

Evaluating the Impact of Emerging Technologies on the ECB's Mandate: Can the European Central Bank Use Distributed Ledger Technology and Digital Euro to Advance Financial Inclusion in Europe?

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Abstract

There is a noted rise in research examining the influence of digital transformation—specifically the application of Distributed Ledger Technology (DLT) on the progression of the financial sector. This paper presents conclusions from a study on participants' awareness, understanding, and intentions regarding cryptocurrencies and the Digital Euro. Participants have a relatively high awareness of digital assets and Digital Euro, but better understanding is needed through effective communication and educational initiatives. While recognizing cryptocurrencies as valuable investments, participants are skeptical about their use for payments due to concerns about illicit activities. Regulatory frameworks are deemed important to address these concerns. Participants support the introduction of the Digital Euro and intend to use it for various purposes, suggesting potential demand. Desired characteristics include privacy, ease of use, and cross-border usability. These findings inform the strategies for introducing and accepting the Digital Euro, promoting financial inclusion, and enhancing accessibility in Europe's digital economy.

Key words: financial inclusion, European Central Bank, Distributed Ledger Technology, Digital Euro, emerging technologies

J.E.L. classification: G11, G14, G15

1. Introduction

The onset of the fourth industrial revolution has sparked widespread adoption of digital technologies across sectors like the internet, social networks, blockchain, including finance. The swift evolution of new technologies has profoundly impacted the financial sector, including the form of money. Digitalization acts as a managerial instrument, and digital transformation (DT) signifies the process of incorporating digital technologies into the chain of value-creating activities. This process enhances value for customers and other stakeholders, leading to an improvement in organizational performance (Wunderlich & Beck, 2017). Additionally, digitalization plays a significant role in promoting sustainable development, highlighting its strategic importance for stakeholder benefits (Luo et al., 2022).

The integration of emerging technologies into the financial sector yields unique value creation opportunities, including innovative offerings, transformative business models, and the restructuring of value chains and ecosystems (Åström et al., 2022). Consequently, this supports enhanced operational efficiency and effectiveness within financial institutions, thereby facilitating a more comprehensive and sustainable development (Tanuchev, 2022). The process of digital transformation plays a pivotal role in driving societal advantages by augmenting financial inclusion, thereby enabling the provision of tailored financial products and user-friendly digital access channels (Mhlanga, 2022).

The utilization of cryptocurrencies as a decentralized digital means of value exchange presents burgeoning prospects for businesses by fostering trust-enabled environments through network-based mechanisms. Moreover, the market value of cryptocurrencies has witnessed a substantial surge, reaching a remarkable peak of \$2 trillion in 2021, fuelled by the existence of more than nine thousand crypto assets (Coinmarketcap, 2023). While ongoing debates persist regarding the intrinsic value and legal implications of crypto assets (Kiviat, 2015), their escalating prominence continues to captivate the interest of scholars, investors, and central banks worldwide (Lo et al., 2014; Auer et al., 2022).

In recent years, Distributed Ledger Technology (DLT) has gained substantial traction across diverse sectors, marking its widespread adoption. This trend has engendered a surge of scholarly and practical interest, particularly within the financial domain, as researchers and practitioners recognize the potential of this nascent technology.

DLT, commonly referred to as blockchain technology, has garnered considerable attention and interest within the financial sector. Its appeal extends to multiple stakeholders, including those engaged in payment, clearing, and settlement procedures. The impetus behind this fascination lies in the perceived benefits of DLT, which encompass heightened operational efficiency and fortified resilience in financial activities. However, a critical question arises regarding the extent of inclusivity inherent in DLT's implementation (Barr et al., 2021).

So, is this new technology adopted by the Central Banks inclusive enough? Scholars have observed a notable upsurge in scholarly investigations focused around the impact of blockchain technology on the financial sector, primarily driven by the impetus of digital transformation. However, academic research examining the link between the adoption of blockchain technology in central banking and the growth of financial inclusion remains limited.

This research aims to discern patterns in the financial inclusion of European Union (EU) countries, employing their respective financial inclusion scores (FIS) as a basis for analysis. The FIS scores serve to categorize nations into four distinct groups: leaders, high performers, aspiring performers, and laggards, with the leaders establishing the performance standards for others to emulate (Pytkowska et al., 2016). Additionally, this study delves into the advancements in financial inclusion within the financial sector facilitated by the digital transformation of the euro. This transformation, propelled by the introduction of ground-breaking technologies and solutions, particularly digital payments, is manifested through enhanced operational efficiency.

