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Features and Development of Central Bank Digital Currency in China – A Comparison with the Digital Euro

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Abstract

This working paper aims to analyse the progress and experiences associated with the rollout of the e-Yuan in China. Furthermore, it compares the key features of the e-Yuan with those of the planned digital euro. Despite the huge time gap – the e-Yuan was first launched in 2019, whereas the introduction of the digital Euro will not take place before 2029 -, of particular interest is the programmability of digital currencies through so-called "smart contracts", which is permitted in China but currently excluded in the euro area. The paper discusses the advantages and disadvantages of programmability, including its potential implications for monetary policy and consumer spending.

Moreover, CBDCs are not only intended for domestic retail payments by consumers, but also for cross-border wholesale transactions between companies. Our analysis shows that a competitive environment has emerged in the field of international payments: on the one side between stablecoins issued by private U.S. companies and CBDCs issued by central banks, and on the other between different CBDC systems themselves. For example, while the PBC relies on the so-called mBridge system for the settlement of cross-border transactions, the ECB uses a different technological platform initiated by the Bank for International Settlements (BIS). These distinctions are driven less by technological or economic considerations than by the growing geopolitical fragmentation of the global economy.

The paper concludes that CBDCs constitute an essential and complementary addition to digital payment systems and cash. This is particularly relevant for the euro area, where a unified retail payment system is still lacking and payment services remain dominated by U.S.- companies. In the case of the e-Yuan, the analysis suggests that its role in international payment systems may be even more important for China than its domestic application. Influence over international payment infrastructures provides considerable economic and geopolitical advantages, particularly by reducing dependence on the U.S. dollar. Within China, one main impact of the digital RMB so far is the increasing level of financial inclusion especially in the countryside.

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Abbreviations

TFEU	Treaty on the Functioning of the European Union
BIS	Bank for International Settlements
BRI	Belt and Road Initiative
CBDC	Central Bank Digital Currency
CNY	Yuan
DLT	Distributed Ledger Technology
DSL	Data Security Law
GDPR	General Data Protection Regulation
EU	European Union
EVM	Ethereum Virtual Machine
ECB	European Central Bank
GENIUS	Guiding and Establishing National Innovation for U S Stablecoins Act
RMB	Renminbi
PBC	People's Bank of China
PIPL	Personal Information Protection Law
UDPN	Universal Digital Payments Network
USA	United States of America
PRC	People's Republic of China

Introduction

Officially, the *People's Bank of China* (PBC) introduced a central bank digital currency (CBDC), the e-CNY or e-yuan, in 2018, although feasibility studies had already begun in 2014. Initially, the project was restricted to selected major banks and internet companies, but from 2019 onward it was gradually expanded to citizens in selected provinces and cities (PBC, 2021).

With this development, PRC became the first major economy to pilot a CBDC on a large scale. The experience gained is particularly relevant for the *European Union (EU)*, which is currently preparing the introduction of a digital euro by the *European Central Bank (ECB)*. In contrast, the United States has thus far refrained from issuing a CBDC through the *Federal Reserve System (Fed)* and instead has witnessed growing activity in privately issued stablecoins.

Like any CBDC, the e-CNY constitutes legal tender and performs the same core function as cash by enabling the purchase and sale of goods and services. As with physical currency, the central bank retains the exclusive right to issue and supply the digital yuan. Together, cash and CBDCs form the monetary base of an economy (M0). The exchange rate between digital and physical renminbi (RMB) is fixed at 1:1. The primary objective of introducing the e-CNY is therefore to satisfy the growing demand for digital payments in central bank money and to modernize the monetary system in line with technological progress, rather than leaving digital payments entirely to private providers. Unlike cash, CBDCs are often described as more transparent and potentially programmable, which may enhance traceability and help reduce risks related to fraud, money laundering, and terrorist financing.

The issuance of the e-CNY follows a two-tier system similar to the distribution of cash. The central bank provides digital currency to commercial banks through appropriate liquidity channels, and these banks subsequently distribute it to end users via digital wallets, typically accessed through applications supported by the central bank. There is no direct relationship between the central bank and individual users: households do not hold accounts with the central bank but instead maintain accounts with commercial banks.

Until the end of 2025, the e-CNY, like cash, did not bear interest and was therefore primarily intended as a means of payment rather than a store of value. From 2026 onward, however, the PBC introduced interest-bearing e-CNY savings accounts within digital wallets. Commercial banks are required to hold corresponding minimum reserves with the central bank, similar to traditional deposits. This development broadens the functional scope of the e-CNY by adding a limited store-of-value function to its role as a medium of exchange.

The rollout of the e-CNY remains in the pilot phase. It is currently recognized as legal tender in 26 cities across 17 provinces, including major metropolitan areas such as Beijing, Shanghai, Tianjin, and Chongqing. In addition to state-owned commercial banks, selected private payment platforms, including Alipay and WeChat Pay, are permitted to integrate e-CNY payments. While this considerably lowers practical barriers to adoption, the legal tender status of the e-CNY remains geographically limited to designated pilot regions. Given the strong dominance of private payment platforms in China, these e-commerce ecosystems are expected to play a crucial role in further adoption.

