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THE EMERGENCE OF THE DIGITAL EURO AND ITS ROLE IN THE EVOLUTION OF EUROPEAN PAYMENTS

APARIȚIA EURO DIGITAL ȘI ROLUL SĂU ÎN EVOLUȚIA SISTEMELOR DE PLATĂ EUROPENE

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Abstract: *Euro digital reprezintă una dintre cele mai semnificative inovații din istoria politicii monetare a Uniunii Europene. În contextul creșterii adoptării globale a monedelor digitale ale băncilor centrale (CBDC), Banca Centrală Europeană (BCE) a demarat un program structurat, multifazic, destinat explorării, proiectării și potențialei introduceri a unui CBDC de tip retail pentru cetățenii zonei euro. Acest articol examinează motivațiile strategice care stau la baza Euro digital, cadrul instituțional și legislativ care ghidează dezvoltarea acestuia, foaia de parcurs cuprinzătoare a UE din 2021 până la implementarea deplină, precum și implicațiile mai largi asupra sistemelor europene de plăți, incluziunii financiare, suveranității monetare și interoperabilității transfrontaliere. Bazându-se pe surse primare ale BCE, BIS și FMI, articolul susține că Euro digital depășește cu mult cadrul unei simple inițiative tehnologice, el reprezintă un instrument geopolitic și economic menit să remodeleze viitorul monedei în Uniunea Europeană.*
Cuvinte-cheie: *Euro digital, CBDC, BCE, zona euro, CBDC retail, incluziune financiară, suveranitate monetară, instrument economic*
JEL CLASSIFICATION: E42, E58, G21

INTRODUCTION

The global financial system is undergoing one of its most profound transformations since the advent of electronic interbank payments in the 1970s. The gradual decline in the use of physical cash accelerated by the COVID-19 pandemic, together with the rapid expansion of private digital payment instruments, is prompting central banks to rethink the nature and role of public money in the digital era. In this context, the European Central Bank (ECB), responsible for price stability and safeguarding the euro area's financial system, is exploring the introduction of a Digital Euro. This would be a central bank issued digital currency, accessible to households and businesses across the euro area. Unlike cryptocurrencies or stablecoins, it would constitute a direct liability of the ECB, aiming to combine the safety and finality of central bank money with the convenience of modern digital payments.

The debate goes beyond technical or operational aspects. It concerns the future architecture of European monetary sovereignty, the competitiveness of European financial markets, and the capacity of public institutions to preserve central bank money as the foundation of the monetary and financial system in an increasingly privatized digital payments environment. First, the article examines how declining cash usage and the rise of private digital payments are reshaping the role of public money in the euro area and driving the consideration of a Digital Euro. Second, it analyses the ECB's rationale and design principles for the Digital Euro, particularly in comparison with cryptocurrencies and stablecoins. Third, it assesses the implications of a Digital Euro for European monetary sovereignty, financial market structure, and the anchoring role of central bank money. Fourth, it develops an integrated qualitative policy assessment of the Digital Euro, building an analytical framework that situates it within the global evolution of central bank digital currencies and its consequences for the future of payments in Europe.

CONTENT

A concise overview of the sources used.

The concept of central bank digital currency is not new. As early as 1987, James Tobin proposed the invention of "deposited currency accounts" at the Federal Reserve, anticipating many debates surrounding CBDCs today. (Tobin, 1985). However, modern CBDC debate was triggered by three aligning events: the post 2008 financial crisis rethinking monetary architecture, the emergence of Bitcoin in 2009 and the subsequent expansion of cryptocurrencies and the 2019 announcement of Facebook's Libra (later Diem) stable coin project, which raised unheard of challenges to monetary sovereignty.

As early as 2020, ECB President Christine Lagarde indicated the need to explore the possibility of a digital euro, presenting it not only as a matter of technological innovation, but also as an issue of monetary sovereignty. (Lagarde, 2020) This direction became more concrete in October 2021, when the ECB's Governing Council initiated the investigation phase of the Digital Euro project. This phase evolved a two year period dedicated to research, consultation, and the development of potential technical frameworks.

Description of research methods used.