2. Literature review

The European Central Bank (ECB) serves as the central monetary authority for the Eurozone, comprising 19 member states that have adopted the euro as their shared currency. Its primary responsibility entails the preservation of price stability within the euro area, chiefly through the maintenance of low and stable inflation rates in the medium term.

In addition to its price stability mandate, the ECB aligns itself with the broader economic policies of the European Union (EU) to foster sustainable growth and stability across the euro area (European Central Bank, 2023). Although secondary in nature, the ECB's endeavours to contribute to these objectives by implementing monetary policy tools such as interest rate management, liquidity provision to banks, and other measures designed to shape economic conditions.

The ECB assumes a pivotal role in the European economy by making consequential decisions that influence the money supply, interest rates, and financial stability within the Eurozone, while also overseeing the banking system and collaborating with regulatory entities to ensure financial integrity and stability (Dabrowski et al., 2016).

In relation to TARGET2 transactions, TARGET2, denoting the Trans-European Automated Real-time Gross Settlement Express Transfer System, serves as a payment framework administered by the Eurosystem, encompassing the European Central Bank (ECB) and the national central banks of Eurozone nations. This system facilitates the instantaneous settlement of cross-border payments within the Eurozone, fostering expeditious and secure monetary transfers. (Jobst et al., 2012)

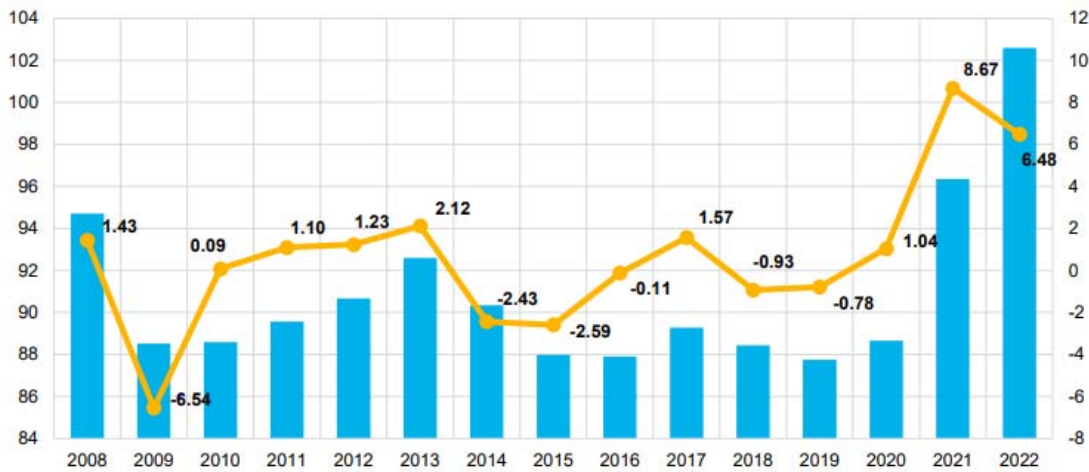
The ECB assumes a critical role within the realm of TARGET2 transactions, entailing the assurance of seamless operational functioning of the payment system while propelling the efficacy and safeguarding of cross-border transactions (Yvon, 2008). It assumes the responsibility of

oversight and the formulation of regulations governing the functioning of TARGET2, ensuring its optimal operation and contribution to the overall stability of the Eurozone's financial landscape

By exercising supervision over TARGET2 transactions, the ECB contributes to the unimpeded circulation of financial resources throughout the Eurozone, fortifying economic endeavours and trade activities within the region. Furthermore, it plays a vital role in upholding financial stability by vigilantly monitoring and addressing prospective risks or disturbances that may arise within the payment system (Tarasiuc, 2018).

Following the decline in transaction volumes during the financial crisis, there was a subsequent recovery in TARGET2 traffic, displaying a positive trend from 2010 to 2013, as depicted in Figure no 1.