Empirical evidence to date suggests relatively slow diffusion. Although approximately 250 million users have downloaded the official e-CNY wallet application, transaction volumes remain limited compared with established private payment systems and cash usage. This indicates that many users do not yet perceive a clear advantage in switching to CBDC-based payments. Possible explanations include habit persistence and "lock-in effects," particularly in the absence of immediate added value. Concerns regarding data privacy may also contribute, as digital payments reduce the anonymity traditionally associated with cash. Against this background, the introduction of interest-bearing e-CNY balances can be interpreted as an attempt to strengthen incentives for adoption.

Beyond domestic applications, the e-CNY is also intended to strengthen the international role of the renminbi and to provide an alternative to the US dollar in cross-border payments. In this context, China plays a leading role in the *mBridge* initiative, a multi-CBDC platform designed for cross-border settlement among participating central banks, including several BRICS countries, and positioned as a potential alternative to the SWIFT system. In addition, China is developing its own cross-border payment infrastructure, including the *Universal Digital Payments Network (UDPN)*, with the aim of promoting Chinese technological standards in international payment systems.

In recent years, international applications of the e-CNY have developed more dynamically than its domestic usage. With the establishment of the *Shanghai Digital RMB International Operations Centre* in 2025, a dedicated institutional framework was created to support global expansion. Moreover, residents of Hong Kong are permitted to use the e-CNY without holding a mainland Chinese bank account. China's overseas infrastructure initiatives, particularly the Digital Silk Road under the *Belt and Road Initiative (BRI)*, further contribute to the internationalization of the e-CNY.

Building on this overview, this paper analyses the progress and experience of the e-CNY rollout in China with the aim of deriving lessons for other countries and currency areas considering the issuance of a CBDC. For developing and emerging economies in particular, the potential contribution of CBDCs to financial inclusion is of special relevance. The paper addresses the following topics:

- the fundamental characteristics of CBDCs and their differences from cryptocurrencies, stablecoins, and cash;

- the policy objectives of the PBC regarding the e-CNY, including its development phases, technological foundations, and data protection aspects;

- the current state of international adoption of the e-CNY and a comparison between the e-CNY and the planned digital euro of the ECB;

- finally, an assessment of the benefits and risks of CBDCs, as well as the emerging international competition among central banks over future standards for cross-border digital payments.

1 Central bank digital currency: cryptocurrencies, stablecoins and cash

CBDC has been on central banks' agendas for some time (BIS 2022a; Hofmann et al., 2025). The reason for this is obvious: payments are increasingly being made digitally, i.e., cashless. Furthermore, cryptocurrencies such as Bitcoin are gaining importance. The first publication by Satoshi Nakamoto (2008), which laid the foundation for Bitcoin as private electronic money transferable between private users without central bank involvement, coincided with the global financial crisis. That crisis undermined trust in fiat money issued by central banks. The spread of cryptocurrencies created technological platforms — primarily blockchain technology — that central banks can now use for their digital currencies.

In the context of blockchain technology, decentralized *Distributed Ledger Technology (DLT)* enables electronic payments between two or more participants while bypassing central and commercial banks (Barley, Troy, Pratt, 2024). DLT rests on the principle that all participants hold the same information simultaneously — the "ledger" — unlike conventional technology where a central authority manages the ledger. To ensure correctness, participating computers continuously coordinate and reach consensus. Because blockchain is an open technology, any actor can in principle participate.

With CBDC, however, only selected actors have the right to participate in the network. Only intermediaries authorized by the central bank — typically commercial banks and selected e-commerce platforms — can perform and validate transactions in the network. Ultimate control lies with the central bank. Although CBDC can be based on blockchain, it is not decentralised like cryptocurrencies: the ledger is held by the central bank. This design is the direct consequence of the central bank's monopoly over the creation of cash and digital money. Technologically, each central bank can develop its own DLT implementation or use an existing one. The PBC has pursued its own solution, while the ECB has not yet made a final choice.

Besides CBDC and cryptocurrencies there is a third form of digital money: stablecoins. The current US administration strongly supports stablecoins, including by prohibiting the US central bank (the Fed) from issuing a CBDC (Hock, 2026). Stablecoins are digital tokens issued by private firms that represent monetary value on a blockchain and are typically backed by legal tender (usually the US dollar) or US government securities. Like CBDC, stablecoins are mainly intended as means of payment — also for businesses — not as stores of value or investment vehicles (unlike cryptocurrencies, which often have a capped supply and therefore price volatility). Stablecoins thus compete directly with CBDC as standards for national and international payments.

Table 1 summarises the main properties and differences between CBDC, stablecoins and cryptocurrencies.

