Central Banks Digital Currencies: Necessary, Multitasking Policy Instruments?

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1. Introduction

A large number of initiatives are underway to introduce Central Bank Digital Currencies (CBDCs). Currently, 134 countries, representing 98% of global GDP, are exploring a CBDC, 68 countries are in the advanced phase of exploration and the Bahamas, Jamaica and Nigeria have fully launched a CBDC. In the Numbers section, we map the level of advancement of CBDC projects by country.

Implementing a CBDC entails the digital extension of a currency issued by a sovereign central bank, alongside establishing a digital payment system utilizing this digital currency.

CBCDs are multi-tasking policy tools addressing a wide range of objectives. In the section on institutions, where we briefly summarize many of such initiatives, it emerges clearly that the goals pursued by central banks vary in emphasis and importance depending on the issuing country. These objectives can be distilled into five primary goals: (i) safeguarding monetary sovereignty and ensuring the effectiveness of monetary policy; (ii) maintaining financial stability; (iii) curbing the market power of private entities in digital payments; (iv) protecting the privacy and security of transactions; and (v) promoting the interoperability of payment systems.

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CBCDs imply direct public interventions in activities otherwise carried out by private sector players, e.g., digital money (i.e., cryptocurrencies and stablecoins) or carrying out payments (e.g., Visa and Mastercard). Consequently, they affect market configurations, turning them into mixed oligopolies. Mixed oligopolies are characterized by the co-existence of private and public players where the action of public ones, by pursuing other than typical market objectives, should, in principle, favour the achievement of socially optimal outcomes. These outcomes are usually also pursued and continue to be pursued through traditional instruments like regulation, supervision, or competition policies.

Therefore, it is useful to discuss CBDs with respect to the market failures they aim at mending and to the effectiveness of their mending action compared to other alternative public policy tools. In this editorial, we will follow this approach and rely on the many valuable insights from the articles collected on this issue of European Economy.

We conclude that if we consider each objective individually, there are no compelling arguments for CBDCs being superior to other policy tools. Nonetheless, as discussed, CBDCs can address multiple objectives at the same time. While CBDCs might not be the most effective tool for achieving specific individual goals, their effectiveness lies in the broad range of outcomes they can deliver. Moreover, they do not replace standard oversight, supervision, and anti-trust policies, possibly reinforcing their impact.

In addition, CBCDs also imply snowball effects. If they are accepted, used by market players, and rapidly spread (which is not a small if, as discussed below), they will be hardly reversible. This is not the case for all other policy tools that might achieve the same objectives, especially if they take the form of ex-post market interventions like competition policy and antitrust. Consider, for example, the impact CDBCs have on fostering competition. By directly changing market configurations into mixed oligopolies, they will not suffer the problems of potentially weakening and reverting the actions of competition and regulation authorities: capture, limited information, and partial commitment.

Nonetheless, it is important to acknowledge the significant costs associated with implementing and maintaining CBDCs, which warrants further detailed analysis. Although proper estimates are lacking, a CBDC entails fixed and

variable costs across several key categories, including infrastructure (most likely in the order of billions of euros for the case of a European CBDC), operations and maintenance, regulatory compliance, and public awareness.

As thoroughly discussed in this number of European Economy, the design of digital currencies also involves broader policy issues, especially for activities where a sizeable role of private agents may have other implications than pure market efficiency. For example, the issuance of digital coins by private organizations like the big digital platforms – e.g., Libra by Facebook, although it was never introduced – or the diffusion of cryptocurrencies may limit the scope and the effectiveness of monetary sovereignty by central banks, which is, of course, a matter of concern, with inherent risks for financial stability.

There are also considerable geopolitical issues. A first mover in the CBDC space could rapidly expand its influence and secure a dominant position in global payment systems. This dominance could, in turn, diminish the usage and relevance of other national currencies in international transactions and financial markets. This prospect is especially meaningful for currencies currently enjoying a central role in global finance, such as the US dollar and the euro. The digitalization of such currencies might favor a marginalization of national currencies in smaller jurisdictions. Or, in contrast, their dominance could indeed be challenged by other rapidly spreading digital currencies.

