The Future of Banking 8

Stephen Cecchetti, Dirk Niepelt,
Hélène Rey and Xavier Vives

Digital Money

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IESE Business School University of Navarra Banking Initiative

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About the authors

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Xavier Vives is Professor Emeritus of Economics and Finance and Distinguished Researcher at IESE Business School. He is a member of the Advisory Scientific Committee of the ESRB (ECB), a Fellow of the Econometric Society since 1992, the European Economic Association since 2004, and the Academia Europaea since 2012. He was President of the European Association for Research in Industrial Economics (EARIE) for 2016-18 and the European Finance Association in 2023, and Duisenberg Fellow of the European Central Bank in 2015. He has taught at INSEAD, Harvard University, Universitat Autònoma de Barcelona, Universitat Pompeu Fabra, UC Berkeley, University of Pennsylvania, and New York University. His fields of interest are industrial organisation and regulation, banking, and financial economics. He has published 125 articles in scientific journals and five books, the most recent being *Competition and Stability in Banking*. In 2011-2014 he was Special Advisor to the EU Commissioner for Competition, Mr. Joaquin Almunia, and until May 2020 he was Lead Independent Director of CaixaBank. He has served as an advisor for the World Bank, the Inter-American Development Bank, the European Commission, and the Federal Reserve Bank of New York. He holds a PhD in Economics from UC Berkeley.

Acknowledgements

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The views expressed in this report are those of the authors. They should not be taken to represent any institutions with which they are or have been affiliated, or the individuals mentioned above.

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Rashad Ahmed	Andersen Institute
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Sophia Bantanidis	Citi
Anna Bayona	ESADE Business School
Juan Luis Bellon	kontxters
Carlos Bellón	Universidad Pontificia Comillas
Carlos Marcelo Belloni	Universitat de Barcelona
Chas Biling	Bank of England
Ulrich Bindseil	TU Berlin
Artur Callau	CaixaBank
Jose Manuel Campa	IESE Business School
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Stephen Cecchetti	Brandeis University
Che Chen	IESE Business School
Long Cheng	IESE Business School
Livia Chitu	European Central Bank
Benoît Coeuré	Autorité de la concurrence
Marc de la Barrera	IESE Business School
Paolo D'imperio	Sapienza University of Rome
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Enric Fernández	CaixaBank
Santiago Fernandez De Lis	BBVA
Roser Ferrer	CaixaBank
Joan Freixa	Banc Sabadell
Jon Frost	Bank for International Settlements
Jordi Galí	CREI, UPF and BSE
Josep Gisbert	IE University & IE Business School
Minfang Guo	IESE Business School
François Haas	Banque de France
Britta Hachenberg	TH Köln
Patrick Honohan	Trinity College Dublin
Yichuan Jia	IESE Business School

Todd Keister	Federal Reserve Bank of New York
Ardit Koka	Universita degli Studi dell'Insubria
Ulf Lewrick	Bank for International Settlements
Hanying Liu	IESE Business School
Gyoengyi Loranth	University of Vienna
Ana Lozano-Vivas	University of Malaga
Alberto Martin	CREI
Montserrat Martínez	Bank of Spain
Jose Marzabal	MTNProjects.com
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Cyril Monnet	University of Bern & Study Center Gerzensee
Justin Reginald Nery	IESE Business School
Alejandro Neut	BBVA Research
Dirk Niepelt	University of Bern & CEPR
Taha Nikkhah	IESE Business School
Elisabeth Noble	European Banking Authority
Remo Oostdam	University of Amsterdam
Luca Orsini	IESE Business School
Cecilia Parlatore	New York University
Gonzalo Patron Costas	Universidad Austral
Witson Peña Tello	Universitat de Barcelona
Vincenzo Quadrini	University of Southern California
Helene Rey	London Business School
Marta Riveira	Banc Sabadell
Jean Charles Rochet	Toulouse School of Economics
Javier Santomá	IESE Business School
Linda Schilling	Washington University in St Louis
Ulf Soderstrom	Sveriges Riksbank
Joerg Stahl	Universidade Católica Portuguesa
Javier Suarez	CEMFI
Leonardo Tariffi	Universitat Pompeu Fabra
Tam Terracciano	IESE Business School
Ariadna Vidal	CaixaBank
Leoluca Virgadamo	IESE Business School
Xavier Vives	IESE Business School
Michelle Wallin	IESE Business School
Haorui Wang	IESE Business School
Zhiqiang Ye	Zhejiang University

Foreword

This is the eighth report in the series on The Future of Banking, part of the Banking Initiative at IESE Business School, launched in October 2018 and supported by Citi. The first report, focusing on regulatory reform of the banking system following the Great Recession triggered by the global financial crisis of 2008-2009, was published in 2019.

The goal of the IESE Banking Initiative is to establish a group of first-rate researchers to study new developments in banking and financial markets, paying particular attention to regulation and competition policy, and to their impact on business banking models and market performance. It aims to promote a rigorous and informed dialogue on current issues in the fields of banking and financial markets amongst academics, regulators, private sector companies and civil society.

The previous seven reports[1] have focused on different aspects of the banking system, from regulatory reform to the impact of technology on financial markets, to how climate and natural disaster risk differs from other, more familiar forms of financial and economic risk. The last report, published in 2025, examined the transformation that artificial intelligence (AI) and, more recently, generative AI bring to finance.

This eighth report examines the challenges digital technology poses to the framework governing money creation. Cash is disappearing from daily payments, private digital liabilities are expanding domestically and internationally, and public authorities are re-evaluating the role of sovereign money. The report shifts attention from technological novelty to the institutional arrangements that make money reliable. Its central argument is that the most important questions raised by digital money concern the architecture of the monetary system: who creates money and under what safeguards, how liquidity is preserved during periods of stress, and how the rents and risks associated with money creation are distributed between public and private entities. It examines the social value of private money creation and the need for a central bank digital currency (CBDC); the implications of cryptocurrencies and stablecoins for the international monetary system and their macroeconomic effects; and the regulatory approach to digital currencies and tokenisation.

The report was produced following the Workshop and Conference on "Digital Money", held at IESE Business School's Barcelona Campus on 19 and 20 March 2026, respectively. The conference programme, along with the comments of the six discussants, is included in this report, as is the opening speech by Benoît Coeuré, President of the French Autorité de la concurrence, and incoming Chair of the CEPR Board. Xavier Vives brought together the team of authors.

1 The reports are available at https://cepr.org/publications/publication-series/barcelona-reports

The Banking Initiative has benefited from the strong support of IESE Dean Franz Heukamp and former Dean Jordi Canals. CEPR and IESE are very grateful to the authors and discussants for their efforts in preparing this report, and to the conference attendees for their perceptive comments. We are also grateful to Carlota Monner for her extremely efficient organisation of the conference and for supporting the report, and to Anil Shamdasani for his unstinting and patient work in publishing the report.

The views expressed in the report are those of its authors alone and do not represent those of CEPR, which takes no institutional positions on economic policy matters, or those of their respective organisations. CEPR and IESE are delighted to provide a platform for exchanging views on this topic.

Tessa Ogden
Chief Executive Officer, CEPR
April 2026

Xavier Vives
Director, IESE Banking Initiative

Executive summary

This report examines the rise of digital money as a transformation of monetary institutions rather than merely a change in payments technology. Its central argument is that the most important questions raised by digital money concern the architecture of the monetary system: who creates money, under what safeguards monetary claims are trusted, how liquidity is preserved during periods of stress, and how the rents and risks associated with money creation are distributed between public authorities and private intermediaries. The report therefore shifts attention from technological novelty to the institutional arrangements that make money reliable. In its view, digital innovation expands the menu of feasible monetary forms, but it does not determine which forms ought to prevail. That remains a question of policy design, public authority, and market structure.

The point of departure is the contemporary two-tier monetary system. In modern economies, central banks issue public money, while commercial banks create most of the money used in day-to-day transactions by issuing deposits tied to lending. This arrangement is sustained by a set of public institutions – convertibility into central bank money, prudential regulation, deposit insurance, and lender-of-last-resort support – that allow private bank liabilities to circulate as money at par with public liabilities. This structure is often treated as natural, even though it is, in fact, a historically contingent institutional settlement. Digitalisation reopens the question of whether this division of labour between the public and private sectors remains desirable, especially as cash recedes and new digital liabilities proliferate.

The report distinguishes among forms of digital money. It argues that the common tendency to group cryptocurrencies, stablecoins, tokenised deposits, and central bank digital currencies under a single category obscures the issues that matter most. The differences between digital monies are fundamental because they determine the quality of monetary backing, the availability of liquidity support, the credibility of par convertibility, and the location of systemic risk.

MONETARY ARCHITECTURE IN THE DIGITAL WORLD

Money has long been digital in operational terms. Bank deposits are electronic records, central bank reserves are already digital liabilities, and large-value payment systems have long relied on electronic settlement. What is new is the rise of platforms, settlement rails, and programmable environments where money-like claims can circulate. Tokenisation, programmability, and the integration of payments with data, collateral, and contractual execution may improve efficiency, but they also alter the governance of monetary claims.

As platforms become hubs where payment, information, and enforcement converge, issues of market power, interoperability, access, and monetary authority become deeply intertwined. The report thus treats digital money not as a narrow payments question but as a matter of institutional organisation and public policy.

Within this framework, the decline of cash assumes particular significance. Cash is the only form of central bank money directly available to the public. As its role in retail payments diminishes, the public layer of money becomes increasingly remote from everyday exchange, even if reserves remain central to wholesale settlement. This development carries several consequences. It may reduce public seigniorage by transferring rents to private intermediaries. It may erode privacy, since digital transactions generally leave data trails that can be monitored, monetised, or misused. It may weaken monetary singleness if new private instruments circulate in closed ecosystems or lose credibility under stress. It may also reduce resilience by increasing dependence on private digital infrastructures that are vulnerable to outages, cyber threats, exclusion, or strategic behaviour by dominant providers. Finally, it may expose countries to external dependence when domestic payment activity relies on foreign-controlled platforms or foreign-currency instruments. In this respect, the retreat of cash is not a superficial change in payment habits, but a structural alteration in the public–private balance of the monetary system.

Wholesale central bank digital currency primarily concerns modernizing settlement among financial institutions, whereas retail central bank digital currency (rCBDC) would introduce digital public money directly accessible to households and firms. Under a narrow conception, rCBDC is primarily a digital substitute for cash, designed to preserve public access to central bank money in an economy where physical currency is declining in transactional use. Under a broader conception, rCBDC could serve as a vehicle for more fundamental reform. However, several commonly invoked motivations for such a project are weaker than they first appear. Financial inclusion, for example, may be more effectively advanced through high-quality public or regulated instant payment systems rather than through a new central bank liability. A badly designed CBDC could impair privacy and become a tool of surveillance rather than a safeguard against it. Sovereignty concerns vary across jurisdictions and depend on the availability of alternative payment infrastructures. The strongest argument for rCBDC lies in its potential to restore or preserve a meaningful public monetary presence in retail payments, to strengthen competition by providing an outside option to private intermediaries, and even to reduce overreliance on fragile structures of privately created money.

There is concern that rCBDC may disintermediate banks and reduce credit supply. If households and firms substitute rCBDC for bank deposits, banks may lose deposit funding, but the central bank could reinvest the funds into the banking system on terms sufficiently close to those previously associated with deposits. Then the overall capacity of banks to lend need not diminish. In this theoretical neutrality benchmark, the substitution of public money for private deposit funding does not mechanically reduce credit provision.

However, this neutrality result is conditional and difficult to implement in practice. It rests on strong assumptions about the substitutability of public and private liquidity services, the non-specialness of deposits, and the absence of meaningful distortions in the cost of liquidity provision. Institutional and incentive frictions may prevent central bank funding from replicating the role of deposits. Moreover, a large expansion of the central bank balance sheet that places it at the core of credit provision may generate significant political-economy risks: pressure for directed lending, intensified lobbying, or broader fiscal claims on seigniorage. The neutrality benchmark is analytically clarifying rather than dispositive. The practical conclusion is that rCBDC may be valuable as a public outside option that strengthens competition and resilience, in a world where a fully transformative redesign of deposit banking would impose substantial institutional burdens on the central bank itself.

IMPLICATIONS FOR THE INTERNATIONAL MONETARY SYSTEM

International currency status is sustained by a web of complementarities across trade invoicing, financial markets, foreign exchange liquidity, reserve holdings, safe assets, and public backstops. On this basis, the dollar remains dominant not only because of the scale of the US economy but also because it is supported by deep Treasury markets, global banking infrastructure, and the Federal Reserve's demonstrated ability to supply liquidity in times of crisis. Digital technologies may reduce transaction costs and facilitate cross-border settlement, but they do not eliminate the network externalities and public institutional supports that anchor international currency hierarchies.

In that international setting, the report identifies dollar-denominated stablecoins as the most consequential development to date. These instruments extend dollar claims onto digital networks beyond the conventional banking perimeter, bringing dollar liquidity into crypto markets, remittance corridors, and jurisdictions with capital controls, limited banking access, or weak monetary credibility. Their importance lies not only in their scale but also in the functions they perform. They can reduce friction in cross-border transfers, serve as savings vehicles in inflationary economies, and facilitate currency substitution without requiring a US domestic banking relationship. However, stablecoins can accelerate 'crypto-dollarisation', weaken domestic monetary sovereignty, reduce local seigniorage, and complicate macroeconomic management in vulnerable economies. In effect, they may amplify the dollar's international reach in digital form while bypassing many of the institutional channels through which cross-border monetary activity has traditionally been mediated. The reserve portfolios backing these instruments also reinforce the US 'world banker' balance sheet and strengthen demand for Treasuries, though the runnability of stablecoins makes this source of external financing volatile.

Digital money can also serve as a vehicle for illicit finance, tax evasion, and sanctions evasion. The growing use of stablecoins and other digital claims in cross-border illicit finance shows that digital money directly affects geopolitical influence, regulatory enforcement, and the practical reach of state power. Compounding the problem is the

difficulty of measurement. Traditional balance-of-payments and national accounts systems were not designed to capture wallet-based, pseudonymous, cross-border movements of tokenised value. As a result, authorities face growing blind spots regarding capital flows, seigniorage losses, sanctions circumvention, and the transmission of foreign monetary conditions. Improved measurement is an essential precondition for informed policy.

On the future international order, the report distinguishes two separate questions: whether the system becomes unipolar or multipolar and whether it remains integrated or fragments. It sketches three trajectories. The first is a deepening of dollar centrality, in which the predominance of dollar stablecoins, the reserve portfolios backing them, and the tokenisation of dollar-based claims reinforce the United States' monetary privilege. This is a more likely outcome if a deep and technologically innovative financial ecosystem develops quickly using USD stablecoins as means of payment. The second is a more multipolar order, in which large currency areas such as the euro area and China develop competing tokenised ecosystems anchored on their own CBDCs. Crucially, a multipolar system need not be fragmented: regional infrastructures could still clear and settle across a common interoperability layer, preserving most of the gains of a unified system. The third trajectory is genuine fragmentation, in which payment connectivity follows geopolitical alliances and cross-bloc transactions become costly.

The report does not anticipate a winner-takes-all outcome but a landscape in which stablecoins, tokenised deposits, and public digital infrastructures coexist. The decisive factors will be governance, interoperability, institutional credibility, the integrity and cyber-resilience of the underlying technology – an 'integrity premium' accruing to the safest, quantum proof rail – and access to public liquidity support. One paradox bears emphasis: the US push to extend the dollar through private stablecoins may, in the medium run, spur rival ecosystems and erode the extraterritorial reach of US sanctions, even as it reinforces dollar usage in the short run.

REGULATION

The regulatory discussion begins by arguing that the essence of money rests on three properties: singleness, transferability, and elasticity. A monetary claim must be accepted at par with other claims denominated in the same unit of account; it must move across users and institutions with low friction; and it must be available elastically when demand for liquidity rises. These properties are produced by institutional arrangements, including legal rules, supervision, central bank settlement, public guarantees, and crisis-management mechanisms. The relevant question for regulatory treatment is functional: what risks does a liability create, and what institutional supports are necessary for it to operate credibly as money?

From this standpoint, stablecoins face substantial limitations as candidates for mainstream money. While they satisfy demand for digitally transferable, sovereign currency-denominated claims, their monetary robustness remains conditional. Their singleness depends on the composition and credibility of reserve backing, the legal terms of redemption, and the broader institutional setting in which convertibility is expected to hold. On-chain transferability requires monetary transferability, which in turn requires low-friction movement into and out of the instrument across broader payment circuits. Most importantly, their elasticity is fragile. Expansion in normal times does not guarantee resilience during stress, when redemptions may require reserve liquidation and confidence may rapidly deteriorate. For this reason, the report likens stablecoins more closely to money market funds than to bank deposits. They may occupy durable niches, particularly in crypto markets and unstable monetary environments, but they do not yet possess the institutional foundations required for large-scale, systemically reliable money.

By contrast, tokenised deposits are structurally better positioned to become the dominant form of private digital money. Their advantage does not stem from superior technology per se, but from institutional location. They remain claims on supervised banks; they sit within prudential frameworks; they may benefit from deposit insurance; and they are connected to central bank settlement and, where necessary, liquidity support. They also draw on pre-existing customer relationships, compliance infrastructure, legal familiarity, and reputational capital. These features matter more than novelty at the technological layer. Once similar digital functionalities are available across multiple instruments, the decisive difference lies in whether the liability is embedded in an institutional environment capable of preserving confidence under stress. On this criterion, tokenised deposits enjoy a clear structural advantage over stablecoins issued outside the banking perimeter.

The preferred regulatory principle is functional equivalence. Instruments that create similar monetary risks should be subject to similar constraints, regardless of the technologies they use. Stablecoins that aspire to circulate widely as money cannot be treated merely as lightly supervised innovations; they require reserve standards, redemption rights, operational resilience obligations, supervisory scrutiny, and, if public support is expected in a crisis, more rather than less prudential discipline. Tokenised deposits, meanwhile, should generally be permitted to develop under bank-equivalent rules because they represent innovation within an already regulated category of monetary claims. Across all cases, the central bank remains indispensable, both because settlement finality ultimately depends on an asset free of private credit risk and because liquidity shocks require a lender of last resort capable of acting elastically when confidence falters.

CONCLUSION

The more meaningful distinction in digital monies is between liabilities that remain embedded in institutions capable of preserving monetary reliability and those whose monetary qualities are conditional, narrow, or fragile. Some digital innovations may strengthen the monetary system by reducing frictions, improving settlement, and broadening access without undermining trust. Others may expand the menu of monetary instruments while increasing opacity, fragility, and geopolitical tension. The policy task is to determine which forms of innovation can be integrated into the monetary system without weakening the institutional conditions that make money dependable in the first place.

Digital money can be understood as a contest over institutional power. Banks seek to preserve deposit franchises and the rents associated with issuing liabilities that function as money. Central banks seek to preserve seigniorage, monetary autonomy, and the public anchor of the monetary order. The United States is positioned to project dollar dominance into digital networks through private dollar stablecoins, even without adopting a rCBDC. The European Union is motivated by concerns about monetary and payment sovereignty and is developing both an rCBDC and a wCBDC, betting on complementarities between central bank liquidity provisions and the development of an integrated ecosystem featuring tokenised deposits and assets. Emerging economies face the prospect of integration into digital dollar ecosystems or into rival geopolitical arrangements. The likely result is neither a seamless global order nor the dominance of a single instrument, but a monetary landscape fragmented across jurisdictions while hybrid across instruments – shaped by competing standards, architectures, and public authorities.

Opening comments at the IESE Banking Initiative 8th Conference, Barcelona, 20 March 2026

Benoît Cœuré[2]
Autorité de la concurrence, Paris

Thank you to Xavier Vives for inviting me to speak about digital money, a topic I have followed in various capacities since 2012 – first as an overseer of payment systems, then as a central bank technologist, and more recently as a competition enforcer.

A decade ago, the Bank for International Settlements' Committee on Payments and Market Infrastructures published its first report on digital currencies.[3] That report observed that the truly innovative element of digital currency schemes lies not in the assets themselves, but in the mechanisms by which they are transferred, typically through a built-in distributed ledger – an observation that still holds today

Since then, digital money has steadily gained ground. Crypto-assets have been promoted successfully as mainstream investment vehicles. Dollar-denominated stablecoins have flourished as well, even if their footprint within the global financial system remains modest.

Central banks, in turn, have actively debated whether to issue their own digital currency (CBDC), yet concrete action has been limited.[4] At present, the ECB is the only advanced economy central bank pursuing a fully fledged retail CBDC project – the digital euro – and a pilot project for wholesale CBDC (see below).

Academic research has explored the implications of digital money across many dimensions.[5] These include competition with existing means of payment; the future architecture of the financial system; consequences for financial stability; risks to integrity arising from fraud, AML/CFT non-compliance, and cyber threats; macroeconomic outcomes; and effects on the international monetary system and the global role of the US dollar.

Clearly, it would be unrealistic to cover all these issues today. Instead, I would like to ask a simpler but more fundamental question: what properties should the monetary system of the future exhibit if digital money continues to expand? Drawing on the classic distinction between the allocative, stabilising, and distributive functions of public policy,[6] I will focus on three dimensions: efficiency, stability, and fairness. I will then discuss adoption dynamics and the risk of being trapped in a low-technology equilibrium.

2 I thank Agnès Bénassy-Quéré, Ulrich Bindseil, Piero Cipollone and Andrea Maechler for their comments. The views expressed here are mine only.
3 CPMI (2015).
4 BIS (2025b).
5 Niepelt (2025).
6 Musgrave and Musgrave (1989).

EFFICIENCY

The efficiency gains promised by tokenisation are well documented. The BIS report to the G20[7] offers many examples. Decentralised finance (DeFi) is gaining traction, yet it remains striking how many of its opportunities have not materialised at scale.

Cross-border payments offer a clear illustration. The G20 effort to make such payments cheaper and faster has focused mainly on upgrading and interlinking domestic fast-payment systems, although the interlinkage could be tokenised[8]. Private actors – including stablecoin issuers and Bitcoin-based money transfer solutions – have been quicker to move.

Other underused opportunities relate to programmability and (possibly conditional) automation. These features can substantially improve settlement efficiency and liquidity management, yet they are still largely absent from mainstream financial infrastructures and treasury operations. Settlement could also be streamlined by enabling delivery-versus-payment and payment-versus-payment arrangements across multiple assets and parties.

Even relatively straightforward use cases – such as tokenised bank deposits, tokenised government securities, or trade finance – remain at an early stage. In short, digital money and tokenised finance are not yet being used in ways that fully support economic efficiency.

STABILITY

Let me now turn to financial stability. Some risks arise from the design of new digital instruments. A prominent example is the risk of runs on stablecoins. This risk is not new – constant net asset value money market funds provide an obvious parallel. It can and should be mitigated through appropriate regulation of reserve assets and redemption mechanisms.

More fundamental risks arise if digital money remains predominantly – or exclusively – privately issued. In academic terms, the financial system would rely only on *inside money*, whereas stability requires a supply of *outside money*, typically issued by a central bank, to ensure that liquidity can expand elastically when needed.[9] There is thus a compelling case for enabling settlement in central bank money within a tokenised environment. There are additional advantages: while private digital money is segmented and risky,[10] central bank money is single, risk-free, and can therefore be accepted on a 'no questions asked' basis.

7 BIS (2024).
8 Lammer et al. (2025).
9 Holmström and Tirole (1998).
10 Brunnermeier and Landau (2022).

Central banks should therefore move decisively toward issuing tokenised reserves (aka wholesale CBDC) that can be used to settle on-chain transactions. The ECB will soon launch a pilot project to link commercial DLT platforms and its own TARGET system, Project Pontes, while the BIS Innovation Hub's Project Agora illustrates the approach in the context of cross-border payments.[11] Tokenised central bank reserves could also be used – though this has received less attention – to provide emergency liquidity on-chain.

Here, transatlantic approaches diverge. While the BIS and European central banks have argued forcefully for settlement in central bank money, the United States has prohibited the Federal Reserve from issuing CBDC – although it remains unclear whether this prohibition extends to wholesale CBDC – and has instead promoted privately issued stablecoins through regulation.

In the absence of tokenised central bank reserves, stability hinges on the assumption that stablecoin issuers will have reliable access either to Federal Reserve facilities, or to bank funding. Whether such a 'three-tier' system can withstand severe liquidity stress remains uncertain, and there are good reasons for scepticism. Even then, the lack of a single, risk-free settlement asset for decentralised transactions risks entrenching fragmentation and vulnerability.

A further, less discussed consequence of digital finance is a potential reduction in the demand for collateral. This could result from data-rich ecosystems – particularly those operated by BigTech firms – that improve credit analytics and reduce reliance on traditional guarantees.[12] It could also result from technologies that replicate delivery-versus-payment across distributed ledgers.[13]

A sustained reduction in collateral demand would reverse a post-Great Financial Crisis trend towards fully collateralised finance, with significant implications for the demand for safe assets and possibly for the global natural rate of interest (the global r*). Current stablecoin dynamics, however, pull in the opposite direction, as their issuance mechanically increases demand for safe assets. Scenarios where stablecoins would displace existing payment systems would make it even worse, by substituting intraday with overnight (and possibly permanent) collateral.

FAIRNESS

Debates on digital money have largely focused on efficiency and stability. Yet distributional effects also matter, not least because they shape adoption and political legitimacy. After all, Bitcoin itself was framed as a response to the Great Financial Crisis and the perceived unfairness of bank bailouts.

There are different channels through which digital money could affect fairness.

11 Maechler (2025).
12 Gambacorta et al. (2023).
13 ECB and Bank of Japan (2018).

Efficiency gains from digitisation may not be passed on to users. Ensuring that they are shared requires robust competition and, where necessary, regulatory intervention.

There are plausible scenarios in which these gains are instead captured by powerful firms, reinforcing market dominance. This risk is particularly acute with BigTech companies, which have a history of building closed ecosystems and engaging in exclusionary and exploitative practices.[14] This was one reason – alongside financial stability – why central banks reacted forcefully to Meta's Libra project in 2019.[15]

While Markus Brunnermeier and Jonathan Payne[16] correctly point out that BigTech finance may create a trade-off between efficiency (in the form of reduced collateral) and fairness, I would argue that entrenched market power ultimately undermines both fairness and efficiency. Similar, though less acute, competitive risks can arise when incumbent financial institutions continue to act as gatekeepers.[17]

Fairness concerns are less pronounced for publicly issued electronic money such as CBDC, though they do not disappear. Issues include access for the poorest, the less technologically skilled, and the unbanked, as well as the potential acceleration of cash decline. At the same time, well-designed CBDC can expand access to services that cash cannot provide and can prevent dominant retail payment providers, such as international credit card schemes, from further increasing their market power as cash usage declines.[18]

Moreover, tokenisation may be perceived as unfair if digital money facilitates fraud, money laundering, tax evasion, or ransomware. The appropriate response is not rejection, but modernising compliance by leveraging technology and embedding supervision into tokenised systems.[19]

SLOW ADOPTION AND THE NEED FOR A BIG PUSH

The adoption of new technologies typically follows an S-shaped curve. The current slow uptake of digital money could therefore accelerate as network effects emerge and regulatory uncertainty diminishes.

Alternatively, the system could become locked into legacy solutions. This might reflect a domination of causes: excessive regulatory caution, high perceived switching costs, or the incentives of incumbents to preserve existing arrangements facing Schumpeterian innovation – particularly in payments, where long-standing ties between banks and card schemes have proven resilient. Backward-looking incentives may help explain why banks have been sometimes sceptical of digital money, and often hostile to CBDC.[20]

14 Autorité de la concurrence (2021), and OECD (2025).
15 G7 Working Group on Stablecoins (2019).
16 Brunnermeier and Payne (2025).
17 OECD (2025).
18 Cœuré (2019).
19 Auer (2019).
20 Bindseil (2026) discusses the narratives underlying these attitudes.

How, then, can we accelerate the uptake of digital money and tokenised finance while safeguarding stability and fairness?

Thriving private ecosystems will be essential. But when there is a risk of slow adoption or inferior equilibria, the public sector has a role to play. Just as war is too important to be left to the generals, money is too important to be left to bankers and technologists alone. I would suggest a four-pronged public response.

First, invest in *foundational infrastructures*, such as digital identity, to enable rapid adoption. These rails can be private, but public initiatives – such as India's Aadhaar – have proven critical. The digital euro is another example. If well designed, it can become a springboard for private solutions to expand.[21] More ambitious projects, including unified programmable ledgers combining public and private tokens on a single platform, should not be ruled out.[22]

Second, ensure *robust competition and contestable markets*, particularly in payments, through regulation and enforcement.[23] Europe's Second Payments Services Directive (PSD2) provides a useful example of procompetitive regulation and underscores the value of close cooperation between central banks, regulators, and competition authorities.[24]

Third, lead by example by *moving faster to tokenise core public-sector functions*, including wholesale and retail central bank money, government funding and transfer programmes such as handouts for the unbanked. Of course, we should move in a careful way – "move fast and *don't* break things" could be the motto of the BIS Innovation Hub, which I have been proud to lead, and of public innovators generally.

Fourth, *encourage incumbents to embrace new technologies* by providing regulatory clarity, particularly in decentralised finance, and addressing legitimate concerns related to stability and integrity. In this respect, I am glad that tokenisation is now fully part of Europe's Savings and Investment Union project.

These steps are needed to engineer a 'big push' towards a better equilibrium, in which we fully reap the benefits of digital money and tokenisation. They are not sufficient, however. In Europe in particular, benefits will remain limited if regulation and markets continue to be fragmented.

21 Cipollone (2025a).
22 Carstens (2023).
23 OECD (2025).
24 Cœuré (2025).

CHAPTER 1

Introduction

Digital money reignites questions that seemed mostly settled in modern monetary systems. For decades, the framework regulating money creation appeared stable: central banks issued public money, commercial banks generated the private money used in most transactions, and regulation linked the two through convertibility, prudential oversight, deposit insurance, and lender-of-last-resort support. This system is now facing challenges. Cash is disappearing from daily payments, private digital liabilities are expanding both domestically and internationally, and public authorities are re-evaluating the role of sovereign money in a growing digital economy. Stablecoins, tokenised deposits, and central bank digital currencies do more than just introduce new payment technologies. They reflect different answers to three longstanding questions: Who should create money? What arrangements ensure its trustworthiness? And how should the related risks and rents be distributed?

Different instruments occupy different positions in the evolving digital money landscape, which is heterogeneous. Native cryptocurrencies such as bitcoin and ether are neither liabilities of a discernible issuer nor claims backed by traditional assets. Stablecoins promise a stable value by pegging themselves to sovereign currencies and backing that promise with reserves, but they operate outside the institutional perimeter that sustains bank money. Tokenised deposits remain bank liabilities and therefore extend the existing architecture onto new technological rails rather than replacing it. Wholesale central bank digital currency (wCBDC) would mainly concern the modernisation of settlement arrangements among financial institutions, a system that is already digital. Retail central bank digital currency (rCBDC) would do something different by introducing digital public money for general use. Grouping all of these instruments together under the label of 'digital money' obscures central questions such as who issues them, what backstop stands behind them, and whether they reinforce or weaken the main functions of money.

This report will deal primarily with the following questions:

- What is the social value of private money creation? Do we need a central bank digital currency?
- What are the implications of cryptocurrencies and stablecoins in the international monetary system? What are their macroeconomic effects?
- What should be the regulatory approach to digital currencies and tokenisation?

Previous reports in the IESE Banking Initiative series have examined fintech disruption, competitive dynamics in banking, digital payments, open finance, and artificial intelligence in financial markets. In particular, and in connection with the topic of the current report, Chapter 4 in the second report in the series dealt with digital currencies,[25] and Chapter 2 in the fourth report dealt with payment system disruptions due to digital technology.[26] The current report places monetary architecture at the centre. The distinction matters because the properties of money – singleness, transferability, elasticity – are not intrinsic to any technology but are maintained by institutional arrangements that can be preserved, reformed, or undermined by digitalisation. The interplay between domestic architecture, international dynamics, and regulatory design is what makes digital money a matter of first-order importance for economic policy.

The remainder of this introduction proceeds as follows. Section 1.1 summarises the analysis in Chapter of the implications of digital money, particularly the design of retail CBDC (rCBDC) for monetary architecture. Section 1.2 summarises the examination in Chapter 3 of how technology shapes international currencies. Section 1.3 summarises the discussion in Chapter 4 of the regulation of digital monies. Section 1.4 draws some conclusions and identifies policy priorities.

1.1 DIGITAL MONEY AND MONETARY ARCHITECTURE

Chapter 2 explores how the digitalisation of money and payments transforms the structure of the monetary system. Digital money is often discussed mainly as a technological advance, offering faster settlement, improved safeguards, greater programmability, and lower transaction costs. However, the more fundamental issues are institutional. Digitalisation may alter a monetary system where the central bank provides public money, while commercial banks generate private money through lending and supply the means of payment used in most transactions. In this way, it raises questions that had seemed settled for decades. At the wholesale level, public money has long been digital: central bank reserves, along with cash, already settle interbank obligations and support the payment system. The critical point is at the retail level. As commerce moves online and cash becomes less relevant, the only form of public money directly accessible to households and firms becomes increasingly marginal. The main issue, then, is not whether money is becoming digital, but whether public money can maintain a significant role once everyday payments are increasingly carried out on private platforms.

25 Carletti et al. (2020).
26 Duffie et al. (2022).

This shift is significant because the monetary architecture influences power, rents, and vulnerability. The current system mainly relies on private intermediaries for retail payments and money creation, but maintains trust through convertibility into central bank money, prudential regulation, deposit insurance, and lender-of-last-resort support. Digitalisation expands the reach of private instruments while weakening cash – the only public tool accessible to everyone. Five key questions emerge: Which parts of the monetary system are changing? What is truly new about 'digital' money? Why does the shift away from cash matter? When can a digital public option serve as a coherent alternative? And which design features decide if such an instrument merely replicates the current system or drives reform?

1.1.1 Which part of the monetary system is actually being transformed?

Modern monetary systems are structured as two-tier systems. At the lower level, final settlement happens in central bank money. At the higher level, households and businesses mainly deal with private money, especially bank deposits. Public money includes cash and reserves; private money is mainly created when banks lend, which generates deposits. This setup is often seen as natural or efficient. However, Chapter 2 suggests that it is actually a flexible arrangement where the state delegates most retail money creation and payment services to private institutions while maintaining trust in the overall system.

The logic of that arrangement rests on monetary singleness: central bank money and commercial bank money circulate at par. This uniformity keeps the coherence of the unit of account even when multiple liabilities circulate side by side. It also allows central banks to influence monetary conditions indirectly by controlling access to reserves instead of directly controlling all payment methods. For that reason, public authorities have long tolerated extensive private money creation so long as private liabilities remain convertible into public money on demand and users continue to perceive them as equivalent. In return, banks enjoy a valuable privilege: because their liabilities function as money, they (or their customers) capture part of the economic benefit associated with money creation, or seigniorage, even though the credibility of those liabilities ultimately depends on public backing. The chapter argues that neither history nor theory implies that this division of labour is uniquely efficient.

