

Can a Central Bank Digital Currency Overcome Structural Barriers? The Case of the Digital Euro

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1. Introduction

The debate surrounding Central Bank Digital Currencies (CBDCs) is gaining momentum across the globe. Presently, 78 countries and currency unions are actively exploring their own retail CBDC projects. Among these, three have successfully launched their digital currencies, while 31 countries are currently in the pilot phase of implementation.⁴⁷

Among the emerging CBDC projects, the digital euro initiative stands out as particularly noteworthy. The European Central Bank (ECB) and the euro area national central banks launched the investigation phase of the digital euro project in October 2021 (ECB, 2021). This was followed two years later with the launch by the ECB Governing Council of two-year preparation phase, which will last until 31 October 2025 (ECB, 2023). Moreover, in June 2023, the European Commission published a proposal for a digital euro Regulation, which is currently the only fully-fledged CBDC legislation being formally tabled and debated in the G7 countries.⁴⁸

46. The views expressed in this paper do not necessarily reflect the position of the European Central Bank (ECB). This contribution is intended solely for academic and discussion purposes and should not be interpreted as reflecting the ECB's position on the design of the digital euro.

47. According to the Atlantic Council Central Bank Digital Currency Tracker: [https://www.atlanticcouncil.org/cbdctracker/#:~:text=134%20countries%20%26%20currency%20units%2C%20representing,advanced%20stages%20of%20CBDC%20development](https://www.atlanticcouncil.org/cbdctracker/#:~:text=134%20countries%20%26%20currency%20units%2C%20representing,advanced%20stages%20of%20CBDC%20development.). Status: 3 Launched (Jamaica, The Bahamas, Nigeria), 31 Pilot, 21 Development, 12 Research, 9 Inactive, 2 Cancelled.

48. On 26 June 2023 the European Commission published its Single Currency Package: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_3501. This legislative initiative includes new proposals to support the use of cash across the euro area and to propose a framework for a possible new digital form of the euro.

The ECB has launched the digital euro project to ensure that central bank money keeps pace with changing users' preference and the digital transformation seen in other payment forms (Lagarde and Panetta, 2022). As people increasingly prefer digital payments and online shopping, the importance of cash in payments is declining (ECB, 2022). If this trend continues, central bank money risks losing its role as the 'monetary anchor' in the digital age, potentially undermining the stability of the financial system. Public confidence in private money relies on the assurance of its one-to-one convertibility with the most secure form of money in the economy: central bank money (Panetta, 2021).

By adapting central bank money to evolving consumer preferences, the digital euro would essentially act as a digital form of cash and – together with traditional cash – would ensure that citizens can continue to trust in the monetary anchor behind their digital payments.

The digital euro project is not only one of the most advanced retail CBDC projects in the G7 economies, but it also possesses unique characteristics that set it apart from other CBDC initiatives globally.

In particular, the digital euro aims to address the specific challenges of a jurisdiction like the euro area, which is a monetary union formed from the integration of national markets with the launch of the euro in 1999. Despite significant integration of the euro retail payments market in recent years, European payment solutions remain fragmented along national lines. This issue has not yet been effectively addressed by the European private actors, leaving international card schemes to ensure that Europeans can make cross-border payments within the monetary union. This fragmentation presents a unique challenge compared to other jurisdictions exploring CBDC projects and appears to be a key driver for the digital euro initiative.

This paper delves into the digital euro project, focusing specifically on the challenges a two-sided marketplace and of fragmented European payment landscape. By examining these dimensions in detail, the paper presents new evidence and insights on how the digital euro can overcome these structural barriers and foster strategic autonomy, integration and innovation.

The retail payment market: a two-sided marketplace

Retail payment systems (like payment platforms more generally) operate as two-sided markets, connecting consumers and merchants for money

exchanges (Rochet and Tirole, 2002). The two sides —supply and demand— have distinct needs and motivations for using the service. Yet their interdependence is what eventually determines the final outcome.

To a large extent, the success of retail payment systems as two-sided markets relies on so called network effects. The latter, refer to the idea that the perceived value of a product or service increases with the number of users—essentially, the larger the network, the greater the value. This increase in value is often exponential, as every new user introduces potential new interactions with all existing users.⁴⁹

When consumers consider using a given payment method, they evaluate the number of merchants that accept the payment methods offered by that system. Conversely, merchants' advantages from participation grow in proportion to the number of consumers utilizing the payment instruments associated with the system. This interdependence creates a strong reciprocal demand between the two sides of the market, consumers and merchants.