Figure no. 1. TARGET2 traffic
(left-hand scale: number of transactions in millions; right-hand scale: percentages)



Source: (European Central Bank): (TARGET Annual Report, 2022, pp. 13)

Transaction levels in TARGET2 initially declined after the financial crisis but saw an increase of four million transactions, followed by a temporary decline in 2014 and 2015 due to the migration to SEPA instruments, stabilizing at around 88 million transactions annually, until 2022 when it reached a record high of over 102 million transactions, surpassing levels seen since the establishment of the euro (ECB, 2022).

Distributed Ledger Technology (DLT) is a paradigm grounded in a decentralized framework for the storage and dissemination of data. It entails the establishment of a mutually agreed-upon and collectively maintained repository of digital information that is dispersed among multiple entities (Del Rio, 2017). DLTs are distinguished by three fundamental attributes: the ledger is stored in numerous locations, mechanisms are in place to authenticate data accuracy, and cryptographic safeguards are employed to enhance security (BIS, 2018).

DLT, notably exemplified by blockchain technology popularized through cryptocurrencies like Bitcoin, transcends its initial application and presents disruptive possibilities in diverse sectors, particularly the conventional financial market. Its impact manifests in several notable ways, like heightened efficiency, augmented transparency, enhanced security, disintermediation and cost reduction, access to financial services. The implementation of Distributed Ledger Technology (DLT) presents transformative prospects for the domain of recordkeeping. Traditional recordkeeping practices were largely centred around a centralized framework, which hinged upon trust in a singular authoritative entity (Bacon et al., 2018). However, the emergence of DLT has significantly diminished, and in certain instances, entirely eradicated the reliance on such central intermediaries. By harnessing the intrinsic features of shared consensus and cryptographic mechanisms, DLT facilitates a decentralized and trust-agnostic paradigm for recordkeeping (ITU, 2017).

Distributed ledgers can be broadly classified into two primary categories: permissionless and permissioned. Permissionless ledgers operate in an unrestricted manner, allowing participation from all entities without any limitations. Permissioned ledgers adhere to a restricted consensus process,

where only approved entities possess the ability to add entries to the ledger. The validation of ledger entries is conducted by trusted entities within the system, rather than relying on consensus among all participants as observed in open or permissionless systems. Both private and public distributed ledger technologies commonly incorporate a consensus mechanism to authenticate and validate transactions. A consensus mechanism refers to a methodology employed to verify the value or transaction on a blockchain or distributed ledger without relying on trust in a central authority. Although specific mechanisms employed may differ based on the design of each distributed ledger, the purpose remains consistent.

By necessitating consensus, the ledger can ascertain the legitimacy of transactions. Consensus plays a vital role in preventing conflicting entries, ensuring accurate sequencing of entries, and safeguarding against malicious actors attempting to gain control over the DLT (Vukolić, 2006).

DLT optimizes intricate financial processes, such as settlement and clearing, by eliminating intermediaries and reducing the time and expenses entailed in manual reconciliations. It enables nearly instantaneous transactions and real-time updates to the shared ledger (Schuldt et al., 2023). Also, it furnishes a transparent and auditable transaction and ownership record. Each participant gains access to identical information, fostering increased trust and mitigating fraud or manipulation risks. Such transparency can facilitate regulatory compliance and bolster the integrity of financial markets (Ni et al., 2020).

The decentralized nature of DLT's fortifies security by eliminating single points of failure and curbing data breaches or cyber-attacks (Crosby et al., 2016). The cryptographic algorithms employed in DLT confer robust safeguards for transaction integrity and confidentiality of sensitive information. Moreover, DLT harbours the potential to disrupt established financial intermediaries like banks and clearinghouses through peer-to-peer transactions, obviating the need for intermediaries (Habib et al., 2022). This transformation can yield cost savings for participants and stimulate heightened competition, and it holds promise for extending financial services to unbanked or underbanked populations, particularly in developing nations, by furnishing a secure and accessible platform for transactions and promoting financial inclusion (Iansiti et al., 2017).

Nevertheless, it is imperative to acknowledge that while DLT harbours considerable potential, it necessitates addressing challenges and considerations encompassing scalability, regulatory frameworks, interoperability, and privacy apprehensions. Successful adoption and integration of DLT within the traditional financial market require meticulous evaluation and collaboration among various stakeholders to ensure its efficacious implementation and the maximization of its prospective benefits (Kshetri, 2021).