A key example of this geopolitical dynamic is the growing concern over the expansion of China's digital yuan. As China accelerates its development and deployment of a digital currency, it potentially positions the digital yuan to become a preferred medium of exchange in international trade, especially within regions heavily influenced by Chinese economic activity, such as Asia and parts of Africa. If the digital yuan were to gain widespread acceptance, it could challenge the dominance of the U.S. dollar and the euro in global trade and finance. This scenario alarms the U.S. Federal Reserve and the European Central Bank (ECB), threatening to erode their monetary sovereignty and influence in global markets (see Angeloni and Holden in this issue).

The geopolitical question appears especially relevant from the Euro area perspective, where there is limited interoperability across borders between national market players, and essentially, non-European payment providers carry out the large majority of digital and card payments. Of course, there is

an argument for market dominance, especially in a market with sizeable network externalities. Still, several EU official documents and Giovannini on this issue stress that the Euro area faces considerable risks regarding data privacy and regulatory compliance because the dominant players are non-European. In this case, the argument for preserving a large degree of sovereignty in payment systems is based on security concerns rather than arguments of market efficiency.

Summing up, while we disagree that CDBCs are a solution in search of a problem – because the issue of the potential diffusion of unregulated private moneys in a world where payments are mainly electronic is evident and substantial – nevertheless, whether they are the best or only solution to these problems remains an open question that requires careful consideration and further debate.

In what follows, we will outline the main conclusions emerging from this issue, discussing the role of CDBCs in mending the market failures related to the five policy objectives above, and we will also take up other broader issues not being covered by this frame of discussion. We start with examining the impact on the effectiveness of monetary policy, then on competition, and finally, on security and privacy. Before concluding, we will briefly consider the specificities of the case for a digital euro.

2. Monetary Policy

One of the main reasons urging central bankers to consider the introduction of a CBDC is the increased competition from private digital currencies. When at the 2019 IMF meetings, Facebook presented its plan for creating a digital currency (initially called Libra and eventually renamed Diem in 2020), the reaction of central bankers was rather fierce. As Davies (this issue) recalls, Benoit Coeuré, a member of the executive committee of the ECB, "described the Libra announcement as 'a wake-up call' and called for the ECB to 'step up its thinking on a central bank digital currency.'"

Indeed, introducing a CBDC can enormously affect the functioning of monetary and financial markets. However, these effects need to be analysed in terms of how the monetary and financial markets would evolve without a

CBDC, not how they work now. In the following paragraphs, we will compare a scenario with a CBDC to the alternative of allowing an increasing role for private moneys, absent a CBDC.

The vast majority of payments are made today using bank money, a form of highly regulated private money. In the current system, private interbank relationships, in which banks regulate their positions by lending and borrowing bilaterally, coexist with payments made by transferring the reserves held at the central bank, which are central-bank liabilities. As shown during the global financial crisis, this dual system was crucial to allow payments through the central bank when the interbank market collapsed.

Because of recent technological innovations, a new realistic perspective has opened up whereby less-regulated private moneys might substitute bank money as the most widely used means of payment. If this were the case, the issuance of money might eventually escape entirely the control of monetary authorities, taking the system back to something similar to a 'technologically-updated' Free Banking Era, like the one in place in the United States between 1837 and 1863, in which private banks where issuing their currencies backed by their reserves.

Would this be a problem for the functioning of monetary and financial markets? How should such a system be regulated? Would regulation be sufficient, or would it be preferable to introduce a CBDC, creating a mixed oligopoly in the payment market, with the central bank competing with private money?

To answer these questions, let's start with the pivotal activity of central banks, maintaining price stability. The Free Banking Era was characterized by a lack of centralized regulation and high variability in the quality and trustworthiness of different banknotes. This led to frequent bank runs and a high degree of price volatility. Due to the lack of a central authority regulating money supply, private banks often over-issued notes relative to their gold reserves, causing inflationary pressures when confidence in a particular bank's notes waned.

An alternative and less fully market-oriented option was in place in Scotland between 1716 and 1845, where several banks issued their own notes in a competitive banking environment, coupled with prudent regulatory oversight, without causing significant price instability. Scottish banks were

required to hold sufficient reserves and were subject to frequent audits, which helped maintain confidence in their notes. The competitive nature of the banking system incentivized banks to preserve the value of their currency, leading to a relatively stable monetary environment.