Table 1: Central bank digital currency, stablecoins and cryptocurrencies

	CBDC	Stablecoins	Cryptocurrencies
Digital money creation	Central bank: legal tender	Private companies: backed by US - government bonds	Privately: no collaterals
Functions of money	Medium of exchange and savings deposits	Medium of exchange	Medium of exchange and financial asset
Technological basis	Closed DLT network	Closed DLT network	Open DLT network

How does CBDC differ from cash? Fundamentally CBDC and cash are substitutes for the same economic function: transacting goods and services. Both are legal tender and issued by the central bank. The consumer, not the central bank, ultimately decides which method to use. This aligns with the positions of the PBC, which is quoted below, as well as the ECB:

"The PBC will issue the e-CNY and the physical RMB in parallel and take both into account in daily data collection, analysis and management. International experience shows that as an economy matures, the need for diversified means of payment naturally increases. China is a large country with a wide territory, a large population, many ethnic groups and substantial regional development differences. In such a society payment habits, age and security needs vary. Therefore, the physical RMB enjoys advantages that cannot be replaced by other means of payment. As long as there is demand for physical RMB, the PBC will neither stop its provision nor replace it by administrative order" (PBC 2021, p.4).

In summary, CBDC primarily enables central banks to regain control over payments to safeguard the stability of national and international payment systems — a guarantee that private providers cannot fully ensure. Private payment providers can become insolvent and do not guarantee the transparency of payment flows in the way CBDC does (Langhammer, 2025). Furthermore, transparency is also an argument why CBDC may be superior to cash: transparent transactions help prevent criminal activities like money laundering and terrorist financing. Finally, CBDC can increase financial inclusion, as we will see with the e-Yuan example.

2 PBC vision, previous development phases and technical foundations

PBC vision

The PBC began working on CBDC as early as 2014. In 2017 it established the *Central Bank Digital Currency Institute* as a department of the PBC, and in 2018 it issued the digital RMB — the e-Yuan or e-CNY — becoming the first central bank in the world to do so.

The central vision was that even for digital payments — which account for over 80% of transactions in China (approximately 60% via payment platforms and 20% by credit cards) — a legal tender should be available rather than leaving the market solely to private providers (PBC 2021; Qian 2019). This promises secure and stable payments because legal tender is considered more secure than private money. The aim is explicitly "*that the authority of fiat money should be strengthened… and the reliance on payment services provided by the private sector should be reduced*" (Qian, 2019:1). This also includes combating the shadow banking system in payments.

Furthermore, it is expected to improve the transmission mechanism of monetary policy, that is, the process by which the central bank influences the real economy via commercial banks. In China the interest-rate mechanism - how changes in central bank policy rates affect banks' rates and thereby lending to non-financial firms - is weaker than in other economies. The PBC therefore seeks to increase the importance of the money supply as a second instrument alongside interest rates.

Following Stiglitz (2017), the PBC has contemplated offering "credit auctions" to banks to more directly influence the volume and structure of their lending. The background is that much of the money Chinese banks borrow from the PBC for lending does not flow into the real economy but into financial markets, which offer higher returns. In addition, loans to the real economy mainly go to state-owned enterprises – around 80% of the overall credit portfolio of banks -, while private SMEs as driving force of innovation struggle to obtain bank credit. This misallocation of capital is mainly the result of the fact that almost all Chinese banks are state-owned.

Under these circumstances, monetary policy could better achieve its goals with CBDC because its distribution within the financial system and real economy can be steered

more precisely. The programmability of the e-Yuan also opens possibilities to set rules on credit volume and preferred lending sectors (Qian 2019, pp. 10–12). It is, therefore, above all the improved provision of information on money flows that enables monetary policy, through the issuance of central bank digital currency, to exert a more direct influence on lending. As pointed out by Stiglitz (2017):

„While credit auctions…could have been introduced even without e-money, the enhanced ability to monitor flows and to organize markets that e-money and digitalization provide increases the potential gains that might arise from the institutional innovations".

However, since the introduction of the e-Yuan the PBC has not yet made use of this possibility and instead focuses on consumer adoption for retail payments. Improving financial inclusion also plays an important role (PBC, 2021: 4–5). Over 200 million people — around 15% of the population — have no bank account, especially in rural western China (Tsai 2017; Baltrusaitis 2021). Because the e-Yuan can be used without a bank account, it offers the potential to include these people in digital payments.

Internationalisation of the RMB is another important motive (PBC 2021, pp. 5–6). By expanding the e-Yuan in cross-border payments, the PBC hopes to accelerate the RMB's international role and establish China's digital payment structure as a global standard, thereby increasing China's economic influence.

The PBC is conscious not only of the benefits but also the risks of digital currency. This concerns above all the anonymity of transactions, which is ensured in cash transactions but no longer in digital payments, thereby raising concerns about the adequate protection of potential users' data (PBC, 2021:7–11). This problem is partly mitigated by allowing small transactions to remain anonymous in CBDC. There is also the risk that during a financial crisis "bank runs" could occur if deposits are converted into CBDC to avoid losses, causing liquidity problems for banks. To counter such a potential stability risk, the regulations stipulate that, if necessary, the PBC is authorized to set maximum limits for individual users' wallets in which the e-yuan is stored. The ECB follows a similar approach to avoid dangerous competition between bank deposits and CBDC.