Distributed Ledger Technologies (DLTs) has the potential to transform financial market data management and standardize procedures, but uncertainties remain about their adoption and efficacy in addressing inefficiencies due to their early stage of development. The T2S Advisory Group's Distributed Ledger Technologies Task Force (DLT-TF) is investigating the impact of DLTs on post-trade securities and harmonization efforts, with challenges including reconciling KYC and AML requirements and ensuring data security across DLT networks and interconnected systems (Auer et al, 2021).

Can the DLT and Digital Euro influence financial inclusion in Europe?

Financial inclusion, which aims to provide access to affordable and quality financial services for all individuals and businesses, is crucial for fostering economic growth and reducing poverty. However, traditional financial systems often leave certain populations underserved or excluded, particularly those who are unbanked or underbanked. We believe that DLT and the Digital Euro have the potential to address these challenges and significantly enhance financial inclusion in Europe (Allen et al, 2016).

DLT, which includes blockchain technology, can facilitate peer-to-peer transactions without the need for intermediaries like banks. This decentralized nature of DLT allows individuals to directly transact with each other, eliminating barriers and reducing costs associated with traditional financial intermediaries. This technology opens new possibilities for financial inclusion, especially for underserved populations who lack traditional access to financial services (Mbaye, 2021).

One of the key advantages of DLT is its ability to enable cross-border payments quickly and inexpensively. Traditional cross-border transactions are often costly and time-consuming, making them inaccessible for many individuals and small businesses. DLT can revolutionize cross-border payments by providing a faster, more efficient, and cost-effective alternative. With DLT, individuals and businesses can send and receive payments across borders with ease, promoting international trade and economic opportunities (Böhme et al, 2015).

The Digital Euro, as envisioned by the European Central Bank (ECB), is a form of central bank digital currency (CBDC) that has the potential to drive financial inclusion in several ways. By providing an electronic form of central bank money, the Digital Euro would be universally accessible to all citizens and firms, irrespective of their location. This accessibility would be like banknotes but in digital form, enabling individuals without traditional banking access to participate in the digital economy (World Bank, 2020).

The Digital Euro would offer a secure and convenient digital payment infrastructure, allowing individuals who are currently unbanked or underbanked to make electronic payments and manage their finances more efficiently. This accessibility to digital payments is crucial, as cash transactions are becoming less prevalent and digital transactions are increasingly becoming the norm. The Digital Euro can bridge this gap and ensure that everyone has the means to participate fully in the evolving digital economy.

Moreover, the Digital Euro has the potential to reduce transaction costs, particularly for cross-border payments within the Eurozone (ECB, 2021). The high costs associated with cross-border transactions have been a significant barrier to financial inclusion, hindering the ability of individuals and businesses to engage in international economic activities. By leveraging DLT and the Digital Euro, the costs of cross-border transactions can be significantly lowered, making them more accessible to a wider range of people and promoting greater financial inclusion.

DLT can also make financial services more accessible to underserved populations using cryptocurrency wallets. Even without a traditional bank account, individuals can participate in the digital economy by utilizing cryptocurrency wallets that leverage DLT. These wallets enable individuals to store, send, and receive digital assets, providing access to financial services that were previously out of reach for the unbanked or underbanked. This innovation opens new avenues for financial inclusion and economic empowerment.

Another potential benefit of the Digital Euro is its offline transaction capability. Offline transactions would enable peer-to-peer transactions even in situations where internet connectivity is limited or unavailable. This feature is particularly relevant in remote or underserved areas where connectivity challenges persist. By allowing offline transactions, the Digital Euro can overcome one of the significant barriers to financial inclusion and ensure that individuals in remote areas can engage in financial transactions without relying on stable internet access.

Furthermore, the implementation of DLT and the Digital Euro can foster financial innovation and competition. DLT's transparency and immutability can increase trust in financial systems, reducing fraud and making individuals more willing to participate in these systems (Deloitte, 2021).

3. Research methodology

The objective of this study is to ascertain the following aspects:

1. Prevalent types of cryptocurrencies and the extent of comprehension regarding them, as well as ownership of such assets;
2. The degree of understanding pertaining to the distinctive features of cryptocurrencies;
3. What is the level of desirability of the Digital Euro;
4. Significance of the characteristics associated with the Digital Euro;
5. Probable circumstances in which the Digital Euro is expected to be utilized;
6. The means by which the Digital Euro could be obtained;
7. Investigation of the methods utilized for the storage of the Digital Eur

For this quantitative study, researchers employed self-report surveys to collect data, constructed based on a validated five-point Likert scales. The surveys consisted of a total of 13 questions related to the Digital Euro, with 6 of them focusing on socio-economic profile variables.