All in all, when private entities issue money in an unregulated environment, the overall money supply can increase rapidly, leading to inflationary pressures. But if reserve requirements for private issuers are enforced, private money retains its value and is therefore accepted and trusted, thus enhancing liquidity and facilitating transactions, with a potentially stabilizing effect on prices.

Transparency in issuing and managing private money is crucial for sustaining public trust. Equally important is the protection of consumers, ensuring they have access to clear, reliable information about the private currencies they utilize and are safeguarded against fraud and financial loss. Regulators can uphold these standards by enforcing disclosure requirements and obligating private issuers to publish financial statements and details of their reserve holdings regularly. Additionally, regulatory bodies can establish rigorous auditing procedures to ensure compliance with regulations, enabling the early detection and resolution of potential issues before they become significant problems.

Regulating the conduct of market participants can also prove essential for preventing manipulative practices that can destabilize prices, curb speculative trading, and avoid market manipulation and insider trading, which can lead to volatile price swings. The global nature of many private moneys, particularly cryptocurrencies, also requires strong international coordination among regulatory bodies. International regulatory standards should be established to ensure consistent oversight and enforcement across different jurisdictions. Such coordination can prevent regulatory arbitrage, where issuers move to less regulated environments, and ensure a stable global financial system (a theme crucial in the reaction to Facebook's Libra project).

It appears that strong regulation and supervision of private money issuance can guarantee the system from the risk of price instability. Interestingly, this seems to be the approach followed in the recent Markets in Crypto-Assets Regulation (MiCAR) approved by the European Parliament and the Council of the European Union in April 2023. MiCAR is very stringent for

issuers of money-like instruments, particularly stablecoins, which promise to maintain a stable value by referencing a fiat currency. Issuers of stablecoins must be authorized, meet specific prudential requirements in terms of capital, governance, and risk management procedures, maintain a reserve of assets that fully back the value of the issued stablecoins, and guarantee the right of holders to redeem the stablecoin at par value, promptly and straightforwardly. This approach is very similar to an adaptation to private money issuers of the existing fractional reserve banking system, where commercial banks are indeed intensely supervised and regulated.

Given this potential option of tightly regulating private moneys, how should we consider a mixed oligopoly framework stemming from introducing a CBDC and hence expanding the scope of central bank liabilities to retail payments? A digital form of central bank-issued money, a CBDC would provide a safe, efficient, and most likely widely accepted medium of exchange. This would create a new competitive market environment where a CDBC would coexist with private moneys such as stablecoins. The competition with CDBCs may drive private issuers to improve the quality of their offerings, potentially enhancing stability and usability. In fact, introducing CBDCs would reduce the demand for private moneys unless they provide levels of credibility and stability like those associated with the currency issued by the central bank, thus mitigating risks for price stability.[4]

Interestingly, in this respect, we should not consider CBDCs as alternative policy tools to regulatory frameworks like MiCAR or supervisory and auditing frameworks for private currencies. But essentially as additional and complementary tools toward the goal of price stability, reinforcing the action of these other standard forms of regulation and supervision. A mixed oligopoly in itself would probably not be sufficient to achieve price stability, as far as money holders would also have the option to use unregulated means of payment.

CBDCs may also bring additional benefits for monetary policies (see Infante et al., in this issue). They can enhance the effectiveness of monetary policy by providing central banks with direct tools to influence the money

4. To avoid fragmentation in the monetary system if multiple forms of money coexist it would nonetheless be required to implement a clear regulatory framework which favours interoperability among different means of payment.

supply and interest rates (that might eventually also be negative), helping maintain price stability more effectively than traditional monetary policy tools. CBDCs can also facilitate more accurate and timely data collection on economic activity, enabling central banks to make more informed decisions and respond more quickly to economic shocks (Bindseil, 2020; Kumhof and Noone, 2018).

CBDCs can also give central banks greater oversight and control over the digital currency landscape. By monitoring and regulating transactions into and out of CBDCs, central banks can ensure better compliance with monetary policy and financial stability objectives. In this respect, the evidence from Figure 3 in the Numbers section is consistent with the observation that CBDC projects are more advanced in countries where central banks are not encumbered by potentially conflicting responsibilities in banking supervision.

3. Financial stability

A key element in the debate between regulating private currencies and introducing a CBDC is their potential impact on financial stability and the overall functioning of financial markets.