From a theoretical perspective, there is a neutrality result because the funding function of deposits can be separated from their role as a means of payment. If households and firms move from deposits into public money (e.g., rCBDC), banks lose deposit funding, but the central bank gains it. If the central bank returns those funds to banks on terms equivalent to those previously associated with deposits, banks' ability to lend need not change. This transfers rCBDC seigniorage to banks. The substitution of public for private money is therefore neutral for banks' balance sheets, for borrowers' funding conditions, and for the overall allocation of credit. Importantly, this does not require the central bank to lend directly to households or firms, nor does it abolish the two-tier architecture. It simply replaces private deposit funding with central bank funding

to banks. Neutrality is not automatic. It requires that the liquidity services of public and private payment instruments can be substituted (not necessarily one-to-one), that deposits are not 'special' in ways the central bank cannot replicate, and that the resource costs of liquidity provision do not change materially. Network effects, operating-cost differences, collateral rules, and political-economy frictions – chiefly among them, threats to central bank independence – can all break neutrality. Even so, the benchmark theoretical result overturns a common presumption in the rCBDC debate: that expanding public money must mechanically shrink bank lending. Whether it does so depends less on technology than on policy choices about central bank intermediation.

1.1.2 What is truly new about digital money?

Money has been digital for a long time. Bank deposits are electronic records, reserves are already digital liabilities of the central bank, and payment instructions have been transmitted electronically for decades. What is new is the rise of new platforms or rails on which money-like instruments can circulate. Tokenisation, programmability, and new complementarities between payments, collateral, and data have changed the economics of intermediation. They can reduce friction, enable conditional execution of transactions, and make it easier to embed financial contracts within broader digital environments.

Tokenisation is a key development because it enables claims to be represented on programmable platforms and transferred in formats that can interact automatically with other digital assets and contractual clauses. Digital platforms can link payments with collateral management or trade credit in ways that traditional payment tools cannot. This can boost efficiency, but it also transforms governance. When the platform becomes the hub where payment, enforcement, and data collection converge, issues of market power, interoperability, and access become deeply intertwined with questions about money itself.

1.1.3 Why does the retreat of cash matter?

The decline in cash use is often seen as a matter of convenience. As its role in everyday transactions diminishes, the presence of public money in retail settings shrinks, even though central bank reserves remain essential for wholesale settlement. This creates an asymmetry caused by digitalisation: the wholesale layer of public money stays intact, while the retail layer is gradually pushed out. Cash holdings do not necessarily drop as a store of value, even as cash becomes less common at the point of sale. This pattern suggests that cash still fulfils functions that digital alternatives cannot fully replicate. It also indicates that the displacement of cash is not solely a natural market development. It is partly influenced by policy choices that discourage cash use under the guise of compliance or crime prevention and by efforts to expand digital payment systems that make the public instrument less convenient.

Five risks result from this decline. The first is the loss of seigniorage: when the public has less central bank money and more private substitutes, the government loses revenue and hands over the benefits of liquidity provision to intermediaries. The second is the loss of privacy: cash offers near anonymity; digital payments leave data trails that can be sold, monitored, or misused. The third risk involves trust and the uniqueness of money: cash creates a direct connection between the public and the central bank, while new private tools can threaten this unity if they circulate within closed systems or lose convertibility during crises. The fourth is the loss of choice and resilience: a payment system that relies heavily on private digital infrastructure becomes more prone to failures, cyberattacks, exclusion, and strategic actions by dominant providers. The fifth is the potential loss of monetary and national sovereignty, especially when domestic payments depend on foreign-controlled networks or foreign-currency instruments.

The Libra/Diem episode demonstrated how quickly a global technology platform can enter the monetary space. Facebook's 2019 Libra project proposed a privately issued digital currency backed by reserve assets and potentially usable across its large user network. Intense regulatory opposition prompted multiple redesigns, a rebranding as Diem, and ultimately abandonment, but the episode revealed that a private platform could scale a quasi-monetary instrument with remarkable speed and challenge existing monetary and regulatory boundaries. One main concern is that the retail anchor of public money might disappear before an adequate digital alternative exists.

1.1.4 Is rCBDC a response to digitalisation or a broader reform of money?

Retail central bank digital currency can be understood in two distinct ways. The narrow view treats it as a digital replacement for cash – a way to preserve public access to central bank money when physical currency becomes less practical. The broader view sees rCBDC as an opportunity to address structural weaknesses in the monetary system that existed long before the current wave of digitalisation. This broader perspective dates back to Tobin's proposal for providing the public with a medium that combines the convenience of deposits with the safety of currency. A public digital payment method could potentially ease some of the tension between competition and stability concerns in banking by separating safe payment functions from riskier bank intermediation.

While several commonly cited motivations for rCBDC focus on addressing the risks associated with declining cash use, not all of these arguments are equally compelling, especially given that policymakers may have alternative tools at their disposal. Financial inclusion might be better achieved in some places through high-quality payment systems, such as Pix in Brazil. Privacy benefits are not guaranteed: a poorly designed rCBDC could become a powerful tool for surveillance. Sovereignty concerns also differ across countries. The more compelling case, therefore, lies elsewhere. Chapter 2 argues that it is in the potential to fix pre-existing structural problems in a payment system that relies heavily on fragile, too-big-to-fail banks and on private money creation supported by public backstops.

Viewed through the lens of the chapter, rCBDC is less of a solution in search of a problem than a potential answer to several long-standing issues. It can act as a 'carrot', offering an alternative to the regulatory 'stick': instead of constantly tightening rules around each new private substitute and watching activity shift elsewhere, policymakers could provide a public digital alternative that maintains uniformity and reduces reliance on specific intermediaries.

1.1.5 Design choices for rCBDC

The first major choice is whether rCBDC should function only as a means of payment or also as a store of value. Current proposals in the euro area heavily favour the first interpretation. Low holding limits, very limited or zero remuneration, and a strong reliance on intermediaries are intended to make rCBDC usable for payments without allowing it to compete too strongly with bank deposits. The stated motivation is financial stability: policymakers fear that an attractive rCBDC would drain bank deposits and exacerbate runs, especially during periods of stress.

That concern may be overstated according to Chapter 2. It treats lost deposits as lost funding, even though the proceeds of rCBDC issuance do not vanish from the financial system. If the central bank passes those funds back to banks, competition from public money does not automatically reduce lending and need not increase instability. It may even reduce fragility by replacing runnable deposit funding with more stable central bank intermediation and by internalising the externalities associated with bank runs.

The choice between holding limits and remuneration matters. Hard caps are simple, but blunt. They risk making rCBDC unattractive not only as a store of value but indirectly as a means of payment, especially if users must continuously convert in and out of deposits. Remuneration is more subtle. It allows the central bank to influence demand for rCBDC while preserving flexibility, and it can be tiered to balance transactional use against large-scale portfolio shifts. A payment-only rCBDC may protect incumbent banks in the short run, but it can also render the public instrument inferior to deposits, thereby undermining the stated goals of strategic autonomy, competition, and monetary anchoring.

Design choices also bring political-economy constraints to the surface. Banks have clear reasons to support low holding limits and unattractive remuneration, because rCBDC threatens cheap funding and deposit franchises. At the same time, a larger central bank balance sheet creates political risks of its own: threats to central bank independence, pressure for directed lending, targeted investment, or wider fiscal use of seigniorage. Privacy advocates raise an additional concern, since a public digital currency that records transactions extensively could displace cash only by sacrificing one of its most valuable properties.

The central lesson is that rCBDC should be assessed at three levels simultaneously: public versus private money; monetary architecture rather than payments technology alone; and distributive concerns, because the relevant trade-offs are distributional as much as technical. The chapter asserts that a well-designed rCBDC could reduce the social cost of liquidity provision and lessen the fragilities built into deposit-funded banking. A badly designed one could add little public value while missing a reform opportunity.

1.2 INTERNATIONAL DIGITAL MONEY

Chapter 3 examines digital money through the lens of the international monetary system. Money does not circulate internationally on equal terms. Some currencies sit at the core of trade, finance, and reserve accumulation; others remain largely confined to domestic use. Digital money does not eliminate that hierarchy, but it may change some of the ways it develops. Stablecoins move across borders more easily than traditional bank balances, tokenised deposits promise settlement on new platforms while maintaining modern safeguards, and rCBDC projects are increasingly driven by sovereignty as much as by efficiency. The question, rather, is whether digital forms of money reinforce the current currency hierarchy or create room for alternative arrangements. Five questions are of interest: What sustains international currency status? Where are digital instruments actually gaining cross-border traction? Can tokenisation reshape currency hierarchies? Why do crypto flows remain difficult to measure? And what are the macroeconomic consequences (for seigniorage, monetary sovereignty, and, indeed, geopolitical power)?

1.2.1 What makes a currency dominant?

International currencies serve multiple roles simultaneously. They are used to invoice trade, denominate securities, facilitate foreign exchange transactions, anchor exchange-rate regimes, and build reserve portfolios. These functions support and reinforce each other. A currency commonly used for invoicing trade also tends to be the primary currency for which other currencies are exchanged; this, in turn, increases liquidity in its FX markets, reduces hedge costs, and enhances its attractiveness for reserve managers and international borrowers. Therefore, the international status of a currency is maintained not by a single function, but through the complementary relationships among markets, institutions, and public backstops.

This is why dollar dominance has remained so resilient. The United States combines a large market, extensive safe-asset markets, a global banking infrastructure, and a central bank capable of providing liquidity during times of stress. The dollar still makes up about 57% of foreign exchange reserves, with the euro a distant second at around 20% while the renminbi remains minor despite China's economic influence. The US Treasury market continues to serve as the core of the international collateral system,

and the Federal Reserve's swap lines have repeatedly demonstrated that dollar liquidity can be expanded when necessary. The outcome is a balance where the dollar is not just one of many international currencies but the central hub around which much of the system revolves.[27]

History reinforces this idea. Under the gold standard, international finance was centred on gold and sterling; during Bretton Woods, it was reorganised around a dollar convertible into gold; with fiat money, convertibility disappeared but dollar dominance persisted because the main constraint shifted from commodity backing to institutional credibility and the supply of safe assets. New technologies can reduce payment frictions, but they do not eliminate the network externalities, institutional complementarities, and liquidity backstops that have long shaped the international monetary system. The key question is whether digital instruments simply integrate into the current dollar-centred system or make alternative equilibria more possible.

1.2.2 Where is digital money actually gaining cross-border traction?

Not all forms of digital money have the same international monetary impact. Native cryptocurrencies, like bitcoin and ether, offer an escape from restricted systems; stablecoins, such as Tether's USDT and Circle's USDC, bring dollar liquidity to new platforms; tokenised deposits modernise regulated claims and can act as a medium of exchange while maintaining features already present in the current monetary system; and rCBDC and wCBDC initiatives aim to reshape the public infrastructure for cross-border settlement. What makes these instruments internationally relevant are the frictions they bypass and the monetary functions they can perform across borders.

Different instruments are finding various international use cases. Native cryptocurrencies like bitcoin and ether are still not suitable as everyday money domestically – they are too volatile, lack scalability, and do not serve as a reliable unit of account. However, internationally, they are useful precisely where existing institutions are weak or restrictive. In countries with capital controls, foreign-exchange restrictions, or fragile banking systems, crypto assets can act as an alternative way to transfer value across borders. They are adopted when the traditional system is expensive, inaccessible, or heavily restricted.

Stablecoins mark the most important development. About 99% of these are dollar-denominated, and the market recently exceeded $300 billion. They replicate the dollar's roles as a unit of account and store of value while operating on digital networks outside traditional banking systems. Tether and USDC have become the main links between traditional finance and blockchain markets, giving them global importance that extends beyond the crypto world.

27 See also Chapter 3 in the fifth Banking Initiative Report (Corsetti et al., 2023).

One reason is remittances. Global remittance flows now approach $905 billion a year, yet the average cost of sending $200 remains around 6.5%. Stablecoins can reduce settlement times and increase competition, especially where banking access is expensive and limited. But the gains are not automatic. KYC/AML compliance costs do not vanish with tokenisation; they are linked to regulation rather than technology and still make up a significant part of transfer costs. Users also remain exposed to exchange-rate risk when converting currencies and to issuer and governance risk when holding claims on private stablecoin issuers. A second use case for stablecoins is currency substitution. In economies with high inflation or weak monetary credibility, dollar stablecoins make it easier for households and businesses to switch to foreign money without needing a US bank account or physical cash. Argentina is a clear example: stablecoins can function as a savings vehicle, an inflation hedge, and a payment instrument, while also helping users bypass capital controls. This is not traditional dollarisation. It is faster, more decentralised, and harder for domestic authorities to monitor. For that reason, it can be more destabilising and weaken monetary sovereignty.

A third, more concerning use case is darker. Digital assets have become an increasing tool for illicit cross-border finance and sanctions evasion. Illicit crypto addresses received roughly $154 billion in 2025, with about $104 billion linked to sanctioned entities. Here, dollar stablecoins are increasingly replacing bitcoin because they are more liquid and better suited for transferring large sums across platforms. Even if illicit activity accounts for less than 1% of total crypto transactions, it shows that digital money impacts not only efficiency and competition but also the geopolitical reach of payment networks and the practical effectiveness of sanctions. There is a paradox here. Because dollar stablecoins are at present the most liquid rails for circumventing the US-controlled financial system, sanctions evasion reinforces the dollar in the short run; yet by exposing the cost of dependence on US infrastructure, it gives other jurisdictions reason to build rival ecosystems that, in the medium run, could erode the very extraterritorial reach of US sanctions.

1.2.3 Could tokenisation change the currency hierarchy?

One possibility is that tokenisation strengthens dollar dominance. The top stablecoins are dollar-based, the dollar already leads the relevant safe-asset and payments system, and the first large-scale cross-border tokenised instruments have appeared around dollar claims. In this case, the digitalisation of money expands rather than replaces the existing hierarchy. Crypto-dollarisation in emerging markets, the use of dollar stablecoins in remittances and illegal flows, and the tokenisation of deposits by major US banks would all expand the dollar's international influence.

The Eurodollar market offers a historical analogy. Eurodollars were dollar liabilities created outside the United States but integrated into the broader dollar system. Stablecoins are similar in one key way: both create dollar claims outside the regulated US banking system while depending on the expectation of parity convertibility. The lesson from Eurodollars is that private offshore money can grow very quickly once users

trust the ecosystem. However, the same history also reveals what stablecoins still lack. Eurodollar markets became much more resilient once the Federal Reserve's liquidity backstop was understood to extend, indirectly, to the wider dollar system. Stablecoins do not pay interest directly, and more importantly, they typically do not have a lender of last resort. This is their fundamental weakness.

The alternatives are not all the same, and it helps to separate two questions: whether the system becomes unipolar or multipolar, and – independently – whether it stays integrated or fragments. Geopolitical tensions are already prompting countries to develop payment links that lessen dependence on US-centric infrastructure, whether by connecting existing domestic systems (such as India's UPI and the Eurosystem's TIPS) or by building new ecosystems centred on the euro or the renminbi. A multipolar outcome need not be a fragmented one: if these systems clear and settle across common interoperability standards, several currencies could coexist while preserving most of the gains of a unified system. Fragmentation proper – where payment connectivity tracks geopolitical alliances and cross-bloc settlement becomes costly – is a distinct and more damaging possibility, and whether it materialises depends less on technology than on whether the major blocs treat payment infrastructure as a shared commons or as a strategic asset. In that sense, technology would not dissolve politics; it would carry it into infrastructure.

This is where CBDC and public infrastructure become essential. Private digital currencies can expand rapidly, but central banks remain uniquely capable of providing flexible liquidity and a public settlement foundation. This gives CBDC an international role that extends well beyond domestic retail payments. Projects like mBridge and Agorá at the BIS, along with the ECB's Pontes and Appia initiatives, aim to shape the framework of cross-border settlement rather than leaving it solely to private platforms. The most probable outcome is not a race where one dominates among stablecoins, tokenised deposits, and CBDCs, but a hybrid system where all coexist. The key question is which currencies can blend technological adaptability with trusted public safety nets, credible institutional governance, and the cyber-resilience of the underlying rails. As encryption is tested by quantum computing, an 'integrity premium' may accrue to the safest rail rather than the largest.[28]

Tokenised deposits deserve particular attention. Unlike stablecoins, they stay within the regulated banking system: they are claims on banks that already have access to the central bank and are subject to prudential supervision. However, their international spread depends on interoperability, governance, and mutual acceptance among institutions and legal systems. Technology can facilitate internationalisation to some extent; institutional coordination still determines whether these new instruments can scale.

28 Rey (2025a).

1.2.4 Why is international digital money still so opaque?

International digital money is becoming financially significant faster than it is becoming statistically measurable. Traditional balance-of-payments and national accounts systems were designed for transactions that pass through identifiable institutions and jurisdictions. Crypto and stablecoin flows do not fit neatly into that framework. Wallet addresses do not disclose residence; on-chain transactions blend payments with speculative trading; and the separation between resident and non-resident holdings – central to external accounts – becomes hard to enforce when assets move through pseudonymous networks.

Current measurement methods are still imperfect. Chainalysis, a blockchain analytics company, infers geographic information from web traffic to centralised exchanges, but this method depends on strong assumptions. Reuters' approach uses machine-learning techniques and off-chain signals to assign wallets to regions, improving previous estimates but still lacking country-level accuracy. BIS Project Atlas combines on-chain and off-chain data in another effort to reduce the gap. Despite these limitations, the overall picture shows that Asia-Pacific accounts for the largest total flows. Meanwhile, Africa, the Middle East, and Latin America are disproportionately important relative to their economic size. This suggests that digital cross-border money is most relevant not in everyday domestic transactions but in cases where remittances, capital restrictions, and weak monetary credibility make alternative channels especially valuable.

The policy implication should be clear. Better measurement is not just a technical issue; it is increasingly vital for effective policy. Without it, authorities will have less ability to evaluate capital-flow patterns, seigniorage losses, sanctions evasion, AML/CFT risks, or the ways foreign monetary conditions influence domestic economies. As digital money becomes more important globally, statistical frameworks will need to evolve accordingly.

1.2.5 What follows for seigniorage, monetary sovereignty, and geopolitical power?

The macroeconomic effects start with public finance. Outside the United States, widespread use of dollar stablecoins essentially privatises seigniorage. Households and firms hold claims similar to money, but the income from the reserve assets backing them goes to private issuers rather than to domestic banks, central banks or finance ministries. At the same time, the reserve portfolios supporting major stablecoins boost demand for US Treasury bills. Tether and Circle now hold more US Treasuries than Saudi Arabia. Digital money, therefore, has a twofold impact: it shifts some monetary rents from the public sector to private issuers with a global reach, and it can strengthen the United States' external financing by creating a new private demand for dollar-safe assets.

That dynamic links digital money to the US 'exorbitant privilege'. The dollar's global role has long enabled the United States to finance itself on very favourable terms. If stablecoins create a new global demand for dollar assets, they could reinforce that privilege in digital form. However, the mechanism is not without costs or perfect stability. Stablecoin demand can fluctuate, and a system that depends more on private token issuers might be more unstable than one based mostly on official reserve demand.

For other countries, the effects could be mixed. Easy access to dollar can be welfare-improving for the public in countries facing very high inflation. But crypto-dollarisation erodes monetary sovereignty, decreases domestic seigniorage, and weakens the transmission of monetary policy. Crypto instruments may also reshape the transmission of global financial conditions: by substituting for bank deposits, dollar stablecoins may push banks toward wholesale funding and sharpen the pass-through of US monetary policy abroad, deepening exposure to the global financial cycle. For instance, US monetary policy may have a stronger effect on euro area banks. The extent to which stablecoins, bank deposits, and money market funds (MMFs) are interchangeable will influence the transmission of monetary policy. Tokenisation could also increase collateral velocity, adding procyclicality to the financial system – though this could be offset by the reduced role of collateral in the digital economy. What appears to be greater efficiency during normal times might lead to sharper portfolio shifts during stressful periods. Lastly, there is a geopolitical impact. Digital money might enable a more efficient cross-border system, but it could also create a more fragmented one – a network of competing platforms aligned with different regulatory regimes, technological standards, and security alliances. In such a scenario, managing crises would be more difficult because providing liquidity would require coordination across infrastructure that is both politically and technically divided. The key issue is who will supply trust, liquidity support, and settlement finality in the emerging international system.

1.3 REGULATING DIGITAL MONIES

Chapter 4 examines how digital currencies should be regulated to serve as secure, efficient payment methods while preserving financial stability. A liability acts as money only if it is trusted to circulate at par with other liabilities in the same currency, to transfer smoothly between users and platforms without excessive friction, and to be readily available when liquidity demand increases. These conditions are so deeply ingrained in modern monetary systems that they are often mistaken for technical features. However, they are not. They result from legal rules, public guarantees, payment infrastructure, and central bank arrangements that collectively maintain confidence in monetary claims.

From this perspective, regulating digital money is not a secondary issue that only arises after innovation has occurred. Instead, it goes to the core of whether new digital money can truly become money at all. Stablecoins, tokenised deposits, and central bank money do not merely offer different payment methods. They represent distinct institutional setups, with different implications for convertibility, crisis response, and the allocation of monetary power. This raises five key questions: What makes a liability money? Why do central banks remain essential even with tokenised assets? Can stablecoins become mainstream money? Why are tokenised deposits better positioned to scale? And which regulatory principle should guide the next stage of monetary innovation?

1.3.1 What makes a liability money?

A liability money is one that is accepted without repeated scrutiny of the issuer, circulates at par with other claims denominated in the same unit of account, moves easily among users, and remains available in sufficient quantity when liquidity needs increase. A good starting point is therefore general acceptance. A claim becomes monetary when users expect that others will accept it at face value, without constantly reassessing the underlying balance sheet.

General acceptance depends on three key properties: singleness, transferability, and elasticity. Singleness means that one unit of money trades at par with another. Transferability means that claims can move across users, institutions, and time with minimal cost and friction. Elasticity means that the system can adjust liquidity by expanding or contracting based on changes in payment demand, funding conditions, and confidence. These properties are often overlooked because modern monetary systems provide them so routinely that they seem natural. They are not. Commercial bank money circulates at par with public money because a comprehensive institutional framework makes that parity credible: prudential regulation, supervision, deposit insurance, final settlement in central bank reserves, and lender-of-last-resort support. The idea that private liabilities can serve as money is therefore closely tied to the public arrangements that support their acceptability. The main issue is not technological innovation itself but whether new digital liabilities can maintain par convertibility, broad acceptance, and liquidity during stressful conditions. That is also the fundamental regulatory question.

1.3.2 Why do central banks remain indispensable in a digital monetary system?

Two public functions remain decisive: settlement finality and elastic liquidity provision. Final settlement in central bank money ensures that payment chains end with an asset free of private credit risk. That anchor is what allows a diverse array of private liabilities to circulate as if they were one money rather than many. Without a common settlement asset, convertibility becomes more fragile, and the conditions for singleness weaken. Monetary systems depend on a final layer of settlement that is not itself another private claim.

Liquidity provision is distinct from settlement, though the two are often conflated. A system may offer settlement on central bank rails without thereby solving the problem of fragility under stress. Monetary systems are inherently exposed to fluctuations in payment demand, shifts in funding conditions, and sudden changes in confidence. When those pressures intensify, the issue is not only where settlement occurs, but who can supply liquidity elastically enough to prevent fire sales, payment gridlock, and destabilising runs. This is the function associated with the central bank as lender of last resort. Finality secures the endpoint of payment. Elasticity secures the survival of the system when demand for safe liquidity rises abruptly.

That distinction is especially important in digital settings. Faster transfers, continuous trading, and programmable execution can reduce certain frictions in normal times, but they do not eliminate balance-sheet pressure. In some cases, they may sharpen it. A system in which claims move more quickly can also be a system in which outflows accelerate more rapidly once confidence falters. Continuous settlement does not eliminate abrupt changes in expectations. The public role therefore remains central even when the interface becomes more digital.

The relevant question is not whether digital money should be public or private in some exhaustive sense. Modern monetary systems are already hybrid. The question is which layers of the system can safely be delegated to private issuers and which continue to depend on public institutions. Once that question is asked in institutional rather than technological terms, the *central bank's continuing centrality* becomes much clearer. The problem is not simply who issues the claim; it is who guarantees final settlement, who absorbs liquidity shocks, and who preserves monetary uniformity when private confidence becomes unstable.

1.3.3 Can stablecoins become mainstream money?

The growth of stablecoins points to substantial demand for transferable digital claims denominated in sovereign currency. They move readily within tokenised markets, facilitate trading and collateral management, and have acquired a degree of relevance in some cross-border uses. Their scale is no longer trivial, and their economic significance is increasingly difficult to ignore. Even so, usefulness should not be confused with monetary robustness. The real test is whether stablecoins can meet the conditions of mainstream money.

The first difficulty concerns singleness. A stablecoin promises par redemption into sovereign currency, but that promise depends on the quality of the reserve assets, the legal structure of the claim, the operational capacity of the issuer, and the broader institutional environment in which redemption takes place. A peg is therefore not enough. Monetary singleness requires convertibility to remain credible under pressure, not only in normal times.

The second difficulty concerns transferability. Blockchain-based transfers can be fast, continuous, and programmable. Yet transferability in the monetary sense is broader than technical settlement on a ledger. It requires that users can move into and out of the claim at reasonably low cost and with broad interoperability. What matters is not only the transfer on-chain, but the entire payment circuit in which the liability is embedded.

The third difficulty concerns elasticity. Stablecoins can expand in normal times as users demand more of them, but contraction under stress is more revealing than issuance in benign conditions. Redemptions require the liquidation of reserve assets or access to pre-existing liquidity. Without central bank facilities, the issuer's capacity to meet large-scale withdrawals can become uncertain precisely when users begin to doubt it. This is why reserve backing, while necessary, is not sufficient. For that reason, stablecoins are institutionally closer to money market funds than to bank deposits. Both rest on money-like claims backed by liquid asset portfolios, both depend on confidence in redemption at par, and both become vulnerable when exit incentives turn collective. The comparison matters because the record of such instruments is not one of effortless stability.

Episodes of de-pegging have already made the point. This does not render stablecoins irrelevant, nor does it suggest that they lack durable use cases. They may continue to serve niches in which access to conventional banking is weak, tokenised markets require an internal settlement asset, or cross-border transfers remain expensive. Cross-border use also raises questions of stability. Who is responsible when a global stablecoin operating across different jurisdictions fails? Stablecoins have a clear role in the crypto ecosystem and in unstable economies with a volatile currency. Different jurisdictions have different regulatory approaches to stablecoins. Regarding central bank access, for example, in the European Union, MiCA provides no central bank support; in the United Kingdom, the Bank of England proposes backstop liquidity facilities for systemic issuers; and in the United States, the GENIUS Act grants bank-affiliated issuers access to Federal Reserve payment systems such as Fedwire and FedNow, but explicitly denies deposit insurance and discount window access to all stablecoin issuers.

1.3.4 Why are tokenised deposits better placed to prevail?

Tokenised deposits begin from a stronger institutional position because they extend an already regulated monetary form onto new technological rails. They remain claims on supervised banks, sit within prudential frameworks, benefit from deposit insurance where applicable, and rely on institutions that already have access to central bank settlement and, under stress, to central bank liquidity. That does not make them frictionless, nor does it guarantee widespread adoption. But it does give them a comparative advantage over standalone stablecoins: operational innovation can be combined with institutional arrangements that already support par convertibility and confidence.

A tokenised deposit is not an attempt to recreate money from outside the monetary system. It is an adaptation of an existing monetary liability to new settlement environments, new forms of programmability, and new operational demands. The hardest part of making money work is sustaining general acceptance, broad usability, and liquidity under stress. Banks already participate in that framework. Their tokenised liabilities therefore start with institutional supports that new issuers would first have to build and then defend in practice.

They also start with other advantages such as existing customer networks, compliance infrastructure, legal familiarity, and reputational capital. Digital liabilities compete within a pre-existing system in which some institutions already enjoy scale, trust, and direct links to central bank facilities. This does not mean incumbents will automatically dominate, but it does mean that the burden of proof is heavier for liabilities issued outside the core banking perimeter.

A further point follows from comparison with other tokenised claims. Stablecoins do not compete only with legacy deposits in their conventional form; they also compete with tokenised liabilities issued by banks and with money-like claims sponsored by large, regulated institutions. That broadens the competitive field in a way that tends to favour arrangements already close to the prudential perimeter. Once operational innovation is available to multiple issuers, the decisive margin may shift away from technology and toward institutional location.

Tokenised deposits are the most plausible route to large-scale digital money within the existing monetary order. They preserve the two-tier structure rather than attempting to circumvent it, and they avoid a false opposition between innovation and stability. The long-run issue is unlikely to be whether digital money will be entirely public or entirely private, but which private liabilities remain sufficiently anchored in public institutions to scale safely. On that criterion, tokenised deposits hold a structural advantage over digital liabilities whose monetary qualities remain conditional, platform-specific, or fragile under stress. This advantage is not only regulatory; it is also organisational and infrastructural. Banks and established payment institutions already possess the legal expertise, technical capacity, and cooperative mechanisms needed to build interoperable clearing and settlement systems, including on a cross-border basis (e.g., SWIFT). Banks moreover have powerful incentives to invest in such innovation. The wider the use of alternative digital monies, the greater the risk that banks lose cheap deposit funding and part of the monetary rents associated with issuing liabilities that function as money.

1.3.5 Which regulatory principle should govern digital money?

The regulatory treatment of digital monies should depend on their monetary character rather than on their technological form. The relevant benchmark is functional equivalence: liabilities that create comparable risks should be subject to comparable constraints. What matters is whether instruments used as money are embedded in safeguards proportionate to the risks they pose for convertibility, payment continuity, and crisis management.

Stablecoins that aspire to monetary use at scale cannot be treated as lightly supervised technological products. The closer they come to functioning as money, the stronger the case for reserve requirements, redemption rights, operational resilience standards, supervisory scrutiny, and restrictions on risk-taking. If they are expected to preserve singleness under stress, some relationship to central bank settlement or liquidity support becomes difficult to avoid. Once public support enters the picture, however, prudential discipline must tighten rather than loosen. Support without discipline would merely expand moral hazard. Indeed, stablecoins share features of MMFs and we know from recent crises that no-bailout commitments are not credible.

Tokenised deposits trigger a different regulatory obligation. Since they already fall under banking law and prudential supervision, the main issue is less about creating a new category and more about how to modify existing rules for new operational formats. When innovation extends an already regulated monetary claim, the default should be to allow that innovation under bank-like rules. Conversely, when innovation aims to create a money-like liability outside that scope, the burden of proof should be significantly higher.

The broader conclusion is that the future of digital money will turn less on technology than on institutional location. Central banks remain essential because of settlement finality and their function as lender of last resort. The liabilities most likely to scale are not necessarily those that are most novel at the technological layer (e.g., stablecoins that fall short of singleness, elasticity and have high transfer costs), but those capable of combining innovation with the institutional conditions that preserve general acceptance, singleness, transferability, and elasticity (e.g., tokenised deposits combining programmability with safety). The issue is which digital liabilities can credibly be made monetary. The answer lies in the capacity to embed innovation within arrangements strong enough to preserve confidence when conditions are least forgiving.

1.4 EVALUATION, CONCLUSIONS AND POLICY IMPLICATIONS

The common theme in the three chapters of the report is that the questions raised by digital money mainly concern institutions, not technology. The ability to develop payment systems with near-instant settlement, programmability, and cryptographic security is generally accessible and relatively inexpensive. What remains under debate is the institutional framework within which these capabilities are used. Who issues

money? What safeguards ensure its stability? How is the public-private boundary in money creation managed? And who bears the costs when issues arise? Technology expands the range of potential monetary arrangements; it does not determine which one is chosen. This distinction shifts the focus from "does this technology work?" to "which institutions do we want?"

Three conclusions arise from the analysis in the chapters. First, digital money has reopened questions about the boundary between public and private money. Second, it has expanded those questions into the international monetary system through new cross-border instruments and infrastructure. Third, it has made regulation inseparable from what can credibly function as money. The main issues are therefore not purely technological, but institutional. How is convertibility maintained? How does liquidity endure under stress? And how is monetary authority allocated among public and private issuers?

A primary implication of the analysis in Chapter 2 relates to the domestic monetary system. The decline of cash is not just a shift in payment methods; it directly impacts the only form of public money accessible to households and businesses, as well as the central bank's retail presence in routine transactions. Cash has traditionally supported monetary stability, resilience, and transaction privacy. As its role diminishes, the public component of retail money might weaken even if the wholesale role of reserves stays intact. The question raised in Chapter 2 is not only whether the public should have a digital replacement for cash but also whether the monetary system should depend almost entirely on privately issued retail money. It suggests that increasing the role of public money does not necessarily lead to less bank lending if the central bank reinvests funds into the banking system under suitable conditions. The disintermediation concern regarding rCBDC, therefore, would hinge more on institutional design than on technology. However, the implementation of the theoretical neutrality result involves formidable impediments.

The main issue is identifying which market failure rCBDC addresses. If there is a lack of competition in payments, other solutions might be more efficient (as shown by the example of Pix in Brazil), although it is true that an rCBDC could encourage incumbent banks to modernise. The China example shows that there is no need for an rCBDC when a private efficient instant payment system (with Alipay and WeChat Pay) is in place backed up by central bank reserves. If the fragility of the fractional reserve system raises questions about the social incentive to create private money, we might also wonder whether some fragility is actually necessary for incentives and for the current liquidity transformation role of intermediaries.[29] Even if the central bank were able to perform the disciplining role more effectively than depositors and replicate the functions associated with deposit specialness, this would place a substantial burden

29 See Calomiris and Khan (1991), Diamond and Rajan (2001), Gale and Vives (2002), and Rochet and Vives (2004), for a range of models on the issue.

on it.[30] A central bank performing all these functions would be similar to a state-run bank.[31] Indeed, the proposal to replace deposits with retail CBDC, which would be lent back to banks, would place the central bank at the core of credit provision. As argued in Chapter 4, however, central banks will require collateral to lend to banks and therefore will have to set haircuts on the posted collateral. This conflicts with the zero-collateral requirement for the neutrality result to hold. Another issue, discussed in Chapters 2 and 4, is that a larger central bank balance sheet threatens central bank independence, increases lobbying pressure for directed lending and targeted investment, and expands the broader use of seigniorage for fiscal purposes. As Andolfatto concludes in his discussion, rCBDC may serve as an outside option, enhancing competition and resilience without requiring a complete reorganisation of the monetary system.

A second implication concerns the competitive structure of digital monetary instruments. Not all digital liabilities stand in the same institutional relationship to the monetary system. wCBDC remains largely within an already public wholesale layer and is therefore best understood as a modernisation of settlement infrastructure. rCBDC would extend digital public money directly to households and firms. Stablecoins occupy a more ambiguous position. They can perform money-like functions, especially within crypto-asset markets and some cross-border use cases, but they do so without automatically inheriting the institutional supports that sustain bank deposits. Tokenised deposits remain claims on supervised banks. They are more likely to prevail not only because they are embedded in prudential and monetary arrangements that already sustain confidence, but because banks have both stronger incentives and greater operational capacity to innovate at scale. If alternative digital monies were to displace deposits, banks would lose a valuable source of cheap funding and part of the monetary rents associated with issuing widely accepted payment liabilities. A key parameter in the competition among digital monies will be the substitutability between stablecoins, MMFs, and bank deposits, but the conjecture is that tokenised deposits will dominate stablecoins.