All the questions were published in English using an online questionnaire (Google Forms), that was sent out to the different age groups through an international network for students, as well as professional networks for different age groups. This research has adopted a web-based survey as a data collection method as it is a method that is efficiently administered and widely used globally.

To choose an appropriate sample size of minimum recommended sample size of 97, the study uses the standard calculation of the sample size, based on a population size of 438.823 crypto users in the EU (17% of 746.000.000 total EU population), with a confidence level of 95% and a margin of error of 10%. In this regard, this study managed to collect data from 99 respondents, which exceeded the minimum recommended sample size of 97. Data was collected between 1st and 16th of June 2023, using a questionnaire survey from the study area. We distributed the questionnaire to the respondents through an online google doc and explained the main objective of data collection. A total of 8000 questionnaires with 99 were received from the digital currency market, indicating a response rate of 1.2%. Ethical approval was not applicable for this research because authors' institutions are not concerned about the present research.

4. Findings

The analysis of the demographic profile, as presented in Table 1, indicates a relatively uniform age distribution among the respondents, except for individuals below the age of 20, who constitute a significantly smaller proportion compared to the other age categories. The findings from the age demographics suggest a widespread interest in gaining further knowledge about the digital Euro. Furthermore, Table no. 1 reveals a higher percentage of respondents with academic degrees, with 47 individuals holding a master's degree and 27 individuals possessing a bachelor's degree. In contrast, the number of respondents with a High School degree is 24, while only one respondent has a PhD, indicating a relatively lower representation.

Regarding employment status, the predominant categories include Full-time employees (53%), Self-employed individuals (13%), and Business owners (12%). Conversely, Retired individuals (9%), Students (8%), Unemployed individuals (3%), and Part-time employees (1%) constitute significantly smaller proportions within the sample.

Regarding income status, most respondents (67%) report earning up to 50,000 euros per year, while 27% report earning between 50,000 and 150,000 euros. A notably smaller percentage (2%) of respondents indicate an income exceeding 150,000 euros.

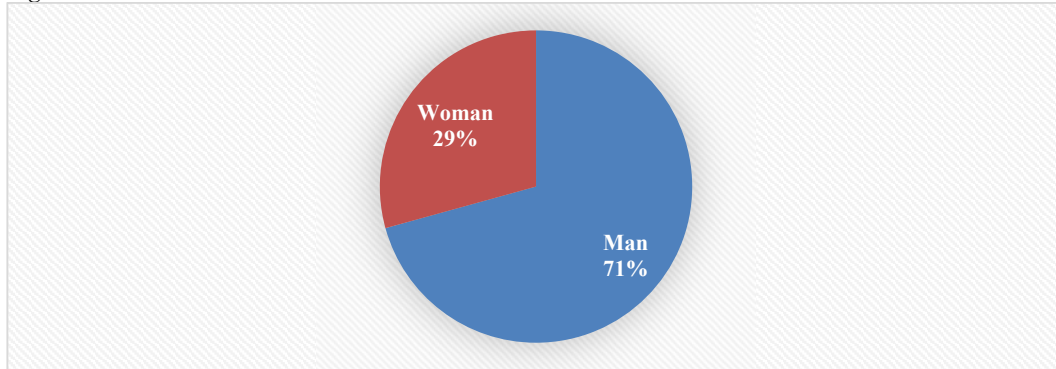
Table no. 1 The total number of respondents age, academic degree, employment, and income

Age		Academic degree		Employment		Income	
Below 20	2	High School degree	24	Full-time employee	53	Below 10,000 euros / year	33
Between 20 – 30	13	Bachelor's degree	27	Part-time employee	1	Between 10,000 – 50,000 euros / year	37
Between 30 – 40	32	Master's degree	47	I own my own company	12	Between 50,000 – 100,000 euros / year	17
Between 40 – 50	30	PhD	1	Self-employed	13	Between 100,000 – 150,000 euros / year	10
Above 50	22			Student	8	Above 150,000 euros / year	2
				Unemployed, currently looking for work	3		
				Retired	9		

Source: (Developed by the author based on data collected by author in June 2023)

Figure no. 2 shows the gender number. It describes the total number of males as 237, and female, 43.