The argument is the same as for price stability. It all depends on the quality and pervasiveness of regulation and supervision and on the ability of authorities to enforce prudential behaviour. Even here, CBCDs, by acting directly in the market, can be useful complementary tools to enforce and induce prudential market behaviour especially during times of stress or uncertainty.

There is, however, a further twist in the argument: bank disintermediation. In other words, even though it is very likely commercial banks will manage them, still CBDC wallets will be central banks' liabilities. If there will be a sizeable shift from commercial banks to central bank accounts, this will imply a disintermediation of the banking system. Of course, this can also occur with cryptos, but given the safer nature of central banks-backed assets, their effect could be especially large. This is consistent with the broad evidence of Figure 4 in the Numbers Section, showing that CDBC projects are more advanced in jurisdictions with lower bank concentration.

The issue is even more relevant in the case of bank runs. If people can quickly and easily transfer their funds from banks into CBDCs, the convenience and speed of digital transactions could make this process 'one click away.' Any sign of instability in the banking sector could lead to a massive shift of funds to CBDCs, precipitating a bank run (see Davies in this issue and Williamson, 2022).

The extent of this potential risk crucially depends on the specific architecture of each CBDC and particularly on the size of available CBDCs. If, as in the plans for the Digital Euro available, CBDCs wallets will be capped, this will limit both the likelihood of bank runs. But also, as argued by Davies in this issue, also the scope of digital currencies.

In extreme scenarios, if banks' disintermediation really happens, this might considerably endanger financial stability, although it is probably safer if central banks rather than private players enact disintermediation. In the former case, at least, central banks have margins to put in place remedial measures.

There is a counterargument, though; this is also pretty extreme. Banks would perform less maturity transformation, thus strengthening their financial safety (see Infante et al., this issue, and Keister and Monnet, 2022). The final impact would be to transform commercial banks into investment banks. Would the system be more stable? Hard to say. What is sure is that in designing digital currencies, Central banks must carefully evaluate their impact on the banking system.

Given the fast technological evolution in payment technologies, can we conclude that CBDCs are necessary for central banks to guarantee price and financial stability? As argued, it is hard to say in both instances. Certainly, their interplay with other standard regulatory tools is essential in determining their final effect. Although stringent, effective, and coordinated regulation might be sufficient to guarantee a monetary anchor, the regulatory and operational architecture of a CBDC can be a powerful tool to strengthen its efficacy in reaching these goals. Indeed, if we see the relationship between regulatory authorities and market players as a game, where the former try to achieve a policy objective and they may be willing to circumvent regulations in their aim at profit maximization, having devised a reliable CBDC project, even without fully implementing it, can be a powerful tool to make the threat of regulation more credible.

4. Market outcomes and market power

By offering a CBDC, central banks can provide a public alternative to private digital payment solutions, possibly promoting competition and preventing excessive market power by private entities. Again, also here the evidence of Figure 4 in the Numbers session of the inverse correlation between concentration in banking markets and the advancement of CBDCs projects is consistent with this presumption,

This is particularly relevant for two reasons. First, cash cannot be used in the ever-expanding digital commerce. This calls for a corresponding evolution in payment systems for central banks to preserve their role in the monetary ecosystem, as discussed above (see also Dhamodharan et al. and Giovannini in this issue).

Second, payments are typically characterized by network externalities, significantly influencing market outcomes. Network externalities occur when the value of a product or service increases with the number of its users. In the context of digital payments, this means that as more people and businesses adopt a particular digital currency or payment platform, the more valuable and indispensable that platform becomes (Dhamodharan et al., Davies and Giovannini, in this issue, and Zeno-Zenkovich, 2023). This creates a self-reinforcing cycle where the most widely adopted digital payment solutions dominate, potentially leading to winner-take-all or tipping markets. Such markets can result in monopolistic control by a few private entities, stifling competition and innovation, as mentioned in Dhamodharan et al. (in this issue). This phenomenon can be seen in the dominance of major credit card networks like Visa and Mastercard and worldwide digital payment platforms like PayPal and Alipay in China, which have established significant market power due to widespread adoption.

Although network externalities and excessive market power can be dealt with ex-ante regulation and ex-post market intervention, such as the antitrust actions, introducing a public CBDC can mitigate the risks associated with these network externalities by offering a CBDC as a government-regulated alternative. Doing so limits the risk of market dominance by private digital currencies, ensuring a more competitive landscape. This environment can prevent any single entity from monopolizing the digital payments market, a

common outcome in digital markets characterized by strong network effects, as mentioned by many authors in this issue.