Previous development phases

China's CBDC development and rollout is advanced by international comparison. Over the past five years, various pilot projects have aimed to promote the use of the e-CNY among the population. The first trials began in 2019 in Shenzhen, Suzhou, Xiongan, and Chengdu, and were gradually expanded to 26 cities, including the four major municipalities Beijing, Tianjin, Shanghai, and Chongqing. Within these designated zones, the e-CNY has legal tender status; outside them, it can only be used with selected Chinese e-commerce providers. Foreigners were first allowed to load e-CNY into their wallets during the 2022 Winter Olympics, enabling purchases locally and online without a Chinese bank account. Another measure to increase circulation has been the payment

of state employees in digital currency and the acceptance of e-CNY as a settlement currency by selected e-commerce providers.

PBC has also distributed digital money to the public for testing purposes. For instance, in October 2020, it issued 50,000 digital "red envelopes" with a total value of 10 million RMB to registered users in Shenzhen (Aguignier, 2022). The primary objective was to familiarise citizens with the use of the e-CNY. An interesting side effect was the currency's programmability: the funds had to be spent within one week, otherwise they expired. The experiment also revealed challenges on the merchant side, as much of the retail sector lacked the technological infrastructure to accept e-CNY payments. Most importantly, many users perceived no significant advantage over existing electronic payment systems and therefore did not continue using the wallet after the trial period (Huang, 2024).

Empirical evidence suggests that the use of the e-CNY remains limited so far (Zuo, 2024). Transaction volumes increased from RMB 13.61 trillion in 2022 to RMB 16.7 trillion in 2025 (approximately €2 trillion), but still account for less than 1% of cash and near-cash payment transaction volumes in China (PBC, 2025; Hilpert, 2024). Possible explanations include the perception among users that the system offers no clear advantages over private digital payment solutions. In addition, concerns about data protection and surveillance may play a role, as users may be reluctant to share transaction data with state authorities or to forgo the anonymity associated with cash.

However, beginning in 2026, the PBC introduced a policy change allowing the e-CNY to be held as savings within digital wallets (PBC, 2025). These deposits are interest-bearing at standard deposit rates and are included in banks' minimum reserve requirements at the central bank. This measure aims to increase the attractiveness of the e-CNY for private users and reduce the incentive to convert traditional savings into non-interest-bearing digital currency.

Technical foundations and data protection

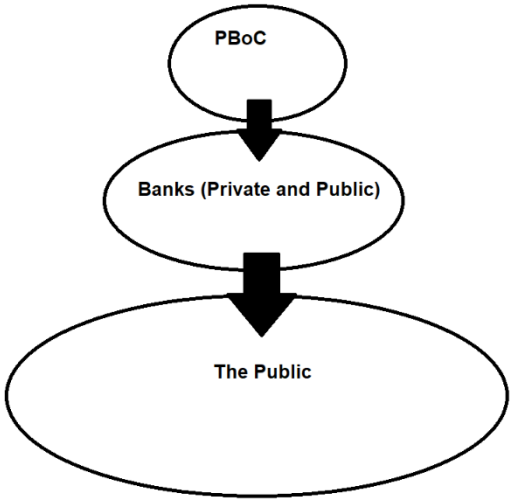
As noted, both CBDCs and cryptocurrencies are based on distributed ledger technology (DLT) (Caudevilla, 2023). However, like other central bank digital currencies, the digital renminbi is not organised as a decentralised network. Instead, it relies on a centralised infrastructure and architecture: the PBC holds a monopoly on the creation and issuance of the e-CNY, which is then distributed to users via commercial banks. Consequently, the PBC retains full control over both the system and its technological framework. In contrast, cryptocurrency-based blockchains are decentralised, as the creation and exchange of digital assets are carried out by network participants without central oversight.

CBDCs also enable a degree of programmability through so-called "smart contracts". In practice, programmability is typically intended to prevent illicit activities such as money laundering, terrorist financing, and tax evasion. In theory, however, it could also be used to define the type, amount, and timing of permitted transactions. This implies that central

bank digital currencies could, in principle, be used to influence private consumption directly, thereby constituting a more intrusive form of economic governance Given China's existing model of state-led economic steering, such an approach appears at least conceptually plausible By contrast, ECB has explicitly ruled out programmability for the digital euro

To strengthen data protection, China enacted two major laws in 2021: the *Personal Information Protection Law (PIPL)* and the *Data Security Law (DSL)* These regulations apply not only to data obtained by banks and the PBC through e-CNY transactions, but also to all entities that collect, use, store, transfer, or disclose personal data of individuals residing in China, including e-commerce platforms, social media companies, financial institutions, and employers In addition, the PBC has issued CBDC-specific guidelines governing the use and protection of user data

Figure 1: The two-tier distribution system



PIPL prohibits telecom companies from disclosing private customer information to third parties unless the user gives explicit consent, including to state institutions such as the PBC This makes it harder to obtain user-specific data for an anonymous wallet via the phone number — which is required at registration This protection is intended to strengthen potential users' trust in the e-Yuan A two-tier system aims to guarantee the e-Yuan's "managed anonymity" (Mu, n d), as Figure 1 shows