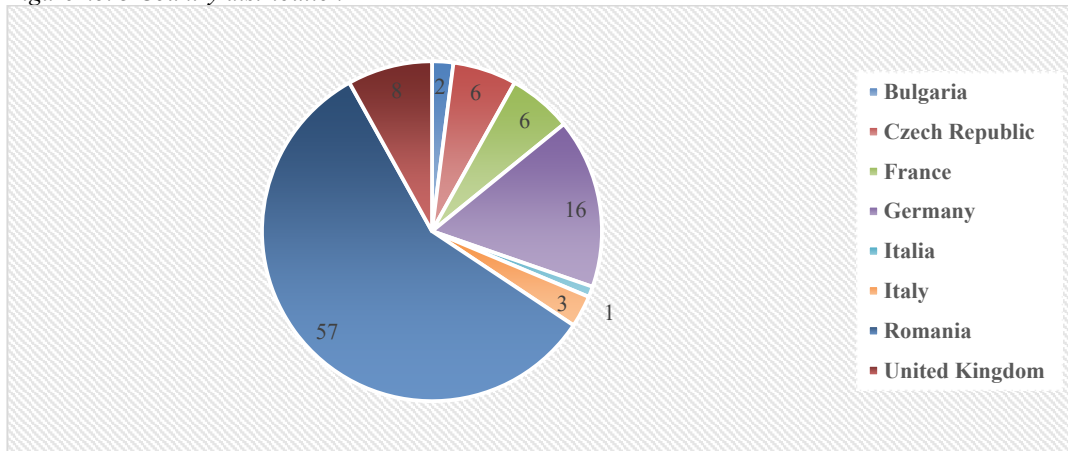
Figure no. 2 Gender distribution



Source: (Developed by the author based on data collected by author in June 2023)

The Figure no. 3 shows the number of respondents from various countries. Among the surveyed individuals, the highest number of respondents came from Romania, with a total of 57 participants. Germany had the second-highest representation, with 16 respondents. The Czech Republic and France both had 6 respondents each, while the United Kingdom had 8 respondents. Bulgaria, Italy, and Italy (presumably a duplicate entry) had 2, 3, and 1 respondent(s) respectively.

Figure no. 3 Country distribution



Source: (Developed by the author based on data collected by author in June 2023)

Analysing the answers to the direct questions, we obtained the following findings and results:

- **The first question** posed to the respondents inquired about their awareness of cryptocurrencies, central bank digital currencies (CBDCs), and stablecoins, as well as their understanding of these concepts. Results indicate that 90.9% of participants strongly agreed or agreed to have heard about cryptocurrencies, while 61.6% acknowledged having some familiarity with CBDCs, and 58.6% were acquainted with stablecoins. However, despite these concepts being recognized by the general public, only 51.5% demonstrated a comprehensive understanding of them, and a mere 38.8% reported possessing cryptocurrencies and/or stablecoins.
- **The second question** asked the participants to express their level of agreement regarding the primary characteristics of cryptocurrencies. The findings indicate that 58.6% of respondents strongly agreed or agreed that cryptocurrencies hold greater value as an investment rather than as a medium of payment. Additionally, 45.4% of participants believed that cryptocurrencies can be easily converted into cash. However, only 41.4% agreed that the government regulates cryptocurrencies, while 47.5% concurred that cryptocurrencies facilitate illicit activities. Interestingly, a higher percentage of 59.6% agreed that the current time is opportune for purchasing cryptocurrencies. Conversely, only 47.5% considered cryptocurrencies to be both secure and user-friendly.