Such a market structure with private operators coexisting with a public actor is known in the Industrial Organization literature in economics as a mixed oligopoly. It has the specificity of combining firms that maximize profits and the publicly controlled actor also aiming at other objectives. Specifically, in a mixed oligopoly within the digital payments market, a public or directly regulated digital payment provider, such as a CBDC, would operate alongside private providers. The CBDC's objective could be to maximize consumer surplus while private providers would continue to maximize profits. This structure can create a balance where the public CBDC exerts competitive pressure on private entities, compelling them to lower costs and improve services, including price stability, to remain competitive.

By reducing reliance on private payment providers and increasing competitive pressure in the digital payments market, including banks, CBDCs can lower transaction costs, making payments more affordable for consumers and businesses. In other words, CBDCs can reduce the market power of banks and payment providers, transforming economic rents into consumer surplus and enhancing allocative efficiency.

The actual competitive pressure of a CBDC on private operators will depend on two relevant dimensions. First, it will depend on users' interests and preferences for different digital payment solutions. It can be anticipated that if a CBDC is offered to citizens at little or no cost, and its acceptance by merchants is made compulsory, as seen in many current and planned implementations, this competitive pressure would likely become significant. Also, it is important to recognize that, at least within the ECB's scheme, public and private operators will not solely function as competitors by introducing a CBDC. They will also engage in distinct yet vertically integrated operations, with Payment Service Providers (PSPs) delivering the payment service at the final point of interaction.

This vertical integration introduces an additional layer of complexity that is often overlooked. From the perspective of the economics of vertical integration in regulated markets, this arrangement raises questions about whether introducing a CBDC could effectively put pressure on PSPs and credit card companies to lower their fees, thereby enhancing competition and

reducing costs for end users. A publicly provided CBDC may not automatically lead to reduced fees in vertically integrated markets unless a clear mechanism or regulatory framework compels PSPs and credit card networks to pass on cost savings to consumers. This interplay between competition and vertical integration in the context of a CBDC necessitates further investigation to understand its potential impact on pricing dynamics and market efficiency.

Another potential effect of CBDCs is their impact on innovation. The hybrid model of a mixed oligopoly leverages the strengths of both types of actors, private and public, ensuring that the public's need for secure and affordable payment methods is met without stifling private sector innovation. The presence of a public player in the digital payment industry can push private providers to innovate more intensively to maintain their market positions. Although the economic literature on innovation in mixed oligopolies is limited, and the relationship between innovation and competition is complex, the increased competitive pressure induced by a CBDC may indeed foster innovation. Private entities must develop new features, improve user experiences, and enhance security measures to compete effectively with a government-backed digital currency. This environment can lead to a more vibrant and innovative digital payment ecosystem, ultimately benefiting consumers and businesses.

To summarize, considering market power, CBDCs have the potential to significantly alter the landscape of digital payments by reducing market power, lowering costs, enhancing financial inclusion, and fostering innovation. Central banks can ensure a more competitive and equitable financial system by introducing a public alternative to private digital payment solutions, addressing current market inefficiencies and future challenges in the evolving digital economy. Given the economic analysis of mixed oligopolies, several market outcomes can be anticipated. First, with the CBDC providing a low-cost alternative, private providers must reduce their fees and offer better services to remain competitive, thus increasing consumer surplus. Consumers benefit from lower transaction costs and improved service quality.[5] Second,

5. Clearly, the design of a subsidized CBDC must carefully consider the risk that private providers could be pressured into lowering their fees to the point of being driven out of the market. This could shift the market from a mixed oligopoly to a public monopoly, ultimately negating many of the intended benefits of a CBDC.

the competitive pressure from the CBDC can drive private entities to innovate extensively, introducing new features, improving user experiences, and enhancing security measures. This environment fosters a more vibrant and technologically advanced payment ecosystem. Third, the CBDC can enhance financial inclusion by providing accessible digital payment services to unbanked and underbanked populations, ensuring more people can participate in the digital economy. Lastly, the central bank's dual role as provider and regulator ensures that the digital payment market remains fair and competitive, with stringent oversight preventing abuses of market power and ensuring consumer protection.