A third implication is international, as argued in Chapter 3. Digital money may influence the hierarchy of currencies. The fact that almost all major stablecoins are denominated in dollars matters for more than being a unit of account. It extends the international use of dollar claims onto new rails, which may become more and more relevant with further technological innovation such as the use of agentic AI in fintech. This dollar 'first-mover advantage' may be critical. It creates forms of crypto-dollarisation in economies with weak monetary credibility, and reinforces demand

30 This applies also to whether the functions studied in the literature on banks' deposit specialness can be replicated by the central bank. Be it by helping to monitor, as in Mester et al. (2007), or by internalizing complementarities between deposits and loans, as in Kashyap et al. (2001). Kashyap et al. (2001) claim that lending and deposit-taking are two manifestations of the provision of liquidity on demand. The synergies between the two activities come from the imperfect correlation between deposit withdrawals and lending commitment takedowns.

31 We may add that public bureaucracies have different incentives than private sector managers, often privileging procedures over efficiency, fostering red tape and blame-avoidant risk aversion, leading to delay or inaction out of fear of legal consequences. See Bozeman (1993) and Wilson (1989) for classic studies.

for US safe assets through the reserve structures backing private issuers. Digital money can strengthen dollar centrality not only through payments, but also through balance-sheet mechanisms long associated with exorbitant privilege. At the same time, the spread of borderless digital liabilities complicates domestic monetary control in more fragile economies, weakens seigniorage, and makes cross-border contagion harder to observe and manage. The resulting pressures are not confined to emerging markets. They also affect how major jurisdictions think about cross-border payment infrastructure, monetary policy transmission and exposure to the global financial cycle, CBDC interoperability, sanctions, and strategic dependence on foreign-controlled networks. Which currencies prevail will depend on blending technological adaptability with trusted public safety nets, credible governance, and the cyber-resilience of the underlying rails. Tokenised deposits deserve particular attention: they remain claims on supervised banks with central bank access, but their international spread hinges on interoperability, governance, and mutual acceptance across institutions and legal systems, so institutional coordination will determine whether they scale.

A fourth implication is regulatory. The most coherent organising principle is functional equivalence: activities that create similar risks should be subject to similar constraints. For example, as stated in Chapter 4, tokenisation should be welcome, but it requires bank-equivalent regulation. Where a claim is expected to circulate at par, support payments at scale, and remain stable under redemption pressure, the regulatory perimeter must reflect those expectations. In practice, this means that large-scale stablecoin arrangements cannot remain lightly supervised if public authorities are expected to preserve convertibility or contain systemic spillovers when conditions deteriorate. Nonbank issuers could scale if they meet requirements, but institutional location matters. Indeed, tokenised deposits are structurally favoured precisely because they reside inside existing banking law, prudential supervision, deposit insurance, and central-bank access.

The role of central banks remains indispensable to provide settlement finality and a liquidity backstop. Furthermore, digital liabilities operate across borders, create opportunities for regulatory arbitrage, and complicate oversight and resolution when issuance, reserve management, and use are distributed across jurisdictions. Because of this, international coordination to establish common minimum standards has become an important policy priority.

A final conclusion follows from the interaction of these themes. Digital money is often presented as a confrontation between innovation and stability, or between public control and private experimentation. However, the more relevant distinction is between liabilities that remain embedded in institutions capable of preserving singleness, transferability, and elasticity, and liabilities whose monetary qualities remain conditional and fragile. Some forms of digital innovation may strengthen the monetary system by improving settlement, expanding access, or reducing frictions

without weakening the institutional foundations of money. Others may widen the menu of instruments while increasing opacity, fragility, and cross-border spillovers. The policy challenge is to determine which innovations can be integrated into the monetary system without undermining the conditions that make money reliable in the first place.

Digital monetary technology has made apparent the tensions between the public and private sectors, and between countries. Banks are fighting to avoid losing their deposit franchises. Central banks are fighting to avoid losing seigniorage and monetary autonomy. The United States is striving to extend dollar dominance into digital ecosystems through private dollar-denominated stablecoins, foreclosing a retail CBDC.[32] The European Union is concerned about monetary and means-of-payment sovereignty and is considering introducing the digital euro. Emerging economies may be absorbed into dollar-denominated digital networks or competing alternatives (e.g., the e-CNY). All this may add up to a fragmentation of standards, of architectures, and of monetary authority.

32 President Trump's January 2025 executive order prohibits federal agencies from establishing or promoting a retail CBDC, and the House passed legislation in July 2025 to codify this in statute, while actively promoting dollar-denominated stablecoins as the vehicle for extending dollar reach into digital payment ecosystems.

CHAPTER 2

Digital money and monetary architecture

2.1 INTRODUCTION

The digitalisation of money and payments is transforming the monetary system. Across advanced and emerging economies alike, cash usage is declining, electronic payments are expanding, and new digital instruments – such as stablecoins, tokenised deposits, and central bank digital currencies – are being developed and adopted.[33] This transformation is often discussed in technological terms, emphasising platforms, infrastructures, and operational processes, as well as their effects on speed, convenience, programmability, or cost efficiency. Yet digitalisation also raises broader questions about the organisation of the payment system and the design of monetary architecture itself.

This chapter is guided by the question of how the digitalisation of money and payments affects that organisation and design. The analysis is grounded in the distinct roles of public and private money, central banks and private intermediaries, and wholesale and retail layers of money and payments. The answer to the question is not uniform across segments of the monetary system. In some domains, digitalisation appears largely evolutionary, improving efficiency without challenging established institutional arrangements. In others, it raises fundamental questions about the boundary between public and private money and about the role of the central bank in a digital economy.

At the wholesale level, central bank money in the form of reserves has long been digital. Innovations commonly grouped under the label of wholesale central bank digital currency can therefore be understood primarily as technological upgrades – new platforms that may enhance interoperability, efficiency, and resilience in payment and settlement systems, while leaving the underlying monetary architecture largely intact.

By contrast, at the retail level, the digitalisation of economic activity increasingly disadvantages physical cash, the only form of public money directly accessible to households and firms. This asymmetry implies that digitalisation exerts pressure on the retail presence of public money rather than on its wholesale counterpart. As commerce and payments migrate to digital environments, public money risks becoming less usable for households and firms.

33 See Araujo and da Silva Correa (2025), Bindseil and Cipollone (2025), Lee (2025), Purnanandam (2025), and Ricci et al. (2025) for overviews of developments in Brazil, the euro area, the United States, India, and Africa, respectively.

Against this background, the introduction of retail central bank digital currency (rCBDC) – digital public money for general retail use – is often viewed as a natural policy response. Yet it would be mistaken to frame the case for rCBDC as merely reactive and triggered by digitalisation. Beyond addressing challenges arising from declining cash usage, rCBDC provides an opportunity to revisit and potentially remedy longstanding structural weaknesses in the monetary system, particularly within the banking sector. Its significance therefore extends beyond the technological substitution of cash. Properly designed, rCBDC could contribute to aligning the monetary system more closely with broader societal objectives. Whether and how these potential benefits materialise will depend critically on design choices and on how underlying distributive conflicts are resolved.

The chapter begins by outlining the existing monetary architecture before turning to new digital payment instruments and their impact on public money. Against this background, it discusses the risks and opportunities of rCBDC, along with the implications for its design and political feasibility.

2.2 PUBLIC VERSUS PRIVATE MONEY

2.2.1 The status quo

Modern monetary systems are organised as two-tier structures. In the foundational tier, payments are settled in central bank money. In the upper tier, households and firms transact using private money issued by financial intermediaries, primarily in the form of bank deposits. This layered architecture combines the issuance of public money by the central bank with the provision of most retail payment services and credit by private institutions.

Public money consists of two types of instruments: physical cash and central bank reserves. Cash is a direct liability of the central bank or the state more broadly and circulates among nonbanks as legal tender. Reserves are also central bank liabilities, but exist in digital form and are held exclusively by financial institutions for the purpose of settling interbank payments and meeting regulatory and operational requirements. Together, cash and reserves form the monetary base (or high-powered money).[34] By contrast, bank deposits and closely related instruments created by commercial banks and other private financial institutions constitute private money.

34 Some definitions of the monetary base exclude cash held by banks.

Private money can be, but need not be, backed by public money. When a household deposits cash at a bank and receives a deposit balance in return, the overall stock of public money is unaffected, as reduced cash holdings by nonbanks are offset by increased holdings of cash or reserves within the banking system. The stock of private money rises. While the household rebalances assets (cash holdings decline, deposit holdings increase), the bank's assets and liabilities expand and the aggregate stock of means of payment held by nonbanks remains unchanged.

Private money creation becomes particularly salient when banks extend credit. When a bank grants a loan by crediting the borrower's deposit account, new private money is created without any cash being deposited (or new public money being created).[35] Both the bank's and the borrower's balance sheets expand: the bank acquires a claim against the nonbank, and the nonbank acquires a deposit claim against the bank such that the money multiplier – the ratio of broad money held by nonbanks to the stock of public money – increases.[36]

Similar balance sheet implications for the consolidated banking sector arise when banks lend deposited cash that is subsequently redeposited elsewhere in the financial system, causing aggregate deposit balances of nonbanks to rise without a corresponding increase in bank or nonbank cash holdings. Since banks must hold some cash and reserves for regulatory and operational reasons, the scope for private credit money creation is limited conditional on public money supply. These limits are characterised by traditional money multiplier analysis.[37]

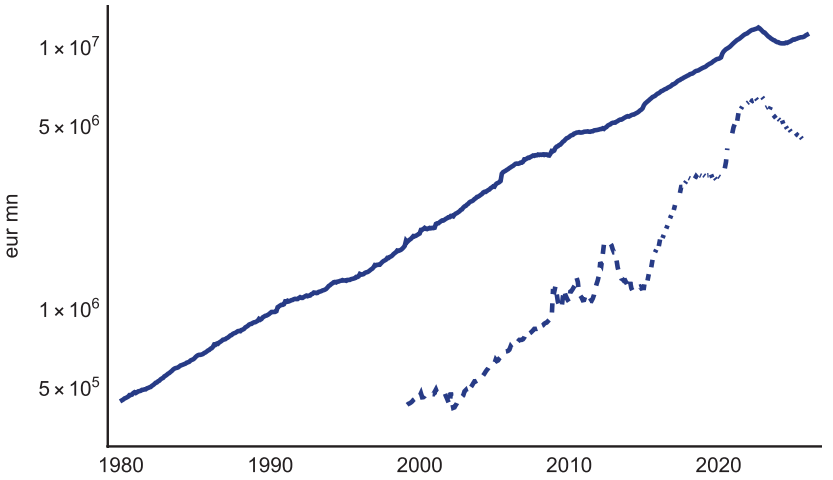
Figure 1 illustrates the evolution of broad money and public money in the euro area. Over the past two decades, the money multiplier has declined substantially, reflecting the expansion of central bank balance sheets, particularly through the accumulation of reserves.[38] As in other currency areas, reserves now account for a larger share of the monetary base than cash, whose relative importance has often been falling since before the turn of the century.[39]

Figure 2 illustrates that cash holdings of euro area nonbanks as a share of broad money ($M3$) have remained stable in the last decade and actually increased over the last two decades. However, despite its continued role as a store of value, cash has steadily lost ground as a means of payment – a development sometimes described as the 'cash paradox'.[40] This decline reflects a combination of policy choices – such as shifting cash-handling costs to the private sector and restricting cash use to combat illicit activity – and structural changes on the demand side, including the growth of online commerce

35 For an illustration, see for example McLeay et al. (2014).
36 On 'inside' versus 'outside' money, see Gurley and Shaw (1960) and Lagos (2006).
37 Phillips (1920).
38 See Pattipeolohy (2016) for a cross-country comparison.
39 See, for example, Bazot et al. (2025).
40 See, for example, Bayeh et al. (2024), Bech et al. (2018), Jiang and Shao (2020), Khiaonarong and Humphrey (2022), and Zamora-Pérez (2021).

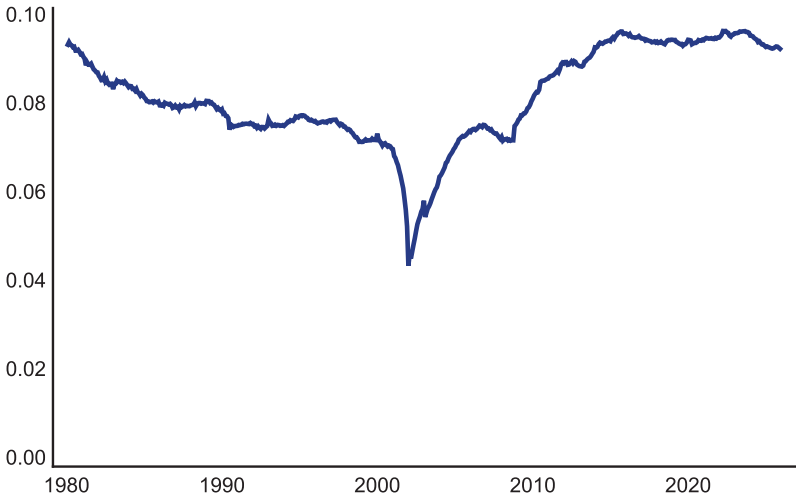
and the acceleration of digital payments during the COVID-19 pandemic. In this sense, the erosion of cash use is partly endogenous to government and central bank policies – the state discourages the use of state money – even as cash remains the only form of public money directly accessible to the general public.

FIGURE 1 **BROAD MONEY AND PUBLIC MONEY IN THE EURO AREA**



Note: The solid line indicates M1 (currency in circulation plus core private money) and the dashed line the monetary base.
Source: European Central Bank Statistical Data Warehouse; series BSI.M.U2.Y.V.M10.X.1.U2.2300.Z01.E and ILM.M.U2.C.LT00001.Z5.EUR (28 January 2026).

FIGURE 2 **CURRENCY IN CIRCULATION AS A SHARE OF BROAD MONEY (M3) IN THE EURO AREA**



Source: European Central Bank Statistical Data Warehouse; series BSI.M.U2.Y.V.M30.X.1.U2.2300.Z01.E and BSI.M.U2.Y.V.L10.X.1.U2.2300.Z01.E (28 January 2026).

2.2.2 Perspectives

The question of how responsibility should be allocated between public and private money suppliers is a longstanding one. Normative assessments vary widely, with the answers evolving over time and shaping both the role of the state in monetary affairs and of central banks.[41] Historically, central banks often provided accounts not only to banks but also to nonbanks, before progressively restricting access over the course of the twentieth century.[42] Similarly, savings banks and postal savings systems – frequently subject to strict regulation and backed by explicit or implicit state guarantees – have long coexisted with commercial banks.[43]

More recently, central banks have shown little concern about money multipliers exceeding unity and have generally been willing to delegate money creation to the private sector.[44] This delegation rests on the principle of uniformity of money: the fact that central bank and commercial bank money circulate at par. Uniformity underpins money's role as a unit of account and as a public good,[45] and it allows central banks to influence monetary conditions indirectly by affecting the terms of access to reserves, rather than by directly controlling broad money (see Box 1 on monetary singleness).[46]

However, this equilibrium is delicate. New forms of private money can threaten uniformity, as illustrated by the 2019-2020 Libra/Diem initiative – a proposed global stablecoin issued by a private consortium and backed by a basket of currencies, which sought to leverage a large existing digital platform to achieve rapid, cross-border adoption. Central banks viewed the project as a potential challenge to monetary sovereignty, financial stability, and monetary uniformity, prompting a strong reaction.

The banking literature often rationalises the creation of private money by banks on the grounds of maturity transformation and risk pooling: by issuing short-term claims while (also) investing in long-term assets, banks can reconcile their clients' idiosyncratic short-term resource needs with the financing of productive long-term investments, thereby improving welfare relative to a situation in which nonbanks individually invest in short- and long-term assets.[47] But other institutions can, in principle, play a similar role as managers of scarce short-term resources, and the provision of insurance is not

41 Sargent (2011) provides a historical overview of the evolution of thought on bank regulation.
42 See BIS (2018, p. 3), Bindseil (2019), Fernández-Villaverde et al. (2021), or Jorge-Sotelo (2024). Grodecka-Messi and Zhang (2023), Xu and Yang (2022), as well as Ogren (2022) and Grodecka-Messi and Zhang (2025), examine the coexistence of public and private money in the context of the establishment of the Bank of Canada in 1935, the US National Banking Act of 1864, and the introduction of the Riksbank's note issuance monopoly in 1897, respectively. Raskin and Yermack (2016), Bordo and Levin (2017), Bordo (2021), and Bordo and Roberds (2023) place central bank digital currency and private digital currencies in broader historical context, relating them to earlier shifts in monetary architecture and the history of economic thought.
43 See Degorce and Monnet (2024).
44 BIS (2003).
45 Ricardo (1816); Issing (1999).
46 Box 1 draws on Milne et al. (2025).
47 See, for example, Diamond and Dybvig (1983).

inherently tied to the issuance of means of payment. Moreover, from a macroeconomic perspective, liquidity – understood as the availability of a medium of exchange – can be provided at very low cost by the public sector, weakening the case for private money creation.[48]

BOX 1 **MONETARY SINGLENESS**

'Monetary singleness' or 'money uniformity' describes the condition in which different forms of money within a currency area trade at par. Uniformity encompasses two primary relationships: among central bank liabilities, such as cash and reserves; and between central bank money and private monies, such as commercial bank deposits.

Uniformity does not reflect technological similarity but is an equilibrium outcome, supported by mechanisms that maintain equal valuation at the margin. These mechanisms include convertibility rules, interbank settlement, and central bank liquidity facilities, which absorb imbalances and ensure one-to-one exchange rates. Deposit insurance and resolution arrangements complement these efforts but introduce trade-offs, due to moral hazard. Minor frictions, such as ATM or merchant fees, do not violate uniformity.

Uniformity reduces transaction, negotiation, and due-diligence costs, enhancing the convenience of money. It supports the unit of account as a public good, lowering coordination costs and reinforcing the central bank's role in monetary sovereignty and policy. Retail public money may also contribute to uniformity through psychological channels, by fostering trust in the monetary architecture; however, if such a mechanism exists, it remains poorly understood.

Uniformity may conflict with innovation, for example by constraining programmable payments,[49] and it can undermine financial stability when par pricing is inconsistent with fundamental valuations, thereby amplifying run risk. Historical experience suggests that monetary regimes have frequently operated with limited uniformity, specifically in the exchange rates among different bank monies.

This latter perspective aligns with the view that private actors might issue money in excessive amounts or too elastically: even when private money creation yields negative net social benefits, it may remain privately profitable to extend credit;[50] and conversely, the money supply might contract too sharply in periods of stress because private issuers fail to internalise certain externalities. These concerns have motivated reform proposals

48 See Friedman (1969). A common normative argument in favour of private money creation – that its higher supply elasticity allows for a quicker response to changes in money demand – is of limited relevance when central banks conduct monetary policy by setting interest rates rather than targeting monetary aggregates.
49 See Chiu and Monnet (2026).
50 See, for example, Chari and Phelan (2014).

aimed at curbing banks' maturity and liquidity 'transformation', ranging from stricter regulation to more radical schemes such as full-reserve banking.[51] The Chicago Plan of the 1930s represents the most prominent historical example of proposals to fully separate money creation from bank lending.[52]

Unsurprisingly, representatives of banks and their customers reject such proposals. Bank money creation generates private gains through reduced funding costs and the capture of seigniorage rents.[53] Depending on the intensity of competition in bank lending, these gains may accrue primarily to bank owners or may be passed on to borrowers in the form of lower lending rates. In either case, replacing private money with public money would tend to reallocate seigniorage from the private to the public sector and could raise the cost of credit.

Such effects need not, in themselves, be associated with social losses. They may instead reflect redistribution or, where bank money creation generates negative externalities, reduce social value destruction. The key question is which monetary architecture most efficiently provides liquidity for households and firms. The answer to this question is less obvious than many commentators presume, for instance when they mix private money creation with the role of bank lending in supporting investment or associate it with inflationary pressures.

Neutrality results make the potential non-essentiality of private money creation clear. They establish that, under conditions, substitutions between private and public money that are accompanied by appropriate policy actions leave the allocation and price system unchanged (see Box 2 on neutrality). From this perspective, a welfare-improving role for bank money creation requires either clearly articulated frictions or policy non-action, i.e., deliberate choices by public authorities which, if revised, could offset the effects of private money creation.

BOX 2 **NEUTRALITY**

Fundamentally, the non-essentiality or neutrality of private money creation rests on separating the funding role of bank deposits from their role as means of payment. Consider a scenario in which the central bank issues money to households and firms, crowding out their demand for deposit liquidity. The shift of nonbank liquidity holdings from deposits into public money generates a loss of funding for banks, but a gain for the central bank. If the central bank passes the newly sourced funds back to banks, directly or indirectly, on the same terms previously applicable to deposits, then the substitution of public for private money leaves banks' funding conditions unchanged and does not affect their capacity to lend. Banks face the same environment as before the change, and both their own and their customers' budget sets are unaltered.

51 See, for example, Kay (2009), Kotlikoff (2010), McMillan (2014), and King (2016). See also Friedman and Schwartz (1963) and Bernanke (1983) on the 'money' versus 'credit' views of the Great Depression.
52 Knight et al. (1933); Fisher (1935; 1936). See also Benes and Kumhof (2012).
53 Drechsler et al. (2017).

BOX 2 **(CONTD.)**

This mechanism based on central bank intermediation between nonbanks and banks operates independently of the type of frictions that affect or rationalise bank lending. It also operates when banks have market power. Neutrality does not entail that the central bank lends to households or firms; pass-through funding merely replaces deposits with central bank loans to banks, leaving the two-tier monetary architecture intact.[54]

Neutrality requires that the marginal rate of substitution between the liquidity or convenience services provided by public and private means of payment be constant – though not necessarily equal to one. When this condition holds, substituting private for public money does not tighten or relax liquidity constraints, nor does it alter marginal valuations of the liquidity services provided. By contrast, a non-constant marginal rate of substitution breaks neutrality because, for given spreads and costs of liquidity holdings, substituting one means of payment for the other reduces total liquidity benefits. A related source of non-neutrality is present when payment instruments have multiple dimensions of convenience or liquidity and differ along those dimensions.

For central bank pass-through funding to leave banks' choice sets unchanged, the central bank loan must fulfil all functions of deposits – not only as a source of funding but also in any other relevant dimension. In other words, deposits must not be 'special' in the sense of embodying features that are relevant to the bank but cannot be replicated by a central bank loan or the central bank itself.[55]

Neutrality also requires that substituting public for private payment instruments does not change the aggregate resource costs of providing liquidity services. Cost differences may arise, for example, from variations in operating costs across means of exchange, differences in network effects, or political-economy frictions that affect public and private forms of money differently.

Since deposits are unsecured, neutrality requires that substitute central bank funding also be unsecured. Such unsecured central bank funding might appear to depart from standard practice, but it mirrors the status quo in which central banks implicitly back a large share of deposits through lender-of-last-resort guarantees – a neutral substitution would make this implicit backing explicit. Alternatively, neutrality would be consistent with secured central bank pass-through funding if collateral requirements already applied in the pre-reform equilibrium, i.e., if banks had to back deposits with liquid assets or pre-positioned collateral at the central bank.[56]

54 Brunnermeier and Niepelt (2019) show that the pass-through logic applies under general conditions and extends to general equilibrium. Niepelt (2020) discusses potential break points, while Niepelt (2026) extends the formal neutrality result to settings in which balance sheet positions and the operation of payment systems generate resource costs.

55 Demandable deposits may help banks mitigate agency conflicts (Calomiris and Kahn 1991, Diamond and Rajan 2001), and accepting deposits from borrowers may improve banks' ability to monitor them (Mester et al. 2007). These functions can, in principle, be performed by the central bank. Indeed, the central bank is often better positioned than individual depositors to discipline bank management.

56 As proposed by King (2016).

2.3 WHAT IS NEW ABOUT 'DIGITAL' MONEY?

2.3.1 Platforms

Discussions of 'digital' money have become central to policy debates in central banks, finance ministries, and international fora. Yet the term itself is imprecise and potentially misleading, as money has long been digital. For decades, banks have issued demand deposits recorded electronically rather than physically, and central banks have issued reserves; in most countries, payment instructions have for many years been transmitted electronically rather than by cheque; and payment cards have also long been in use.

What is new, however, is the proliferation of digital payment instruments that operate on new technological platforms or 'rails', often outside traditional banking infrastructures. Financial innovation driven by fintech and BigTech firms has lowered transaction frictions, expanded access to payment services, and increased convenience. These developments have altered the economics of payments, including the role of intermediaries, the use of data, and the degree of centralisation in transaction processing. Beyond payments narrowly defined, they also affect credit, collateral, and broader intermediation.

Tokenisation – the digital representation of assets on programmable platforms – has the potential to transform money, payments, and financial markets, enabling automation and composability and improving efficiency by reducing transaction costs and settlement frictions. Beyond money, tokenisation extends to bonds, stocks, real estate, and trade finance claims, opening new investment avenues, streamlining transactions, and enhancing capital market functioning.[57]

Programmable money and smart contracts allow contract execution to be conditioned on a variety of contingencies and financial obligations to be automatically enforced. This may further lower settlement costs and improve traceability. By linking payments and collateral functions, digital money can integrate transaction and credit processes in novel ways, improving commitment powers and supporting liquidity on secondary markets.[58]

At the same time, these innovations create trade-offs around governance, enforcement, and privacy. While embedding credit into digital payment systems can relax borrowing constraints, it faces a trilemma: strong enforcement, limited private rent extraction, and user privacy cannot all be achieved simultaneously.[59] Different institutional approaches manage this trilemma in distinct ways. BigTech platforms can enforce repayment by controlling trade and payment flows through proprietary tokens and internal ledgers,

57 See, for example, Frost et al. (2025).
58 See, for example, Ozdenoren and Yuan (2025).
59 Bunnermeier and Payne (2025).

but may raise concerns about monopoly power and privacy. Public options can provide inclusive, transparent alternatives, at the cost of sacrificing enforcement possibilities or privacy. Regulatory 'co-opetition' between platforms encourages enforcement via shared data and coordinated default tracking while using competition to limit rents.

2.3.2 Instruments

Cryptocurrencies

Among the specific instruments commonly grouped under digital money, the first is cryptocurrencies, most prominently bitcoin and ether.[60] These are digital tokens traded on decentralised ledgers that are neither liabilities of any identifiable issuer nor backed by traditional assets. In essence, they are either bubbles, deriving value from the expectation that someone else will pay for them in the future, or they offer convenience.

Like fiat money – which is no longer redeemable against gold or other assets – cryptocurrencies rely on collective belief and usability rather than explicit backing. However, that collective belief is far less stable than for fiat money in contexts of credible, price-stable monetary policy. In practice, cryptocurrencies are thus often held for speculation or used by agents seeking to avoid transparency or regulatory oversight. Their macroeconomic significance as money remains limited, and they do not function as a unit of account.

Stablecoins

The second group of instruments contains stablecoins – digital assets designed to maintain a stable value by pegging to fiat currencies such as the dollar or the euro. Initially a niche innovation within crypto markets, they have rapidly expanded into a major segment of digital finance, now encompassing a variety of designs including (more or less) backed and algorithmic (non-backed) ones. Their growth has been driven by demand for blockchain-native instruments that combine the technological advantages of cryptocurrencies with the relative stability of traditional money.

Stablecoins function as settlement and collateral medium in decentralised finance (DeFi), enabling lending, borrowing, trading, and other financial activities on blockchain platforms without exposing participants to the high volatility of unpegged cryptocurrencies.[61] Fiat-backed stablecoins, such as Tether (USDT) and USD Coin (USDC), also enable high-speed, cross-border payments. Like "digital travellers' cheques",[62] they facilitate efficient clearing without dependence on national payment infrastructure. Backed by reserves held in fiat-denominated assets, often short-term government bonds or bank deposits, they promise redemption at par, at least for institutional investors.

60 See also the 'money flower' taxonomy of monetary instruments in Bech and Garratt (2017) and BIS (2018).
61 See, for example, Huang (2025).
62 Garratt (2025).

Despite these promises, episodes of de-pegging highlight the vulnerabilities of such instruments, related to limited transparency, variable issuer commitment, and illiquid reserves paired with lack of explicit lender-of-last-resort support (fostering run risk). For retail users, reliance on secondary markets rather than direct redemption introduces additional liquidity and valuation risks. Multi-issuer stablecoins involve joint issuance by institutions under separate regulatory regimes. While this design can expand market reach, it introduces further risks, due to fragmented reserve management, regulatory arbitrage, and uneven redemption enforcement during stress events (see Chapter 3).[63]

In addition, stablecoins avoid the settlement frictions associated with traditional payment rails only if they genuinely simplify the settlement process or avoid it altogether. This may occur either because regulatory constraints (such as customer identification and anti-money laundering requirements) are applied less stringently than for conventional payment instruments, or because the payee is willing to hold the stablecoin rather than immediately converting it into bank deposits or another preferred asset. If widespread reconversion occurred, the transaction would ultimately pass back through traditional payment rails, thereby limiting the extent to which stablecoins reduce underlying settlement frictions.

E-money represents a closely related type of private digital money, typically issued by regulated nonbank institutions under dedicated legal frameworks.[64] E-money instruments are denominated in fiat currency and promise redemption at par, while placing residual asset risk on users rather than on the public sector. Customer funds must be fully safeguarded, either through segregation in dedicated accounts or investment in low-risk, highly liquid assets, and are legally separated from the issuer's own balance sheet; as a result, e-money does not fund credit creation. Economically, therefore, e-money closely resembles fully backed stablecoins. The primary differences lie in institutional form and regulation. While e-money is embedded in established payment law and supervisory regimes, stablecoins originated in the crypto-sphere and are only gradually being brought under comparable regulatory standards.

Tokenised bank deposits

The third group of instruments comprises tokenised bank deposits. These are digital representations of traditional bank deposits, issued by regulated financial institutions. Unlike stablecoins, they benefit from legal protections, deposit insurance, and the issuer's access to central bank lender-of-last-resort support and payment systems, making them structurally more resilient in times of stress. Still, tokenised deposits retain many of the technological advantages of stablecoins, including programmable payments and real-time settlement. Their design reduces risks around redemption, privacy, and multi-currency handling.

63 For an overview of stablecoins and tokenised deposits, their design, market growth, applications, opportunities, and risks, see Andolfatto (2025), Garratt (2025), Gersbach et al. (2025), Cecchetti and Schoenholtz (2025d), Lee (2025), Portes (2025), and Uhlig (2025). These authors also discuss recent changes in regulatory frameworks.

64 Under European law, e-money is a long-standing legal category, defined independently of crypto-assets and predating stablecoins. The recent Markets in Crypto-Assets (MiCA) Regulation classifies certain fiat-referenced crypto-tokens as e-money (see Articles 3(1)(7) and 48(2)).

At the same time, transactions in tokenised deposits are subject to similar qualifications as those discussed in the context of stablecoins: avoiding the settlement frictions associated with traditional payment rails requires that the underlying process be genuinely simpler, or that no settlement between the institutions representing the payer and the payee be required at all – a condition that current designs do not necessarily satisfy.[65]

Central bank digital currencies

Finally, central bank digital currencies are another group of digital money instruments. Unlike instruments in the first three groups, CBDC refers to digital money issued by the central bank. Wholesale CBDC (wCBDC), or 'digital reserves', is a form of central bank reserves, designed for use by financial institutions for interbank settlements and large-value transactions. It is best understood as a technological upgrade of an existing instrument (i.e., reserves) that enables features such as atomic settlement and improved interoperability across platforms and helps reduce frictions, operational risks, and reconciliation costs in wholesale financial markets.[66] While wCBDC may improve efficiency, it does not alter the two-tier structure of the monetary system, nor does it materially change the boundary between public and private money. Its implications are therefore primarily technological rather than architectural.

Retail CBDC (rCBDC), by contrast, is widely accessible to the general public, extending access to digital central bank money beyond financial institutions. Unlike deposits, rCBDC is a direct liability of the central bank rather than a commercial bank, and unlike cash, it is digital and can be used for online payments. In this sense, rCBDC is 'reserves for all'. Unlike proposals such as the Chicago Plan, rCBDC does not restrict the money-creation role of banks but instead provides a safe, public alternative to deposits, allowing nonbanks to hold electronic central bank money and use it for payments. Retail and wholesale CBDC could interact with stablecoins and tokenised deposits to enable seamless settlement, liquidity management, and interoperability across private and public digital money instruments.[67]

65 Scholars, policymakers, and market commentators often draw a distinction between tokenised deposits and deposit tokens, though the definitions used differ in the characteristics they prioritise (see Chapter 3). One commonly highlighted difference concerns whether the instrument enjoys the full legal status of a traditional bank deposit.

66 Post-trade processing costs in securities clearing and settlement alone amounted to tens of billions of dollars annually a decade ago, largely reflecting fragmented infrastructures and manual interventions (Mainelli and Milne, 2016). For an overview of wCBDC projects see, for example, Boar and Wehrli (2021), Kosse and Mattei (2023), Di Iorio et al. (2024), and Illes et al. (2025).

67 See, for example, Project Agorà of the Bank for International Settlements (https://www.bis.org/press/p240403.htm).

2.3.3 Policy implications

Neither stablecoins nor tokenised deposits or CBDCs fundamentally alter the nature of money. Even if any of these instruments were to gain widespread adoption, public and private money would continue to consist of liabilities issued by central banks or private intermediaries and backed by assets on the issuer's balance sheet – even if redemption against those assets is not guaranteed. By contrast, widespread adoption of cryptocurrencies would fundamentally change how money is backed.

There are good reasons to expect the outstanding stock of stablecoins and tokenised deposits to expand. Fiat-backed, trustworthy stablecoins that benefit from strong network effects can grow alongside decentralised finance, improve access to financial services in emerging markets, and may facilitate some cross-border payments by reducing fees and frictions for retail users. Even if they do not grow, they might still affect the payment system by exerting competitive pressure on incumbent payment service providers, particularly in countries subject to financial repression. Tokenised bank deposits, by contrast, may be more attractive to users that place greater weight on legal certainty, issuer access to central bank money, and robustness under stress. Tokenised bank deposits also benefit from higher remuneration, although regulatory restrictions on paying interest on stablecoins can, in practice, be circumvented.

A key question is how the public sector should respond to these private sector innovations. From a laissez-faire perspective, one might argue that the mere substitution of existing private forms of money by new ones does not warrant a policy response. But this argument is not entirely convincing.

On one hand, new forms of money may introduce new types of market failure that call for corrective action. For example, the shift towards new digital payment instruments is closely tied to changes in how payments interact with the use of data and other activities of payment service providers, including BigTechs. These complementarities between payments, data collection, and platform services alter market structure and incentives in ways that differ from traditional banking and finance and may call for a different regulatory approach.