- **The third question** aimed to gather the participants' viewpoints on the Digital Euro. A notable majority of 75% indicated awareness of the Digital Euro's existence, although only 40.4% possessed a clear understanding of its nature. Nonetheless, 58.6% expressed support for the introduction of the Digital Euro in 2026, while 54.5% expressed their intention to utilize it from that year onwards.
- **The fourth question** aimed to ascertain the participants' perception of the importance associated with the key characteristics of the Digital Euro. A significant majority of 76.7% regarded it as highly important for the Digital Euro to be accessible free of charge. Furthermore, 86.9% emphasized the significance of maintaining the privacy of payment information, while an equal percentage of 86.8% stressed the importance of ensuring the safety of data in terms of protection. Ease of use was highlighted by 77.8% of respondents as an important characteristic. Regarding the usability of the Digital Euro, a substantial 86.9% of participants underscored the importance of it being accepted across all European Union (EU) countries. Additionally, 79.8% considered the ability to use the Digital Euro at point-of-sale (PoS) terminals as a significant aspect. Furthermore, 77.8% of respondents emphasized the importance of the Digital Euro not being reliant on internet access for its usage. Instant crediting to the recipient was deemed important by 88.8% of participants. Compatibility with chip cards was valued by 79.8% of respondents, while 85.9% stressed the importance of the Digital Euro being usable with smartphones.
- **The fifth question** sought to ascertain the participants' anticipated utilization of the Digital Euro. 50.6% of respondents expressed their intention to utilize the Digital Euro within a crypto wallet. Additionally, 68.7% revealed their plan to employ the Digital Euro for e-commerce transactions. Moreover, 62.6% stated their intention to use the Digital Euro at point-of-sale (PoS) terminals. Regarding peer-to-peer transactions, 66.7% of participants indicated their preference to utilize the Digital Euro for payments between individuals. Furthermore, 36.4% expressed their inclination to employ the Digital Euro for government-related payments. In terms of cross-border transactions, 62.6% of respondents revealed their intention to use the Digital Euro for such purposes.
- **The sixth question** aimed to explore the participants' anticipated methods of obtaining Digital Euro. A significant proportion of 68.7% of participants envisioned obtaining Digital Euro through a direct link with their bank account. Additionally, 73.8% anticipated acquiring Digital Euro by making payments with a card. Regarding alternative methods, 50.5% of respondents expected to obtain Digital Euro through ATM fiat ramp-up. Moreover, 75.5% anticipated receiving Digital Euro through direct debits to their Digital Euro account, such as salary or individual payments. Furthermore, 56.6% of participants expressed their expectation of receiving Digital Euro through direct credits to their Digital Euro account, such as loans.
- **The seventh question** aimed to inquire about the participants' preferred storage methods for Digital Euro. A notable percentage of 63.5% expressed a preference for centralized storage, where the Digital Euro would be recorded in the central bank's ledger. Additionally, 50.5% of participants indicated a preference for decentralized payment cards as a means of storing Digital Euro. Furthermore, 58.6% expressed a preference for decentralized smart devices as a storage option for Digital Euro. On the other hand, 38.4% indicated a preference for decentralized cold wallets for storing Digital Euro. Interestingly, 41.4% of respondents expressed a preference for a combined approach, utilizing both centralized and decentralized methods for storing Digital Euro.

5. Discussions and conclusions

Based on the presented scenario and the data analysis, several follow-up conclusions can be drawn regarding the participants' awareness, understanding, opinions, and intentions related to cryptocurrencies and the Digital Euro. These conclusions provide valuable insights into the potential adoption and acceptance of the Digital Euro and can inform future research, policy decisions, and implementation strategies.

Firstly, the findings indicate a relatively high level of awareness among the participants regarding cryptocurrencies, CBDCs, and stablecoins. The majority of respondents have heard about these concepts, suggesting that they have gained some prominence in public discourse. However, a comprehensive understanding of these digital assets remains limited, with only about half of the

participants demonstrating a clear understanding. This emphasizes the need for educational initiatives and awareness campaigns to enhance public knowledge and comprehension.

Furthermore, the participants' opinions on the characteristics of cryptocurrencies reveal a diverse range of perspectives. While many recognize cryptocurrencies as valuable investments, there is some skepticism regarding their use as a medium of payment. The perception of cryptocurrencies facilitating illicit activities also raises concerns and highlights the importance of addressing regulatory frameworks and promoting responsible use within the digital asset ecosystem.

Regarding the Digital Euro, the findings suggest a significant level of awareness among the participants, with three-quarters of them having heard about it. However, there is a gap in understanding, as less than half possess a clear comprehension of its nature. This highlights the need for effective communication and educational campaigns to ensure a better understanding of the Digital Euro's benefits, functionalities, and implications.

Encouragingly, most participants express support for the introduction of the Digital Euro in 2026, indicating a positive reception and willingness to embrace this digital currency. Additionally, more than half of the respondents intend to utilize the Digital Euro from 2026 onwards, indicating potential demand and adoption. These findings indicate a favourable environment for the successful implementation and acceptance of the Digital Euro in the future.