But is a CBDC necessary to reach these market outcomes? Why would addressing the specific issues for digital payments require a new public digital payment like a CBDC? Why can it not be obtained with regulation of the existing digital payment means? In principle, similar outcomes can be obtained with regulations. This happened, admittedly with significant delay, in the digital markets and the European regulations, Digital Market Act (DMA) and Digital Service ACT (DSA).

The digital payments landscape is rapidly evolving, and central banks worldwide are grappling with whether to introduce CBDCs or enhance the regulation of existing private digital currencies, or both.

Regulating existing PSPs offers the advantage of utilizing existing infrastructure, reducing the need for new investment and development. Private entities, driven by profit motives, can quickly adapt to changing market conditions and technological advancements, fostering a more dynamic payment ecosystem. This flexibility and adaptability encourage innovation and competition among PSPs. Regulation can also be more cost-effective than developing a new CBDC, as it avoids duplicating infrastructure and technology. It reduces the burden on the government, allowing the central bank to focus on its core responsibilities while ensuring the private sector adheres to regulatory standards. However, regulation is generally not an easy task.

However, regulating PSPs (and issuing private digital currencies) can also be less effective than creating a CBDC. A wide economic literature illustrates the primary limits of regulation: that the regulator is typically less informed than the regulated entities, the risk of regulatory capture, and limited commitment to regulation. Establishing and enforcing comprehensive

regulations for numerous private entities can be complex and resource-intensive. Ensuring compliance across different jurisdictions and legal frameworks can be challenging, requiring substantial coordination and oversight. In particular, interoperability between different private payment networks may become an issue, stifling market entry and competition. A regulatory framework should ensure that various payment schemes can interact seamlessly with each other to enhance competition and liquidity and stability in the financial system. The risk is that ineffective regulations stifle competition and innovation in the payment systems.

Overall, if not correctly administered, dominant PSPs might still exercise significant market power, leading to monopolistic behaviours. Ensuring a level playing field among private entities requires continuous and vigilant regulatory oversight to prevent abuses of market power. In this respect, even in this domain of market competition CBDCs can integrate and strengthen regulators' action.

5. Privacy and security

Modern private moneys, such as stablecoins and cryptocurrencies, present unique regulatory challenges due to their technological nature. Regulators should thus develop technological standards to ensure the security and stability of private money systems, including enforcing protocols for secure transactions, preventing hacking and fraud, and ensuring the robustness of the underlying blockchain technology.

The security issues associated with CBDCs encompass a range of concerns due to the public and centralized nature of CBDCs. Key risks include vulnerabilities to cybersecurity threats, such as hacking and digital theft. These are common to all digital financial systems but are especially critical for CBDCs, as they could become a high-value target for attacks, unlike more fragmented private digital money systems. Similar problems would also affect private digital money, which, for this reason, is subject to increasing levels of oversight by regulation authorities. In this case, too, the optimal solution depends on the trade-off between the risk of a fully centralized system managed by public authorities and several decentralized private systems under the oversight of regulatory authorities.

Privacy concerns are also central to the discussion surrounding both private digital currencies and CBDCs. While both forms of digital money raise significant privacy issues, the nature and implications of these concerns differ between the two.

With private digital currencies, the regulatory landscape is primarily concerned with accessing and using private information generated every time a digital payment is made. As these transactions involve releasing sensitive data, there is a pressing need for regulatory frameworks that safeguard user privacy. In the European context, the approach taken by authorities, mainly through the Second Payment Services Directive (PSD2) and the Digital Market and Digital Services Acts, has been to regulate the use of private information rigorously. These regulations ensure that private digital currencies operate within a framework that protects consumer data from misuse and promotes transparency and accountability among service providers.

Although private operators, particularly dominant non-European players like Visa, Mastercard or Paypal are required to comply with the regulations of the jurisdictions in which they operate, which mitigates some risks, there is a broader concern, often articulated especially by European authorities, about the reliance on foreign providers, specifically concerning privacy risks, also reflecting geopolitical anxieties regarding dependence on foreign technologies. In this context, the privacy risks are less about non-compliance and more about the strategic implications of data control by foreign entities.