First, the PBC supplies e-Yuan to authorised intermediaries (large commercial banks and selected e-commerce providers), which in turn provide them to customers Intermediaries collect and store users' personal data The PBC itself stores only intermediaries' data on its servers, not individual users' personal data Intermediaries use ID anonymisation between wallets so that under normal conditions neither the PBC nor the intermediaries have the right to view transaction data and personal information — although the capability exists Only when suspicious transactions occur are transaction data disclosed

The concept of "*managed anonymity*" also stipulates that the degree of anonymity decreases as transaction size increases For small-value transactions, users are required only to register with a mobile phone number Because telecommunications companies are legally prohibited from sharing personal data, banks operating the wallets typically have access only to the phone number, but not to associated personal information such as name or address Such wallets are subject to a transaction limit of 2,000 RMB For

transactions exceeding this threshold, users must disclose personal information to intermediaries and potentially to PBC.

These rules are intended to strengthen financial inclusion, particularly for unbanked populations. Individuals can open an e-Yuan wallet using only a mobile phone number and conduct transactions even without internet access. In addition to smartphones, users may also use so-called "hardware wallets" in various forms. This range of access options ensures that individuals without smartphones or reliable internet connectivity can still participate in the system. Initial empirical studies suggest that this approach is effective and that the e-Yuan has contributed to increased financial inclusion in China (Chen & Zhang, 2025).

3 International use: UDPN and mBridge

The digital RMB also serves as an instrument to further advance RMB internationalisation, a process that began shortly after the 2008 global financial crisis (Löchel, Jablonski 2025:104–108). A key institutional milestone in this regard was the establishment of the *Shanghai International Operations Centre* in autumn 2025, which is intended to coordinate and promote the international activities of the e-yuan.

The *World Bank* estimated global cross-border transaction costs at 6.25% of transfer amounts in Q1 2023, and 12.10% for bank transfers (Hilpert 2024:31). These costs are often higher in less developed regions. The use of the e-yuan in international payments would therefore be particularly relevant for trade with Global South countries, potentially generating network effects and increasing the dependence of participating states on China's currency and technological infrastructure.

A key challenge is the interoperability of the e-yuan with foreign payment systems. This requires the establishment of common settlement standards, which may be uni-, bi-, or multilateral in nature. One of the most prominent initiatives in this context is the *Universal Digital Payment Network (UDPN)*, which contributes core infrastructure components for the e-yuan within China. The objective is to develop UDPN into a central node connecting foreign payment systems directly to China's digital payment architecture. This could significantly enhance interoperability among digital currencies and payment systems, enabling foreign institutions to transact in digital RMB without relying on traditional correspondent banking channels.

Such a network would further strengthen RMB internationalisation and expand China's influence within the global payments and financial system. It could also facilitate the integration of other countries' central bank digital currencies (CBDCs) into global payment infrastructures. In the long term, UDPN may develop into a unified and interoperable platform for digital payments, usable by banks, corporations, and governments alike.

China has also supported the *mBridge* project, initiated by the *Bank for International Settlements* (BIS, 2022b). *mBridge* provides a multilateral framework for cross-border digital payments. In 2024, it reached the status of a *Minimum Viable Product (MVP)*, enabling participating central banks and commercial banks to settle CBDC transactions in real time—the first multi-CBDC platform of its kind globally (BIS, 2024). In pilot tests, CBDCs worth USD 12 million were transferred, while 160 payments with a total volume of USD 22 million were processed.

A key technological feature of *mBridge* is its compatibility with the *Ethereum Virtual Machine (EVM)*, a decentralised virtual computing environment that provides a high level of security. This compatibility not only accelerates development but also enables potential interaction with the broader Ethereum ecosystem, which underpins significant parts of the international financial infrastructure, including crypto exchanges. This interoperability could give *mBridge* a comparative advantage over alternative solutions, as it allows participants to benefit from the innovation capacity and security standards of the Ethereum network.

However, in 2025 the BIS withdrew from the project (Löchel, 2026). This decision was linked to the 16th BRICS Summit in autumn 2024, where *mBridge* was proposed as a platform for digital transactions among BRICS countries, referred to as "BRICS Bridge". This initiative includes Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, Saudi Arabia, the United Arab Emirates, and Indonesia, and would enable participating states to conduct transactions outside the US dollar system and SWIFT. This also implies the potential participation of countries subject to Western sanctions, which was not compatible with the BIS's mandate. The BIS has since shifted its focus to *Project Agora*, a separate initiative for multilateral CBDC exchange involving Western central banks, including the *Eurosystem*, the Fed, and the *Bank of England (BoE)*.