A closer examination of the retail payments market reveals two types of network externalities, arising from its two-sided nature (Katz and Shapiro, 1985). Direct network externalities demonstrate how an individual's likelihood of holding and using a given payment method is influenced by the decisions of other users of that method. Conversely, indirect network effects demonstrate that the willingness to adopt and utilize a particular payment method is influenced by the extent to which merchants accept that payment option (Krivosheya, 2021).

As a result of this market structure, an innovative new entrant into a market governed by network effects often faces significant challenges in establishing itself. The core difficulty lies in the fact that the value of the service provided remains low until a substantial active user base is developed.

49. The concept of network effects originated in the early 20th century with the telephone. Theodore Vail, Bell Telephone's first post-patent president, argued for a monopoly on telephone networks using this idea. Later, Robert Metcalfe, inventor of Ethernet, popularized it through Metcalfe's Law, which states that a network's value is proportional to the square of its connected users. For example, with just two telephones, there is only one possible connection (1 to 2). Introducing a third telephone adds two more possible connections (1 to 3 and 2 to 3). Adding a fourth telephone expands the network further, creating three additional connections (1 to 4, 2 to 4, and 3 to 4). Therefore, each new participant significantly enhances the overall value of the network by exponentially increasing the number of possible interactions.

This creates a classic chicken-and-egg dilemma: without a critical mass of users, the platform cannot generate sufficient value to attract new users, yet it cannot scale effectively without that initial user base.

This challenge is particularly relevant in the context of payment platforms, as well as more widely recognized services such as social networks like WhatsApp, Facebook, and Instagram. For these platforms, the user experience improves dramatically as more participants join, which in turn attracts even more users. However, this positive feedback loop can be difficult for new players to initiate and ultimately, the inability to scale can stifle innovation and limit competition within the market, reinforcing the dominance of established players.

This theoretical framework is crucial for analyzing significant developments in the retail payment landscape, particularly within the Eurozone, but also beyond. For example, the lack of competition in the card sector presents a critical issue in the United Kingdom⁵⁰, the United States⁵¹, Canada⁵² and Europe.

However, the European context is characterized by unique fragmentation in the retail market, which complicates the ability of private actors to navigate the structural barriers of a two-sided market. This fragmentation poses additional challenges in providing a payment solution that is effective across the entire Euro area.

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50. In May 2024, the UK Payment Systems Regulator published a report saying that Mastercard and Visa – the two biggest card schemes – dominate the UK card payment market, lacking effective competition and leading to substantial fee hikes. The report reveals that over the past five years, scheme and processing fees have surged by more than 30 per cent in real terms, without corresponding improvements in service quality, yet, the UK businesses have little choice but to pay increased fees as Mastercard and Visa cards account for 95% of transactions using UK-issued cards, while non-card payment methods are often not effective competitive alternatives for businesses. See PSR (2024), “Market review of card scheme and processing fees interim report”, May 2024: <https://www.psr.org.uk/news-and-updates/latest-news/news/psr-provisionally-finds-that-the-cards-schemes-do-not-face-effective-competition-in-the-supply-of-scheme-and-processing-services-to-acquirers/>
51. In June 2024, A U.S. judge rejected a \$30 billion antitrust settlement in which Visa and Mastercard agreed to limit fees they charge merchants that accept their credit and debit cards. Many merchants and trade groups including the National Retail Federation opposed the accord, saying card fees would remain too high, while Visa and Mastercard would retain too much control over card transactions.
52. In 2010, the Canadian Commissioner of Competition launched a case against the Visa and Mastercard associations alleging that the no-surcharge rule had an anticompetitive effect. While the Competition Tribunal dismissed the case on the grounds that the law regarding resale price maintenance did not apply, the Tribunal found evidence of market power and adverse effects on competition.

2. The euro area retail payment market: fragmentation along national lines and reduced competition

The Single Euro Payments Area (SEPA) was introduced in 2002 with the objective of overcoming the fragmentation that characterized non-cash payment systems at that time and harmonise the way cashless euro payments are made across Europe. Thereafter, SEPA was introduced for credit transfers in 2008, followed by direct debits in 2009, and instant credit transfers in 2017.⁵³

Despite its successes, SEPA has not fully addressed the evolving landscape of digital payments, which play an increasingly vital role in daily transactions. Specifically, there is no SEPA framework for point-of-sale interactions, including in-store, mobile, or e-commerce payments. Additionally, person-to-person (P2P) payment solutions continue to exhibit fragmentation, limiting their effectiveness and integration within the broader payment ecosystem (Cipollone, 2024b).