CBDCs, on the other hand, introduce a different set of privacy concerns, primarily because they are state-backed and centrally managed. One of the most significant privacy issues with CBDCs is the potential erosion of user anonymity. Cash transactions are inherently anonymous, while CBDCs may not be able to offer the same level of privacy. Although CDBCs, notably the digital euro, could potentially incorporate offline functionality with privacy levels comparable to cash, as emphasized by Giovannini in this issue, achieving this result is complex, as the design of a CBDC must also meet regulatory requirements for traceability to prevent illicit activities. The challenge lies in offering sufficient privacy protections while ensuring the system is not exploited for criminal purposes. In this respect, it is somehow of concern that the most advanced CBDC projects have been developed in countries where central banks are less independent, which mostly happens

where the form of government is not fully democratic (see Figure 2 in the numbers section).

The traceability of transactions in a CBDC system raises significant concerns. In this issue, Davies warns of the potential emergence of a "Surveillance State," where central banks could excessively monitor consumer spending patterns, encroaching on personal privacy—a point also addressed by Holden. However, we believe this concern is equally relevant for private digital currencies, depending on their design and the degree of transaction privacy they offer.

In this case it is crucial to analyze privacy concerns against the correct counterfactual. While it might be technically impossible to guarantee the same level of anonymity with a CDBC as with cash, most transactions are already digital and are traced, recorded, and stored by private PSPs. Regulation on the treatment of these data is rather heterogeneous worldwide, and all privacy concerns characterising CDBC transactions extend to transactions with private moneys. Once again, the optimal solution must trade off decentralization under regulatory oversight with centralization under public authorities, with different degrees of attention depending also on how much the state might be able and willing to use this information for coercive purposes (on the matter, see also Holden, in this issue).

Finally, cross-border data privacy presents significant challenges for both private digital currencies and CBDCs. The complexities involved in ensuring privacy across diverse regulatory environments are particularly acute for CBDCs, given their potential for international use (Giovannini in this issue). Private digital currencies already navigate these complexities. However, a state-backed CBDC would need to reconcile these issues on a potentially more significant scale, involving diplomatic and regulatory coordination across jurisdictions.

6. A European case for CBDC?

While the previous discussion aimed at covering all the main pros and cons of introducing a CBDC, the case of the digital euro has some specificities of its own, due to the fact that it refers to a currency adopted by different

countries that are part of a monetary union with not-fully-integrated financial markets.

The pressing concern within the Euro area is the fragmented state of its payment systems, which remains surprisingly disjointed despite the existence of a single currency, a single market, and an almost completed banking union. The limited expansion of sizeable European players in payment systems and the lack of a seamless, integrated payment landscape have significant implications for the region's financial efficiency and sovereignty. Currently, the effective interoperability of payment systems in Europe largely depends on non-EU-based credit cards, such as Visa and Mastercard, which account for 46% of all payments, and other e-payment solutions like PayPal. This reliance on non-European providers is a major concern for the European Central Bank (ECB), as it not only undermines the efficiency and increases the cost of cross-border payments but also exposes the Euro area to risks related to data privacy and regulatory compliance, as argued by members of the executive committee of the ECB (e.g., Cipollone, 2024) and by Giovannini in this issue.

The fragmented payment landscape in Europe starkly contrasts the ideals of the single market and of the banking union. Although the Single Euro Payments Area (SEPA) has facilitated cross-border credit transfers and direct debits since its implementation in 2002, there remains a significant gap in the unification of payment systems at the point of interaction, particularly for digital and person-to-person payments. This is due to the lack of technological solutions that make national payment networks interoperable among themselves, a solution that is instead being offered by the Eurosystem through TARGET in the case of interbank transactions. Of course, incentives to provide these solutions were different since TARGET was essential to guarantee a smooth transmission of monetary policy decisions, while the unification of the national payment systems was less of a concern, more so at a time when electronic payments were not as common as today.

Since 2002, several steps have been undertaken by the Eurosystem to foster the interoperability of payment systems. In 2017 the SEPA instant credit transfer (SCT Inst) scheme was launched, allowing the provision of instant payment clearing services by a number of European automated clearing houses, and the TARGET Instant Payment Settlement (TIPS) service in 2018. These schemes allow for instant payments from bank accounts across the euro

area. They might, therefore, be used to make electronic payments at any point of interaction, including a shop or an online transaction, for example, through NFC and QR code recognition. However, these technologies were scarcely adopted by PSPs and are not diffused among merchants and consumers.[6] Strengthening the use of TIPS is one of the pillars of the payments strategy of the Eurosystem, complementary to the digital euro.