On the other hand, the innovations may offer solutions to pre-existing problems; after all, it is not clear whether the existing monetary architecture is close to 'optimal' to begin with. New forms of public money – particularly rCBDC – could offer opportunities to improve the design of the monetary system in ways that were previously infeasible or overlooked. By offering households and firms an attractive public alternative, rCBDC could reduce reliance on bank-based payment systems and help address structural weaknesses in the banking sector without requiring new regulation. We next take up these issues insofar as they relate to the public–private money dimension.

2.4 DIGITALISATION AND PUBLIC MONEY

2.4.1 Cash versus reserves

As we have seen, digitalisation affects the two forms of public money – cash and central bank reserves – in fundamentally different ways. As economic activity increasingly shifts towards online commerce and digitally mediated transactions, cash is not merely inconvenient but often unusable. Even in face-to-face transactions, the convenience and integration of digital payment instruments frequently outweigh the advantages of using cash. By contrast, to date, digitalisation has not fundamentally altered the wholesale tier of the monetary system. Even if similar pressures were to emerge at the wholesale level, a technological upgrade from reserves to a wCBDC would be relatively straightforward.

This asymmetry suggests that digitalisation does not threaten public money as such, but rather its use at the retail level. Associated with the gradual displacement of cash by private digital payment instruments is a set of interrelated risks. Some stem from the disappearance of a physical means of payment, others from the erosion of a public form of money, and still others from the increasing dominance of a small number of private – potentially foreign-controlled – payment instruments and providers.[68] We discuss several of these risks in turn.

2.4.2 Risks

Loss of seigniorage

Perhaps the most immediate risk associated with the crowding out of cash concerns the transfer of seigniorage from the public to the private sector.[69] Holding government spending and distributional objectives constant, this transfer requires higher taxation of the beneficiaries of private seigniorage and corresponding tax reductions elsewhere, with implications for the welfare losses from tax distortions.

Importantly, this risk concerns the displacement of cash as a store of value – not as a medium of exchange – and therefore is not directly related to the emergence of new private payment instruments, such as stablecoins, per se. If such instruments are backed by central bank reserves or short-term government debt and substitute for bank deposits rather than cash, demand for central bank money and short-term government paper – and seigniorage for the public sector – can actually rise.

68 Allen and Walther (2024) study the implications of financial innovation for money creation and stability in an environment with bank and nonbank financial firms.

69 Seigniorage revenue as a share of GDP is often on the order of 0.2-0.5% (Belhocine et al., 2023; Cecchetti and Hilscher, 2024).

Rising demand from private digital money issuers for central bank reserves or short-term government debt could have broader implications for money and debt markets, potentially shifting demand across the spectrum of government liabilities. In segmented financial markets, it could affect the term structure of interest rates, influence risk sharing between government debt holders and taxpayers – with implications for debt management – and alter the monetary transmission mechanism.

Loss of privacy

A second risk arises from reduced privacy due to growing reliance on private digital money. Whereas cash affords near-complete anonymity, electronic payments automatically generate and store detailed transaction data – such as sender, recipient, amount, and timestamp – held by banks and other payment service providers. These data may be exploited commercially, often without the payer's explicit consent, generating social costs when transacting parties cannot commit to refrain from subsequent opportunistic behaviour.[70] Even when users formally consent to data sharing, the resulting outcomes may be inefficient due to privacy externalities: information revealed by one individual can disclose sensitive details about others, leading to insufficient incentives to protect privacy.[71]

Loss of trust and singleness

A third potential risk concerns the erosion of monetary tangibility and trust. Unlike other payment instruments, cash provides a tangible link between the public and the central bank. This physical presence reinforces the perception that both public and private money are universally accessible, reliable, and ultimately backed by public authority. The disappearance of this link – and with it, the central bank's direct interface with the public – may weaken trust in the monetary system and undermine an important institutional anchor.[72]

New private payment instruments may also challenge monetary singleness. Without interoperability and credible convertibility, retail payments could migrate into closed-loop 'walled gardens', fragmenting the currency and endangering singleness. Unlike tokenised bank deposits that settle in central bank money, stablecoins without access to liquidity backstops pose this risk most acutely: they might trade off-par, especially under stress.[73]

70 See, for example, Kahn et al. (2005).
71 See Garratt and van Oordt (2021). Beyond commercial uses, the large-scale collection and analysis of payment data can facilitate the monitoring, censoring, or restriction of payments. Recent episodes include the freezing of accounts during political protests and the termination of banking relationships on reputational grounds.
72 See, for example, Brunnermeier and Landau (2022). While the role of cash in sustaining trust in money is widely discussed, it has yet to be formally incorporated into economic models.
73 See, for example, Aldasoro et al. (2023a) and Bidder (2025).

If policymakers could commit to disregarding such de-pegging episodes – treating stablecoins as fringe assets outside the regulated perimeter and beyond the scope of monetary singleness – these deviations would not necessarily pose a policy concern. However, once stablecoins reach sufficient scale, policymakers and regulators are likely to view them as systemically relevant regardless of prior announcements. In that case, the risk of de-pegging becomes economically and politically salient, and it may ultimately lead policymakers to grant access to central bank liquidity facilities.

Loss of choice and resilience

A fourth risk associated with the decline in cash usage is the loss of choice in payment instruments, coupled with increasing reliance on private digital payment services. Facilitated by strong network effects, these dynamics may amplify the market power of private payment service providers and lead to a high degree of concentration in payment services.[74] Such concentration can exacerbate inefficiencies inherent in two-sided payment markets, increase systemic vulnerability, and reduce the resilience of the payment system by undermining its ability to deliver a basic service level during power outages or cyberattacks.[75] Moreover, the disappearance of cash payments may limit the ability of households without access to digital payment options to engage in transactions; that is, financial inclusion may suffer.

Loss of sovereignty

Finally, growing reliance on foreign payment service providers and payment instruments may pose risks to monetary sovereignty, as domestic authorities could see their control over the supply, governance, and regulation of money, payments, and seigniorage weakened.[76] Such sovereignty challenges need not be limited to conflicts between nation states. Indeed, Brunnermeier et al. (2019, pp. 2-3) predict that new privately issued digital currencies "will emerge as the central lynchpins of large, systemically important social and economic platforms that transcend national borders", unbundling the functions of money, contributing to the establishment of "digital currency areas" and fostering competition between private and public money, eventually leading countries to offer CBDC "in order to retain monetary independence".[77]

A key question in this context concerns the scope of monetary sovereignty, or the extent of local self-sufficiency. For example, while it seems plausible that sovereignty requires payment instruments and networks to remain under local control, it is unclear whether it also demands full independence from players strongly exposed to foreign pressure

74 See, for example, Sveriges Riksbank (2017) and Sveriges Riksbank (2018). Lagos and Zhang (2022) analyse how the option to use cash affects the terms of trade in monetary exchange.
75 See Rochet and Tirole (2006) on two-sided markets, and Eisenbach et al. (2022) for an analysis of the effects of a cyberattack on the contemporary US wholesale payments network.
76 See, for example, Board of Governors (2022) and Lane (2025). Bindseil and Cipollone (2025) classify risks to monetary sovereignty.
77 Raskin and Yermack (2016) consider dollarisation-type challenges that private cryptocurrencies pose for central banks and discuss the implications of CBDC remuneration.

(such as banks reliant on access to the US dollar market) to prevent them from exerting influence or disrupting the smooth functioning of the local payment system. Chapter 2 of this report examines these international and geopolitical dimensions in greater detail.

2.5 RETAIL CBDC AS THE NATURAL RESPONSE?

Since the structural changes associated with the digitalisation of commerce and payments tend to crowd out cash use, and since this crowding out gives rise to a range of risks, it may appear natural to counter these risks by introducing rCBDC. From this perspective, rCBDC could take on the role traditionally played by cash in a digital financial system. Such a conclusion, however, would be both premature and too narrowly framed. It would be premature because policymakers may have alternative instruments at their disposal to address these risks. It would also be too narrowly framed because the introduction of rCBDC may be justified by considerations that extend beyond mitigating the risks associated with cash displacement. In particular, rCBDC could provide an opportunity to address pre-existing structural shortcomings in the monetary architecture, most notably within the banking sector.

Against this background, this section examines the potential role of rCBDC. It begins with a brief review of the motivations for rCBDC before turning to design and political economy issues.

2.5.1 Motivations

From Tobin to Libra

Tobin (1985) initiated the modern discussion of rCBDC by emphasising the benefits of a public digital means of payment. In his view, institutional arrangements that promote financial stability – most notably, deposit insurance – create tensions with competitive efficiency and sound incentives in the financial system. To address these tensions, Tobin proposed that "government should make available to the public a medium with the convenience of deposits and the safety of currency, essentially currency on deposit". Transactions would be cleared through the Federal Reserve, and interest "at a rate sufficiently below the rates on Treasury securities to cover costs" could be paid. Alternatively, "[b]anks and other depository institutions could offer the same type of account, or indeed be required to do so," with deposited funds segregated and invested exclusively in federal funds or short-term Treasury obligations.[78]

Tobin's vision did not gain traction for many decades. Central banks and regulators were confident about outsourcing money creation to the private sector and in their ability to manage the tensions Tobin had emphasised. When discussions about rCBDC re-emerged in the mid-2010s, the impetus came from an unexpected direction: a

78 Tobin (1987, pp. 172-173).

wave of proposals – such as the 'Fedcoin' proposal for a US dollar-based central bank cryptocurrency by Koning (2014) – drew on innovations originating in the crypto-sphere and the technological advances that made them feasible.[79] These developments, in turn, reflected the push into – or reinvention of – monetary economics by software engineers, alongside a growing distrust of traditional financial institutions in the wake of the global financial crisis and the Occupy Wall Street movement.[80]

With few exceptions, central banks' engagement with rCBDC evolved only slowly.[81] Prominent policymakers initially rejected the idea outright and equated rCBDC with cryptocurrencies. The mood shifted with the Libra (later Diem) proposal to establish a global payment system integrated with social media and supported by a payment instrument backed by reserve assets denominated in a basket of currencies. It was fear, rather than enthusiasm, that ultimately prompted central banks to take rCBDC seriously.[82]

Solution in search of a problem?

The motivations advanced to justify a potential role for rCBDC differ across currency areas and have evolved over time. Most are in some way linked to the risks described earlier. However, they are not always compelling, because the stated objectives could, in principle, be achieved through alternative means, giving rise to the criticism that rCBDC is a "solution in search of a problem".[83] Moreover, some projects fall short of meeting even the conditions required to achieve their stated objectives.

For example, regarding financial inclusion, the introduction of rCBDC is neither necessary nor clearly the most effective instrument. This is illustrated by the success of mobile payment systems in Africa and Brazil's instant payment platform Pix, which is supported by the central bank but does not rely on rCBDC, as well as by low adoption rates of rCBDC in some countries where it has been introduced.

To protect payer privacy, an alternative approach would be to strengthen regulation and enforcement vis-à-vis private payment service providers.[84] At a minimum, rCBDC would need to offer meaningfully stronger privacy protections than existing private payment solutions, a condition that, given current design trends, appears unlikely to be met.[85]

79 See also Groff (2013), Kaminska (2014), Motamedi (2014), and Andolfatto (2015). Niepelt (2015) focuses on the reserves-for-all aspect of rCBDC.
80 See, for example, Berentsen and Schär (2018).
81 In 2017–2018, Banco Central del Uruguay tested an e-Peso for consumers, allowing for one-to-one conversion between cash and the digital payment instrument.
82 See, for example, Auer et al. (2020) and Niepelt (2019).
83 See, for example, Engert and Fung (2017), Mancini-Griffoli et al. (2018), and Economic Affairs Committee (2022).
84 However, such a regulatory approach could suffer from enforcement problems.
85 See van Oordt (2025) for the digital euro. Much of the public perceives rCBDC less as a tool to enhance privacy than as a vehicle for state surveillance, and concerns about official monitoring, data misuse, or even restrictions on payments remain widespread (ECB, 2021). Many potential users appear more willing to share sensitive information with private service providers than with a central bank-operated payment system, even though governments already have legal means to access data held by private providers.

Finally, preserving monetary sovereignty would likely require measures to discourage the most 'mobile' users – such as multinational firms and frequent cross-border transactors – from using foreign payment platforms and instruments. In practice, however, central banks often focus on households rather than businesses as the primary rCBDC user group.

The success of such a household-centric strategy could rely on indirect mobilisation effects: broad household adoption of rCBDC may encourage banks and financial institutions to develop a domestic payment ecosystem around it,[86] which in turn could help insulate the monetary system from foreign influence and external pressures. However, this approach hinges on achieving widespread adoption, which in turn requires a rCBDC that is both attractive and practical.

A broader perspective

Beyond being a response to problems grounded in the crowding out of cash payments, rCBDC can be viewed as a policy tool to address pre-existing structural weaknesses in the monetary architecture. From this perspective, it is natural to focus on what is unique about rCBDC – its nature as public digital money, directly accessible to the public and fully backed by the central bank – and the objectives these unique features can help achieve.

For example, by offering an attractive public alternative to bank-based payment options (the 'carrot'), rCBDC could reduce reliance on private liquidity insurance and maturity transformation, thereby lowering fragility in the banking sector and lessening the need for strict regulation (the 'stick'), which often encourages circumvention, such as migration into shadow banking. It could also mitigate too-big-to-fail risks by making the payment system less dependent on the survival of individual financial institutions, while shifting seigniorage rents from commercial banks to the central bank, where liquidity is arguably created.[87]

From this perspective, rCBDC should be understood not merely as a response to structural changes arising from new private digital payment options, but also as a tool to address pre-existing problems in the monetary system. In other words, seen in this light, the introduction of rCBDC represents a deliberate architectural reform, reshaping the relationships among the central bank, the public, and private intermediaries.

86 See, for example, Infante et al. (2023).
87 Most depositors perceive the central bank as the ultimate guarantor (if not, mistakenly, the issuer) of commercial bank deposits. Banks benefit from this perceived guarantee, which allows them to borrow more cheaply.

2.5.2 Design

The design of rCBDC should be guided by its intended purpose. It requires careful attention not only to the market or policy failures it seeks to address but also to the risks of unintended consequences. Getting design choices such as remuneration, holding limits, or privacy features wrong could imply that reforms are implemented that are not aligned with the objectives.

Means of payment versus store of value

A central design choice is whether rCBDC should primarily replicate cash as a means of payment or serve as a substitute for bank deposits. Current design plans in the euro area treat rCBDC as a digital counterpart to cash solely as a payment instrument – not as a store of value, and not as a substitute for bank deposits. The idea is for nonbanks to (mostly) continue holding bank deposits and to convert these deposits into digital euros only during the payment process, with the paid amount reconverted into deposits on the recipient's side. To that end, low holding limits are envisioned for households, and even stricter caps of zero for businesses.

The reasons that are typically offered for this design choice are not fully convincing. For example, early ECB progress reports state three main objectives:[88] to preserve European strategic autonomy in payments, reduce rent extraction by home and foreign payment service providers, and serve as a robust monetary anchor amid declining cash transactions. Achieving these objectives requires that the digital euro be an attractive payment instrument, inducing households and firms to use it.

In line with G7, G20, and general policy principles, the digital euro should also be designed to avoid adding financial instability. The ECB appears to have concluded that this entails banking as usual. A fourth, implicit objective – not to interfere with banks and their business models – has assumed a dominant role. Key design options favoured by the ECB Governing Council, such as the holding limits and unattractive (zero) remuneration, reduce the digital euro's attractiveness as a store of value and thereby, indirectly, as a means of payment. Moreover, plans to outsource client interfacing to commercial banks raise incentive compatibility concerns.

One key question is how strongly these features affect demand for digital euros as payment instruments, and to what extent they may jeopardise the achievement of the stated goals.[89] The proposed design produces an instrument quite distinct from cash – peer-to-peer and nearly anonymous – especially since technological options to enhance payer privacy are unlikely to be fully exhausted.[90] In terms of payment functionality, the planned digital euro more closely resembles bank deposits, mirroring their convenience,

88 ECB (2022a; 2022b; 2022c).

89 For estimates of the effects of design features on rCBDC demand, see Bijlsma et al. (2024), Bidder et al. (2024), Gross and Letizia (2023), Huynh et al. (2020), Lambert et al. (2024), Li (2023), Nocciola and Zamora-Pérez (2024), and Whited et al. (2023).

90 See, for example, Kahn et al. (2019).

limited privacy, and safety (provided the holder trusts deposit insurance). However, lacking remuneration and flexibility regarding holding amounts, such a deposit-like digital euro is inferior to bank deposits, which offer additional functionality as stores of value.

An equally important question is why public money should not be an attractive store of value in the first place. The answer to this latter question is often taken for granted: letting rCBDC compete with bank deposits also as a store of value would endanger (cheap) bank financing, investment, and growth, particularly during episodes of financial stress when sudden portfolio reallocations from bank deposits into rCBDC could upend financial stability. According to this narrative, the established monetary architecture with a limited role of public money as store of value serves the economy well.

One of several problems with this view is that it overlooks how the central bank reinvests the proceeds from rCBDC issuance. While the narrative implicitly treats rCBDC funds as either non-investible or as funds that cannot be invested in banks, there is no immediate economic or technical restriction that would prevent the central bank from passing rCBDC funds through to the banking sector if that were desirable. Both the theoretical neutrality result discussed earlier and elementary balance sheet arithmetic suggest that concerns about rCBDC-induced 'disintermediation' of banks are overstated.

If the central bank channels newly sourced rCBDC funds back to banks and chooses to do so at deposit-equivalent terms, it transfers rCBDC seigniorage to banks and insulates them from any consequences of rCBDC. Nevertheless, it decouples bank funding from liquidity provision and transforms private into public money. Assessments of the consequences of rCBDC therefore remain incomplete if they do not properly account for the funding that rCBDC generates and for the associated investments the central bank undertakes.

Naturally, central bank loans to banks constitute just one type of central bank asset acquisitions. But even if the central bank acquires other assets, a substitution of deposits by rCBDC must result in some financial market participants obtaining claims against the banking sector (on net). The question thus is not whether deposit outflows make way for alternative sources of bank funding, but what these sources are and under what terms the financing is extended.

Another problem with this narrative is that it misattributes responsibility. Contrary to what it suggests, the banking sector is inherently fragile, and the introduction of rCBDC does not necessarily exacerbate that fragility. Under a neutral regime change, the nature and extent of fragility remain unchanged – the only difference is a relabelling

of positions: what was previously a deposit becomes, from the bank's perspective, a central bank loan. Even a non-neutral regime change does not automatically increase fragility. In fact, fragility may be reduced if the central bank replaces unstable deposit financing with more stable central bank lending, internalising run externalities.[91]

Largely absent from the narrative is, finally, a rationale for the underlying assumption that the monetary architecture – with its limited role for public money and reliance on cheap bank financing – is socially optimal (and remains so after the structural changes induced by digitalisation). This assumption is far from self-evident once one acknowledges that liquidity provision through the banking system may entail substantial social costs that are not internalised. As the Bank of England's outgoing chief economist put it in 2021:[92]

> *"On financial stability, a widely used digital currency could change the topology of banking fundamentally. It could result in something akin to narrow banking, with safe, payments-based activities segregated from banks' riskier credit-provision activities. In other words, the traditional model of banking familiar for over 800 years could be disrupted. While the focus of debate so far has been on the costs of this disruption, largely in the form of disintermediation of existing agents, there are significant potential benefits to be had too.*
>
> *... This radically different topology, while not costless, would reduce at source the fragilities in the banking model that have been causing financial crises for over 800 years. Given the costs of those crises – large and rising – this is a benefit that needs to be weighed."*

On the other hand, an expansion of the public money supply as a consequence of rCBDC issuance would entail costs, perhaps most importantly in the political-economy domain. For example, a larger central bank balance sheet could invite pressure from special interest groups for preferential access to cheap funding or for targeted central bank investments, and seigniorage could become a more salient source of government finance, thereby intensifying political pressure on monetary policy.[93]

Against this backdrop, recent research has begun to quantify the social costs of different monetary architectures. These costs arise both from payment operations and from the social costs associated with market and policy failures. An rCBDC-based system entails higher operational costs than a deposit-based architecture unless the public sector operates more efficiently than banks. The case for rCBDC is further weakened by deadweight losses related to political economy frictions and other costs linked to a large central bank balance sheet, as well as by deadweight losses that may arise when the central bank offsets the crowding out of deposits by lending to banks. At the same

91 See Brunnermeier and Niepelt (2019).
92 Haldane (2021).
93 See, for example, Tucker (2017) and Cecchetti and Schoenholtz (2018).

time, only the deposit-based architecture is subject to inefficiencies originating within the banking sector itself. Such frictions stem, among others, from limited competition in deposit markets or externalities related to banks' reserve holdings; addressing them through fiscal instruments also generates deadweight losses.

A calibrated model suggests that, taken together, the benefits of the rCBDC-based architecture outweigh its disadvantages, contrary to what a narrow focus on operating costs would suggest.[94] Intuitively, the technological advantages of fractional-reserve banking over narrow banking, and the social costs of pass-through funding, are small relative to the excess burden created by the need to correct banking-sector frictions. As a result, the optimal share of rCBDC in the payment system exceeds that of deposits.

While these results are necessarily model- and calibration-dependent, they underscore that the presumption in favour of a limited role for public money combined with extensive reliance on bank deposit funding is far from obviously optimal; it may well not be.[95] Societies that restrict rCBDC to a narrow payment function and suppress its use as a store of value forego the opportunity to address deeper structural weaknesses in the monetary architecture. If these weaknesses are quantitatively important, this choice may be costly.[96] Moreover, if central banks give disproportionate weight to the interests of banks or, similarly, interpret financial stability as preserving the status quo, then delegating the assessment, design, and implementation of rCBDC to them risks producing decisions shaped by this bias rather than by an economy-wide assessment of the most beneficial arrangement.

Remuneration versus holding limits

If one were to conclude that it is socially desirable to use rCBDC as a means of payment but not as a significant store of value, the natural policy instrument to regulate demand would be remuneration, potentially including negative interest on certain balance tiers.[97] Yet many policymakers are sceptical of the effectiveness or political feasibility of price-based instruments and instead favour quantity restrictions – most notably, holding limits – particularly during periods of financial stress. However, such limits neither eliminate run dynamics nor are cost-free. As Cecchetti and Schoenholtz (2022) point out:

94 See Niepelt (2024).

95 See Bindseil (2020). See also, for example, Infante et al. (2023), who argue that a remunerated rCBDC offers the prospect of "accruing network externalities for the public–as opposed to allowing banks and fintechs appropriate rents–as well as limiting disruptions to the financial system stemming from the shifting fortunes of various competing private monies" (p. 25).

96 For a discussion see, for example, Monnet and Niepelt (2023).

97 Remuneration would also provide a direct channel for monetary policy transmission to households and firms, weakening the dependence on banks in the pass-through of policy rates.

> *"[C]apping the amount of CBDC in periods of strain could limit runs into CBDC, but would not halt runs. Any scarcity of CBDC would result in a premium for CBDC relative to other central bank liabilities (such as currency in circulation and bank reserves) and to insured deposit balances. That premium would encourage runs into other safe, liquid instruments that are close substitutes for CBDC, such as Treasury bills and paper currency ..."*

Moreover, binding holding limits risk fragmenting the monetary system by creating incentives for circumvention. Scarcity premia may give rise to secondary markets for rCBDC, undermining parity and potentially amplifying, rather than mitigating, stress.

As an additional defence against so-called 'digital bank runs', rCBDC could exclusively be issued in exchange for government debt or convertibility at par between rCBDC, reserves, and deposits could be restricted.[98] While such measures shield banks from deposit outflows into rCBDC, they do so by segmenting payment instruments and weakening uniformity. This conflicts with core central banking principles, could suffer from time-inconsistency, and may foster circumvention and instability.[99]

2.5.3 Politics

The large and growing macroeconomic literature on rCBDC provides only very limited support for the notion that its introduction would dramatically alter financial markets or the environment banks operate in, provided that central banks and governments accommodate the introduction.[100] Much of the literature attributing significant effects to rCBDC actually identifies policy-induced effects, which would disappear if policymakers in the models behaved differently. In other words, many conclusions about negative impacts of rCBDC on the financial sector and its ability to support financial intermediation functions rely on specific assumptions about policy choices; if these assumptions were modified, rCBDC would be largely inconsequential.

Yet the narrative of rCBDC-induced 'disintermediation' risks persists. This may be politically motivated. From a political-economy perspective, the introduction of rCBDC could have adverse implications for banks and their customers even if central banks were able, in principle, to neutralise these effects on technical grounds. After all, implementing such insulation measures may not be politically feasible if the greater transparency about the monetary architecture brought about by rCBDC alters voters' perceptions of the distributive consequences embedded in the status quo, and this eroded political support for it.[101]

98 See Kumhof and Noone (2021).
99 See, for example, Bindseil (2020), Infante et al. (2023), and Carapella et al. (2024).
100 See Niepelt (2026) for a survey.
101 It is far from clear that increased transparency would weaken political support for cheap bank financing. Support may persist even when interest rates are inefficiently low, so long as cheap bank funding is seen as easing credit and relaxing funding constraints for households and firms.

In other words, while the current monetary architecture reflects a politico-economic equilibrium, the introduction of rCBDC has the potential to shift that equilibrium and redistribute rents away from banks and their customers. A back-of-the-envelope calculation based on liquidity spreads and demand elasticities suggests that in the United States, bank net interest margins, net of deposit franchise costs and exposed to such political risk, have averaged roughly 0.2% of GDP over the past fifty years.[102] The introduction of rCBDC could place a substantial share of these margins at risk if central banks chose – or were forced to – abstain from pass-through funding on deposit-equivalent terms. Against this background, the insistence of banks and their customers on rCBDC holding limits and the absence of rCBDC remuneration can be understood as an ex-ante defensive strategy: by preventing future rCBDC adoption, banks reduce the likelihood of entering a subgame in which their profits hinge on favourable central bank pass-through funding that may become politically untenable. A similar political-economy logic could explain banks' opposition to remuneration of stablecoins – unless they issue these payment instruments themselves.[103]

2.6 CONCLUDING REMARKS

The digitalisation of money and payments presents both technological and institutional challenges. As technological change reshapes platforms and processes, it exposes – and in some cases creates – structural weaknesses in the monetary architecture, particularly at the retail level. Cash – the only form of public money directly accessible to households and firms – becomes less useful as a means of payment, while private digital payment instruments gain prominence. This shift endangers public seigniorage, privacy, choice, resilience, and monetary sovereignty, and may weaken trust and singleness.

rCBDC may help address some of these risks, but it is not necessarily the most appropriate instrument in all cases. In addition, it can serve broader objectives. Rather than viewing rCBDC as a narrowly targeted policy tool for fine-tuning payments in a digital economy, it should be understood more broadly as a potential instrument for addressing structural problems in the monetary system, whether related to digitalisation or not. The case for rCBDC is strongest when the problem at hand requires what is unique about it: digital money, fully backed by the central bank, and directly accessible to the public.

By giving households and firms direct access to safe, central bank-issued digital money, rCBDC can help address banking-sector frictions. But by expanding the central bank's balance sheet, it can also expose society to a range of political risks. In this light, the introduction of rCBDC is not merely a technological innovation but a deliberate architectural reform, reshaping the relationship between the central bank, private intermediaries, and the public. Its relevance extends far beyond the narrow question of

102 See Niepelt (2026).
103 See also Uhlig (2025).

digital cash substitution. Retail CBDC design choices – such as remuneration, holding limits, and privacy features – will determine whether rCBDC fulfils its potential, if any. Constraining rCBDC's role as a store of value may protect banks against competitive pressures in the short run (though not necessarily against other rivals, such as stablecoins), but it also forgoes opportunities to address structural weaknesses and strengthen systemic resilience.

Ultimately, the debate over digital money is not solely about technology or narrow measures of payment efficiency; it concerns the fundamental design of the monetary system. Policymakers face a choice between preserving a status quo that may be far from optimal and embracing reforms that modernise the monetary architecture for the digital age.

CHAPTER 3

International digital money

3.1 INTERNATIONAL CURRENCY ROLES

3.1.1 Synergies: Why some currencies become international

As we contemplate profound technological changes in the way we exchange money and assets, it is worthwhile to ask ourselves how monies become widely used. The international monetary system has historically been shaped by the interaction between economic size, financial depth, technology, institutions, and trading and military power. Digital money does not break from this history; rather, it forces us to revisit how new technological and geopolitical developments reshape old questions.

International currencies perform multiple functions: they serve as units of account, means of payment, and stores of value in the international sphere; they anchor debt contracts, international reserves, and collateral hierarchies. These roles reinforce one another through network externalities – the more widely a currency is used, the higher the incentives are for others to use it – and through complementarities in function.

As Krugman (1984) explains, there is a synergy between the role of a currency as an invoicing currency and its role as a vehicle currency in foreign exchange markets. The use of a currency to invoice and settle international trade is associated with greater liquidity and lower transaction costs in foreign exchange markets, which in turn reinforces its use as a medium of exchange. The development of hedging instruments – futures and forwards – denominated in that currency and used by traders further amplifies this effect. Because of the United States' large and pervasive trade links, particularly since World War II, the US dollar has become the dominant vehicle currency in foreign exchange markets: it serves as a natural 'hub' for currency exchange. As a result, the Thai baht and the Mexican peso, for instance, are almost never exchanged directly but instead via the dollar – baht against dollars, then dollars against pesos. This indirect routing increases the liquidity of all bilateral dollar markets and further lowers transaction costs.[104] Moreover, many actors hold short-term liquidity in the vehicle currency, which means a disproportionate share of market transactions passes through US dollar payment systems.

104 Rey (2001).

The banking sector in many countries provides dollars to exporters and importers because commodities trade is invoiced and settled in dollars, and because US import demand is so large that much of world trade is denominated in dollars.[105] Since the dollar is so prevalent as a unit of account, it is unsurprising that many countries stabilise their currencies against it, which in turn leads them to hold larger dollar reserves. There are thus synergies between the invoicing role, the anchor role, and the reserve role of a currency. When central banks intervene in foreign exchange markets, they naturally do so in the most liquid markets, i.e., those involving the dollar, and therefore hold dollars as reserves.

Finally, in a world where the dollar pervades the balance sheets of financial intermediaries, occasional liquidity crises arise from maturity mismatches and the inability to roll over dollar debt in stressed conditions. In such situations, a lender of last resort capable of rapidly scaling up liquidity provision becomes essential. The US Federal Reserve played that role in 2008 during the Global Financial Crisis, and again in 2020 during the COVID-19 crisis, by extending swap lines to the central banks of affected regions, which then lent onwards to their domestic financial sectors. This lender-of-last-resort function has been critical to the internationalisation of the dollar. The Eurodollar markets (see Box 3) grew quicker precisely when it became clear that the Federal Reserve would provide liquidity in times of stress. There are synergies between the willingness and ability to act as lender of last resort and international currency use.

All these synergies and complementarities between the private sector and the official sector use of a currency as summarised in Table 1. These cumulative advantages – what Eichengreen et al. (2018) call the 'persistence' of incumbency in international currency status – are what makes the dollar equilibrium so hard to dislodge. They also confer substantial power on the United States in the international economy, as many entities rely on the US dollar payment system and many countries and market participants depend on dollar liquidity.

TABLE 1 **INTERNATIONAL CURRENCY ROLES**

	Medium of exchange	Store of value	Unit of account
Private sector	Vehicle currency Liquid and safe asset markets	Nominal securities issuance Banking and cash hoarding	Denomination of securities Trade invoicing
Official sector	Intervention currency Lender of last resort Swap lines	Reserves	Exchange rate pegs

105 Gopinath and Stein (2018).

3.1.2 International monetary systems: From commodity-backed money to fiat currencies and digital money

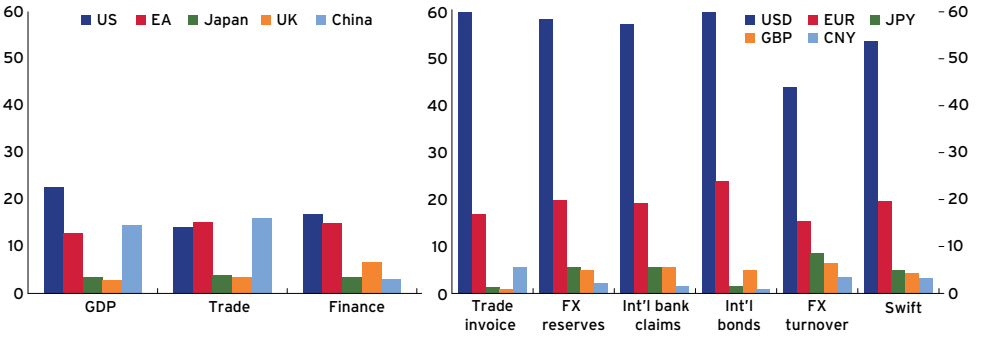
Under the gold standard, international currency roles were tightly bundled. Gold served as the ultimate settlement asset. Sterling was convertible into gold, trade balances were netted through gold flows, and reserves were held in the centre country. This arrangement imposed a clear external constraint on monetary policy: the balance of payments mattered because gold reserves mattered. Following various shifts in pre-eminence among sterling, the dollar, the Deutsche Mark, and the French franc,[106] the Bretton Woods system brought about the decisive transition from sterling to the US dollar as the primary international currency.[107] Yet it preserved the same underlying logic, since the dollar remained convertible into gold. This was a transition between allies and a cooperative transition. Capital controls under Bretton Woods softened the external constraint on the balance of payments by limiting 'hot money flows' and thereby afforded some domestic monetary policy autonomy. The system did not, however, resolve the fundamental problem of international adjustment identified by Keynes: deficit countries faced pressure to adjust, as they risked being unable to refinance their external debt, while surplus countries, which simply accumulated net foreign assets, faced no equivalent pressure.

With fiat money, the rules of the game changed significantly, since the centre currency was no longer convertible into gold. Many observers expected that the removal of this asymmetry would reduce the international role of the dollar. In fact, given the synergies described above, the dollar's dominance in the international monetary system remained intact – and remains overwhelming today. Figure 3 shows that, despite the broadly comparable size of the United States, Europe, and China in international trade, the dollar dominates as an international currency along every dimension: trade invoicing, FX reserves, international banking, international bond issuance, foreign exchange turnover, and the SWIFT messaging system that underpins international payments. The euro is a distant second.

Figure 4 illustrates the dynamics of the monetary system vividly by showing the centrality of each currency in both trade and financial networks over time. Trade intensity is measured by exports and imports; financial connections by cross-border positions. The centrality measure captures the importance of a node in the network, taking into account both its size and the importance of its neighbours.