Despite advancements in infrastructure - such as the establishment of TARGET Instant Payment Settlement (TIPS)⁵⁴ - and regulatory initiatives - namely the adoption of the instant payment regulation (Regulation (EU) 2024/886) - the risk of not overcoming the current fragmentation in the electronic retail payment market remains very high. This issue is particularly evident when examining data on how people conduct digital transactions.

Card payments now represent the majority of retail transactions in the euro area by value. In terms of payment value, cards accounted for 46% of transactions, surpassing cash payments at 42% (ECB, 2022). Yet, while SEPA has effectively facilitated credit transfers and direct debits, national card schemes have not achieved cross-border integration.

Euro area users can only utilize their cards outside their home jurisdiction through partnerships with international card schemes, all of which are owned by non-European companies. Furthermore, in most of euro area countries (13 out of 20), national card schemes have been replaced entirely by these

53. European Payment Council, SEPA timeline: <https://www.europeanpaymentscouncil.eu/about-sepa/sepa-timeline>

54. 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.

international alternatives. Furthermore, in some jurisdictions where national card schemes remain operational, certain banks have determined that issuing cards under both the national and international schemes is no longer viable. Consequently, they have opted to offer only the international scheme, further strengthening the relevance of the latter.

This situation results not only in the necessity of using an international card scheme, for card payments within the monetary union. It also leads to diminished competition in the payments market, as international card schemes now account for nearly two-thirds (64%) of all electronically initiated transactions involving cards issued in the euro area.⁵⁵

The limited competition within the card payments sector has resulted in heightened fees for merchants, which ultimately affects end-users. Card schemes in the EU nearly doubled from 0.27% in 2018 to 0.44% in 2022 (EC, 2024). Although the European Union has implemented significant regulatory measures, such as the Interchange Fee Regulation, to address the issue of elevated fees in this constrained market, these interventions have not deterred scheme operators from compensating for their own and their issuers' revenue losses. Instead, they have shifted their focus to non-regulated aspects of the merchant service charge.⁵⁶

In this context, the Eurosystem has actively advocated for pan-European, market-driven solutions for retail payments at the point of interaction since 2019.⁵⁷ This initiative supports the development of European private solutions at various channels, including physical points of sale, mobile devices, and e-commerce platforms, all of which are subject to regulation at the European level.

Five years later, the anticipated emergence of a pan-European solution capable of competing with established players has not materialized. On the contrary, in the e-commerce sector, global non-European companies (like Paypal) have significantly expanded their footprint, thereby consolidating the

55. Elaboration based on data collected under Regulation (EU) No 1409/2013 of the European Central Bank on payments statistics (ECB/2013/43), as amended.

56. This includes increasing scheme fees, introducing new scheme fees, reclassifying cardholders from consumers to commercial accounts, transitioning consumers from debit to deferred debit (i.e., credit), and converting four-party schemes into three-party schemes. See Eurocommerce (2024).

57. The Eurosystem published in November 2023 its updated retail payments strategy, which was first developed in 2019 and then expanded in 2020. See ECB (2023b).

presence of international entities in this domain.⁵⁸

Furthermore, technology giants like Apple and Google have introduced payment solutions for both in-store and mobile commerce, which predominantly rely on international card schemes. This reliance further reinforces the market position of these global companies, but also creates further risks, as big techs entering payments could leverage their dominant positions in neighbouring markets and their closed ecosystems.⁵⁹

3. A digital euro as engine to foster strategic autonomy, integration and innovation

The increasing dependence on a small number of non-European global companies in the retail payment sector poses considerable challenges to European governance and sovereignty.

As these dominant firms exert substantial influence over payment systems, European countries face potential vulnerabilities regarding data privacy, and regulatory compliance. Moreover, the strategic decisions made by these global entities may not align with European values or regulatory frameworks, further complicating the governance landscape.

This dependence can result in reduced control over vital financial infrastructures that are integral to the daily lives of European citizens, like conducting digital payments. Addressing these concerns is crucial for empowering European policymakers to protect their economic interests and enhance the resilience of their payment systems. This scenario also challenges the EU's sovereignty in shaping its digital landscape and may hinder the implementation of policies aimed at promoting financial inclusion and consumer protection.

In light of these challenges, the development of a digital euro emerges as a strategic solution to ensure that the payment systems within the euro area align with the region's economic and social priorities. A digital euro would

58. See also Plooj, M. (2020).

59. For instance, Apple's significant market power in smart mobile devices and its dominant position in mobile wallet markets on the iOS operating system have raised concerns about anticompetitive behaviour. See Cipollone (2024a).

not only enhance the efficiency and security of transactions but also reinforce the ECB's role in maintaining monetary sovereignty for its jurisdiction.