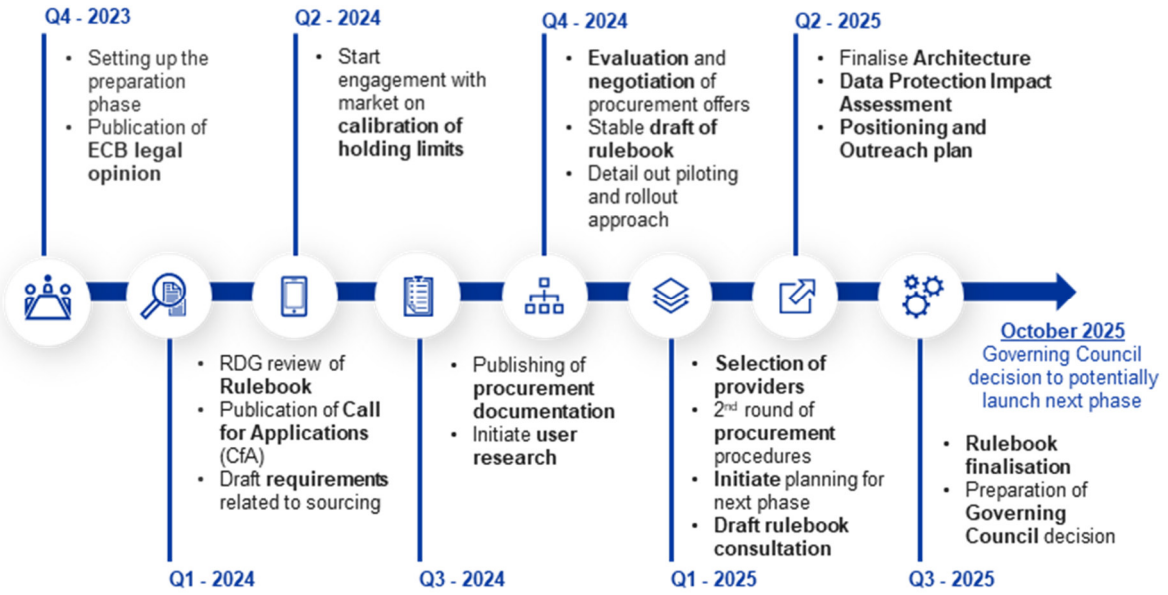
Independently of *mBridge*, PBC is likely to conclude additional bilateral agreements with central banks and foreign governments based on its UDPN technology in order to further test and promote the interoperability of the digital RMB. One such collaboration already exists with the Hong Kong Monetary Authority. Even more significant, however, are partnerships on cross-border digital payments with countries participating in China's BRI, where existing dependence on Chinese infrastructure and technologies facilitates the adoption of Chinese digital payment standards (Löchel, Jablonski, 2025: 98–101).

4 Comparative analysis: digital RMB and digital Euro

The *European Central Bank* (ECB) has been working on the development of a digital euro for several years (ECB, 2025a; Neyer, 2025). However, the project is considerably less advanced than China's e-Yuan initiative, and a digital euro has not yet been introduced. The ECB is still in the process of defining the final design and characteristics of a European digital currency (Angeloni, 2023; Waller, 2021). One reason for this delay is the

need to assess whether the introduction of a digital euro would be compatible with existing European treaties, as neither the *Euro Introduction Regulation* nor the *Treaty on the Functioning of the European Union (TFEU)* explicitly provides a legal basis for a digital euro (Wellerdt, 2025).

Figure 2: Original timetable for the introduction of the digital euro



Source: ECB 2024

Since November 2023, the ECB has been preparing the regulatory and technical foundations for the issuance of the digital e-euro (see Fig. 2). This process includes finalising the rulebook, selecting suitable platforms and service providers, and building the necessary technological infrastructure. The preparation phase concluded in autumn 2025 with the publication of an ECB proposal (ECB 2025b); the next steps now depend on political agreement among the EU institutions.

A final decision on the introduction of the digital euro has not yet been taken (Siedenbiedel, 2025). At present, it appears likely that the *European Council*, the *European Commission*, and the *European Parliament* could reach a common position by mid-2026 (Storbeck, 2026c). A further three-year testing phase is then planned, making 2029 the earliest possible launch date for the digital euro — approximately ten years after the introduction of the e-Yuan. Pilot transactions could begin as early as mid-2027, provided the institutions agree on a common proposal.

A key milestone will be the vote in the *European Parliament* during the first half of 2026. While the Council and the Commission have already endorsed the ECB's plans, significant reservations remain within parts of Parliament (Mussler, 2025). These concerns largely reflect a preference for private-sector solutions in digital payments and align with the interests of much of the European banking sector, which fears losing business in the payments market. European banks and savings institutions have recently

launched the Wero payment service as a European alternative to the US-based provider PayPal. Another source of concern is the high cost of implementation: PwC (2025) estimates rollout costs of at least €18 billion, whereas the ECB estimates maximum costs of around €6 billion (Siedenbiedel, 2025).

Fernando Navarrete, the European Parliament's rapporteur on the digital euro, has proposed allowing only an offline version limited to person-to-person transactions, thereby excluding consumer-to-business payments (Storbeck, 2026a). If adopted, such a proposal would effectively undermine the objective of creating a unified digital payment instrument across the euro area. The same holds for the idea that the digital euro should be relevant for the wholesale market only (Angeloni, 2026).

The ECB's strategy for the digital euro rests on three main pillars: complementarity between public and private money, the integration of private market participants — particularly commercial banks — into distribution, and technological platform neutrality (Cipollone, 2025). As with the e-Yuan, the digital euro is intended to complement rather than replace cash.