Methodologically, the article employs a qualitative policy analysis based exclusively on secondary data. It does not rely on primary data collection, surveys, or econometric modelling. The research draws on three main categories of sources: (i) primary institutional documents, including ECB reports, SPACE consumer payment surveys, and BIS publications on CBDC architecture; (ii) academic literature that frames structural risks and monetary policy implications; and (iii) comparative secondary sources that position the Digital Euro within the broader global CBDC landscape.

The results obtained.

The Bank of International Settlements (BIS) defines a CBDC as a digital form of central bank money that is different from balances in traditional reserve or settlement accounts. (BIS, Central bank digital currencies: foundational principles and core features, 2020) Academic research distinguishes between wholesale CBDCs which are restricted to financial intermediaries for interbank settlements and retail CBDCs, which are accessible to the general public as a substitute for or to complement physical cash. Digital Euro is anticipated as being a retail CBDC.

The acceleration of CBDC research globally is revealed by BIS data, by 2024, over 130 countries representing more than 98% of global GDP were exploring this concept, with numerous countries including China (e-CNY), the Bahamas (Sand Dollar) and Nigeria (eNaira) having already launched operational systems. (Council, 2025).

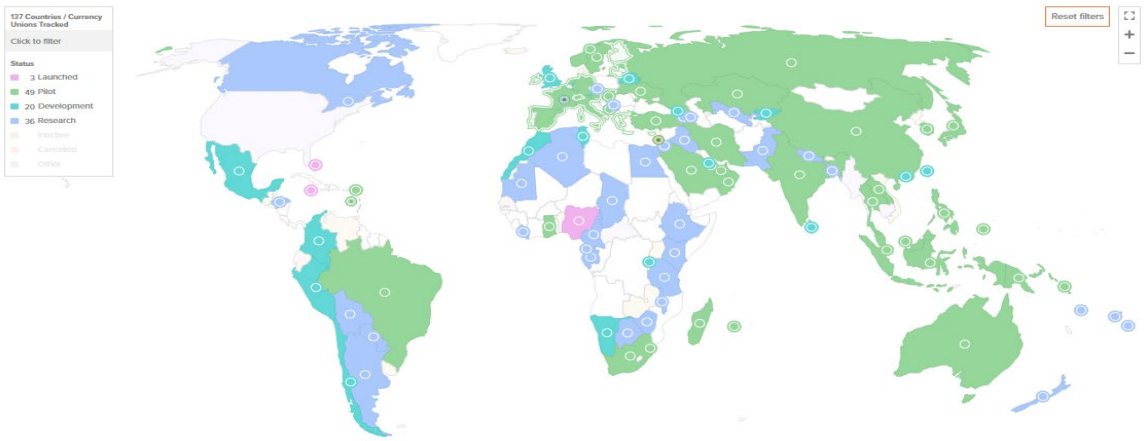


Figure 1. Worldwide CBDC Stages based on Atlantic Council Tracker July, 2025.

Source: Atlantic Council, CBDCs tracker, last update July, 2025, available at: www.atlanticcouncil.org/cbdctracker.

Understanding the digital euro requires examining the context of payment behavior across the euro area. The ECB's SPACE (Study on the Payment Attitudes of Consumers in the Euro Area) surveys, conducted in 2022 and 2024 after the pandemic, provide the most comprehensive comparative database on European payment habits. First, the use of cash across Europe has dropped significantly. Data from the SPACE indicate that income received in cash accounted for 85% in 2022, an average across all 19 euro area member states. The below data reveal a clear geographic gradient. At one extreme, Finland leads with 96% of consumers receiveing none of the income transactions in cash, followed closely by Estonia (95%), France, Slovenia, the Netherlands, and Belgium all at 94%. These economies have largely completed their shift to fully digital income flows. In the middle of the spectrum, countries, such as Italy, Luxembourg, and Germany, cluster around 86-87% reflecting a partial but substantial digitalization. At the other end, Greece, records the lowest share at 65% with Cyprus 71% and Slovakia 76% also lagging begind, indicating a considerably stronger attachment to physical currency in Southern and Eastern member states.