However, the digital euro would go further by directly addressing the significant reliance on a limited number of non-European providers, which restricts competition and highlights the unique challenges of the European payment landscape, particularly the absence of pan-European retail payment solutions. Leveraging widespread accessibility and acceptance among both consumers and merchants as grated by the draft Regulation⁶⁰, the digital euro would accomplish this objective in three distinct, but self-reinforcing, ways.

Firstly, by transitioning central bank money to a digital format, the digital euro would align with other payment methods, enabling euro area citizens to make payments seamlessly anytime and anywhere within the region. the euro area, for all types of digital payments. The digital euro would accommodate a wide array of payment scenarios, from online transactions in e-commerce, to in-store purchases, and person-to-person payments, both online and offline. Moreover, the offline functionality of the digital euro would offer a level of privacy comparable to that of cash, thereby enhancing user privacy while simultaneously promoting resilience and financial inclusion within the euro area. Unlike current payment methods, a digital euro would provide a comprehensive solution designed to address the full spectrum of modern consumer needs. No existing payment system offers this combination of features and resilience, making the digital euro a uniquely advantageous option in the evolving landscape of retail payments.

Secondly, the digital euro would create a robust infrastructure supported by the Eurosystem and a comprehensive digital euro rulebook, establishing common standards across the EU acceptance network. This framework would enable private providers to achieve pan-European scale with their payment solutions, resulting in cost efficiencies and fostering a more integrated European payment market. The digital euro rulebook and infrastructure would serve as a catalyst for innovation, promoting the development of new value-added services by European companies tailored to the evolving needs of

60. The legislative proposed presented by the Commission would assign to the digital euro, like cash, the status of legal tender, which means that merchants located in the euro area would need to accept payments in digital euro from consumers. Moreover, the same legislative proposal foresees that all users would be able to open a digital euro account at any commercial bank or any other payment service provider, such as payment institutions and electronic money institutions.

consumers in the digital age. On one hand, the ability to utilize the open digital euro framework would ensure the necessary standardization that is currently lacking and impeding innovation. On the other hand, it would empower private retail payment solutions to introduce new products and functionalities on a broader scale immediately, enhancing euro area user access to new services and foster increased competition and innovation across the continent. In essence, a digital euro would offer an alternative infrastructure for routine transactions, which payment service providers and schemes, such as the European Payments Initiative, Bizum, or Bancomat, could leverage to implement instant payment-based solutions across the euro area (Cipollone, 2024c). This development would decrease reliance on non-European entities and enhance competition among European participants.

Last but not least, the mere existence of a digital euro as an alternative payment option could significantly enhance market equilibrium. Given the complexities associated with regulating payment networks, as discussed in the previous section, a digital euro—and CBDCs more broadly—could serve as a more effective tool for competition policy.⁶¹ It would do so by providing customers and merchants with a low-cost payment instrument, accepted as legal tender through the euro area. In doing so, the digital euro has the potential to lower the fees currently imposed by existing operators and address the limitations that antitrust lawsuits and regulatory measures have encountered in recent years.

4. Conclusions

The digital euro project is a pivotal move to enhance the euro area's strategic autonomy and monetary sovereignty, especially as digital payments become increasingly favored by its users.

The project stands at the forefront of transforming the European financial landscape by addressing the complexities of a two-sided marketplace and a fragmented European retail payment system. While the challenges posed by

61. For a discussion on how CBDCs can provide a payment platform that maximizes welfare, thereby offering a significant improvement over purely private platform outcomes, see Usher et al. (2021).

a two-sided marketplace are significant, the legal tender nature of the digital euro and its mandatory distribution, as proposed in the draft Regulation by the European Commission, will enable the digital euro to achieve widespread accessibility and acceptance among both consumers and merchants.

Such network effects would benefit not only the digital euro but also private initiatives, allowing them to develop their own services using the digital euro's standards and infrastructures. This would help overcome the fragmentation within Europe and address the current over-reliance on a few non-European players that characterize the euro area.

The digital euro also presents a unique opportunity to enhance Europe's strategic autonomy, particularly in the current context of global geopolitical shifts and increasing digitalization of economies. Furthermore, integrating the digital euro into the broader financial system can enhance the EU's competitive edge, positioning it as a leader in the digital economy.

Public-private partnerships will be crucial in driving innovation and ensuring that the digital euro remains adaptable to evolving market needs and technological advancements. Such collaboration is essential to achieving the digital euro project's goals of bringing central bank money into the digital era while fostering integration and securing a competitive advantage for Europe in the global digital economy.

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Proposal for a Regulation on the establishment of the digital euro
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