A distinctive feature of the euro area, compared with China, is that digital payments have thus far been dominated by US payment providers such as PayPal and Mastercard. The introduction of the digital euro could therefore support the development of a unified European payments network and reduce dependence on foreign payment providers. Both the ECB and the *European Commission* regard this objective as part of the EU's broader efforts to strengthen its "strategic autonomy" (Cipollone; Dombrovskis, 2025). It is also argued that the digital euro could lower transaction costs for both consumers and businesses (Balz, 2026).

The most important difference compared with China is that the ECB has ruled out programmability of the digital euro for regulatory and data-protection reasons. In addition, a holding limit per wallet is planned in order to prevent large-scale transfers from bank accounts into digital wallets during a banking crisis. To facilitate larger payments, wallets may be linked to bank accounts so that transactions exceeding the wallet limit can be settled via the connected account. Unlike the PBC's recent policy shift regarding the e-Yuan, the ECB has so far not planned to allow interest-bearing digital euro holdings.

Table 2 summarises the main similarities and differences based on current information.

Table 2: Comparison of digital RMB and digital euro

Criterion	Digital RMB	Digital Euro
Issuing institution	People's Bank of China (PBC)	European Central Bank (ECB)
Objectives	Improve the payment system by reducing reliance on private digital payment providers; strengthen control over the money supply; combat illegal activities; promote financial inclusion; advance RMB internationalisation	Improve and unify digital payments across the euro area; reduce dependence on US digital payment providers; combat illegal activities; strengthen financial stability
Technological platform	DLT/blockchain technology with centralised management in cooperation with intermediaries; programmability permitted	DLT/blockchain technology with centralised management in cooperation with national central banks and intermediaries; programmability excluded
International interoperability	Planned interoperability with other CBDCs and international systems such as UDPN and mBridge	Planned through a blockchain-based version of the existing TARGET Instant Payment Settlement (TIPS) system
Data protection	Anonymity is guaranteed only for payments under 2,000 RMB□Larger transactions are monitored by intermediaries and, in suspicious cases, reported to the PBC□	Emphasis on data protection and anonymity; anonymous small payments possible, while larger payments are monitored; thresholds have not yet been defined
Pilot projects	Multiple cities in selected provinces and municipalities; cooperation with companies and banks; cross-border transactions	First test transactions planned for mid-2027
Market introduction	Gradual national rollout since 2019	Intended launch in 2029

Nevertheless, it should be emphasised that the final design of the digital euro has not yet been determined. In particular, balancing privacy with regulatory requirements remains challenging. To prevent terrorism financing and other illegal activities, a certain degree of anonymity will necessarily be restricted. As with the e-Yuan, full anonymity is likely to be available only for smaller transactions, although the exact thresholds have not yet been defined. Offline transactions are also expected to provide a higher degree of anonymity.

The ECB further adheres to the principle of data minimisation, according to which only data strictly necessary for preventing illegal activities should be stored. In addition, the ECB is considering decentralised data storage in order to reduce the risks associated with single points of failure and data leaks. All development and testing activities remain subject to European data-protection standards, in particular the GDPR.

5 Summary and Outlook: Competing Systems

China was the first country to introduce a central bank digital currency (CBDC) into circulation in 2018. The objective was to provide consumers with the option of making digital payments using legal tender rather than relying exclusively on private digital money. To accelerate adoption of the e-Yuan, the People's Bank of China (PBC) also permitted selected private e-commerce providers to offer CBDC services to their customers.

Initially, the e-Yuan was designed solely as a digital means of payment. Since the beginning of 2026, however, it has also been possible to hold e-Yuan in digital savings accounts. Like conventional deposits, these accounts bear interest paid by commercial banks, and the deposits count toward the minimum reserves commercial banks are required to maintain at the central bank. This reform marks an important transformation of the Chinese CBDC from a purely transactional instrument into a store of value. Whether this change will significantly increase the attractiveness of the e-Yuan for individual users, however, remains uncertain.

As with physical RMB, the e-Yuan is issued through a two-tier system: commercial banks receive digital currency from the central bank and distribute it to customer wallets. No direct relationship exists between individual users and the central bank, thereby preserving the role of commercial banks within the national payment system. To date, the primary target group has been private consumers, while corporate customers have not yet been comprehensively integrated.

Experience with the e-Yuan has so far been mixed. On the positive side, one important advantage is improved financial inclusion through the integration of previously unbanked consumers into the payment system. Nevertheless, the e-Yuan has not yet established itself as a widely used alternative to private digital payment providers, even in provinces and cities where it has been introduced as legal tender.

The reasons for this remain unclear, but one important factor appears to be the absence of additional user benefits. Many consumers see little reason to change established payment habits. Moreover, the central bank's broader argument of ensuring a secure and stable payment system remains relatively abstract for end users as long as no systemic crisis occurs. Despite its limited domestic uptake, however, the e-Yuan has contributed to the internationalisation of the RMB — a development that should not be underestimated in the context of intensifying geopolitical rivalry.