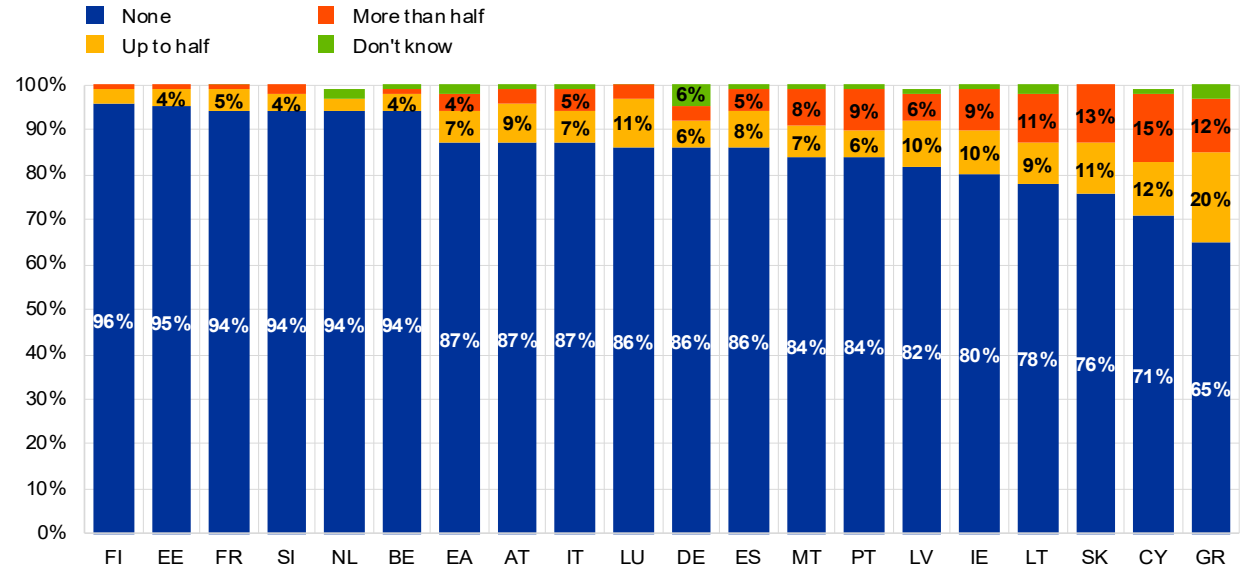


Figure 2.Share of regular income received in cash, 2022 after pandemic.

Source: Study on the payment attitudes of consumers in the euro area (SPACE). The data are for the euro area (19 countries as of 2022) - Chart 61.

	FI	EE	FR	SI	NL	BE	EA	AT	IT	LU	DE	ES	MT	PT	LV	IE	LT	SK	CY	GR	Avg
None	96%	95%	94%	94%	94%	94%	87%	87%	87%	86%	86%	86%	84%	84%	82%	80%	78%	76%	71%	65%	85%

Figure 3.Average share of regular income of none received in cash based on the above figure.

Source: Compiled by author based on ECB data from 2024.