The participants' perceptions of the important characteristics of the Digital Euro provide valuable insights for its design and implementation. Accessibility, privacy of payment information, data protection, ease of use, cross-border usability, and instant crediting to the recipient emerge as key priorities for the participants. These findings highlight the importance of designing the Digital Euro with user-friendly features, robust security measures, and seamless interoperability to meet user expectations and ensure widespread adoption.

The anticipated usage patterns of the Digital Euro reflect its potential versatility and utility across various domains. The participants express intentions to utilize the Digital Euro for e-commerce transactions, point-of-sale payments, peer-to-peer transfers, government-related payments, and cross-border transactions. These findings underscore the potential role of the Digital Euro in facilitating seamless and efficient digital transactions across different sectors of the economy.

Regarding the methods of obtaining and storing the Digital Euro, the participants exhibit preferences for convenience, ease, and security. Direct links with bank accounts, card payments, and direct debits or credits to Digital Euro accounts emerge as the most anticipated acquisition methods. Moreover, a mix of centralized and decentralized storage methods is preferred, with participants showing interest in centralized ledger records, payment cards, smart devices, and cold wallets. These preferences highlight the importance of providing diverse options and ensuring a seamless user experience in acquiring and storing the Digital Euro.

In conclusion, the findings suggest a growing awareness and interest in cryptocurrencies and the Digital Euro among the surveyed participants. However, there is a need for continued educational efforts to improve understanding and address concerns. The overall positive attitudes, support for the Digital Euro, and anticipated usage patterns indicate a promising environment for its adoption and integration into the digital economy. The insights from this study can guide policymakers, central banks, and developers in shaping the design, implementation, and communication strategies for the successful introduction and acceptance of the Digital Euro.

The findings from the data analysis shed light on various aspects that indicate the positive impact of the digital euro on enhancing financial inclusion and accessibility for individuals across different demographics.

Firstly, the widespread awareness of cryptocurrencies, CBDCs, and stablecoins among the participants suggests a growing interest and engagement with digital financial assets. This indicates a general openness towards digital forms of money and a willingness to explore alternative financial instruments beyond traditional banking systems.

Furthermore, the participants' intentions to utilize the digital euro for various purposes, such as e-commerce transactions, peer-to-peer payments, and cross-border transactions, indicate the potential of the digital euro to facilitate seamless and efficient financial interactions. This can particularly benefit individuals who have limited access to traditional banking services or face barriers in conducting cross-border transactions due to high fees or complex processes. The digital euro's ease

of use and acceptance across European Union (EU) countries can foster financial inclusion by providing individuals with a reliable and accessible digital payment option.

Moreover, the findings regarding the anticipated methods of obtaining and storing the digital euro highlight the importance of offering diverse and user-friendly options. The preference for direct links with bank accounts, card payments, and direct debits or credits to digital euro accounts demonstrates the need for inclusive financial infrastructure that integrates with existing banking systems. By leveraging established financial channels and technologies, the digital euro can leverage the infrastructure already in place, making it more accessible and inclusive for individuals with varying financial backgrounds and preferences.

Additionally, the emphasis on privacy, data protection, and instant crediting to the recipient underscores the importance of building trust and confidence in the digital euro. These features can address concerns related to financial security and privacy, particularly for individuals who may have been hesitant to engage with digital financial assets in the past. By incorporating robust security measures and ensuring privacy in digital transactions, the digital euro can create a safer and more inclusive financial environment for all users.

However, it is crucial to acknowledge that while the data indicates positive potential for financial inclusion through the digital euro, certain challenges and considerations need to be addressed. These include ensuring equal access to digital infrastructure, promoting digital literacy and education, and addressing potential barriers for marginalized or underserved communities. It is essential to implement inclusive policies and initiatives that bridge the digital divide and empower individuals from all socioeconomic backgrounds to participate in the digital economy.

In conclusion, the data suggests that the digital euro has the potential to enhance financial inclusion by providing individuals with accessible, secure, and user-friendly digital payment options. By leveraging the advantages of digital currencies and addressing the needs and preferences of diverse user groups, the digital euro can contribute to a more inclusive financial system that empowers individuals and promotes economic participation. However, it is crucial to implement comprehensive strategies that address barriers and ensure equitable access to digital financial services to truly maximize the impact of the digital euro on financial inclusion.

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