As the introduction of the e-Yuan demonstrates, central bank digital currency entails not only advantages but also significant challenges and risks. One issue concerns the role of intermediaries in the payment system. Although commercial banks continue to provide individual settlement accounts for CBDC transactions, they may lose parts of the payment business that they previously controlled independently. Additional concerns relate to data protection, the safeguarding of private anonymity, programmability, and financial market stability.

Unlike cash, electronic payments are generally visible and traceable unless they are conducted offline. While this increases the ability to combat illicit financial flows, it also eliminates the anonymity traditionally associated with cash. The PBC has attempted to mitigate this problem by distinguishing between small and large transactions. Small payments remain anonymous, whereas personal data associated with large transactions may be disclosed to intermediaries and, in suspicious cases, transmitted to the central bank.

Both the PBC and the ECB envisage offline functionality that would allow anonymous payments similar to cash (Neyer, 2025). Under such a system, only the sender and recipient would be aware of the transaction, while no digital record would be created. Digital money would be transferred directly from one individual wallet to another. For online payments, the ECB plans that banks transmit only encrypted and non-personalised data to the central bank.

Another important issue concerns the fundamental programmability of digital currency. In principle, CBDC can contain so-called "smart contracts" that predetermine what users may or may not purchase with it. Such programmability opens up the possibility of influencing private consumer behaviour and therefore raises concerns about individual consumer sovereignty. From a regulatory and market-economy perspective, this is problematic because it expands the scope for state intervention in economic activity. It is therefore unsurprising that the ECB has explicitly excluded programmability from the planned digital euro.

At the same time, proponents may argue that programmability could provide advantages for economic policy. During periods of weak economic activity, for example, imposing a time limit on the use of e-Yuan could increase the velocity of money — that is, the

frequency with which a given money supply circulates through the economy — thereby stimulating demand and potentially supporting economic recovery. Such an approach would be consistent with China's state-directed economic system, although whether consumers would consider it desirable is another matter.

Finally, CBDC may intensify liquidity risks for commercial banks during economic crises. In the event of a bank run, deposits could be rapidly converted into central bank digital currency in order to avoid potential losses. To reduce this risk, the ECB plans to introduce wallet limits for individual users, while the PBC has likewise retained this option.

At the international level, competition over the future standard for digital payments has intensified, particularly following the passage of the so-called GENIUS Act (*Guiding and Establishing National Innovation for U.S. Stablecoins Act*) in the U.S. House of Representatives in July 2025, supported by President Trump. The legislation followed extensive lobbying by the American crypto industry. By contrast, many American banks regard stablecoins as a threat because they could weaken banks' influence over the payment system and encourage the withdrawal of savings deposits into digital assets (Quino, 2025).

The ECB, in particular, has expressed concern that dollar-backed U.S. stablecoins could lead to "*euro deposits being moved to the United States*" and contribute to "*a further strengthening of the role of the dollar in cross-border payments*," as ECB Executive Board member Piero Cipollone has argued (Asgari, 2025). China and the PBC have not yet formally responded to these U.S. initiatives and continue to pursue their own approach. Nevertheless, a pilot project for stablecoin issuance has recently been launched in Hong Kong. Attempts by major Chinese technology companies such as Ant Financial and JD.com to participate in the programme were blocked by Chinese authorities, although it remains unclear whether this decision will be permanent. Apparently, policymakers fear that such initiatives could create competition for the e-Yuan. More broadly, Chinese authorities remain sceptical of additional private digital payment solutions, which are often regarded as opaque, risky, and heavily dependent on the U.S. dollar (Leng et al., 2025; Theile, 2025). A similar position is increasingly visible in Europe (Langhammer, 2025; Wolf, 2025).

The e-Yuan therefore affects not only China's domestic payment system but has also become part of a broader geopolitical rivalry through its growing international role. It remains uncertain which model — the Chinese, the European, or the American — will prevail in the long term. At present, digital payment standards are likely to expand primarily within their respective geopolitical spheres of influence. For the e-Yuan, this includes the Global South, particularly Asia, the BRICS+ countries, and states participating in the Digital Silk Road initiative. Collectively, these regions constitute a sufficiently large market for the e-Yuan to compete with U.S. stablecoins.

For the digital euro, by contrast, defending its traditional sphere of influence within the euro area is becoming increasingly difficult in light of the expanding role of US stablecoins. From a European perspective, it is therefore crucial to implement a unified digital euro rapidly (Storbeck, 2026b). The more firmly stablecoins establish themselves within the EU, the more difficult it will become to position the digital euro successfully. This challenge applies not only to consumer payments but also to corporate transactions.

With regard to the future development of the e-Yuan, the PBC is likely to accelerate its domestic rollout by expanding the number of provinces and cities in which it is recognised as legal tender, with the long-term objective of nationwide implementation. No detailed roadmap has yet been published, but the recent introduction of interest-bearing e-Yuan savings accounts clearly signals these ambitions.

Internationally, China is also likely to intensify efforts to expand the use of its CBDC, perhaps even more vigorously than domestically, since influence over the international payment system confers considerable economic and geopolitical advantages (Alonso-Trabanco, 2025). For a country that increasingly positions itself as an emerging superpower, such a strategy appears entirely consistent.

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