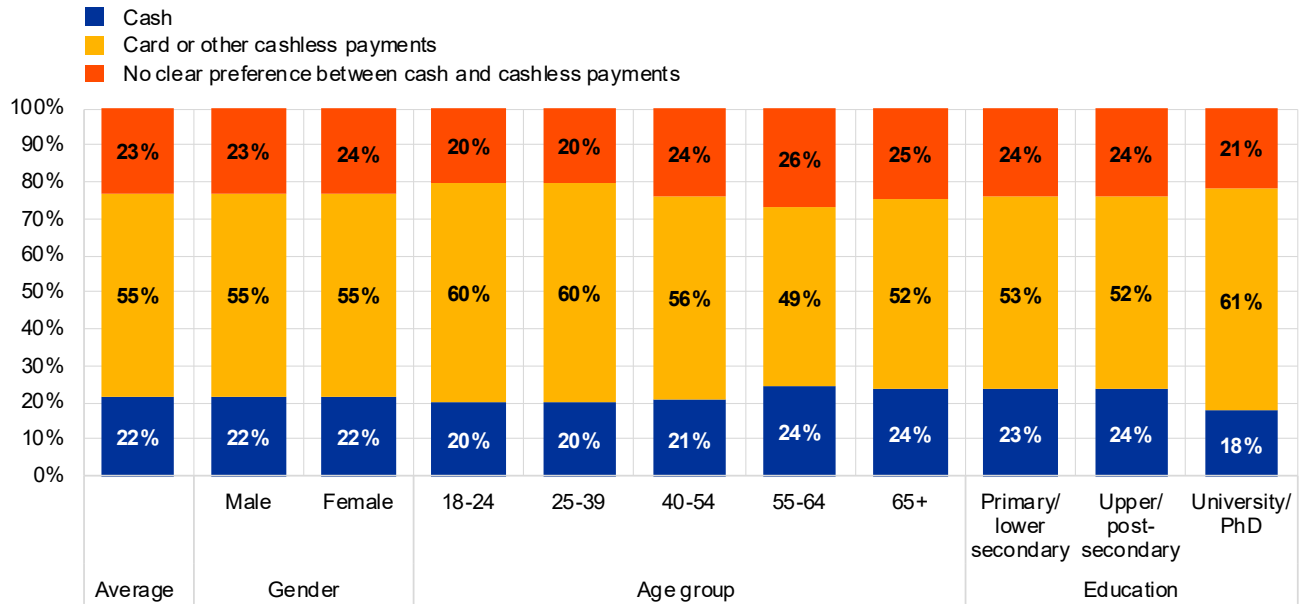


Figure 4. Preferences for cash or cashless payment methods in shops, breakdown by demographics, 2024.

Source: Study on the payment attitudes of consumers in the euro area (SPACE). The data are for the euro area (20 countries as of 2024) - Chart 24.

This behaviour shift is further confirmed when examined through a demographic lens. As shown in above figure, based on the SPACE survey data for the euro area (19 countries, 2024), preferences for cashless payments methods in shops are consistenly dominant across all demographic groups, yet notable patterns emerge. On average, 55% of euro consumers prefer card of other cashless payments, against only 22% who still prefer cash, with 23% expressing no clear preference. Gender plays virtually no role in this divide, male and female respondents report identical preferemces at 22% cash and 55% cashless, suggesting that the digital payments shift is broadely societal rather than gender specific. Taken together, these figures paint a clear picture: the transition away from cash is not a marginal phenomenom confined to tech savy minoritirs, it is a structural, cross demographic trend reshaping how European citizens transact daily, and one that demands a sovereign digital response.

The European Central Bank holds a unique position in the architecture and development of the Digital Euro project. Established under the Treaty on the Functioning of the European Union (TFEU, 2012) and the regulation of the European System of Central Banks, the ECB holds the exclusive right to authorise the issuance of euro banknotes and coins, the primary mandate of price stability and responsibility for the smooth operation of paument systems.

The Eurosystem which is comprising the ECB and the 21 national central banks (NCBs) of euro area member states (EU, 2026) forms the institutional pillar of the Digital Euro project. The ECB acts as an infrastructure owner and technical operator of the general ledger, while NCBs are foreseen as the primary interface with national financial ecosystems. This two tier model mirros the existing relationship between central bank money and commercial bank money, citizens would access the Digital Euro not directly from the ECB, but throughout supervised payment service providers (PSPs) which are commercial banks, FinTech firms and e-money institutions. (BIS, 2024).

The ECBs governance role includes four dimensions: first, monetary policy instrument ensuring the Digital Euro complements rather than disturbs the monetary transmission mechanism; second, payment system supervisor mantaining the integrity and resilience of European payment infrastructure; third, regulatory player collaborating with the European Commission, European Banking Authority (EBA) and national authorities; and four, technological innovator developing and exploring the core infrastructure, privacy and offline payment capacities. (Næss-Schmid, 2023).

The path towards a potential fully developed Digital Euro has followed and follows in continuing a deliberate, phased plan, combining technical experiments with legal and institutional preparation. Table 1 summaries key milestones in the process of implementation of a Digital Euro.