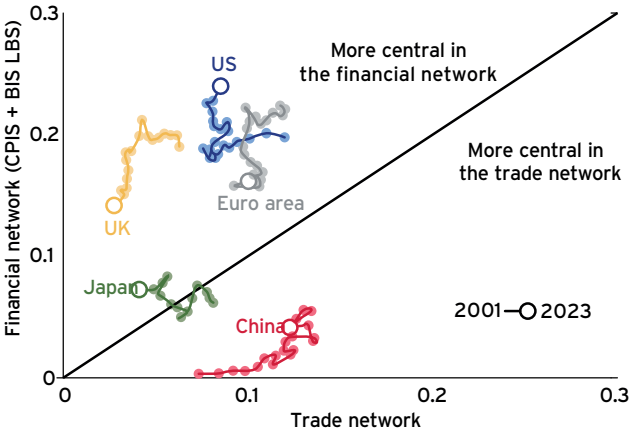
106 Eichengreen and Flandreau (2009).
107 For a long-run perspective on the rise and fall of dominant currencies through to the digital era, see Eichengreen (2026).

FIGURE 3 **SHARE IN GLOBAL ECONOMY AND CURRENCY COMPOSITION IN 2023**



Source: IMF (2025b).

FIGURE 4 **CURRENCY CENTRALITY IN TRADE AND FINANCIAL NETWORKS**



Note: Each dot represents annual value of the centrality measure of a country in trade and financial network (eigenvalue centrality). Financial network represent the sum of crossborder holding of portfolio assets and banks loans and deposit claims. Mirror data is used to fill missing data whenever available. Portfolio holdings are corrected for the role of offshore financial centers using rescaling matrix of Coppola and others (2021). Intra-EMU holdings and trade are excluded. CPIS = Coordinated Portfolio Investment Survey, BIS = Bank for International Settlements, LBS = Locational Banking Statistics; EMU = European Monetary Union. IMF staff calculations.

Source: IMF (2025b), updated.

The dollar, the euro, and sterling are disproportionately central in the financial network relative to the trade network; the dollar's financial centrality has increased over time, while that of the euro and sterling has declined. China, Europe, and the United States are the most central regions in trade networks, but China is not a large player in financial networks. Japan is roughly equally central in trade and finance, although its importance in trade networks has been declining.

As regards central bank foreign exchange reserves, the IMF's latest COFER data (Q3 2025) show that global official foreign exchange reserves total approximately $13 trillion (excluding gold and Special Drawing Rights (SDRs)). The US dollar remains dominant, accounting for roughly 57% of allocated reserves. The dollar's share has declined gradually over the past decade, from the mid-60s to the high 50s, driven largely

by exchange rate valuation effects.[108] The euro accounts for around 20% of reserves, consolidating its position as the second international reserve currency. The renminbi represents just under 2%, while a group of other advanced economy currencies (the yen, sterling, the Canadian and Australian dollars, and the Swiss franc) collectively account for roughly one-fifth of reserves. Outside COFER-reported reserves, gold holdings have increased significantly, reflecting hedging motives and geopolitical risk considerations. The international reserve system nonetheless remains highly concentrated, with the dollar continuing to anchor the global monetary system.

The nature of the system has changed, however. Once gold reserves no longer needed to be held in the centre country, the external constraint shifted from having sufficient gold reserves to maintaining the credibility of institutions. The international system became increasingly reliant on 'safe assets' – US Treasuries – rather than commodity-based settlement assets such as gold. Inflation risk, financial liberalisation, the growth of securitisation, and the pervasive role of collateral in repo markets have made US Treasury markets the backbone of the international financial system and have made US fiscal backing central to the system's functioning.[109]

Fiat money, whether central bank reserves or commercial bank money, is already largely digital. In that sense, the digitalisation of money that is sometimes associated with cryptocurrencies today represents continuity rather than rupture: it is an extension of a long-standing trend.[110] What is new is that we are entering an era of tokenisation of money and assets. Tokenisation is defined as the process of recording claims – either on assets that exist on a traditional ledger or on natively digital assets – on a programmable platform, where they can be transferred.[111] What is of interest is whether new technologies, and the emergence of different types of cryptocurrency and tokenisation, alter the process of currency internationalisation and reshape the roles currencies play.

The technological edge of tokenised money lies primarily in reducing frictions in payments – cash-to-cash, cash-to-assets, and potentially asset-to-asset – and in introducing programmability, which may support an enhanced medium-of-exchange role in both domestic and international spheres. It does not fundamentally alter the unit-of-account function, which remains anchored in the existence of legal tender and taxation and upheld by the central bank. The interesting questions are therefore whether reduced payment frictions and programmability increase or decrease the network externalities inherent in the medium-of-exchange function, and whether they alter the store-of-value role. In other words, do these new technologies and their developments, which are endogenous to geopolitical frictions, alter the process of internationalisation?

108 Goldberg and Hannaoui (2024).
109 On the long-run vulnerabilities and durability of dollar dominance, see Rogoff (2025).
110 Brunnermeier et al. (2019).
111 Agur et al. (2025).

And do these new instruments potentially carry macroeconomic effects and change international monetary policy spillovers? These are novel and important questions and answering them requires understanding the nature of the new payment technologies, their institutional frameworks, and their use cases.

BOX 3 **PARALLELS BETWEEN STABLECOINS AND EURODOLLAR MARKETS**

Emerging in the post-war period and expanding rapidly from the 1960s onwards, the Eurodollar market consists of US dollar deposits held outside the United States, notably in European and offshore banks. These deposits are legally outside US jurisdiction but economically embedded in the dollar system. European banks play a central role, recycling dollar deposits into dollar lending and securities, while relying implicitly on access to the Federal Reserve's liquidity backstop in times of stress. Eurodollars have been a crucial component of global dollar liquidity and of the international transmission of US monetary policy. By the mid-1980s, following a considerable amount of 'petrodollar recycling', Eurodollars exceeded the amounts of dollars held in the United States. They gave US banks a central role in global payments, which has served as an important instrument of US geopolitical power.

Dollar-denominated stablecoins resemble Eurodollars in essential ways. Both represent dollar claims outside the regulated US banking system, and both rely on the promise of par convertibility. The Eurodollar market was originally created in the Cold War context out of the Soviet Union's need for a safe haven for dollar holdings outside the United States with which to buy commodities. Regulatory arbitrage then played a central role in the growth of the Eurodollar market – just as it does today for stablecoins. History suggests that such systems can scale rapidly, but also that their stability ultimately depends on backstops, whether explicit or implicit. It was only once market participants understood that the Federal Reserve, which had become increasingly aware of the importance of Eurodollars for the dollar system, would provide a liquidity backstop that Eurodollar volumes grew rapidly. Today the Eurodollar market is estimated at roughly $13 trillion. There are two key differences between USD stablecoins and Eurodollar deposits. The first is the absence of interest payments on USD stablecoins. The second is the absence of a lender of last resort for USD stablecoins. These are fundamental issues. It may be expected that there will be some convergence in financial instruments, with either stablecoins becoming interest-bearing and benefiting from a lender of last resort through different regulation, or tokenised deposits becoming more widely traded across institutions.

3.2 CRYPTOCURRENCIES: CURRENT INTERNATIONAL LANDSCAPE

3.2.1 Native tokens

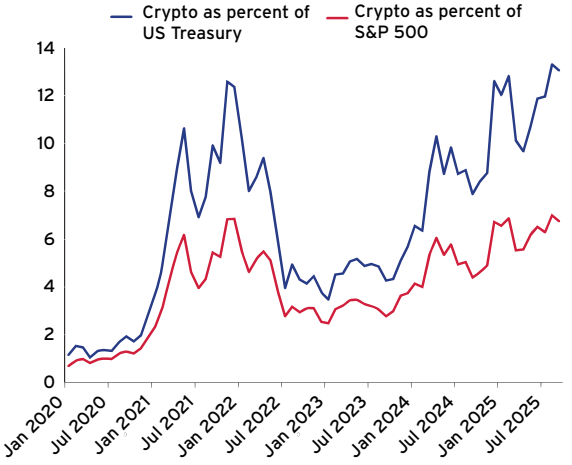
Native cryptocurrencies (such as bitcoin, which has the largest market capitalisation) have *limited payment roles* due to their volatility, absence of a unit-of-account function, and constrained scalability. Within economies, their use is largely speculative. Across borders, however, they have been used for transactional purposes: remittances, illicit

trade, and sanction evasion. The March 2026 market capitalisation of bitcoin is around $1,400 billion. Crypto currencies as a group are no longer negligible compared to other financial assets; together, they amount to about 13% of US treasuries capitalisation (see Figure 5). Their highly decentralised nature makes them difficult to track.

Graf von Luckner et al. (2023) develop a creative methodology to detect transactional, as opposed to speculative, use of bitcoin, focusing on large peer-to-peer off-chain exchanges covering 163 fiat currencies and more than 128 million trades (2017–2022). These exchanges operate globally and facilitate fiat-to-bitcoin trades without holding fiat deposits, allowing them to bypass most national banking regulations. The authors identify when bitcoin is being used as a vehicle currency – that is, as an intermediary to transfer value between two fiat currencies or across borders – by matching identical bitcoin transaction sizes within very short time windows. They find that bitcoin is frequently used to evade capital controls, to circumvent foreign exchange restrictions, and to move funds internationally when banking channels are constrained. Countries with strict capital controls are heavily over-represented in their data. A tightening of capital restrictions in Argentina, for example, is associated with increased crypto usage.

In sum, bitcoin functions as a de facto parallel cross-border payment system in jurisdictions with tight regulation or fragile financial systems. Yet there is little prospect of bitcoin becoming an international currency given its poor performance as a unit of account, and its inability to scale as a medium of exchange because of the very costly validation process. Bitcoin is arguably not a currency at all, let alone an international one – it has the characteristics of a speculative asset, a commodity without physical substance. Moreover, its very large energy requirements and corresponding environmental costs disqualify it as a viable medium of exchange, given its extremely decentralised structure.

FIGURE 5 **CRYPTO MARKET CAP AS A PERCENTAGE OF US TREASURIES AND S&P 500**



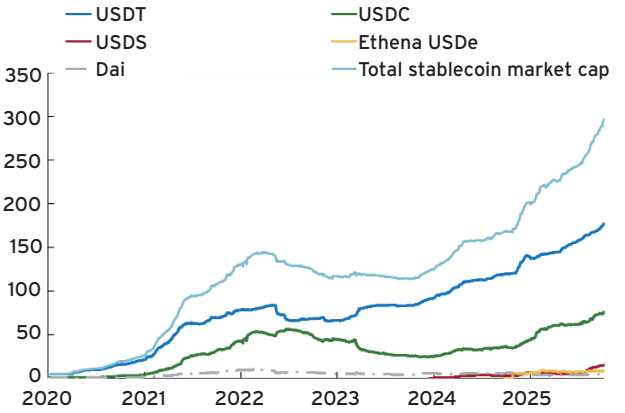
Source: IMF (2025c).

3.2.2 Stablecoins

Stablecoins are privately issued tokens typically *pegged to fiat currencies*, overwhelmingly the US dollar (more than 99%). They therefore 'borrow' the dollar's unit-of-account role which makes them far more attractive than native cryptocurrencies for international transactions. Their current market capitalisation is around $320 billion in April 2026 (Figure 6). In regulated jurisdictions, they are backed by high-quality liquid assets in a manner analogous to money market funds, though they do not pay interest, at least not directly. There are currently two dominant stablecoins: Tether (USDT), currently based in El Salvador and Circle (USDC), based in the United States. Both are emerging as de facto bridges between traditional finance and blockchain-based systems (see Chapter 4 in this report) and are taking on an increasing role in cross-border payments.

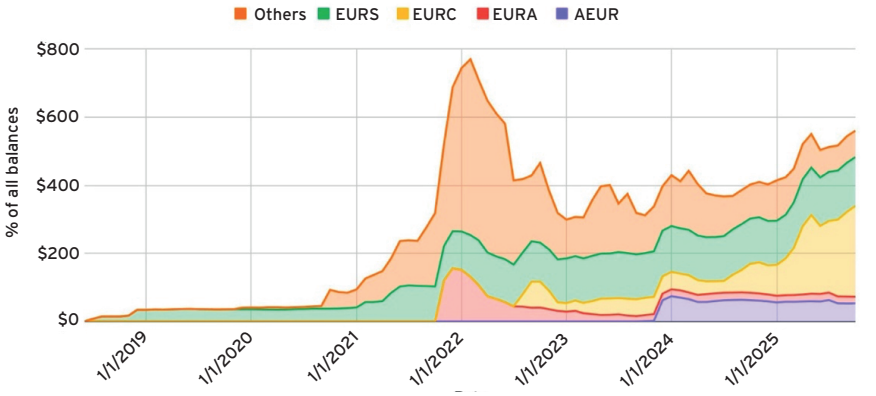
Non-USD stablecoins (Figure 7) have not yet gained traction. Euro stablecoins amount to only about $600 million in supply; Société Générale's crypto subsidiary issued a euro stablecoin in 2023.

FIGURE 6 **STABLECOIN MARKET CAPITALISATION (IN BILLIONS OF US DOLLARS)**



Source: IMF (2025c).

FIGURE 7 **NON-USD STABLECOIN SUPPLY**



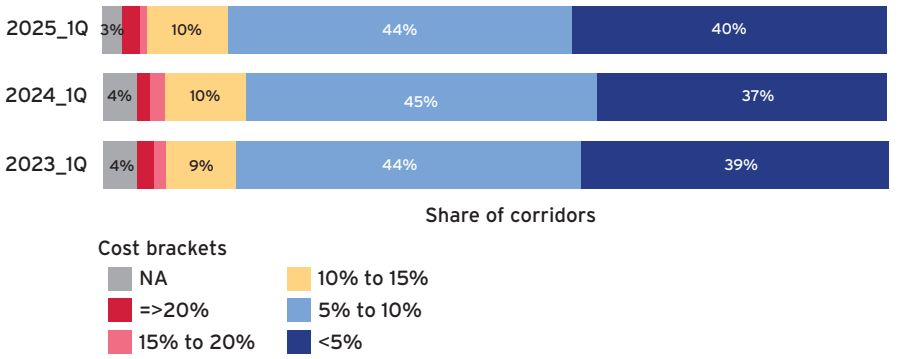
Source: Artemis (2025).

3.2.3 Use cases

Remittances

For remittances, the use case for stablecoins is tangible. Stablecoins can reduce transaction costs and settlement times, particularly where banking access is limited. The World Bank's Remittance Prices Worldwide database[112] monitors the cost of sending money internationally across major remittance corridors, tracking transfer fees and exchange rates across banks, money transfer operators (MTOs), mobile money providers, and post offices. Global remittance flows may have reached around $905 billion in 2024. As of August 2025, the global average cost of sending $200 was approximately 6.49% of the amount sent. This cost varies widely across corridors and provider types (see Figure 8): banks typically charge more than MTOs or mobile money services. Costs are highest in Sub-Saharan Africa (7.9%), followed by the US–Mexico corridor (6–8%), and are lowest in South Asia (4.8%). Even the most sophisticated customers who use on average the three cheapest providers with a transaction speed of fewer than five days now pay around 3.29% on average. Average costs have, however, remained stubbornly high. A structural decline in correspondent banking relationships over the past decade, particularly in emerging markets and small jurisdictions,[113] has raised costs and reduced access for the corridors most reliant on remittance flows. Stablecoins may help reduce costs.

FIGURE 8 **DISTRIBUTION OF AVERAGE REMITTANCE COSTS ACROSS CORRIDORS**



Source: World Bank (2025).

Users nonetheless remain exposed to exchange-rate risk between the dollar and their domestic currency, to the governance risk of issuers, and to on- and off-ramp frictions. The cost of a stablecoin transaction currently ranges from well under $1 to a few dollars, depending on the network and the exchange or wallet used, independently of whether the transaction is cross-border. Exchanges and custodial wallets add a withdrawal fee on top of the blockchain fee. For a cross-border transfer using a stablecoin, the total

112 https://remittanceprices.worldbank.org
113 CPMI (2016); World Bank (2018).

cost is likely to be around 0.2% to 2% of the transaction value. Some very low on-chain costs (Tether, for example, operates on the Tron blockchain) may come at the expense of lax risk management. Circle, for its part, does not allow USDC to circulate on Tron, citing risk management and reputational considerations.[114]

Importantly, cost savings are limited when operating within a regulated framework that requires compliance with KYC and AML/CFT legislation. Although it is difficult to quantify precisely, industry studies suggest that AML/KYC compliance costs account for a meaningful share of average remittance costs, perhaps 1–3 percentage points or more.

Compliance costs are high partly because data are incomplete or inconsistent across jurisdictions. Information is unstructured (held in free-text fields), each intermediary must independently re-screen and re-verify information, cross-border payments pass through multiple correspondent banks, and checks are thereby multiplied. This creates duplication, manual review, delays, and high costs. Regulated stablecoins could offer lower-cost alternatives if they succeed in embedding compliant AML/KYC/CFT processes within their infrastructure. The introduction of ISO 20022 as an international messaging standard may represent genuine progress, as it incorporates a common structured data format, more granular information, and machine-readable identifiers. If greater uniformity of message transmission could be achieved and supplemented with legal entity identifiers, it could allow automatic sanctions screening and substantially better compliance risk-scoring accuracy through programmability.

A productive way forward would therefore be to allow competition among all payment providers within a well-defined regulatory framework, facilitated by new data standards, with compliance requirements uniformly enforced across jurisdictions. Competition among all provider types, whether banks, stablecoin issuers, fintech companies or CBDC networks, as well as existing payment systems such as connections between India's UPI and European retail payment networks (TIPS), would ensure that legal international transactions such as remittances are conducted at the lowest possible cost consistent with sound regulation. The potential gains are large and matter in particular for the many migrant workers in the world economy and their families. A back-of-the-envelope calculation for total remittances, assuming that savings in compliance costs due to programmability and interoperability are on the order of one percentage point, yields approximately $905 billion × 1% = $9.05 billion per year. These savings would accrue to a relatively poor segment of the world population, and may well be an underestimate given that increased competition would drive down costs further.

114 "Circle is Discontinuing Support for USDC on the TRON Blockchain", Circle, 21 February 2024 (https://www.circle.com/blog/circle-is-discontinuing-support-for-usdc-on-the-tron-blockchain).

Currency substitution

Stablecoins and native tokens can substitute for the domestic currency in countries where institutions are too weak to guarantee monetary stability. This has traditionally been the case in countries facing hyperinflation or high inflation, which typically become 'dollarized'. In such environments, using a USD stablecoin may be easier than resorting to barter or obtaining physical dollar bills or USD bank accounts, and the availability of cryptocurrencies can represent a genuine welfare improvement for the population.

Argentina offers a clear illustration. Inflation has frequently exceeded triple digits in recent years, eroding the value of the peso and undermining confidence in the domestic currency. In response, many households and firms have turned to crypto assets, especially stablecoins such as USDT, as a means of preserving purchasing power and accessing a de facto dollar-linked store of value. Crypto is used for savings, as people convert pesos into stablecoins to hedge against inflation and capital controls; as a means of payment for certain online or informal transactions; and for cross-border transfers that bypass restrictions on foreign currency access. Crypto does not, however, replace the national currency in any formal sense. It operates alongside it as an alternative financial channel. This reflects a broader pattern: in high-inflation environments, individuals seek substitutes – whether foreign currency, gold, or crypto – to protect their wealth when domestic monetary policy loses credibility. The availability of stablecoins makes this substitution easier. Currency substitution however comes with well-known costs for macroeconomic stabilisation, in particular lower monetary policy effectiveness.[115]

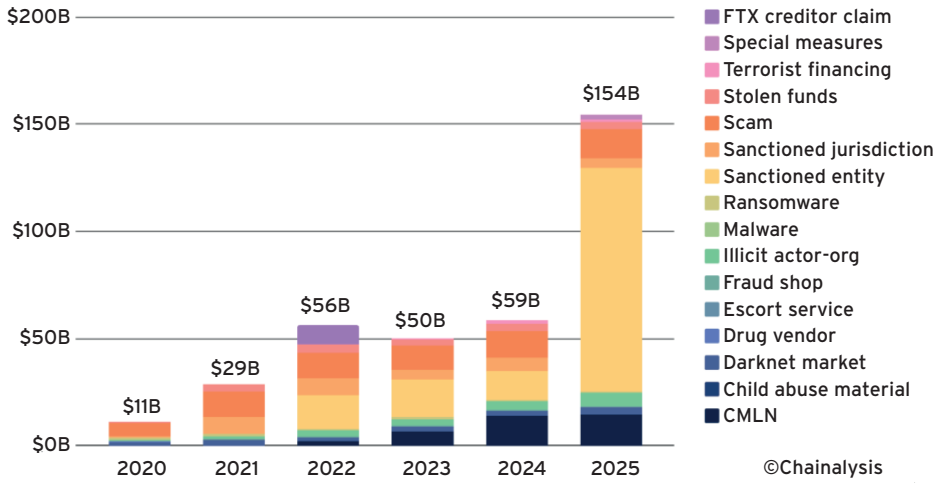
Illicit transactions

Currently, stablecoins such as Tether (headquartered in El Salvador) and associated blockchains and exchanges operate in a grey area, lightly regulated. The weakness of AML/CFT and KYC frameworks opens the door to a wide range of 'below-the-radar' international transfers. The use of 'mixers' further enhances actors' ability to conduct untraceable transactions. A mixer is a service designed to obscure the origin and destination of cryptocurrency transactions. It breaks the direct on-chain link between sender and recipient by pooling and redistributing funds for a fee, such that the returned funds cannot be directly traced to the original deposits through simple blockchain inspection. These obfuscation techniques are particularly potent with USDT, which is highly liquid, dollar-denominated, and easily moved across chains. It is widely accepted in over-the-counter markets, including in loosely regulated jurisdictions. Actors can move quickly, convert USDT to other tokens, or cash out through exchanges. The risk, once again, is that regulators and supervisors are outpaced and outresourced.

115 Calvo (2006).

Some uses of stablecoins resemble the traditional use of large-denomination cash in the underground economy: difficult to monitor, portable across borders, and capable of operating outside formal financial channels. It has always been very difficult to quantify the magnitude of such flows. Using data on banknotes in circulation and surveys of domestic currency use, international seigniorage from USD bill holdings has typically been estimated at a few tenths of a per cent of US GDP. The cash typically used for this purpose is the $100 bill,[116] though high-denomination euro notes are also used in some geographies. Some of this cash is used for tax evasion and illicit trade (drugs, human trafficking, and so on). In this context, $100 notes historically held a large market share partly because their wide acceptability and high denomination minimised the weight of a suitcase travelling fraudulently across borders. It seems that USD stablecoins and other cryptocurrencies can serve these purposes more conveniently, suggesting a possible tilt towards greater dollarisation in this particular domain, given that USD stablecoins are more developed than their counterparts in other currencies. According to the blockchain analytics firm Chainanalysis, USD stablecoins are increasingly displacing bitcoin for illegal cross-border transactions and sanction evasion. In 2025, illicit cryptocurrency addresses globally received at least $154 billion in digital assets, a 162% increase year-on-year (see Figure 9). Of this total, sanctioned entities accounted for approximately $104 billion. These flows still represented less than 1% of total crypto transactions, but they may be particularly strategically significant (see Figure 10).

FIGURE 9 **TOTAL CRYPTOCURRENCY VALUE RECEIVED BY ILLICIT ADDRESSES, 2020–2025**



Source: Chainanalysis (2025).

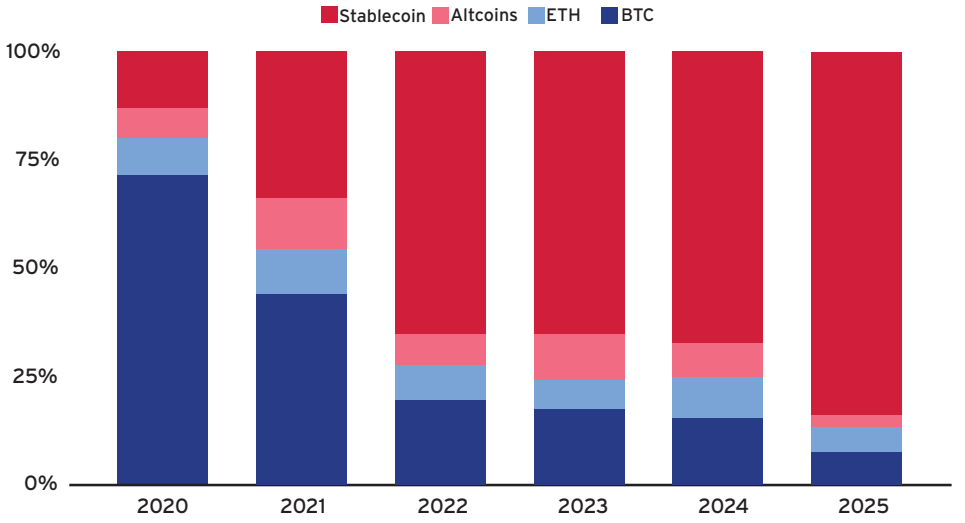
116 See Rogoff (1998).

Chainanalysis writes:

> *In 2025, nation-state use of cryptocurrency moved decisively into the billions. What were once experimental and opportunistic tactics have matured into institutionalised strategies embedded within national economic and security policy. Russia, Iran, and North Korea each operate with distinct objectives and tradecraft, yet despite differing operational models, the three states have collaborated across a number of military, technological, and economic domains in recent years.*

More than $3 billion of cryptocurrency activity in 2025 was linked to networks associated with Iran's Islamic Revolutionary Guard Corps (IRGC), used to support regional militia proxies, facilitate oil sales, and procure dual-use equipment, all activities that traditional fiat channels cannot easily support given sanctions. Chainalysis also noted temporary spikes in crypto outflows from Iranian exchanges following joint US–Israeli airstrikes, illustrating how geopolitical tensions influence cryptocurrency flows. North Korea has become one of the most active sanctioned states in the cryptocurrency sphere, primarily through organised theft and illicit acquisition; estimates suggest North Korea-backed hackers stole more than $2 billion in cryptocurrency in 2025. Russia launched its ruble-backed A7A5 token in February 2025, which transacted over $90 billion in less than one year. It is explicitly designed to bypass the traditional financial system and appears to be used primarily by the Russian government and businesses to settle cross-border accounts. The A7A5 token comes with an Instant Swapper service that operates without KYC and converts it into mainstream USD-pegged stablecoins. To date, $2.2 billion in value has moved through this swap service. Cryptocurrencies are therefore no longer peripheral to sanction-evasion strategies.

FIGURE 10 **ILLICIT ACTIVITY BY ASSET TYPE, 2020-2025**



Source: Chainalysis (2025).

3.2.4 Tokenised deposits

Tokenised bank deposits are still not very developed. They represent claims on regulated banks but operate on distributed ledgers, potentially combining settlement efficiency with institutional backing. They are denominated in fiat currency, backed by traditional bank balance sheets, and programmable and transferable via blockchain infrastructure, for the moment mostly within the boundary of the bank. Crucially, they remain inside the regulated banking perimeter, which means they preserve access to central bank liquidity – a key difference relative to stablecoins, which, so far, do not have access to a lender of last resort. Stablecoins are more akin to banknotes: bearer instruments that can be accepted and used by individuals who believe others will do the same, and that face asymmetric information issues regarding their quality. Stablecoins may nonetheless scale because of their ease of use for certain transactions, as illustrated by the remittances example above.

Tokenised deposits could offer a convenient way of combining the credibility of bank money with the settlement efficiency of blockchain. For multinational corporations, they allow liquidity to be moved across subsidiaries and intra-group payments to be managed in real time. For banks, they can facilitate the settlement of cross-border obligations and improve liquidity management.

After an initial development phase as an internal token, JPMorgan made JPM Coin (JPMD) available to institutional clients on a public Ethereum-compatible blockchain in November 2025, enabling 24/7 near-instant settlement. A key issue for the development of tokenised deposits is the degree of interoperability with other actors as well as clearing mechanisms. Going forward, the development of these 'external rails' and the degree of joint acceptability, ease of clearance, and settlement of tokenised deposits will largely determine their domestic and international usefulness.

A means of payment, to be useful, must be acceptable by many counterparties. Different forms of tokenised deposits must therefore be acceptable by many actors in different jurisdictions, and reliable clearing and settlement mechanisms must exist for this new instrument to develop. In domestic payments, under the current system, interbank liabilities are cleared in central bank money. For international transactions, clearing and settlement are conducted through nostro–vostro accounts at correspondent banks – that is, reciprocal accounts that domestic banks hold with foreign banks. These correspondent banks agree to accept each other's liabilities. The key question is therefore under what conditions banks will agree to accept the tokenised deposits of banks from other jurisdictions.

In sum, the international role of tokenised deposits remains nascent and is heavily dependent on regulatory recognition and legal structures, interoperability across jurisdictions, and clearing and acceptance arrangements across banks.

3.3 IMPACT OF TOKENISATION ON THE INTERNATIONALISATION OF CURRENCIES

3.3.1 Prospects of internationalisation for stablecoins and tokens

Analysing the internationalisation process in a world where geopolitical tensions are intensifying and technology is changing quickly requires a different framework from the past. First, market forces, though important, may become secondary relative to strategic actions taken by states. Geopolitical alignments and military power may thus play an even more central role than before. Second, trust plays a key role in the acceptability of a currency. In traditional fiat currency systems, trust is 'external' in the sense that it depends on the ecosystem of the currency – the rule of law, the quality of institutions (fiscal backing, central bank governance, regulation). With crypto currencies, trust can sometimes be purely 'internal': for bitcoin, it depends solely on cryptology and the algorithm. It can also depend on both internal characteristics (cryptology and blockchain) and external ones (for stablecoins, the quality of asset backing and regulation). The role of technology may therefore be even more critical than it was in the past, though the role of regulation and governance is, as always, critical to develop trust in a currency. The moneyness of a cryptocurrency is underpinned by singleness – different forms of money are perfectly substitutable at par across financial intermediaries and platforms – and interoperability – systems and ledgers are able to communicate and settle across each other.[117]

What do the different use cases tell us about the potential effect of these new digital instruments on the process of currency internationalisation?

For remittances, the choice of currency is driven primarily by transaction costs and ease of use for workers and their families. The emergence of fintech firms and stablecoins has increased competition in a market where international transactions via correspondent banking had been slow and costly, partly for legitimate regulatory reasons. To the extent that uniformisation of message standards is rolled out extensively, processes will become more efficient and competition will intensify. If the winners in that competitive market turn out to be USD stablecoins, these changes in technology could increase the role of the dollar in the remittance market and contribute to greater dollarisation in economies with weak monetary institutions. But if alternative architectures are widely adopted, such as the connection of existing domestic payment systems (for example, between India's UPI and the European TIPS),[118] then the dollar's role in international remittances may actually decline and the role of other currencies – whichever provides the best transfer services – could be enhanced. One advantage of connecting different domestic payment systems is user familiarity and low costs; one major difficulty is the governance of the interface. The connectivity of payment systems will likely be largely

117 Hernández de Cos (2026); Lagarde (2026).
118 "Eurosystem moves forward on work to connect TIPS with India's Unified Payments Interface and with Nexus Global Payments", ECB, 20 November 2025 (https://www.ecb.europa.eu/press/intro/news/html/ecb.mipnews251120.en.html)

determined by geopolitical alliances. Hence, we may be moving towards a world in which the currency of major economic areas will be used for international transactions within the regionally geopolitically aligned hub. There are already signs that this is occurring: Ferrari Minesso et al. (2025) find that the reduction in the probability of payment links between geopolitically distant countries is as much as three times stronger than for geographically distant ones.

As described in the preceding section, in the current geopolitical context, cryptocurrencies and stablecoins are becoming key tools for sanction evasion. The goal is often to avoid the US dollar financial system. The dynamics may paradoxically, in the short run, favour the dollar ecosystem (for example, Tether USDT), as it is the most developed and easiest to use to circumvent sanctions. There is a parallel here with the creation of Eurodollars to facilitate payments for the Soviet Union in dollars outside the United States during the Cold War (Box 3). But geopolitical conflict may lead in the medium run to increased segmentation and the development of alternative ecosystems centred on different currencies, such as the euro and the yuan. This would be consistent with what has been observed in the reconfiguration of global value chains: sectors exposed to geopolitical risk exhibit higher innovative activity[119] to reduce the probability of coercion. In that spirit, the regionalisation of payment infrastructures in response to sanctions is likely to increase currency competition and contribute to a more multipolar financial system. Paradoxically, the push by the US to develop USD stablecoins may increase the likelihood that other countries develop their own competing crypto systems for international transactions, which would considerably diminish the extraterritorial reach of US sanctions and substantially weaken the geopolitical power of the United States. In the competition between stablecoins, important considerations are linked to the credibility of the stablecoin issuer and its business model, its runnability, the safety of the blockchain, and cyber risk. The safest currency may earn an '*integrity premium*'.[120] The regulation of the exchanges associated with the issuers is also a matter that the regulatory community has yet to address adequately.

Tokenised deposits have not yet been widely adopted. They constitute an alternative to stablecoins that may be attractive for large multinational corporations. In the presence of strong externalities and increasing returns in banking, tokenised deposits, by decreasing transaction costs, could increase the market share of the most efficient players and favour the currency of their ecosystem. The largest global banks adopting the most efficient and secure technologies may therefore play an important role in driving the internationalisation of their currency. However, this is conditional on interoperability and clearing and acceptance arrangements across banks and jurisdictions.

119 Clayton et al. (2025).
120 Rey (2025a).

Another possible role for stablecoins would be to become the instrument of choice for cash buffers, thereby reducing the role of repos in funding markets and allowing participants to partly circumvent custodians (instead of borrowing cash by posting treasuries as collateral, a participant would hold a USD stablecoin). Stablecoins are now used in smart contracts in DeFi lending protocols.[121] Alternatively, the role of treasuries as collateral in funding markets could be fulfilled by tokenised treasuries, which could increase collateral velocity and reduce costs, though this would require new infrastructure to be developed. Asset managers have already begun to tokenise shares of money market funds (BNP Paribas, Amundi, Blackrock, and others). These tokens would require interoperability with a future wholesale CBDC used between banks, in order to ensure robustness and avoid fragmentation. If such an ecosystem were built, it could sizably increase the international footprint of the currencies best placed to use it. It is possible that the first-mover advantage of USD stablecoins within this new market infrastructure turn out to be important.

3.3.2 Role of CBDCs and central banks in internationalisation

Central bank digital currencies (CBDCs), whether retail or wholesale, reintroduce the public sector at the core of monetary innovation. Their international implications depend critically on design. A key issue is liquidity provision and the lender-of-last-resort function. Central banks can provide elastic liquidity in crises, as demonstrated by dollar swap lines, which have been instrumental in supporting the financial system in crisis time. Without such backstops, private digital monies such as stablecoins may remain fragile. Singleness of money rely fundamentally on the monetary anchor of the central bank.[122] There is a sharp contrast between the strategy of the US administration, which has so far prohibited the Federal Reserve from creating a CBDC, and those of the European Central Bank and the People's Bank of China, which have embarked on the design of both retail and wholesale CBDCs. The existence or otherwise of CBDCs and their integration on ledgers with payment instruments or tokenised assets is likely to be a key factor behind the functioning of tomorrow's financial system and the internationalisation of currencies.

