supervised intermediaries could process personal data linked to digital euro activity to promote new financial products and services for consumers and firms.

Controllers:

In the context of payment accounts, supervised intermediaries could fulfil the role as controllers when acting as account information services providers (AISP), Payment Initiation Service Providers (PISP) or Account Service Payment Service Providers (ASPSP) as defined in Article 3 PSD2.

[373] The revised Payment Services Directive (PSD2) provides third-party service providers' access rights to payment accounts upon customer request.

Categories of personal data processed:

Types of personal data processed could include identity data (name, address, date of birth, nationality, occupation, email address and phone numbers) and payment account data as specified in Article 67 PSD2. The combination of which data sets will be processed will depend on the offered service, subject to a customer's agreement. Data sharing would be limited to the specific purpose of processing, as agreed with the data subject.

Such data will not be accessed or stored for purposes other than performing the account information service explicitly request by the data subject (payment service user), in accordance with the GDPR.

Annex 13 - SME Test

Identification of SMEs affected

The digital euro will affect all merchants and transacting parties throughout the European Union, including SMEs. For some SME merchants there may be small one-off costs due to the requirement in the preferred option to establish mandatory acceptance (see impacts section below). Other SMEs and microenterprises will be exempted from mandatory acceptance and will not be directly affected. The creation of the digital euro may however induce a faster uptake of digital payments in the European market which could create pressure on exempted parties to enable their customers to use an electronic payment channel.

Consultation of SME stakeholders

The public consultation did not provide any feedback which was specifically related to SMEs. In general, respondents expect that with the development of new payment solutions, accepting electronic payments means will become more attractive. It was also pointed out that the costs of acceptance infrastructure and payment fees will likely decrease thus benefitting in particular SME merchants. Low costs for acceptance infrastructure would materialise in particular if the digital euro enables payment solutions which can be integrated on existing mobile devices, using for example NFC and dynamic QR codes.

Impacts on SMEs

The digital euro will enable the use of central bank money in an electronic setting. It will transform the European market for payments by establishing an alternative channel to settle payments. This is expected to increase competitive pressure in the market in terms of both price and innovation. Merchants throughout Europe, including many SMEs, would benefit from this development.

It is impossible at this stage to estimate these benefits quantitatively, especially for a specific subgroup like SMEs. The digital euro is expected to give rise to significant benefits for merchants but the extent to which they materialise will depend on the technical specifications and the fees at which payments in digital euro will be offered in the market. Once the technical specifications are set, it may be possible to estimate broadly the direct cost-based benefits. The introduction of the digital euro is also expected to give rise to market improvements in terms of increased quality of payment services as well as innovation that will enhance conditions for transacting parties, including SMEs.

The requirement for mandatory acceptance may imply small one-off costs for SMEs provided they already accept an electronic form of payment. The extent to which these costs will be incurred depends on the technical specifications to be developed by the ECB. If new or updated payment terminals are required for the acceptance of the digital euro, costs are expected to range from 60-1000 euros per merchant based on stakeholder input[374]. If existing mobile devices can be used instead, one-off costs would be significantly lower and edge towards zero. There will be some minor costs also for SMEs to get acquainted with handling

[374] See table in Annex 2 IV

digital euro payments and possible changes to internal systems. In stark contrast to the initial introduction of the euro as a common currency, any changes to internal systems required will be small as there is no need for any conversion of prices.

Options to mitigate any negative impacts on SMEs

The preferred option would stipulate that there is a mandatory acceptance of the digital euro for all merchants that already accept an electronic means of payments. This requirement is necessary in order to establish sufficient market penetration and create a widely useable form of payment. However, in order to avoid any undue costs on microenterprises the option explicitly exempts merchants that only accept cash. This effectively avoids the need to stem possible one-off costs for payment terminals as well as on-going payment processing fees.

If the digital euro should enable payments run on existing mobile devices (e.g. smartphone based NFC or dynamic QR codes) it could provide the means for microenterprises to offer an electronic payment channel while avoiding the need for investment in a payment terminal.