Table 1. Digital Euro implementation roadmap

Phase	Timeline	Key developments
Pre-project phase	2021-2023	ECB reflection and consultation
Investigation phase	2023-2025	Design and use cases
Preparation phase (Part 1)	2023-2026	Rulebook, provider selection, experiments
Preparation phase (Part 2)	2025-2027	Technical readiness and pilot testing
Issuance phase	2029+	Public launch subject to Council decision, treaty reaquirements and legislative implementation

Source: Author synthesis based on article from Journal of Risk and Financial Management (Ioannis Tsouris, 2025).

Table 2.Proposed design parameters of the digital euro

Design parameters	Key developments
Form	Retail CBDC (for citizens and businesses)
Technology	ECB-operated ledger by supervised
Holding limit	3,000 EUR per resident
Offline mode	Chip based offline payments (near field communication/NFC)
Programmability	Conditional payments with no expiry dates
Interest	Non-remunerated (no interest paid to holders)
Coverage	Euro Area 21 member states with the potential extension to non euro EU

Source: European Commission Regulation Proposal (EuropeanCommission, 2023) *Parameters remain subject to legislative finalisation.*

The holding limits per cap in amount of 3,000 EUR intended to prevent large scale bank disintermination has been among the most debated design choices. (Bidder, 2024). Critics argue that it is insufficient to guarantee financial stability in hard, stressed scenarios, while others argue that it achieves an appropriate balance between monetary policy control and public utility. (Bindseil, 2024). The introduction of the Digital Euro would represent the most significant structural change to European retail payments since the establishment of SEPA (Single Euro Payments Area) between 2008 and 2016. It's impact would be felt across four primary big directions.

First, **monetary sovereignty and strategic autonomy** – currently, international card schemes make up about 61% of card payments in the euro area, while domestic schemes account for the remaining 39%, highlighting the strong reliance on global providers. (ECB, Report on card schemes and processors, 2022). The majority of card payments in Europe are processed through non-European networks, mainly Visa and Mastercard, while widely used digital wallets such as Apple Pay and Google Pay are controlled by US companies. A digital euro would offer a Europe wide payment option that operates within the EU's own institutional framework, reducing reliance on external providers and reinforcing the EU's capacity to enforce and avoid financial sanctions.

Second, **financial inclusion** - even though access to banking has improved in recent years, around 13 million adults in the euro area are still unbanked or have only limited access to financial services, particularly in Southern and Eastern Europe. (ECB, Digital financial inclusion, 2023) The Digital Euro accessible via basic smartphone apps or even offline through prepaid cards could offer a universal means of payment. This would be especially beneficial for migrant communities that rely on remittances.

Third, **payment system resilience** – the ECB's design includes offline functionality using Near Field Communication (NFC) enabled devices, allowing payments to continue during internet outages, power failures, or cyber incidents. This adds an extra layer of robustness compared to fully private digital payment systems, which may not function during widespread disruptions

Fourth, **competitive dynamics** - under the European Commission's proposed regulation, merchants above certain thresholds would be required to accept the Digital Euro, which could reshape the payment acceptance landscape. While Payment Service Providers (PSPs) would receive distribution fees from the ECB, their traditional income from card transaction fees and foreign exchange margins could come under pressure. Academic studies suggest that strong network effects may, over time, encourage merchants, especially in high-volume, low margin retail sectors to adopt the Digital Euro more widely. (Fernández-Villaverde, 2020)

Bank disintermediation is clearly seen as the most significant structural risk. In a stress situation, such as a financial crisis or a sudden loss of confidence, the convenience of the Digital Euro could encourage people to move their funds quickly out of commercial bank deposits. This could intensify bank runs. Academic simulations by (Brunnermeier, 2019) and (Fernández-Villaverde, 2020) suggest that even relatively small shifts, on the order of 5–10% of household deposits could noticeably reduce banks' ability to lend and allocate credit. While proposed measures such as holding caps and a non-remunerated design help mitigate this risk, they do not fully remove it, especially in extreme scenarios.

Privacy is another complex issue unique to central bank digital currencies. Unlike cash, both token-based and account-based digital systems inevitably generate data. The ECB's proposed tiered privacy approach providing cash like anonymity for small offline NFC payments and pseudonymised data for online transactions offers a balanced solution. However, its alignment with GDPR principles, particularly data minimisation, remains a subject of debate.