The current period has seen a multiplication of multilateral initiatives. mBridge and Agorá, for example, explore cross-border CBDC settlement, potentially reducing reliance on correspondent banking and fintech firms and improving payment efficiency. Yet their scale remains limited and governance issues are daunting. mBridge is a multi-CBDC bridge focused on real transactions and FX settlement between different jurisdictions. Its cross-platform interoperability depends heavily on governance and legal alignment. Agorá is a BIS-led public–private tokenisation experiment that brings

121 Barbon et al. (2025).
122 Hernández de Cos (2026).

seven large central banks together with a curated group of around 40 banks and financial firms to test tokenised deposits and wholesale CBDCs on a unified ledger. It emphasises close alignment with existing regulatory frameworks, which favours broad interoperability with global incumbents.

The ECB and the Eurosystem are also spearheading two initiatives, one near term and one longer term. Pontes is the near-term, market-facing bridge to allow DLT market platforms to settle in euro central bank money (TARGET connectivity). The participants are the Eurosystem (the ECB and the 20 euro area national central banks) and a market contact group formed of euro area banks, FMIs, and DLT providers. Appia is the longer-term architectural workstream to study how the euro CBDC and collateral services could be provided across different DLT networks at scale; it will involve Eurosystem actors and market participants. The ECB is also planning to issue a retail CBDC mainly to offer an alternative to existing US payment systems such as Visa and Mastercard, Apple Pay, and so on, which are currently the only ones functioning across all euro area countries. As Cipollone (2026b) emphasises, a euro CBDC is in this sense a question of monetary sovereignty as much as of payments efficiency: in its absence, European retail payments remain structurally dependent on US-controlled private infrastructure.

Table 2 provides an overview of a subset of multilateral initiatives currently under way.

Rather than substitutes, CBDCs, stablecoins, and tokenised deposits are likely to be complements. Hence the importance of initiatives that aim to place multiple instruments of different types on the same ledger. Central banks can anchor trust in new digital instruments by providing robust clearing and settlement mechanisms. If history is any guide, currencies that assume significant international roles are likely to combine advanced technologies — in the current environment that would mean cutting-edge, quantum-proof cryptography to ensure safety against cyber risk — with an ecosystem supported by institutions possessing a solid legal and regulatory framework. Such a framework should guarantee central bank liquidity provision and the singleness of money, including final clearing and settlement in central bank money as legal tender.[123]

123 BIS (2025c).

TABLE 2 **OVERVIEW OF KEY MULTILATERAL CBDC AND TOKENISATION INITIATIVES**

Initiatives	Convenors	Main goals	Core participating countries / authorities	Stage (latest)
mBridge (Multiple CBDC Bridge)	Several central banks	Cross-border wholesale CBDC payments and FX between participating jurisdictions using a shared DLT ledger	People's Bank of China (Digital Currency Research Institute), Hong Kong Monetary Authority, Bank of Thailand, Central Bank of the UAE; Saudi Central Bank. (BIS was an early participant in the project design.)	pilot (project reached MVP in mid-2024; ongoing participant-led development).
Agorá	BIS Innovation Hub in partnership with seven central banks & private sector (IIF convened firms)	Explore tokenisation of wholesale central bank money and commercial bank deposits on a shared programmable ledger to improve wholesale cross-border payments	Seven central banks: Bank of France (representing the Eurosystem), Bank of Japan, Bank of Korea, Bank of Mexico, Swiss National Bank, Bank of England, and the Federal Reserve Bank of New York. Plus ~40–41 private-sector financial firms selected by the IIF to take part in public-private tests.	Design / prototype phase; private-sector test cohort selected and experiments under way.
Pontes	European Central Bank (Eurosystem)	Short-term "bridge" to connect market DLT platforms with euro settlement (TARGET services) so tokenised assets can be settled in central bank money	Led by the Eurosystem, i.e. the European Central Bank together with 20 euro-area national central banks. Market contact group includes a range of euro-area banks, infrastructure providers and DLT platforms.	Short-term track of ECB DLT strategy – pilot / market contact workstreams active.
Appia	European Central Bank (Eurosystem)	Long-term component: explore a scalable, interoperable ecosystem for tokenised assets and DLT-based settlement	Primarily a Eurosystem initiative (ECB & euro-area NCBs); Appia's work will engage market participants and DLT operators but does not have a simple external "country list" beyond the Eurosystem membership.	Strategic / design phase – longer-term workstream complementary to Pontes.

3.4 POSSIBLE SCENARIOS FOR THE INTERNATIONAL MONETARY SYSTEM: UNIPOLAR OR MULTIPOLAR? INTEGRATED OR FRAGMENTED?

The synergies and complementarities described in Section 3.1 imply considerable inertia in the international currency hierarchy. Network externalities, the bundling of medium-of-exchange, store-of-value and unit-of-account functions, and the depth of US Treasury markets together constitute formidable barriers to displacement and make it difficult to isolate the drivers of currency internationalisation. A commonly held view is that international trade in goods is what drives the international role of a currency. More goods trade, which depends positively on country size, geopolitical power, and development, leads to increased invoicing and settlement in that currency, the development of financial services and instruments, and increases in financial development and market depth. This is the trade view of currency internationalisation. Portes and Rey (1998) emphasised instead the financial market view: the growing importance of asset trade relative to goods trade, and hence the key role of financial market development, bond markets, their depth and efficiency in driving currency internationalisation.

The combination of profound technological change and intensifying geopolitical fragmentation makes the trajectory of the international monetary system more uncertain than at any point since the collapse of Bretton Woods. The technological architecture on which the medium-of-exchange function rests is being rebuilt, and this rebuilding is taking place in a period of acute geopolitical realignment, in which payment infrastructure has become a strategic asset and a tool of statecraft.

Two broad scenarios frame the range of plausible futures. In the first, tokenisation acts as a centripetal force, reinforcing the dollar's position at the centre of an increasingly digitalised, US dollar-anchored *unipolar* monetary system. In the second, geopolitical fragmentation acts as a centrifugal force, producing a *multipolar* world in which payment systems interconnect along the lines of political alliance and alternative ecosystems coalesce around the euro, the yuan, and a small number of regional hubs. An important additional question, on top of whether the monetary system becomes unipolar or multipolar is whether the system that emerges from this transition is *integrated* or *fragmented*.

3.4.1 Unipolar scenario: A crypto-dollar hegemon

The case for an entrenchment of the US dollar rests on the cumulative force of first-mover advantages that already operate, with great power, in conventional finance and that may well be magnified in the tokenised world. The dollar is the incumbent international currency *and* USD stablecoins are by far the most developed segment of that crypto ecosystem: more than 99% of issued stablecoins are pegged to the dollar. Tether and Circle now hold collectively more US Treasuries than Saudi Arabia. The technology and the regulatory framework that surround them – i.e. exchanges, custody arrangements, smart-contract integrations in DeFi lending protocols, on- and off-

ramps with traditional finance – are far thicker on the dollar side than anywhere else. As long as users care about acceptability, liquidity, and ease of conversion, the advantage of choosing the dollar rail over any alternative is, at present, clear. The question is how decisive this first-mover advantage proves to be.

The synergies analysed in Section 3.1 reproduce themselves in the crypto sphere. The deeper liquidity of dollar pairs reduces the cost of conversion and increases the willingness of merchants and intermediaries to accept dollar-denominated tokens; greater acceptance reinforces liquidity. To the extent that big tech platforms – payments providers, marketplaces, social networks – embed stablecoin functionality in their products, the dominance of the incumbent rails is further entrenched, since these platforms tend to default to whatever has the largest installed base. The self-fulfilling channel through which expectations of continued dominance are themselves a determinant of dominance, may be especially powerful in network industries where coordination on a single standard is highly valuable.

Crypto-dollarisation in emerging markets reinforces the same direction of travel. As discussed in Section 3.2, the availability of USD stablecoins lowers the cost of escaping a fragile domestic currency: it is easier to convert pesos into USDT than to obtain dollar bills or to maintain a dollar bank account abroad. Households and firms protecting themselves from inflation and capital controls thereby become users of the dollar ecosystem in a deeper sense than they ever did with banknotes, since stablecoins are programmable and can be used directly in transactions and savings. This deepens the dollar's penetration of the medium-of-exchange function in precisely those jurisdictions where the network externalities that normally protect domestic currencies are fragile and weakens the credibility of domestic monetary institutions through a self-reinforcing loop.

A more uncomfortable channel runs through illicit and grey area uses. The discussion in Section 3.2 showed that USD stablecoins are increasingly displacing the hundred-dollar bill as the international currency of choice for sanction evasion, tax evasion, and underground trade. This is paradoxical: the development of crypto rails has been driven, in part, by actors seeking to escape the US-controlled financial system, yet the most developed and liquid stablecoins are themselves dollar-denominated, so that, in the short run, the dollar ecosystem is reinforced rather than displaced. The Eurodollar precedent (Box 1) is instructive: a market originally created in the Cold War to give the Soviet Union a means of holding dollars outside US jurisdiction ended up entrenching the centrality of the dollar in international finance and amplifying, rather than reducing, the geopolitical leverage of the United States.

Finally, on the wholesale side, the development of tokenised deposits by large US banks may further deepen global dollar liquidity. JPMorgan's JPMD, available to institutional clients on a public Ethereum-compatible blockchain since November 2025, illustrates the direction of travel. If a small number of large global banks succeed in establishing interoperable rails for tokenised dollar deposits, multinational corporations will be

able to manage cross-border liquidity in real time and at very low cost, with the dollar leg of essentially every transaction passing through a US-regulated balance sheet. The combination of stablecoins for retail and small-value transactions, tokenised deposits for institutional flows, and tokenised Treasuries for collateral could constitute a digital pillar of the dollar system, strengthening rather than weakening the *exorbitant privilege* identified in Gourinchas and Rey (2007). In this scenario, the world banker function of the United States is reinforced and the dollar's ecosystem extends its reach into segments of activity – programmable payments, machine-to-machine transactions, micropayments – that physical cash and traditional banking could not previously serve.

3.4.2 Multipolar scenario: An international monetary system with regional currencies

The case for a multipolar outcome starts from a different premise: the weaponisation of the dollar payment infrastructure makes it less attractive for non-aligned actors and, increasingly, for jurisdictions that simply wish to retain monetary sovereignty. The intensification of US sanctions since 2022 has sharpened the incentives for other states to develop and connect alternative payment systems. Where dependence on dollar rails is a strategic liability, the political return on developing alternatives is high, and rises with the perceived probability of future sanctions.

The architecture that emerges from this logic may not be the construction of a single rival to the dollar – neither the euro nor the yuan appear poised to assume that role on its own – but rather the *interlinking of regional payment systems along geopolitical lines*. India's Unified Payments Interface (UPI) and the European TARGET Instant Payment Settlement (TIPS) have begun to negotiate cross-border connectivity; mBridge connects the People's Bank of China with the Hong Kong Monetary Authority, the Bank of Thailand, the United Arab Emirates, and Saudi Arabia in a multi-CBDC arrangement and allows real transactions to be settled outside the dollar system; the Eurosystem's Pontes and Appia initiatives aim to connect DLT-based market infrastructure to euro central bank money. The combined effect of these arrangements is to construct a topology of payment connectivity that increasingly mirrors the topology of geopolitical alliance. Ferrari Minesso et al. (2025) provide already quantitative confirmation of this pattern: the reduction in the probability of payment links between geopolitically distant countries is as much as three times stronger than for geographically distant ones. Geography matters; geopolitics seems to matter more for payments.

Two technological features make this fragmentation more credible than past attempts to displace the dollar. The first is the rise of central bank digital currencies as the institutional anchor of regional ecosystems. Wholesale CBDCs, in particular, address the central weakness of stablecoins identified in Section 3.2, namely, the absence of a lender of last resort and the absence of final settlement in central bank money. The US administration's prohibition of a Federal Reserve CBDC leaves the dollar's tokenised

future essentially in private hands. The asymmetry is striking: the United States is betting on private digital dollars; its main potential rivals are betting on public ones. The architecture that combines tokenisation with central bank settlement and an explicit liquidity backstop could be the more robust.

The second technological feature is the safety of the underlying cryptography. As cyber threats become more sophisticated and as the prospect of quantum computing erodes the security of legacy encryption, the integrity of the rail itself becomes a determinant of currency choice. Currencies whose digital infrastructure is built on, or rapidly migrating to, post-quantum cryptography will earn an integrity premium relative to those whose infrastructure is not.[124] There is no inevitable ranking here – the United States, the euro area, and China are all investing heavily, but the technological frontier is moving fast and the first mover in encryption integrity need not be the first mover in stablecoin issuance. The premium attaches to the safest rail, not necessarily to the largest one.

The implications for sanction power are direct. The reach of US sanctions depends on the centrality of the dollar in global payments; the centrality of the dollar in global payments depends, in part, on the absence of credible alternatives. Each new bilateral interlinkage of regional payment systems, each new multilateral CBDC arrangement, each new tokenised deposit network outside the dollar perimeter chips away at the choke-point power of US extraterritoriality. The paradox of the unipolar scenario – that sanction evasion in the short run reinforces the dollar – finds its counterpart in the multipolar scenario: the sustained weaponisation of the dollar rail accelerates the construction of alternatives that, in the medium run, reduce the *effective* extraterritorial reach of US policy.

3.4.3 Integrated or fragmented?

It is tempting to read the two scenarios as a simple horse race between the dollar and the rest. That framing misses what is most consequential about the choice. The deeper question besides which currency(ies) dominate is whether the international monetary system that emerges from the current technological transition is *integrated* or *fragmented*. The two dimensions are conceptually distinct, even if they are often conflated in public debate.

An integrated system – whether anchored on the dollar alone or on a small number of co-existing reserve currencies – preserves most of the gains from a unified medium of exchange: low transaction costs, deep liquidity, common standards, broad acceptability, and a coherent backstop framework in crisis. It rests, however, on a degree of trust between major issuers and on a willingness to refrain from weaponising payment infrastructure that recent experience has called into question. The unipolar scenario, in its pure form, is one version of integration: the dollar provides the unified rail, and

124 Rey (2025a).

the rest of the world plugs into it on conditions set, ultimately, by Washington. But the multipolar scenario does not preclude integration. A multipolar system in which regional CBDCs and tokenised assets clear and settle across a common interoperability layer – built around BIS-led initiatives such as Agorá, around joint standards for messaging and identification (ISO 20022, legal entity identifiers), and around shared cryptographic protocols – could deliver many of the same network gains while reducing the geopolitical concentration risk inherent in a single-anchor system. In an integrated multipolar system, however, different currencies are close substitutes in normal times but shocks to credibility, to cyber security, or to the integrity of any one rail may produce sudden portfolio shifts; hence the need for cooperative liquidity provision. This is, in effect, the modern incarnation of the proposals discussed in Farhi et al. (2011) for a multi-polar reserve system.

A fragmented system is a different proposition altogether. In a fragmented system, payment connectivity follows the contours of geopolitical alliance, and the cost of cross-bloc transactions rises sharply. Stablecoin and CBDC ecosystems are not interoperable; on- and off-ramps are restricted at the border; cross-bloc settlement reverts to a thin layer of correspondent banking, gold, native tokens and informal channels. Liquidity provision in crises becomes a coordination problem rather than a technical exercise within a network of partners; swap-line arrangements no longer span big parts of the system.

Which path the system takes is not a matter of technology alone. The same protocols can be used to build a single global ledger or twenty regional ones. The variable that determines the outcome is the willingness of the major issuers to *cooperate on infrastructure even as they compete on issuance*. The history of the international monetary system suggests that this willingness is highly state-contingent: cooperative in the swap-line architecture of 2008 and 2020; fragile in periods of acute geopolitical stress. The current moment combines a rapid period of technological change with a strained geopolitical environment. Whether the system that emerges is integrated or fragmented depends on whether the major economic blocs choose to treat payment infrastructure as a *commons* – a shared good whose value depends on regulated universal access – or as a *strategic asset* which can be used as a coercion tool.

The policy choices of the next few years on the issuance and design of CBDCs, on the regulation of stablecoins, on the interlinking of fast payment systems, and on participation in initiatives such as Agorá, mBridge, Pontes, and Appia may have outsized effects on which scenario materialises. Path-dependence in network industries means that early decisions matter. Second, the trade-off between dollar dominance and a multipolar system is not the only relevant trade-off: the trade-off between an integrated multipolar system and a fragmented one is consequential since fragmentation imposes costs on every participant, irrespective of which currency they hold.

3.5 INTERNATIONAL MACROECONOMIC CONSEQUENCES

Internationalisation of currencies matter from a geopolitical perspective; it also matters from a macroeconomic perspective. We discuss here two domains in which crypto internationalisation is important: public finances and its effect on the global financial cycle.[125]

3.5.1 Public finances

For the United States, international seigniorage garnered from US dollar bills has been estimated to be in the order of a few tenths of a percent of GDP every year.[126] If USD stablecoins replace all this cash, this money will go straight to private companies and not any more to the US Treasury.

Outside the United States, wide adoption of US dollar stablecoins for payment purposes is equivalent to the privatisation of seigniorage by global actors: it could substitute for the legal tender issued by the domestic central bank decreasing its seigniorage revenues.[127] Hence crypto-dollarisation affects seigniorage and public finances, particularly in emerging markets.

The fiscal implications of crypto-dollarisation extend beyond seigniorage in the narrow sense. The domestic tax base can be eroded through two distinct channels. First, the migration of transactions onto pseudonymous on-chain rails reduces the visibility of taxable activity, weakening VAT and corporate income tax collection in jurisdictions where stablecoins begin to displace domestic payment instruments. Second, the cross-border portability of dollar-denominated digital claims facilitates the relocation of household and corporate wealth to lightly regulated venues, compounding the well-documented difficulties of taxing offshore wealth.[128] The spread of tokenised dollar instruments may further deteriorate the tax authority's information set, particularly in emerging market economies where administrative capacity is most strained.

A second mechanism operates through the demand for safe assets. The backing of dollar stablecoins by short-dated US Treasuries effectively converts a fraction of global liquidity demand into financing for the US fiscal authority.[129] If most of that global liquidity demand was already satisfied by USD money market funds or by banks invested in USD safe assets, then the net demand does not increase. If that global liquidity demand, however, shifts from non-dollar liquidity to dollar liquidity demand because of the attraction of the technology itself (maybe because of ease of use or regulatory arbitrage), then there is some additional net demand for US Treasuries. Tether and Circle already

125 There would also be very important issues linked to exchange rate volatility and other financial stability risks which we are not covering here.
126 Rogoff (1998).
127 Rey (2025a).
128 Zucman (2014).
129 Ferrari Minesso and Siena (2025).

hold collectively more US Treasuries than Saudi Arabia.[130] By increasing the demand for Treasuries abroad, US dollar stablecoins could reinforce the world banker balance sheet of the United States and also help stabilise US external deficits. These stablecoins could constitute a digital pillar strengthening the 'exorbitant privilege' of the US dollar. Until a recent period, the United States, being long risky and short safe, earned an average of 1.5% excess return in real terms on its external assets compared to its liabilities.[131] The recent increase in equity liabilities and the outperformance of US markets drove this excess return towards zero despite the large amount of Treasuries on the liability side of the external balance sheet of the United States. An increase in demand for US T-bills due to stablecoins could help stabilise the 'short safe' position of the world banker. If stablecoin assets under management were to grow towards two to three trillion dollars over the medium term, the sector could plausibly absorb between 5% and 10% of the outstanding US Treasury bill stock, providing a source of demand for short-term US funding while increasing the elasticity of that demand to crypto-market shocks. Hence the same channel that stabilises the world-banker balance sheet *in normal times* increases the elasticity of safe-asset demand to crypto-market and cyber shocks *in stressed times*. The flip side of an increased world demand for USD stablecoins is reduced demand for short-dated sovereign paper of competing issuers: an erosion of the European and Japanese 'safe-asset' franchise, with implications for the cost of public debt outside the United States.[132]

Third, the runnability of stablecoins introduces a new contingent fiscal liability. Should a major stablecoin face a redemption run, the resulting fire-sale of Treasuries would tighten financial conditions at the precise moment when policymakers may wish to ease them. The depegging of USDC in March 2023, in the wake of the failure of Silicon Valley Bank, illustrates how rapidly such episodes can unfold. The fiscal authority would face implicit pressure to backstop the system even in the absence of a formal lender-of-last-resort commitment. The contingent liability is opaque, hard to price, and likely to be revealed only in crisis.

3.5.2 Crypto-dollarisation, the global financial cycle, and monetary policy transmission

The global financial cycle refers to the co-movement of capital flows, asset prices, and credit conditions across countries; it is largely driven by financial conditions in major economies especially the United States.[133] When global risk appetite is high, capital flows surge into riskier markets, asset prices rise, and credit expands worldwide; when risk sentiment tightens, the opposite occurs. US monetary policy is an important driver of risk taking in the financial sector and global banks play a central role in transmitting

130 IMF (2025b).
131 Gourinchas et al. (2019; 2026).
132 Farhi and Maggiori (2018) analyse a world of competing reserve issuers.
133 Rey (2013).

monetary policy across borders within this cycle. Changes in the monetary policy of the US Federal Reserve affect the balance sheets, funding costs, and risk-taking capacity of internationally active banks.[134] Through their cross-border lending and use of wholesale dollar funding, these banks propagate financial conditions globally.

One channel of transmission of monetary policy that could be potentially affected by crypto dollarisation is the funding cost channel. If stablecoins were to grow and to substitute for retail bank deposits, whether in domestic currency or in dollars, this would probably lead to increased reliance of the banking sector on wholesale markets on the funding side to finance credit. Thus, the rise of stablecoins may affect monetary policy transmission by altering banks' funding structures and the pricing of their liabilities, potentially modifying the pass-through from policy rates to lending and deposit rates.[135] A sizable shift towards wholesale funding would imply, *ceteris paribus*, a *sharper response* of balance sheets to monetary policy as wholesale funding conditions are driven more strongly by monetary policy compared to deposits. Altavilla et al. (2026) find that banks which rely more heavily on wholesale funding indeed see funding costs rise more sharply after a monetary policy contraction and pass through those costs quickly into lending rates, which leads to a sharper decline in loan growth compared to the banks which are less reliant on wholesale funding. Interestingly they also find stronger effects of US monetary policy shocks for European banks using more wholesale funding or having high US dollar deposits.[136]

From a cyclical point of view, there are some additional effects that could play out. Both Altavilla et al. (2026) for the euro area and Aldasoro et al. (2025) for the United States find that a contractionary monetary policy shock has a sizable negative effect on the market capitalisation of stablecoins – as well as a well-known contractionary effect on bank loans. Because an increase in interest rates makes stablecoins less attractive compared to MMFs and bank deposits, there should be some composition effect playing out. More stablecoin demand in times of low interest rates, and therefore more reliance on wholesale funding for banks, could, *ceteris paribus,* amplify monetary policy effects on banks funding costs. Conversely, fewer stablecoins in times of high interest rates and lower reliance on wholesale markets could dampen the effect of monetary policy on banks funding costs. The quantitative magnitude of this mechanism and its interaction with the substitution between deposits and MMFs remains to be explored,

134 Miranda-Agrippino and Rey (2020).
135 The mechanism is somewhat similar to the competition between deposits and money market funds in that it increases reliance of banks on wholesale markets except that stablecoins so far do not pay interest so that retail investors may substitute out of stablecoins into deposits when the interest rate increases; but this is traditionally a situation where retail investors substitute into MMFs and out of deposits. The effective degree of substitutability of stablecoins, bank deposits and MMF will be a key factor shaping the monetary policy transmission channel. It will be determined to a great extent by regulation. In the case of Europe (MiCAR) where stablecoins are backed to a large extent by deposits (as opposed to mostly government bonds), those wholesale deposits are usually more flighty than retail ones.
136 See also BIS (2022).

however. At today's $300 billion market cap the channel is small, but the mechanisms described above would become economically significant if the sector grew to the $2–3 trillion projection above, in which case stablecoin substitution for retail deposits could materially affect banks' funding mix.

An increasing number of countries use macroprudential tools to manage their exposure to the global financial cycle. If it materialises, a broader use of crypto currency is likely to decrease the effectiveness of macroprudential policies. Capital controls and macroprudential measures rely on the ability to identify and intermediate cross-border financial flows through the regulated banking and payment system. Self-custodial wallets, peer-to-peer transfers, and decentralised exchanges weaken this capacity. Currently, cross-border flows in crypto currencies are not well measured at all (see the appendix to this chapter). This is a serious constraint for policymakers. A country that imposes a capital outflow tax on bank wires can find itself watching residents convert deposits into USDT through over-the-counter channels and bridge them out of the jurisdiction in minutes. Argentina's experience with crypto adoption during successive rounds of capital tightening is consistent with this mechanism. The relevant policy variable is therefore not whether controls exist on paper but whether the on- and off-ramps between fiat and crypto can be effectively regulated. The implication is that macroprudential policies and capital controls are likely to lose effectiveness in those jurisdictions where crypto rails are widely accessible to retail users.

Further, crypto-dollarisation, just like traditional dollarisation, degrades the domestic currency unit of account function by reducing the informational content of domestic monetary indicators, which again weakens the ability of the domestic central bank to stabilise inflation and output. Dollarisation may also lead to illiquidity crises: when short-term obligations in foreign currency exceed the amount of foreign currency a country can have access to on short notice, self-fulfilling financial and currency crises may arise.[137]

Crypto-dollarisation is likely to be more relevant for emerging markets with weaker monetary and financial institutions than for advanced economies. But the radical change in technology and the rate at which traditional market infrastructure may become obsolete due to tokenisation makes that statement much more uncertain. Tokenisation may open the door to more disruption than has historically been the case. In other words, crypto-dollarisation could be faster-moving than traditional dollarisation and relevant for a broader set of economies.

137 Chang and Velasco (2001).

3.6 CONCLUSIONS

The international monetary system is usually characterised by inertia linked to network externalities and complementarities. The current situation, however, presents an unusual mix of technological changes in transaction technology, new cyber threats, and large geopolitical shocks. So scenarios may be more uncertain than usual.

One possible scenario is an entrenchment of the US dollar as the main international currency, reinforced by the first-mover advantage of USD stablecoins, the depth and liquidity of US Treasury markets, and the absence so far of credible alternatives in cross-border payments. A second scenario is a more multipolar order in which the euro and the renminbi develop competing tokenised ecosystems anchored on their own CBDCs, partly in response to the extraterritorial reach of US sanctions. A third is a more fragmented system in which regional payment hubs cohere along geopolitical lines, with cross-bloc interoperability mediated by a small number of bridge protocols and multilateral arrangements such as Agorá and mBridge.

Which path prevails will depend less on raw technology than on institutional choices: whether stablecoins and tokenised deposits are brought inside the regulated perimeter with credible AML/CFT standards and access – directly or indirectly – to lender-of-last-resort liquidity; whether central banks converge on interoperable settlement infrastructures that preserve the singleness of money; and whether the international community builds the statistical and supervisory capacity to track cross-border crypto flows and to manage the new contingent fiscal, monetary, financial and cyber risks they generate.

The policy implications follow directly. Domestically, the regulatory perimeter must keep pace with the migration of money onto programmable rails. In particular, the singleness of money must be preserved through final settlement in central bank money and through robust prudential standards for stablecoin issuers. Internationally, cooperation through the BIS, the FSB, and the IMF should focus on shared data and supervisory standards, on liquidity arrangements robust to a fragmented and cyber-exposed system, and on the governance of multilateral platforms that connect different jurisdictions. Crypto money does not abolish the classical questions of international finance – trust, liquidity, safety, and power. It does, however, increase the speed with which those questions must be answered, and it makes the institutional choices made over the next few years particularly consequential for the shape of the international monetary system to come.

APPENDIX: CRYPTOCURRENCIES: STATISTICAL CHALLENGES

Current national accounts and balance-of-payments frameworks capture crypto flows very poorly, complicating the measurement of currency substitution and capital movements. An important issue is the non-coincidence between the border of exchanges and the border of jurisdictions, and the fact that wallet addresses do not reveal personal information about the user. Data from blockchains must therefore be supplemented with information about senders and receivers in order to measure cross-border flows.

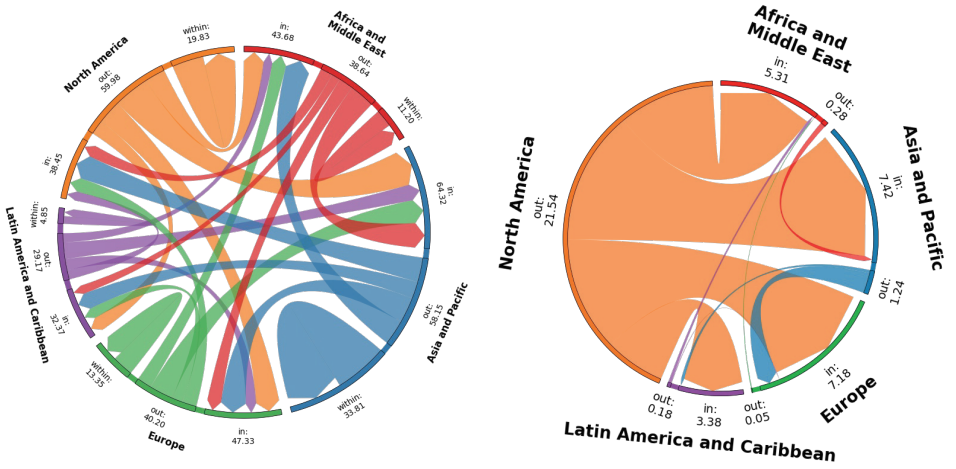
So far, only rough estimates of international flows exist. One widely used data source is Chainalysis, which relies on web traffic data into centralised exchanges to assess the localisation of users, making some assumptions (no VPNs, uniform transaction sizes). Cardozo et al. (2024) use exchange-level transaction data to estimate cross-border crypto flows for a panel of emerging-market economies and document their sensitivity to capital-account restrictions. A different methodology is presented by Reuter (2025). It focuses on wallets that operate in the Ethereum ecosystem but makes progress by using AI and machine-learning techniques to infer the geographic region of crypto wallets and map stablecoin transfers accordingly. The approach supplements public blockchain transaction data with off-chain signals (e.g., linguistic and cultural markers in Ethereum Name System labels, wallet behavioural patterns including the time of day at which trading takes place, and interactions with region-focused exchanges) to assign wallets to regions. Machine learning then generalises this regional assignment to arbitrary wallets, making it possible to approximate cross-border stablecoin flows despite pseudonymity. This approach makes no assumption about VPNs or transaction sizes, but it can only pinpoint regions, not countries. It has been used to analyse stablecoin transactions in the Ethereum ecosystem in 2024.

Figure 11 from Reuter (2025) presents self-custodial wallets only. It shows that Asia and the Pacific lead with the highest stablecoin gross flows (around $160 billion), followed by North America ($120 billion). Latin America and the Caribbean have the smallest stablecoin flows ($65 billion). But relative to GDP, Africa and the Middle East (1.5%) and Latin America and the Caribbean (1.4%) exhibit significantly higher stablecoin flows than the other regions, which are all below 0.5%. Intra-regional flows are small compared with inter-regional flows. Most net flows originate from North American wallets towards the rest of the world.

All of this suggests that stablecoin use is driven primarily by remittances. It also suggests that within countries, USD stablecoins are not widely used as domestic payment instruments, since domestic payment systems in domestic currencies are presumably more efficient. Reuter also documents that Tether's USDT is more popular in regions with more emerging economies, such as Africa, the Middle East, Asia and the Pacific, and Latin America and the Caribbean, while Circle's USDC is more prevalent

in regions with more advanced economies (Europe and North America). As regards crypto exchanges, Binance is favoured in emerging market regions and for 'on-ramp' transactions (converting fiat into crypto), while Coinbase is more widely used in North America and for 'off-ramp' transactions (converting crypto into fiat).

FIGURE 11 **SELF-CUSTODIAL WALLETS: REGIONAL STABLECOIN GROSS FLOWS (LEFT) AND NET FLOWS (RIGHT)**



Source: Reuter (2025).

Reuter then estimates total regional flows (both self-custodial and exchange transactions) by making the admittedly strong assumption that the geographic distribution of self-custodial wallets interacting with exchanges is similar to the geographic distribution of exchange users. This effectively scales up the geographical patterns of Figure 11. The estimated net flows out of North America are on the order of $55 billion: the United States is an exporter of crypto dollars to the rest of the world, which fits naturally with its usual role as a 'world banker'.

It should be clear from this discussion that we are still relatively far from having precise flow estimates for stablecoins and cryptocurrencies more generally. There remains much to learn from observed transaction patterns, from the types of exchange used and their jurisdictions, and from the types of stablecoin used to bridge the crypto and conventional systems. Improving these estimates should be a priority for international organisations such as the BIS,[138] the FSB, and the IMF, as they are becoming material at a minimum for AML and CFT purposes, and increasingly for financial and monetary stability and public finances.

138 BIS (2023).

CHAPTER 4

Regulating digital monies[139]

4.1 INTRODUCTION

Every generation has seen new payment technologies, but stablecoins and digital tokens are different: for the first time, private issuers are attempting to replicate the functions of money without access to the central bank infrastructure that makes money work. Can that attempt succeed, and if so, how should we regulate digital monies to ensure they serve as safe, efficient means of payment while maintaining financial stability? Our answer depends critically on understanding what makes something 'money'.

For any privately issued liability to function as money, it must achieve general acceptance. Three features underpin this: homogeneity and divisibility, ease of transferability, and the ability to expand or contract flexibly in response to changes in demand. The central bank plays a critical role in ensuring these properties hold. Together with explicit deposit insurance, central bank access enables commercial bank deposits to serve as money – but this creates moral hazard, which is why institutions that benefit from these facilities require close regulation.

Can reserve-backed stablecoins serve as a widely used medium of exchange?[140] The answer may be yes, but only if regulation gives them the properties we currently associate with money. Do the existing and proposed regulatory regimes meet this test? We examine the EU, US, and UK regimes for stablecoins and conclude that the UK proposal – which in effect requires stablecoin issuers to be narrow banks – is most likely to lead to stablecoins that function as money. The EU system is sufficiently ambiguous that it is hard to tell – except that the regulation creates spillovers between stablecoins and traditional banks by design, which suggests it will exacerbate systemic risk. Finally, the US system remains at an early stage but appears likely to yield stablecoins similar to those already in existence.

So, what types of digital money will dominate payments? We contrast stablecoins with tokenised deposits and tokenised money market funds and conclude that the latter are likely to prevail. Tokenisation may genuinely improve payment systems, but stablecoins face significant barriers to becoming widely accepted means of payment outside the crypto ecosystem.

139 We thank our discussants, Jon Frost and Elisabeth Noble, as well as Rhys Bidder, Kim Schoenholtz and Jeremy Stein for discussions that helped to clarify a number of issues. We also gratefully acknowledge the research and editorial assistance of Anthropic's Claude in preparing this chapter.

140 In this chapter, we focus on collateralised or fiat-backed stablecoins backed one-to-one by traditional assets held in reserve by the issuer. We ignore alternatives, such as purely crypto-backed, commodity-backed, or algorithmic stablecoins. For a discussion of the last of these, see Liu et al. (2023).

4.2 PRELIMINARIES

We begin with the properties of money, which leads to definitions of various types of money, and then to a brief discussion of programmability.