Interestingly, with the acceleration of the digital euro project, some private sector initiatives have been recently launched. For instance, digital mobile payment frameworks are being developed through collaborations between entities like SIBS in Portugal, Bancomat in Italy, and Bizum in Spain. Additionally, the European Payment Initiative (EPI), spearheaded by central banks in France, Germany, Belgium, and Spain, aims to create a European-based instant payment solution. Remarkably, the EPI plans to leverage the SEPA instant credit transfer scheme and existing infrastructures like the Eurosystem's TARGET Instant Payment Settlement (TIPS), offering a payment network and a wallet with NFC and QR code capabilities. This seems to mirror the evolution of EURO1, a private sector large-value payment system for single same-day euro transactions at a pan-European level that leverages on TARGET and has been developed by EBA-clearing, a partnership of several large European banks.

In principle, instant payments can provide a reliable alternative to private money for electronic payment. Representing bank money transfers provided by regulated PSPs would create no problems for the conduct of monetary policy and price stability. In fact, this technology is largely used for electronic payments at the point of interaction in China. However, the question remains whether these private sector initiatives can achieve the level of interoperability and integration needed across the Euro area.

And how will they be affected by the introduction of the digital euro? Will it strengthen the interoperability of payment systems across the Euro area borders through its design and implementation more effectively and rapidly than simply enacting policies supporting private sector projects like the EPI? And, in case all projects evolve together, will they be complementary, or will they compete with each other, possibly creating costly redundancies?

6. See the ECB's document: https://www.ecb.europa.eu/pub/pdf/other/ecb.eurosystemretailpaymentsstrategy%7E5a74eb9ac1.en.pdf

In any case, even with the introduction of the digital euro, the role of the private sector in European payments will remain crucial. The ECB's design for the digital euro foresees a strong role for private PSPs managing digital euro accounts and transactions, including responsibility for identification and possible frauds. According to the project, digital euro wallets will be linked to traditional bank accounts, creating a significant connection between the digital euro and the services PSPs provide in facilitating payments at the point of interaction.

The backing of the ECB fuels a pervasive action, more than any private sector operator could achieve, to address key barriers to interoperability, such as networks. It could, for example, make it mandatory for sales points to offer payments through digital euros. Moreover, by combining payment services with private providers, the ECB could help establish a unified regulatory framework, thus overcoming some of the major impediments that have hindered interoperability to date.

Still, as Dhamodharan argues in this issue (from the perspective of one of the incumbent market players), the success of the digital euro will ultimately depend on whether consumers and businesses perceive additional benefits compared to existing digital solutions already available or those that the market could potentially develop. A key aspect that seems to be overlooked in the debate is the effectiveness of the digital currency from the users' perspective. If alternatives to the digital euro offer a better user experience to make electronic payments, its diffusion will be smaller. As recalled by Angeloni (in this issue), in China, in the last year for which data are available, transactions per second in digital Yuan were 0.02% of those performed by Alipay alone.

The ECB also pursues a geopolitical issue in addressing the Euro area payment systems. As argued above, in several official documents of the Bank, there emerges a concern that presently, the interoperability of payment systems across the Euro area is provided to a very large extent by non-European operators like VISA and Mastercard. This, of course, raises concerns about compliance with European standards and regulations, including worries for security and privacy. But frankly, even concerning this issue, it is unclear why such concerns could not be addressed more effectively through adequate regulation and supervision. Especially given that interoperability is effectively

granted by these operators, although in a framework of excessive market dominance, as discussed earlier.

In summary, the argument that a digital euro is essential for establishing an effective pan-European payment system due to the market's failure to deliver one is, in our view, somewhat weak on its own. It remains uncertain whether market-driven initiatives, such as the European Payments Initiative (EPI), could ultimately offer viable solutions. Moreover, these goals might be achievable by enforcing a unified regulatory framework across the Euro area or by strengthening the Eurosystem's oversight framework for electronic payment instruments, schemes, and arrangements (PISA). In any case, addressing the current shortcomings of the Euro area's payment systems will require tackling key issues such as interoperability, regulatory fragmentation, market power, and user experience, regardless of whether a digital euro is introduced.

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