Table 3.Risk assessment for Digital Euro

Risk	Level	Key developments
Bank disintermination	High	Holding limit, 3000 EUR per resident
Privacy breach	Medium	Tiered anonymity, offline NFC payments, GDPR compliance
Cybersecurity threats	High	Decentralised system and advanced encryption that can resist attacks
Financial exclusion	Medium	Offline/physical alternatives and allowing access through regulated payment providers
Geopolitical fragmentation	Medium	Different digital currencies work together across borders
Monetary policy transmission weakening	Low-med	Tools like holding limits are used to prevent the digital euro from weakening the central bank's control over money supply and policy
Constraiment on technology	Low	Open systems and neutral providers help avoid dependence on a single technology or vendor

Source: Authors' synthesis based on (Carstens, 2021) (EuropeanCommission, 2023).

Cybersecurity risks are also significant due to the central role of ECB infrastructure. A successful attack on the Digital Euro system would not only disrupt payments but could also damage trust in the euro itself. The ECB has indicated plans to use quantum-resistant cryptography to strengthen security, but since quantum computing threats are still evolving, this introduces some uncertainty into the long-term resilience of the system.

CONCLUSIONS AND RECOMMENDATIONS

This article has traced the development of the Digital Euro from its theoretical foundations and real world payment context through to its institutional design, implementation roadmap, and the expected benefits and risks. The Digital Euro represents a more than just a new form of payment, it represents a broader shift in how Europe envisions the future of money in an increasingly digital world. At its core, it is a response to structural changes in payment behaviour and the growing influence of private, often non-European, financial intermediaries. But beyond its technical design, it raises deeper questions about control, sovereignty, and the role of public institutions in shaping the monetary system.

The shift away from cash in the euro area is neither marginal nor temporary. SPACE data shows that 85% of consumers did not receive income in cash in 2022, while the preference for cashless payments reached 55% across all demographic groups in 2024. This strongly supports the case for a sovereign digital payment instrument.

Second, the current European payments landscape reveals a clear strategic vulnerability. With 61% of card transactions processed through non-European networks, the digital euro appears less as a technological option and more as a strategic necessity.

Third, the proposed design parameters represent a balanced but not tension-free solution. The €3,000 cap reduces but does not eliminate the risk of disintermediation. The tiered privacy model only partially addresses GDPR concerns and the 2029+ timeline leaves a prolonged window of uncertainty.

Fourth, financial inclusion requires more targeted policy attention. The 13 million unbanked adults are concentrated in member states that already lag behind the euro area average in digital infrastructure.

Ensuring a smooth and effective rollout of the digital euro requires addressing several key priorities. One of the most pressing is the need to close the remaining gaps between GDPR requirements and the proposed privacy framework before the preparation phase is completed, as clear and consistent data protection standards will be fundamental in building public trust. At the same time, greater investment in public communication is essential, particularly in member states with lower levels of digital adoption, since even the most well-designed system may struggle to gain acceptance without broad public understanding.

Another important consideration is the €3,000 holding cap, which should not be treated as a fixed parameter but instead reviewed regularly, especially under stress scenarios, to ensure it continues to strike the right balance between financial stability and usability. In parallel, efforts to develop interoperability should advance alongside domestic implementation, including both non-euro EU countries and emerging international CBDC systems, so that the digital euro remains fully compatible within an increasingly interconnected global financial landscape.

Ultimately, the digital euro represents Europe's most significant monetary policy decision since the introduction of physical euro cash. While the institutional framework is robust, the empirical justification strong, and the strategic rationale convincing, its success will depend on political will, legislative precision, and effective execution in transforming a well-designed concept into a trusted and universally accessible public monetary instrument for the decades ahead.

LIMITATIONS

This analysis relies solely on secondary data available up to the end of 2025. As the digital euro project is still evolving, key design features and legislative elements may change. Future research incorporating pilot outcomes and finalized regulatory frameworks would provide a more robust empirical basis for these conclusions.

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