4.2.1 The properties of money[141]

For any liability to function as money, it must achieve general acceptance. This requires meeting a minimum standard of trust. People must believe that others will accept the money and that it will retain its value, at least in the near future. This trust stems from the issuer's integrity and the regulatory framework governing it. Without general acceptance, a liability might serve as a store of value but cannot function as an efficient medium of exchange. Maintaining integrity helps prevent currency substitution, in which people abandon an unreliable form of money in favour of one they perceive as more reliable and less susceptible to illicit use.

Singleness

Several features of money promote general acceptance. Three stand out. These are homogeneity and divisibility, ease of transferability, and flexibility of expansion. Homogeneity and divisibility determine whether a currency trades at par in all circumstances. That is, one dollar is identical to and interchangeable with any other dollar, and you can make payments of any size. We call this *singleness*.

Importantly, singleness is not merely a property of individual tokens. It is a property that derives from convertibility rules, interbank settlement, and central bank liquidity facilities that keep all forms of money within a currency area trading at par. Commercial bank deposits circulate at par with public money explicitly because there is a comprehensive institutional foundation standing behind them. New digital liabilities must meet this standard — not just in calm conditions, but also when the system is under severe stress.

Transferability

Second, *easy transferability* refers to the ability to make exchanges across both space and time. The costs of making and receiving payments should be low enough that money facilitates rather than impedes transactions. This includes not just explicit fees but also the time and effort required to complete a payment. More efficient alternatives will displace expensive or cumbersome money.[142]

141 In this section, we build on the analysis in Chapter 3 of BIS (2025).

142 BIS (2025) uses 'integrity' as its third feature rather than 'transferability'. We prefer 'transferability' because it more directly captures the payment function of money – the ease and cost of moving it between parties – which is the dimension most relevant to evaluating digital alternatives.

Elasticity

Third is *elasticity* – the fact that the money supply must expand and contract in response to changes in demand. Elasticity operates at two frequencies. In normal times, commercial banks create money by extending credit to meet borrowing demand, while central banks provide intraday settlement credit to ensure the smooth functioning of payment systems. At high frequencies during stress periods, the central bank's lender-of-last-resort function allows solvent institutions to obtain emergency liquidity against good collateral, preventing illiquidity from cascading into insolvency. An inelastic money supply – one that cannot expand in either dimension – can lead to deflation or sharp spikes in interest rates when demand for liquidity rises suddenly.[143]

These three properties of effective money are not mere technicalities. They support the three fundamental economic functions of money: serving as a medium of exchange, a unit of account, and a store of value. A liability that fails to meet these standards might still have value for speculation or as a niche payment method within a particular community.

4.2.2 Defining digital money

Money today is almost entirely digital. When you check your bank balance on your phone, transfer funds to a friend using an app, or pay for coffee with a tap of your card, you use digital money. But what exactly do we mean by this term, and how can we systematically classify its various forms?

Bech and Garratt (2017) provide a helpful structure for understanding the landscape of money. Their taxonomy classifies money according to four key properties: the issuer (central bank or other entity), the form (digital or physical), the accessibility (widely available or restricted), and the technology (token-based or account-based).[144]

Using this framework, we can classify forms of digital money relevant to our analysis. Commercial bank deposits are digital, widely accessible, account-based money issued by private institutions. Central bank reserves represent digital, restricted-access, account-based money issued by central banks. Stablecoins such as Tether's USDT and Circle's USDC are digital, widely accessible, token-based money issued by private entities and governed by smart contracts on blockchains. Central bank digital currencies (CBDCs) could take different forms: retail CBDCs would provide digital cash to the public, while wholesale CBDCs would facilitate settlement among financial institutions.

143 On the two dimensions of monetary elasticity – normal-times credit creation and stress-period liquidity provision – see Banerjee et al. (2025).

144 Adrian and Mancini-Griffoli (2021) extend this framework, adding the dimensions of value stability (unit of account, fixed value, or variable value) and the nature of the backstop (government or private). Their analysis highlights the competitive dynamics among different forms of digital money – something we explore below.

This taxonomy matters because it maps onto different regulatory approaches and risk profiles. Traditional bank money benefits from established regulatory frameworks, deposit insurance, and access to central bank facilities. Even when they aspire to function as money, blockchain-based tokens often operate in regulatory grey areas and lack these safety features.

It is worth focusing on the first feature of Bech and Garratt's framework: whether the issuer is public or private. Public money consists of liabilities issued by the government or central bank – today, primarily cash (paper bank notes) and central bank reserves. By contrast, private money consists of liabilities issued by commercial banks and other financial institutions, such as chequing account balances and money market fund shares.

The balance between public and private money is critical to the functioning of the financial system and the broader economy. Public money is generally safer when a solvent government backs it. Central banks can operate with negative equity and still maintain trust in money – though trust can also break down under sufficiently severe conditions.[145] Government currency often serves as legal tender. Furthermore, it may be possible to design public money so it can expand and contract in response to market demand. To see how, consider the case described in Chapter 2 in which all money is central bank digital currency. That is, the central bank becomes a pass-through entity, refinancing the commercial banks through uncollateralised loans priced as if they were deposits. In this case, the commercial bank can offer a line of credit to private entities, knowing that the central bank will provide the financing. That is, the firm or household draws the line of credit; the commercial bank creates a demand deposit that the customer quickly transfers into central bank digital currency; and the central bank immediately books a loan to the bank against that digital currency.

Private money's ability to expand to meet the economy's needs is somewhat simpler and more transparent. When businesses require more liquidity to finance inventories or when consumers want to make more purchases, banks can create additional deposits by extending credit. This elasticity is essential for accommodating economic growth and seasonal fluctuations in money demand. But private money also introduces risks. Banks can fail, leading to losses for depositors and potential contagion to other institutions.[146]

The challenge for regulators is to preserve the benefits of private money creation while mitigating its risks. This requires ensuring that private money is safe enough to gain and sustain general acceptance while maintaining sufficient elasticity to accommodate economic fluctuations. As we discuss in the next section, achieving this balance necessitates various forms of regulation and, crucially, requires convertibility of private money into public money on demand.

145 See the discussion in Cecchetti and Hilscher (2024) and Bell et al. (2024).

146 There are limits to the elasticity of both the public and private money creation processes. While the central bank can expand its balance sheet without limit, commercial banks cannot. A combination of internal risk controls and prudential regulatory requirements places limits on the degree to which banks, and the entire banking system, can increase the size of their balance sheet.

This is the central paradox of the stablecoin project: private issuers trying to replicate the safety and stability of public money without access to the infrastructure that makes public money safe. Whether stablecoins can resolve this paradox is a central question of this chapter.

4.2.3 On the programmability of money

One of the most frequently cited advantages of blockchain-based digital money is programmability – the ability to embed conditional logic directly into the payment instrument itself. Proponents argue that this feature could revolutionise payments by enabling automated, trustless transactions that eliminate intermediaries and reduce costs.

The potential applications are indeed compelling. Automated conditional payments could trigger transfers when specific events occur, such as the delivery of goods or assets or the satisfaction of contractual milestones. Smart contracts could enable trustless settlement between parties who do not know each other, with a smart contract on the blockchain serving as a neutral arbiter. Supply chain finance could become more efficient if the system automatically disburses payments to suppliers as goods move through production and distribution networks. Even government payments could be conditional on how recipients use the funds.

Most of these advantages already exist with different trade-offs – escrow services, letters of credit, and ACH transactions with conditional triggers are pervasive.[147] The real question is whether, compared to well-established alternatives, blockchain-based programmability offers substantial improvements in cost, speed, or functionality.

Moreover, programmability introduces new risks. Bugs in smart contract code can lead to significant losses.[148] The immutability of blockchain transactions, which proponents often tout as a feature, becomes a bug when people need to correct errors or reverse fraud. And the complexity of programmable money may make it less transparent and more difficult to regulate than traditional payment instruments. More broadly, as Makarov and Schoar (2022) document, while the architecture of decentralised finance (DeFi) has the potential to reduce certain transaction costs, it also creates new layers where rents can accumulate, and its permissionless, pseudonymous design generates challenges for enforcing tax compliance, anti-money laundering laws, and consumer protection.

147 To give one common example, in the United States, everything involved in electricity payments is automated – the reading of meters, the generation of bills, the presentation to customers, and the payment by banks. While it is possible to intervene in the process to correct errors, the default is that no person is involved at any point in the process.

148 See Atzei et al. (2017) for an early discussion of attacks on smart contracts. For a more recent review of vulnerabilities, see Iuliano and Di Nucci (2025)

BOX 4 **TOKENISATION AND SMART CONTRACTS**

We can think of finance as a set of databases and code. The databases (or ledgers) have a specific structure, and the code defines a set of protocols for updating entries. For example, a bank's ledger contains records with fields for the account number, the owner, a value representing the euro or dollar amount, and other information. The code might then embed the permissions governing who may modify the entries and what changes are valid.

A complex database version supports *tokenisation*. A token is a unique, digital representation of an asset recorded on a programmable ledger. A token's records differ from those in a traditional database in that one of the fields can include code – that is, the smart contract. The smart contract can encode a variety of things, including conditional actions. Tokenisation is possible for virtually any asset, ranging from stocks, bonds, and bank deposits to property rights associated with homes and commercial buildings.

The value of programmability may lie in specific use cases rather than as a universal feature of money. For certain business-to-business transactions or in cross-border trade finance, programmability might offer meaningful improvements. For consumers, the ability to make payments conditional on performance may seem attractive at first. Imagine you can purchase a train ticket whose final payment depends on the train's on-time performance. But restricting how your college-age child spends the money you send them not only creates questions of trust, but it will almost surely encourage the development of an underground economy for whatever it is you are trying to ban them from buying.

As we discuss later, traditional financial institutions are already beginning to offer tokenised deposits and money market funds that combine programmability with the safety and regulatory compliance of conventional bank products.

4.3 EXTERNALITIES AND INEFFICIENCIES

Both public and private money creation generate externalities – costs and benefits that extend beyond the immediate parties to a transaction. Understanding these externalities is essential for designing appropriate regulatory frameworks.

4.3.1 Public money

The issuance of public money can generate various social costs and benefits. The most obvious involves inflation. When central banks create too much money relative to the economy's productive capacity, the result is a general rise in prices that erodes the purchasing power of money and can distort economic decisions.

Another concern involves the weakening of fiscal discipline. If there is discipline, then money generates the positive externality of seigniorage. However, if governments finance spending by having the central bank create money rather than raising taxes or borrowing from the public, they face weaker incentives to control spending or make difficult budget choices. This problem is acute in countries with weak institutional constraints on fiscal policy.[149]

Public sector dominance of payments can also crowd out innovation in private payment systems. If government-provided payment services prove adequate, private firms may have limited incentives to invest in developing better alternatives. This concern has become more salient with discussions of central bank digital currencies. Depending on the design details, CBDC could substitute for private retail payment systems and disintermediate banks, potentially stifling financial innovation.[150]

Finally, both public and private money can facilitate criminal activity. The anonymity of cash makes it attractive for money laundering, tax evasion, and other illicit purposes. While private digital payment systems typically have better audit trails than physical currency, criminals can still exploit them if issuers fail to put proper safeguards in place.

4.3.2 Private money

Private money creation generates both positive and negative externalities. In normal times, intermediaries that issue money-like liabilities have lower funding costs, which they can pass on to borrowers by expanding access to and reducing the cost of loans. But private money can also generate financial instability – its most serious risk. Under their current structure, banks and other issuers of private money are vulnerable to runs – situations in which many depositors and short-term creditors simultaneously demand repayment, the institution must sell assets at fire-sale prices.[151] Such runs can spread through the financial system via contagion, where the failure of one institution triggers doubts about others. The result can be systemic panics that devastate the real economy.[152]

A related problem involves the cost of verifying the value of assets backing private liabilities. When you deposit a cheque or when a bank credits a transfer to your account, you implicitly trust that the issuing bank has sufficient assets to honour its obligations. But assessing a bank's solvency is complex and costly, requiring detailed knowledge of its loan portfolio, risk-management practices, and capital adequacy. Disclosure requirements and standardised accounting reduce these verification costs.

149 See Cecchetti and Schoenholtz (2025b) for a general discussion of fiscal dominance.
150 See Cecchetti and Schoenholtz (2021) for a discussion of the pitfalls of central bank digital currencies. For a recent examination of the likely extent of disintermediation in the euro area, see Georgarakos et al. (2025).
151 Shifting to alternative models, such as narrow banking, has the potential to mitigate this problem. However, if there is private demand for liquidity transformation, such changes are likely to simply push the activity elsewhere in the system. See Pennacchi (2012) for a survey of the history of narrow banking proposals.
152 The seminal model is Diamond and Dybvig (1983). See Cecchetti and Schoenholtz (2020) for a primer on bank runs and panics.

Like public money, private money can facilitate criminal activity. The pseudonymity of some digital payment systems and the ease of cross-border fund transfers can make them attractive to money launderers and other criminals. Know-your-customer (KYC) and anti-money laundering (AML) requirements limit such abuse.

Finally, private money may be unresponsive to changes in demand. Private issuers create money primarily when they can profitably invest the proceeds. During financial stress, when demand for safe, liquid assets rises sharply, private issuers may be unable or unwilling to expand their liabilities. The result can be deflation or sharp spikes in interest rates, as people scramble for the limited supply of information-insensitive money-like assets.[153]

These externalities justify regulatory intervention in money and payment systems. The goal of regulation should be to preserve the benefits of private money creation – its elasticity and support for credit provision – while mitigating the risks of instability, opacity, and criminal abuse.

4.4 ENSURING PRIVATE LIABILITIES FUNCTION AS MONEY

For private liabilities to function most effectively as money, regulation must ensure that they achieve general acceptance, are homogeneous and divisible, are easily and cheaply transferable, and that they expand or contract flexibly in response to changes in demand. To do this, authorities focus on ensuring trust in the issuers of the liabilities. How do users gain confidence that a dollar of bank deposits, a money market fund share, or a stablecoin will indeed be worth a dollar when we try to spend it or transfer it to someone else?

The classic answer is that a government first creates a backstop to prevent or mitigate bank runs and systemic panics and then addresses the moral hazard that the backstop itself creates.

The first step is to ensure convertibility into public money on demand. Banks allow depositors to convert their deposits into central bank currency. This convertibility serves two functions: it provides an ultimate claim on public money if the private issuer fails, and it helps maintain singleness by ensuring that private money trades at par with public money. This means that the central bank plays an essential role: by lending under highly adverse conditions, it ensures the singleness of money even during periods of severe financial stress. We take up the role of the central bank in the following section.

153 See Gorton and Metrick's (2012) seminal discussion of the run on the repo market during the 2007-09 financial crisis.

In addition, the government can offer deposit insurance.[154] Insurance compensates depositors when an issuer cannot meet its obligations. In the United States, the Federal Deposit Insurance Corporation insures bank deposits up to $250,000 per depositor per institution. In the European Union, national deposit guarantee schemes protect up to €100,000 per depositor. This insurance serves two purposes: it protects individual depositors from losses, and it prevents runs by eliminating the incentive to withdraw funds at the first sign of trouble.[155]

BOX 5 ON THE CONCEPT OF LEGAL TENDER

Legal tender is a financial instrument that courts must recognise as a valid form of payment. It usually takes the form of public money that individuals, firms, and governments must accept in payment of debts, taxes, and similar obligations. However, legal tender status alone is neither necessary nor sufficient for something to function as money. The Bank of England's banknotes do not serve as legal tender in Scotland, and Scottish banknotes do not serve as legal tender in England or Scotland. Yet both circulate widely and gain general acceptance in Scotland. People accept these notes not because they serve as legal tender but because they trust that others will accept them and that they can exchange them for other forms of money if needed.

Conversely, legal tender status does not guarantee general acceptance. Between September 2021 and February 2025, bitcoin was legal tender in El Salvador, meaning that the law required its acceptance as a means of payment. Yet adoption remained minimal because bitcoin lacked the stability and convenience necessary to function as everyday money.[156]

That said, digital money poses a new technical challenge. An individual or firm can only accept a specific form of digital payment if they have the appropriate physical equipment. In the same way, accepting card payments requires that merchants have suitable equipment with appropriate communication features; accepting stablecoins or central bank digital currency requires that both parties to the transaction have compliant software and hardware capable of executing the transaction. When something is legal tender, everyone must be capable of accepting it.[157]

But the presence of the government backstop provided by the central bank and the deposit insurer creates moral hazard. Institutions that can issue private money will tend to issue too much and use it to finance excessively risky lending and other investments. Regulators respond with a combination of licensing (through bank charters and the like), balance-sheet restrictions (capital and liquidity requirements), and supervision and examination.[158]

154 Private deposit insurance schemes do exist. But the fact that they have limited resources means that they will fail in a banking panic. See Todd (1994) for a discussion of the failure of private deposit insurance schemes in the United States between 1981 and 1991.
155 Stablecoins currently lack explicit government insurance, though some issuers have explored private insurance arrangements. Whether stablecoins should have deposit insurance or similar protections remains a key policy question we explore later in this chapter.
156 See Alvarez et al. (2023) for a discussion.
157 Cipollone (2025b) provides an explanation in the context of the adoption of the digital euro.
158 For a discussion of the recent debate over capital requirements, see Cecchetti et al. (2025). And for liquidity requirements, see Coelho and Restoy (2025).

Note that for issuers of money-like liabilities, there are some specific concerns. These include account segregation, where institutions keep customer funds separate from their own operating funds; privacy protection, where issuers implement adequate security measures and limit how they use or share customer data; and KYC/AML verification, which requires institutions to identify their customers and to monitor them for suspicious activity.

4.5 THE ROLE OF THE CENTRAL BANK IN PRIVATE MONEY CREATION

Central banks play two indispensable roles in enabling private money creation: providing settlement finality and serving as a lender of last resort. Put slightly differently, for a privately issued financial instrument to serve as money in all circumstances, it must be possible to convert it into central bank reserves quickly and at a predictable rate.

4.5.1 Settlement finality

In normal times, when two banks wish to settle payments between each other, they can do so by transferring central bank reserves – deposits that banks hold at the central bank. These reserves constitute the ultimate settlement asset in the banking system. While banks may agree to settle payments through private clearinghouses, the option of settling on the central bank's balance sheet, with the movement of reserves between the accounts of the banks, is a critical feature of the system.

This settlement function proves crucial for two reasons. First, it provides certainty. Once central bank reserves have transferred, no one can reverse the payment (except through a new, separate transaction). This finality provides recipients with confidence that they have genuinely received payment. Second, settlement in central-bank money preserves the singleness of money. A dollar at Bank A is worth the same as a dollar at Bank B because it is possible to convert both into central bank reserves on a one-for-one basis.

Without access to central bank settlement, private issuers must rely on correspondent banking relationships, which introduce counterparty risk, can be slow, and can increase the cost of payments. The absence of central bank-based settlement is one reason stablecoins today face challenges competing with traditional bank deposits for mainstream payments.

4.5.2 Lender of last resort

Even well-managed, solvent financial institutions can face liquidity crises. During periods of stress, private funding sources may dry up suddenly as investors flee to safety. Without access to emergency liquidity, even sound institutions may have to sell assets at fire-sale prices – triggering illiquidity and contagion.[159]

159 For recent discussions of the lender of last resort, see Tucker (2014) and Buiter et al (2023).

Following Bagehot (1873), the central bank addresses this problem by standing ready to lend freely to solvent institutions against good collateral at a penalty rate. This lender-of-last-resort function plays a central role in maintaining financial stability and preventing liquidity crises from becoming solvency crises. It gives institutions confidence that they can obtain funding during periods of stress, thereby reducing the likelihood of such stress.

Importantly, the lender of last resort is available only to institutions with access to central bank facilities – primarily, regulated banks. As of this writing, stablecoin issuers, money market funds, and other shadow banking institutions do not have such access. During the 2008 financial crisis and again in March 2020, the Federal Reserve created special, ad hoc facilities to provide liquidity to money market funds, demonstrating the fragility of private money issuers without standing access to central bank support.[160]

The absence of lender-of-last-resort support represents a fundamental vulnerability for both stablecoins and other forms of private digital money issued outside the banking system. Without this backstop, these instruments remain vulnerable to runs and may prove unable to maintain their value during periods of stress.

We should note that the Federal Reserve's proposal to create limited accounts for payment companies – what Federal Reserve Board Governor Christopher Waller (2025) refers to as "skinny master accounts" – does not solve this problem. The purpose of these accounts is to provide direct access to central bank payment facilities for payment service providers who currently use third-party banks to settle their transactions. However, these skinny accounts come without credit access. So, while they offer finality in the form of settlement on the central bank's balance sheet, they do not offer daylight overdraft privileges or last-resort loans. Consequently, skinny accounts fall short of the central bank support for private liabilities that would ensure singleness.

To see why, consider the case of Silicon Valley Bank (SVB). Authorities closed SVB on the morning of Friday, 10 March 2023. At the time, the bank's liabilities exceeded its assets by around $20 billion, with total assets of around $200 billion. Importantly, the day before that – when the bank must have already been insolvent – there was a run estimated at $42 billion.[161] How is it that SVB's depositors were able to obtain redemption at par from an insolvent bank? The answer is that the transactions settle on the Federal Reserve's balance sheet. And if SVB's account at the Fed was insufficient to meet the withdrawal demands, then the bank could receive intra-day credit. So, it is the combination of finality and access to central bank credit that made SVB's deposit liabilities function like money until the authorities closed SVB.

160 There is an extensive literature on central bank responses to both the 2007-09 financial crisis and the pandemic. For a discussion of the former, see Kacperczyk and Schnabl (2013).

161 Ahmed et al. (2024) and Campello et al. (2025) provide detailed descriptions of this episode, including a discussion of how public information and transparency about reserve quality can trigger runs.

As we discussed in the previous section, the presence of a central bank backstop creates moral hazard. Knowing they can always borrow, private money issuers will be less vigilant in managing liquidity risk. This, in turn, justifies the combination of capital and liquidity regulations that restrict the composition of the qualifying institutions' balance sheets.

The neutrality result in Chapter 2 complicates this picture. It shows that substituting public for private money – with the central bank recycling the proceeds back to banks on deposit-equivalent terms – need not change the size of commercial banks' balance sheets, borrowers' funding conditions, or credit allocation. The neutrality result matters: it implies that the case for private money creation rests on specific frictions and deliberate policy choices, not on technological necessity.

But the neutrality result depends on conditions that central banks will not meet. Achieving neutrality requires unsecured central bank lending – something central banks do not do and would not change simply by introducing retail CBDC.[162] Any lending programme designed to recycle the proceeds from issuing CBDC back to commercial banks therefore requires a collateral framework: eligibility criteria, pricing, and haircuts. Once that framework exists, the central bank controls which assets qualify, at what discount, and therefore which institutions and activities get funding on favourable terms. That is directed credit. The collateral framework becomes credit policy; credit policy attracts political direction; and the endpoint looks less like a modern central bank and more like a state bank.[163]

With this background, we now turn to a detailed discussion of stablecoins. What are the properties of current stablecoins? How is regulation adapting? Can stablecoins replace current forms of private money?

4.6 STABLECOINS: PROPERTIES AND REGULATORY STRUCTURE

Stablecoins represent the most prominent example of current attempts to issue digital money outside the traditional banking system. What will they need to succeed? To address this question, we examine their properties and regulatory treatment.

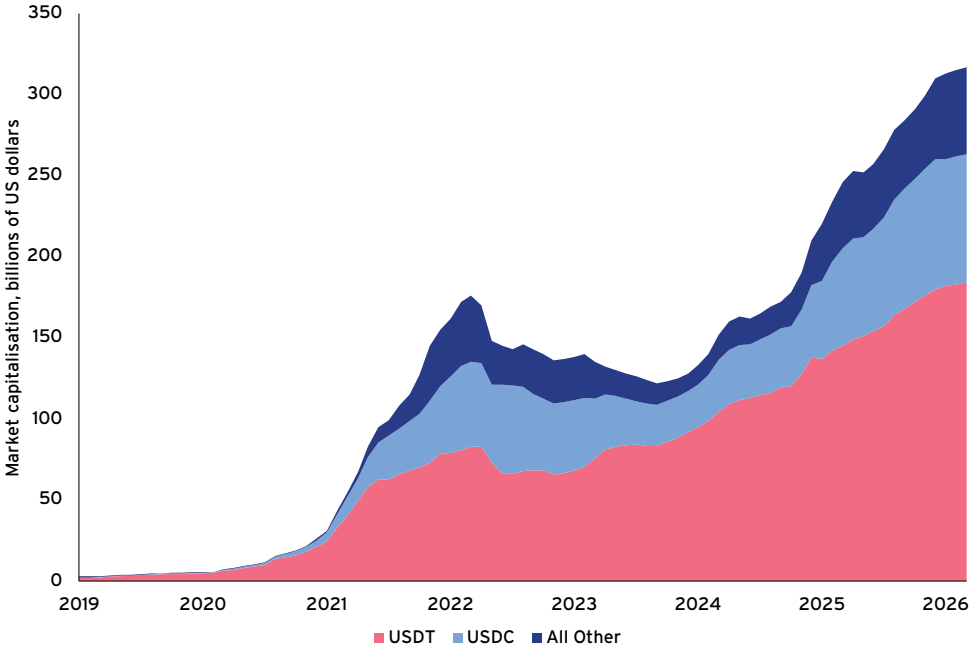
162 Niepelt (2026) notes that neutrality is consistent with secured central bank lending if collateral requirements already applied pre-reform – that is, if banks had to back deposits with pre-positioned collateral before the introduction of CBDC as proposed by King (2016). In practice, no such requirement exists today, so any collateral framework introduced alongside CBDC would be genuinely new, and our directed-credit concern applies.

163 Some people might argue that the central bank could use retail CBDC payment data to replicate the monitoring and disciplining functions that bank depositors currently perform, and that its superior legal authority makes it better placed than individual depositors to do so (Niepelt, 2026). This argument faces two problems. First, in the intermediated model most central banks contemplate – where private firms provide retail services and hold segregated customer accounts, much as brokers do – the central bank would not have direct access to individual payment records. Second, and more fundamentally, even if the central bank did have that data, deploying it to assess the creditworthiness of bank borrowers would make it a more powerful credit allocator, not a more neutral one. Giving the central bank that kind of operational reach amplifies the directed credit concern rather than resolving it. For the formal statement of the neutrality conditions, see Brunnermeier and Niepelt (2019) and Niepelt (2020); for an earlier analysis of the broader risks of retail CBDC, see Cecchetti and Schoenholtz (2021).

4.6.1 Properties of stablecoins

Stablecoins have experienced remarkable growth. The total market capitalisation is now over $300 billion (Figure 12), with daily trading volume of close to $90 billion (which is hugely inflated by intra-exchange transactions and wash trading – estimates correcting for these activities suggest adjusted transaction values are roughly 1% of unadjusted figures, with retail-sized transactions of $250 or less accounting for less than 1% of even that adjusted total).[164] Their expanded use makes stablecoins a significant component of the crypto ecosystem and a potential concern for financial stability.[165]

FIGURE 12 **STABLECOIN MARKET CAPITALISATION, JANUARY 2019 – MARCH 2026 (US$ BILLION)**



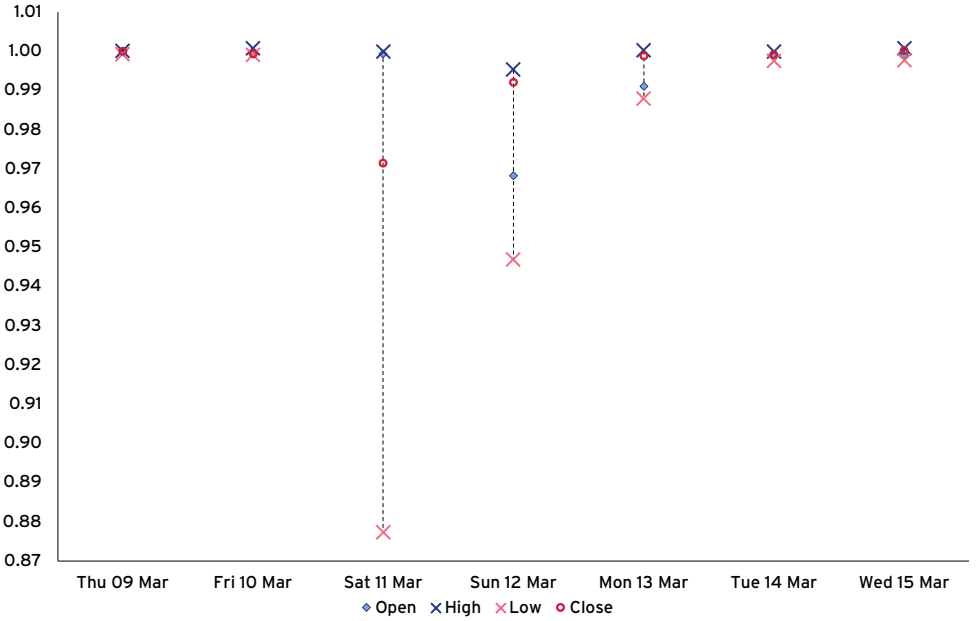
Source: CoinGecko.

The price history of stablecoins reveals both their successes and their limitations. While USDC, one of the largest stablecoins, has experienced relatively stable pricing, its value fell to $0.877 during the March 2023 banking stress (see Figure 13). The average intraday high-low spread over the past 365 days has measured $0.0014, suggesting reasonably effective arbitrage and price stability under normal conditions.

164 See Figure 5 in Aldasoro et al. (2026), which draws on underlying data from Visa. These adjusted figures are significantly smaller than the numbers typically cited in press coverage to argue that stablecoin activity dwarfs that of established payment services.

165 See ESRB (2025a).

FIGURE 13 **DAILY TRADING RANGE OF USDC, 9 MARCH 2023 – 15 MARCH 2023**



Source: Coinmarketcap.com.

However, outside of the crypto world, the costs of using stablecoins for payments remain substantial. Fees are complex, depending on the amount transferred and the specific method used, but a recent Coinbase quote for converting £1,000 to USDC and back yielded approximately £940 – a round-trip cost of 6%. This compares unfavourably with the costs of traditional payments. Whether competition will lead to a decline in these fees depends on new entrants' ability to erode incumbents' market power.

The balance sheet structure of stablecoin issuers resembles that of money market funds. At this writing, Circle, the issuer of USDC, holds approximately $65 billion in its Circle Reserve Fund against a market capitalisation of $75 billion, with the remainder held in bank deposits.[166] This structure closely resembles that of US government money market funds, which currently hold more than $6 trillion in assets.

The similarity is not coincidental. Both stablecoins and money market funds attempt to create money-like liabilities backed by safe, liquid assets. And both rely heavily on the traditional financial system. They depend on banks to hold reserves, custodians to safeguard assets, brokers to facilitate trading, payment processors to connect

166 The Circle Reserve Fund is a BlackRock-managed government money market fund with Circle as the only customer (www.blackrock.com/cash/en-us/products/329365/circle-reserve-fund). To quote from the prospectus: "*Shares of the Fund are held by Circle Internet Financial, LLC and Circle Internet Financial Europe SAS (collectively, "Circle") as a portion of the reserves associated with Circle's issuance of stablecoins to customers. The assets of the Fund are expected to fluctuate depending on the creation (mining) of additional stablecoins or the redemption (burning) of such coins. Stablecoins may face periods of uncertainty resulting in the potential for rapid requests by Circle for redemption of the Fund's shares.*" Circle publishes USDC reserve composition at www.circle.com/transparency.

to traditional payment networks, and miners or validators to process blockchain transactions. This comparison raises questions about whether stablecoins offer significant advantages over traditional bank-based payments or merely add complexity and cost to existing infrastructure.

The experience of money market funds provides instructive lessons for stablecoin regulation. Money market funds seek to maintain a stable $1 per share net asset value, but there is no guarantee of this stability. In 1994, the Community Bankers US Government Fund, with assets of $82 million, paid only 96 cents per share. In 2008, the Reserve Primary Fund, with $60 billion in assets, eventually paid $0.991 per share after suffering losses on its holdings of Lehman Brothers commercial paper.

These instances of 'breaking the buck' were rare because fund sponsors often provided support to preserve their reputations. A 2009 BIS study found that sponsors provided support to 145 money market funds before July 2007.[167] During the 2007-2011 crisis, a Federal Reserve Bank of Boston study documented that 78 of 341 funds disclosed receiving support, with 21 funds that would have broken the buck without such assistance.[168]

When sponsor support proved insufficient, government bailouts followed. In September and October 2008, the US Treasury established a temporary guarantee programme for money market funds, and the Federal Reserve created the Money Market Investor Funding Facility. In March 2020, the Federal Reserve again intervened through the Money Market Mutual Fund Liquidity Facility. These episodes demonstrate that supposedly private, money-like instruments backed by safe assets still require public-sector support during severe stress. That is, central bank backing is essential for these liabilities to function reliably as money.[169]

4.6.2 Stablecoin regulatory structure

Regulators worldwide are developing rules for stablecoins, though their approaches vary considerably.[170] We examine three major frameworks in detail: the European Union's Markets in Crypto-Assets Regulation (MiCA), the United States' GENIUS Act, and the United Kingdom's Bank of England proposals. These frameworks share common objectives: protecting consumers, ensuring financial stability, and preventing illicit activities. All three frameworks eventually require compliance with AML/combating

167 See Baba et al. (2009).
168 See Brady et al. (2012).
169 Barr (2026) draws an analogous lesson from the history of the Free Banking Era, the Panic of 1907, and the 2008 and 2020 money market fund episodes. He concludes that stablecoins "will be stable only if they can be reliably and promptly redeemed at par in a wide range of conditions, including during stress in the market that can put pressure on the value of otherwise liquid government debt".
170 In 2023, the Financial Stability Board issued a set of recommendations for the regulation, supervision, and oversight of stablecoins (FSB, 2023). A subsequent thematic peer review found implementation to be "incomplete, uneven and inconsistent": of 28 jurisdictions assessed, only five had finalised global stablecoin frameworks, and regulation of stablecoin arrangements was lagging well behind that of general crypto-asset activities (FSB, 2025). The IMF's comprehensive assessment (IMF, 2025a) reaches a similar conclusion on regulatory fragmentation, adding that different requirements for reserve custody, foreign issuers, and AML/CFT enforcement across the United States, European Union, United Kingdom, and Japan create scope for regulatory arbitrage.

the financing of terrorism (CFT) and KYC standards. They all mandate transparency through regular reporting, external audits, and public disclosure, including the headquarters location. And all require segregation of reserve assets to protect holders. The frameworks differ in several specific requirements. As enumerated in Table 3, these include reserve composition, central bank access, the degree of prescriptiveness, and the fundamental stance toward stablecoins as financial innovations versus threats.

TABLE 3 **COMPARING STABLECOIN REGULATORY FRAMEWORKS**

Policy Area	MiCAR (EU)	GENIUS Act (US)	Bank of England (UK)
Reserve Requirements	30-60% bank deposits; remainder in liquid assets	USD, short-term Treasuries (regulator-specified)	40% BoE deposits; up to 60% UK govt debt
Redemption	At par; fees prohibited	Standards set by regulators; fees permitted	End of business day; fair/transparent fees
Capital	Own funds required	Risk-based, regulator-tailored	CET1 + financial-risk reserve
Central bank access	None	Bank-affiliated issuers only	Backstop facilities for systemic issuers
Interest payments	Prohibited for issuers and Crypto-Asset Service Providers (CASPs)	Payments prohibited by statute for issuers, but not for others	Prohibited; remuneration subject to limits
Supervision	A combination of NCAs and EBA	Federal/state dual system	BoE for systemic; lighter for non-systemic
Holding limits	No EU-wide systemic risk measures possible	Not mandated; regulators may impose	£20k individuals; £10m businesses
Regulatory philosophy	Restrictive containment through detailed rules	Principles-based with regulatory discretion	Systemic risk-focused with prescriptive standards

Notes: NCA: National Competent Authority; CET1: Common Equity Tier 1 (capital); EBA: European Banking Authority; ESMA: European Securities Market Authority.

Source: Authors' comparison based on Bank of England (2025), European Parliament (2023), U.S. Congress (2025), and White House (2025).

Before getting into the details of each of the three frameworks, it is worth asking whether a stablecoin that is not compliant with regulatory requirements in an established jurisdiction such as the European Union, the United States, or the United Kingdom can come into widespread use for law-abiding transactions. That is, can a stablecoin like Tether, headquartered in El Salvador, become a generally accepted medium of exchange? While it is possible, we suspect the answer is no.

The European Union: MiCA[171]

MiCA went into effect in June 2024, establishing the world's first comprehensive regulatory framework for crypto-assets.[172] MiCA takes a deliberately restrictive approach, viewing stablecoins primarily as a potential threat to monetary sovereignty – though its recitals explicitly acknowledge innovation potential – and imposes detailed prudential requirements accordingly.

MiCA requires issuers to hold 30-60% of reserves in bank deposits, provides holders with a clear right to redeem at par, prohibits fees that discourage redemption, prohibits interest payments, and imposes no EU-wide per-user holding caps. The combination of remuneration restrictions and requirements that issuers hold significant reserves in bank deposits reveals the European Union's concern that interest-bearing stablecoins could directly compete with bank deposits and undermine monetary transmission.[173]

Critically, MiCA provides no central bank backstop – reflecting European policymakers' view that stablecoins should not benefit from public sector support. However, the bank deposit requirement creates a structural channel through which stress in either sector tends to transmit to the other: a stablecoin run forces rapid liquidation of bank deposits, while banking stress can impair the value of stablecoin reserves. The European Banking Authority (EBA)'s concentration limits aim to mitigate this channel, but they do not sever it.

The regulation's comprehensive approach – combining detailed numerical prudential rules with strong governance requirements and EU-level cooperation for significant tokens – aims to contain risks while discouraging stablecoins from achieving the scale necessary to challenge traditional payment systems or destabilise the banking sector.

The United States: The GENIUS Act

The Guiding and Establishing National Innovation for US Stablecoins Act (GENIUS Act) establishes a federal regulatory framework for payment stablecoins. The Act takes effect around January 2027, giving regulators time to develop implementing regulations. The GENIUS Act delegates substantial rulemaking authority to financial regulators, requiring them to establish tailored standards for capital, reserves, liquidity, and anti-money laundering compliance.

171 MiCA distinguishes between asset-referenced tokens (ARTs) and e-money tokens (EMTs). ARTs maintain value by referencing a basket of currencies, commodities, or other crypto assets, while EMTs are pegged to a single official currency. Our focus is on USDT and USDC, which are EMTs.

172 For a recent analysis see Chapter 1 of ESRB (2025a) and ECB (2026a).

173 MiCA Article 36(4) mandated that the EBA develop regulatory technical standards further specifying these liquidity requirements. Four additional requirements go beyond the headline percentages. First, the 30% (60% for significant tokens) deposit floor applies per referenced official currency, not as a single aggregate. Second, deposit counterparties must meet a creditworthiness standard: issuers must have no reason to expect non-performance by the receiving bank. Third, concentration limits cap deposits with any single institution at 25% of reserve assets for global and other systemically important institutions (G-SIIs and O-SIIs), 15% for other large institutions, and 5% for all others; total exposure to any single banking group – including liquid instruments issued by that group and OTC derivatives – may not exceed 30% of the reserve. Fourth, mandatory over-collateralisation applies where historical evidence shows reserve values have not consistently covered tokens outstanding, calibrated on a five-year look-back (see EBA, 2024b).

The statute requires stablecoin reserves to consist of US dollars, short-term Treasury securities, and other high-quality liquid assets but leaves regulators to specify acceptable asset categories, concentration limits, and valuation methodologies. The Act requires regulators to establish liquidity and redemption standards but does not mandate specific redemption timing or fee structures in the statute itself. It permits issuers to charge reasonable redemption fees, recognising that costs are inherent in converting stablecoins back into dollars.

The Act requires capital standards but specifies that these must be risk-based and tailored to individual issuers. Significantly, the statute limits capital requirements to amounts "sufficient to ensure the ongoing operations" of the issuer, explicitly rejecting the higher capital standards that apply to banks.

The GENIUS Act prohibits stablecoin issuers from paying interest directly to holders, thereby preventing stablecoins from competing directly with bank deposits. However, the prohibition contains a critical loophole: it does not prevent crypto asset service providers – such as Coinbase or PayPal – from offering rewards to customers who hold stablecoins in custody accounts. These platforms can share their revenue from lending or investing customer funds, effectively circumventing the interest prohibition. As of this writing, some custodians offer rewards of 3% to 5% annually, prompting traditional banks to call for legislation to close this loophole.[174]

The Act establishes a dual regulatory structure. Issuers can obtain either federal or state licenses, provided the Federal Reserve approves them. Bank-affiliated stablecoin issuers – those operating through approved subsidiaries of insured depository institutions – gain access to Federal Reserve payment services, including Fedwire and FedNow. This access provides issuers with a crucial competitive advantage: their stablecoins can settle instantly in central-bank money, thereby achieving true finality.

Critically, the Act explicitly states that payment stablecoins "shall not be backed by the full faith and credit of the United States, guaranteed by the U.S. Government, [or] subject to deposit insurance by the Federal Deposit Insurance Corporation" [GENIUS Act Sec. 4 (e) (1)]. The statute does not grant non-bank issuers access to the Federal Reserve's discount window, preserving this lender-of-last-resort facility for traditional banks.[175]

These exclusions reflect a deliberate policy choice: stablecoins should compete in the market based on the quality of their reserve assets and the reputation of their issuers, rather than on government guarantees or central bank support. However, this choice creates a fundamental asymmetry. Bank-affiliated stablecoins benefit from deposit

174 See Bank Policy Institute (2025). Note that Miran (2025) takes a more sanguine view, arguing that because GENIUS Act stablecoins offer no yield and carry no deposit insurance, there is "little prospect of funds broadly fleeing the domestic banking system" into stablecoins. The real opportunity, in his view, is to satisfy foreign demand for dollar assets in jurisdictions with limited access to dollar banking.

175 In their comprehensive analysis of the GENIUS Act, Ahmed et al. (2025) emphasise how the absence of deposit insurance and central bank access means that regulated coins will be vulnerable to run risk.

insurance (for the underlying reserve deposits), potential access to Fed facilities, and the perceived too-big-to-fail status of their parent institutions. Lacking these advantages, nonbank stablecoin issuers may find it difficult to enter the mainstream payments ecosystem.[176]

The United Kingdom: Bank of England proposals

The Bank of England's proposed regulatory regime for stablecoins, scheduled to take effect in late 2026, takes a third approach that is distinct from both MiCA and the GENIUS Act. The regime's reserve requirements exemplify its prescriptive approach. Systemic sterling stablecoin issuers must hold at least 40% of reserves in unremunerated deposits at the Bank of England, with the remaining up to 60% invested in short-term UK government debt.

The Bank expects systemic issuers to honour redemption requests by end of business on the day of the request. This aggressive standard aims to ensure that stablecoins function as true money substitutes rather than as investment vehicles with redemption delays. The regime permits redemption fees but requires that these be fair, transparent, and not structured to discourage legitimate redemption requests.

Regarding capital, the proposal requires systemic issuers to hold Common Equity Tier 1 (CET1) instruments and a separate financial risk reserve. This approach follows that of banks in assuming that a stablecoin issuer faces both operational and financial risks.

The proposed regime establishes holding limits: individuals may hold up to £20,000 in systemic sterling stablecoins, while businesses may hold up to £10 million. These caps aim to prevent excessive concentration of holdings that could amplify redemption runs during stress periods, while reducing the risk of disintermediation from the traditional banking system.

The Bank of England proposes granting systemic issuers direct access to UK payment systems and contemplates operating backstop liquidity facilities that provide emergency lending against high-quality collateral during stress periods when private funding dries up. This lender-of-last-resort function replicates for systemic stablecoin issuers the support that traditional banks receive.

The framework prohibits design choices that would convert stablecoins into deposit-like yield products, threatening banks' funding base. For cross-border activity, the regime requires non-UK issuers of sterling systemic stablecoins to establish UK subsidiaries, hold UK reserves, and subject themselves to Bank of England supervision.

176 The scope for rulemaking is substantial. Barr (2026) identifies a series of pending regulatory issues. These include reserve-asset specifications, regulatory arbitrage across the federal/state dual system, the permissible scope of activities for stablecoin issuers beyond issuance, capital and liquidity standards, AML controls, and consumer protection requirements.

4.7 COMPARING FRAMEWORKS

These three frameworks reveal fundamentally different regulatory philosophies. MiCA adopts a restrictive stance, employing detailed rules to constrain stablecoins and prevent them from jeopardising the European Union's banking system or monetary sovereignty. The framework provides little explicit central bank support and actively discourages stablecoins from achieving scale or offering deposit-like features. But by institutionalising connections between stablecoins and traditional banks, MiCA ensures the transmission of stress from one to the other. That is, because MiCA requires stablecoin issuers to hold 30% to 60% of their reserves in bank deposits, stress in either sector will spill over to the other.

The GENIUS Act adopts a principles-based approach, delegating substantial rulemaking authority to regulators who will tailor requirements to issuer characteristics. This flexibility allows for innovation but creates uncertainty during the transition period. The Act sharply distinguishes between bank-affiliated and non-bank issuers, providing the former with significant competitive advantages through access to Federal Reserve services, while explicitly denying federal guarantees to all payment stablecoins.

The Bank of England proposals take a systemic risk-focused approach, imposing stringent requirements on systemically important issuers while maintaining lighter standards for smaller players. The framework's most distinctive features include its prescriptive reserve requirements (including the 40% Bank of England deposit mandate), aggressive redemption timing expectations, statutory trust protections, holding caps, and explicit provision for central bank backstop facilities.

All three frameworks require transparency, regular reporting, external audits, and compliance with AML/CFT and KYC standards. All recognise that stablecoins could pose systemic risks if they achieve sufficient scale and interconnectedness. However, they differ profoundly in their views about whether stablecoins should receive central bank support, how prescriptive regulations should be, and whether stablecoins represent opportunities for financial innovation or threats to monetary and financial stability that regulators should actively contain.

Despite their otherwise different regulatory philosophies, both MiCA and the GENIUS Act prohibit interest payments on stablecoins. This is not a coincidence. Banks have strong incentives to oppose remunerating stablecoin holders – unless they are the issuers – because interest-bearing stablecoins compete directly for deposit funding. As Chapter 2 argues, banks oppose instruments that substitute for deposits to protect franchise value and monetary rents, not out of principled concern about systemic risk.

One limitation is common to all three frameworks. AML/CFT and KYC requirements apply to the on-ramps and off-ramps – the points at which users convert fiat currency into stablecoins and back – as well as to exchanges that act as custodians. But once issued, stablecoins transferred between non-custodial or self-hosted wallets effectively become bearer securities: the issuer and regulators lose visibility into who holds

them and how they move. No current framework adequately addresses this gap. This is not merely a theoretical concern – it is precisely the feature that makes stablecoins attractive for capital flight, sanctions evasion, and the corruption and bribery uses discussed below. Any regulatory regime that treats on-ramp and off-ramp compliance as sufficient is, in effect, regulating the entry and exit doors while leaving the building itself unmonitored.[177]

4.8 WILL STABLECOINS FUNCTION AS MONEY?

Recall that the fundamental property of money is general acceptance, promoted by the combination of singleness, easy transferability, and elasticity. The central bank, in turn, enhances these properties. How well do stablecoins meet these criteria?

Regarding homogeneity and divisibility (singleness), stablecoins face a fundamental challenge. Without access to central bank settlement, different stablecoin tokens may trade at slightly different prices depending on which exchange or platform hosts them and on the issuer's perceived credit risk. This lack of perfect singleness means that stablecoins do not fully satisfy this first property of money. As Gorton and Zhang (2023) emphasise, stablecoins – like the private banknotes of the 19th century – fail to achieve the 'no questions asked' status that true singleness requires.[178] And, as we have stressed, true singleness requires settlement in central-bank money.

Regarding transferability, stablecoins offer genuine speed advantages – blockchain-based transfers operate 24/7, unlike traditional payment systems that close overnight and on weekends. But speed is not the binding constraint. The all-in costs of using stablecoins for payments remain relatively high, domestic bank transfers often incur little or no cost, and cross-border transfers through traditional banking have become faster and cheaper in recent years. Until transfer costs decline significantly, stablecoins will struggle to compete for mainstream payments.

The elasticity of stablecoin supply may be a limitation. A bank can create new deposits essentially instantaneously by extending credit. When money demand rises suddenly – say, during a financial crisis – banks with access to central bank facilities can expand their balance sheets quickly. And banks can contract similarly quickly – again, so long as they have access to central bank facilities. While a stablecoin issuer may be able to

177 Barr (2026) identifies this as a primary concern, noting that "bad actors can purchase stablecoins in secondary markets that may not have customer identification requirements", and calls for both regulatory and technological solutions to address the gap.

178 Cipollone (2026a) makes this point, noting that "even fiat-backed stablecoins – by far the least volatile type of stablecoin – rarely trade exactly at par, even during calm market conditions". Breeden (2025) frames the same concern as the Bank of England's central regulatory objective: ensuring 'singleness of money' such that stablecoins can be "freely and frictionlessly exchangeable at par" at all times.

expand quickly by acquiring reserve assets to back newly minted coins, it may struggle to meet rapid redemptions when contracting without access to the central bank.[179] This inability to shrink quickly makes stablecoins poorly suited to serve as general-purpose money.

Finally, there is the question of central bank support. While the MiCA precludes it, the GENIUS Act provides it to certain issuers, and the Bank of England proposes granting it.[180]

As a result of these deficiencies, general acceptance of stablecoins remains limited. While they remain widely used in the crypto ecosystem, stablecoins have yet to gain traction in mainstream commerce.[181] For stablecoins to gain general acceptance for cross-border payments or retail commerce, two conditions must be satisfied: clear, comprehensive regulatory rules that provide users and merchants with confidence in their safety, and either central bank backing or access to settlement in central bank money.

4.9 STABLECOINS AND SYSTEMIC RISK

Even if stablecoins remain confined to niche uses within the crypto ecosystem, they could pose systemic risks to the broader financial system. We identify several distinct channels: runs and contagion, resolution failures, structural fragilities, and – as I argue below – a feedback loop between stablecoin stress and US financial markets that would compel Federal Reserve intervention.

The most immediate risk involves redemption runs. If stablecoin holders lose confidence and rush to redeem their tokens, the issuer may need to sell reserve assets quickly to meet redemptions. The March 2023 episode involving Circle and Silicon Valley Bank illustrates this risk. Circle held $3.3 billion of USDC's roughly $42 billion reserves as deposits at SVB. When SVB failed, Circle faced questions about whether it could honour redemption requests, and USDC briefly traded well below par. Emergency responses by the Federal Reserve and the FDIC effectively bailed Circle out (along with a number of other SVB creditors) when they invoked the systemic risk exception to guarantee all liabilities. As a result, Circle could honour all USDC redemption requests at par. But this episode clearly revealed the vulnerability of stablecoins to stress in the traditional banking system.

179 Note that Aldasoro et al. (2025) provide empirical evidence that stablecoin supply contracts as monetary policy tightens, suggesting that issuers could struggle to expand supply during periods of stress.

180 One interpretation of the Bank of England's proposal is that stablecoins be issued by what are, in effect, narrow banks.

181 Ahmed et al. (2025) provide evidence that the primary use of stablecoins remains facilitation of crypto trading. This is corroborated by Figure 6 in Aldasoro et al. (2026), which draws on Boston Consulting Group and Visa data to show that as of end-2024, crypto trading pairing accounts for roughly 80% of stablecoin use, with P2P payments barely visible. Barr (2026) independently characterises current stablecoin use in identical terms, stating that they are "mostly used to facilitate crypto-trading activities and, secondarily, as a dollar-denominated store of value in some foreign jurisdictions".

Asset fire sales and contagion represent related concerns. If multiple stablecoin issuers hold similar reserve assets (as they likely would under current and proposed regulatory requirements), simultaneous redemptions could force coordinated asset sales that depress prices and spread losses across the financial system. This mirrors the experience of money market funds in 2008 and 2020.

The multi-country nature of many stablecoin issuers and the portability of blockchain-based tokens complicate resolution and crisis management. As Portes (2025) points out, an entity in one jurisdiction may issue a stablecoin that investors worldwide hold and that trades on platforms in dozens of countries. If the issuer faces stress, which country's authorities bear responsibility for resolving the situation? How can authorities achieve an orderly resolution when tokens can move across borders instantly? These questions have no clear answers under current international frameworks.[182]

In the European Union, the ESRB (2025b) recommended banning stablecoin arrangements that allow the issuance of fungible stablecoins backed by reserves held in fundamentally different jurisdictions. The concern is that someone who purchases a stablecoin issued in New York, with reserves located in the United States, could redeem it in Paris. Because the MiCA requires stablecoin redemption at par on demand, holders who question a stablecoin's value could run to the EU subsidiary, regardless of where the coin was initially issued. Unless the reserves track the stablecoins as they cross borders, this could create redemption demands that the issuer cannot meet.

Our base case is that stablecoins will not achieve wide adoption in the mainstream financial system. Should that prove incorrect, then they may introduce longer-term structural fragilities. The most obvious is the potential to disintermediate the banking system. If people hold stablecoins rather than bank deposits, banks will have less stable funding and may need to reduce lending. This could reduce credit availability and economic growth.[183]

Even if stablecoins do not achieve widespread adoption, they have already gained a foothold in countries with highly unstable currencies. In these instances, people are shifting from local currency to the US dollar. This deterioration of monetary sovereignty reduces the effectiveness of monetary policy and leaves a country more vulnerable to external shocks.[184] Such dollarisation has occurred in various countries throughout history, but stablecoin-driven currency substitution differs in important ways: unlike

182 Authorities are clearly aware of this issue. For example, the recently published Eurosystem Payments Strategy (ECB, 2026a) notes that "without consistent rules, the current fragmentation may persist" and risk "fuelling instability, regulatory arbitrage and global US dollar dominance".

183 This is analogous to the risk associated with the issuance of central bank digital currencies. See Brunnermeier and Landau (2022) and Cecchetti and Schoenholtz (2021). Miran (2025) disagrees with the claims stablecoins create disintermediation risk. He argues that since GENIUS Act stablecoins pay no yield and carry no deposit insurance, they are unlikely to attract domestic banking deposits; any net expansion of dollar stablecoin holdings, in his view, is more likely to come from foreign demand.

184 Rey (2025a) argues that dollar stablecoin adoption for payments amounts to the privatisation of global seigniorage, with consequences for fiscal revenues, exchange rate volatility, and the international monetary system. See Chapter 3 for more on these issues.

traditional dollarisation, which typically proceeds through the banking system and remains at least partially visible to regulators, digital currency substitution operates through channels that are harder to monitor, potentially faster to propagate, and more difficult to reverse.[185]

Stablecoin-driven substitution may be more difficult to reverse than traditional dollarisation. Once households and firms have set up wallets, established exchange relationships, and developed settlement habits using dollar stablecoins, conventional monetary policy tools cannot easily reverse the process. Two complications compound the challenge.[186] Stablecoins displacing bank deposits push banks toward wholesale funding, amplifying the pass-through of US monetary conditions. And as dollar stablecoins displace domestic currency, the central bank loses the monetary anchor it needs to stabilise inflation and output – its credibility erodes regardless of its own policy actions.

Beyond currency instability, residents of countries with fragile political and financial institutions may turn to dollar-denominated stablecoins to protect their savings from various forms of expropriation. For these users, stablecoins serve more as a store of value and a vehicle for capital flight than as a payment instrument. While this will reflect genuine demand, it accelerates the erosion of domestic monetary sovereignty and may expose users to the risks – issuer opacity, lack of deposit insurance, and vulnerability to runs – that stablecoins pose in more developed markets. More broadly, the same properties that facilitate capital flight – pseudonymity, instant cross-border settlement, and programmable automation – also lower the cost of bribery and other forms of corruption, enabling payments that are difficult to trace, attribute, or reverse. There is thus a risk of a self-reinforcing dynamic: the countries most vulnerable to digital currency substitution are often least equipped to manage it, potentially entrenching new forms of financial subordination before policymakers can respond.[187]

A more subtle risk involves holdings of tokens issued by non-compliant foreign entities. If investors in a jurisdiction with rigorous rules hold substantial amounts of stablecoins issued by entities in jurisdictions with weak regulation and supervision, losses could spill over from the latter jurisdictions' financial systems into the former. There is also the possibility that influential individuals or institutions with significant exposure to a particular stablecoin might lobby for government bailouts if that stablecoin faces stress.

185 Evidence from P2P crypto platforms suggests this phenomenon is extensive. For example, Archid (2025) notes that in the Middle East and North Africa (MENA) region, P2P crypto markets appear to function as parallel foreign exchange markets in countries with capital controls or unstable currencies, including Morocco, Algeria, Egypt, and Lebanon. For a broader and more academic discussion of traditional dollarisation, see Calvo and Reinhart (2002). On the distinctive features of stablecoin-driven currency substitution – including its speed, opacity, and difficulty of reversal – see Aldasoro et al. (2026).

186 See Rey (2025a).

187 For a more detailed discussion of the general uses of crypto for capital control evasion, see Graf von Luckner et al. (2023; 2024).

Overall, the lesson from recent episodes with money market funds is clear. Commitments not to bail out private money-like instruments lack credibility. No central banker or finance minister will ever risk the collapse of a stablecoin which could trigger a systemic crisis.

A further systemic risk runs through sovereign debt markets. Stablecoin issuers now hold more short-term US Treasury securities than many sovereign central banks – Tether and Circle together hold more than Saudi Arabia.[188] In normal times, growing stablecoin adoption boosts demand for dollar safe assets, extending what economists call the 'exorbitant privilege' of the reserve currency. But under stress the same mechanism runs in reverse: large-scale redemptions force rapid Treasury liquidations, adding pressure to short-term sovereign debt markets at the worst possible moment – and potentially destabilising the very privilege that stablecoins appear to reinforce in calmer conditions.

The Eurodollar market offers a cautionary parallel. Dollar claims outside the regulated US banking system grew for decades without an explicit Federal Reserve backstop. The backstop came later – and it came not because the Fed chose to extend its safety net abroad, but because the offshore dollar system had grown large enough that its instability threatened US financial markets directly. The Fed's swap lines, established in 2008 and made permanent in 2013, were an act of self-preservation, not altruism: absent a lender of last resort, a run on offshore dollar liabilities would force fire sales of dollar assets that would spill back into US markets.[189] Dollar stablecoins are following a similar path. Should they grow large enough, a run would force rapid liquidation of the Treasury securities backing their reserves – precisely the fire sale risk described above – and the resulting pressure on short-term US funding markets would compel Fed intervention. The question is not whether the Fed would backstop a systemically significant stablecoin run. It would. The question is whether regulation should allow stablecoins to reach that scale before the backstop is in place.

Our analysis of systemic risk focuses on stablecoins as they currently exist – primarily as payment instruments and within the crypto ecosystem. A more structural long-run risk arises if stablecoins become the settlement layer for a broader tokenised financial system that replicates the functions of traditional finance: lending, asset management, insurance, and derivatives. DeFi advocates argue this is the intended direction of travel, and the current use of stablecoins for collateral in tokenised lending and real-world asset (RWA) transactions suggests it is already beginning. Should this trajectory continue, stablecoins would become an integral part of the financial system in a way that makes the risks described in this section considerably more severe. Custodians already offering yield products on stablecoin holdings – effectively converting payment instruments into investment products – illustrate how quickly the boundary can shift.[190]

188 See IMF (2025a).
189 See Cecchetti and Schoenholtz (2025c).
190 See Aquilina et al. (2024) for a discussion.

These systemic vulnerabilities stem directly from stablecoins' lack of access to the central bank infrastructure that underpins traditional financial institutions – a structural disadvantage whose full implications become clear when we compare stablecoins directly against tokenised deposits and money market funds.

4.10 STABLECOINS VERSUS TOKENISED DEPOSITS AND MONEY MARKET FUNDS

The comparison that stablecoin advocates least like to confront involves tokenised deposits and tokenised money market funds issued by traditional financial institutions. These instruments offer functionality similar to stablecoins but benefit from established regulatory frameworks, government guarantees (in the case of bank deposits), and access to central bank facilities. Understanding this competition requires examining the specific features of leading examples from each category and analysing why traditional institutions hold decisive advantages.[191]

Table 4 shows that USDT and USDC share many characteristics: both operate on permissionless platforms, function as bearer instruments, pay no interest to issuers, lack central bank relationships and government guarantees, and support non-custodial wallets. They differ primarily in transparency and risk management. USDT holds approximately 80% of reserves in various forms of 'cash' with the remainder in precious metals, bitcoin, secured loans, and other assets. Tether has never completed a full audit by a Big Four accounting firm and provides limited public disclosure.[192] USDC holds over 85% of its reserves in the BlackRock Circle Reserve Fund (the remainder in bank deposits), undergoes annual audits by Deloitte, and publishes weekly reserve holdings.

In sharp contrast, JPMD operates on JPMorgan's permissioned ledger as a registered security rather than a bearer instrument. Tokenised deposits pay interest, liquidate at par, benefit from FDIC insurance and JPMorgan's too-big-to-fail status, and enjoy comprehensive access to Federal Reserve facilities. JPMorgan's entire balance sheet – not just segregated reserves – backs JPMD. Transactions settle 'on us' within JPMorgan's systems, achieving instant finality. Liquidating JPMD does not generate a taxable event because the token represents a deposit that settles at par. A tokenised deposit from JPMorgan would not have experienced a crisis like the one Circle suffered in March 2023 – the backing of JPMorgan's entire balance sheet, FDIC insurance, and the bank's access to Fed facilities would have maintained confidence, just as they did for JPMorgan Chase's traditional deposits.

191 This section draws on Cecchetti and Schoenholtz (2025a).

192 Note that US authorities fined Tether on two occasions. In 2021, the CFTC fined $41 million and the New York Attorney General fined them $18.5 million. In both cases, the fines were for misrepresenting the reserves held to back their stablecoins (see www.cftc.gov/PressRoom/PressReleases/8450-21 and https://ag.ny.gov/press-release/2021/attorney-general-james-ends-virtual-currency-trading-platform-bitfinexs-illegal).

BlackRock's BUIDL resembles a government money market fund tokenised for operation on public blockchains, including Ethereum and Solana. The fund operates under SEC oversight, holds reserves in a combination of cash, short-term Treasury bills, and repurchase agreements, and pays interest. While BUIDL carries no explicit government guarantee, it benefits from BlackRock's reputation and systemic importance – regulators would likely support BlackRock funds during a crisis, as they have supported money market funds generally in past crises. The fund provides daily liquidity and net asset value disclosures, with monthly portfolio holdings filed with the SEC.[193]

193 Another recent example is Franklin Templeton's offering of the BENJI fund, a tokenised money market fund recorded on a blockchain ledger targeted at retail investors with a low minimum threshold.

TABLE 4 **KEY FEATURES OF TOKENISED STABLECOINS, DEPOSITS, AND MONEY MARKET FUNDS**

	Stablecoin (Tether USDT)	**Stablecoin (Circle USDC)**	**Tokenised deposit (JP Morgan JPMD)**	**Tokenised MMF (Blackrock BUIDL)**
Platform	Permissionless (Ethereum)	Permissionless (Ethereum)	Permissioned (Kinexys)	Permissioned (Ethereum, Solana, & others)
Bearer instrument	Similar (unregistered)	Similar (unregistered)	No (registered)	No (registered)
Clearing and settlement	24/7/365 On exchange netting	24/7/365 On exchange netting	24/7/365 On-us netting	24/7/365 On-us netting
Pays interest	No	No	Yes	Yes
Taxation of sale	Taxable event (excise tax if treated as bearer bond*)	Taxable event (excise tax if treated as bearer bond*)	Not taxable (liquidates at par)	Not taxable (liquidates at par)
Central bank relationship	None	None	Transaction finality and access to central bank	None (except in crises)
US regulator	Registered with FinCEN (foreign pathway under GENIUS Act)	Registered in 46 states and with FinCEN (OCC under GENIUS Act)	Bank regulators (Fed & FDIC)	SEC
Government guarantees	No	No	Deposit insurance (and TBTF)	No (except in crises)
Custody	Allows non-custodial wallet	Allows non-custodial wallet	Custodian is issuing bank	Traditional bank custodian
Bank Secrecy Act (AML/CFT, KYC)	Yes	Yes	Yes	Yes
Assets (reserves)	Cash (about 80%), precious metals, bitcoin, secured loans, and other	Govt MMF (> 85%) and bank deposits	Various bank assets	Cash, Treasury Bills, and repo
Transparency	Limited	Effective	Bank/SEC regulatory filings	SEC filings, daily NAV
Market cap	~$165 billion	~$65 billion	Experimental	$2.3 billion
Headquarters	El Salvador	New York	US	US
External audits and disclosures	Partial (BDO Italia) No full audit Limited disclosure	Deloitte Annual audit Monthly attestation Weekly reserve holdings	Big 4 Annual audit Quarterly supervisory and SEC filings	Big 4 Annual audit Daily liquidity & NAV Monthly portfolio (SEC)

Source: Figure 5 in Cecchetti and Schoenholtz (2025a).

BOX 6 **TOKENISED DEPOSIT VERSUS DEPOSIT TOKENS**

The common meaning of the terms **tokenised deposit** and **deposit token** remains in flux. Even experts often use them interchangeably, though their meanings differ in important regulatory and legal respects.[194]

A **tokenised deposit** is the representation of an existing bank deposit as a digital token. The token constitutes a claim on the bank, with terms and conditions identical to those of any other deposit claim – including the same regulatory status and deposit guarantee scheme coverage as a claim recorded in a traditional ledger. Transferring the tokenised deposit transfers the deposit itself. The liability remains on the issuer bank's balance sheet, but ownership of the deposit can change hands via a ledger that can use blockchain protocols and distributed technology but is typically private and proprietary.

A **deposit token** works differently. The token represents a claim or right the holder has against the issuer, who controls the underlying deposit – but the token itself is not the bank's direct liability. Transferring a deposit token triggers a corresponding settlement on the traditional deposit ledger.

These two structures raise distinct legal challenges. For tokenised deposits, the core question is whether transferring the token transfers the underlying deposit. The answer is generally yes. A payment between clients of different banks using tokenised deposits works as a conventional interbank payment: the sending bank extinguishes the sender's deposit claim, the receiving bank creates a new claim for the recipient, and the two banks settle the net position in central bank money through the relevant interbank settlement system. The instrument's settlement in public money preserves singleness.

By contrast, deposit tokens are not representations of traditional deposits, so authorities must determine their regulatory and legal standing. How should authorities treat them when calculating regulatory requirements such as the liquidity coverage ratio? What is their status in resolution? Which authority governs when a token crosses borders? In the European Union, MiCAR classifies deposit tokens issued by a credit institution as e-money tokens and governs their issuance and transfer accordingly. Among other consequences, issuers may not pay interest on them, and holders receive no deposit guarantee. Other jurisdictions may reach different classifications, compounding the complexity of cross-border application.

4.10.1 The decisive advantages of traditional institutions

Traditional financial institutions enjoy decisive advantages over stablecoin issuers that extend beyond the specific features of individual products. These advantages stem from decades of relationship-building, infrastructure development, and regulatory integration that new entrants cannot easily replicate.

194 The EBA's formal analysis of the characteristics distinguishing tokenised deposits from e-money tokens issued by credit institutions, including the settlement mechanism, deposit guarantee treatment, and regulatory classification under MiCAR, is set out in EBA (2024a), Section 6.2 and Table 2; on design models see Section 4.3. For a broader discussion of banks' use of tokenisation and deposit tokens, see also EBA (2024a), KPMG (2025), Oliver Wyman and J.P. Morgan (2023), and Swiss Banking (2025).

First, organisations such as JPMorgan and BlackRock have built decades-long reputations for integrity. Both institutions operate in more than 100 countries, serving customers across multiple regulatory regimes. They have navigated financial crises, regulatory changes, and technological disruptions while maintaining customer trust. Their safe-haven status – the tendency for funds to flow to them during crises – reflects market confidence that these institutions will survive severe stress periods.

Second, traditional institutions have deep experience with cross-border transactions and data protection in multiple jurisdictions. JPMorgan processes trillions of dollars in international payments annually through its correspondent banking network. Both institutions employ thousands of compliance professionals who ensure compliance with local laws governing privacy, taxation, reporting, and the prevention of financial crime. Building comparable global infrastructure from scratch would require years of effort and tens of billions of dollars in investment.

Third, traditional institutions can credibly ensure the continuity of operations through robust physical and human infrastructure. JPMorgan employs more than 60,000 IT staff and spends $18 billion annually on technology. The five largest US banks collectively invest $50 billion in information technology each year. These institutions operate redundant data centres, maintain extensive disaster recovery systems, and employ deep pools of talented professionals across multiple time zones.

Fourth, traditional institutions operate under comprehensive regulation and supervision – costly to comply with, but a source of real confidence for customers. Bank regulators conduct regular examinations, review risk management systems, test capital adequacy, and monitor liquidity. This regulatory oversight typically identifies and addresses problems before they threaten customer funds.

Fifth, established institutions can exclude illicit actors from their platforms with high confidence. Decades of experience implementing AML/CFT and KYC procedures, combined with sophisticated transaction-monitoring systems, enable banks and asset managers to detect and prevent most attempts at money laundering, terrorist financing, and sanctions evasion.

Before continuing, we should note that the technical structures of stablecoins, tokenised deposits, and tokenised money market funds may include features that permit recourse. That is, unlike cryptocurrencies such as bitcoin, ether, or dogecoin, some features may enable error correction.

4.11 NETWORK EXTERNALITIES AND SCALE ADVANTAGES

Beyond these operational and reputational advantages, traditional institutions benefit from powerful network externalities. JPMorgan, with approximately $4 trillion in assets, ranks as the largest bank outside China. BlackRock, with over $12 trillion in assets under management, dwarfs all other asset managers. When these institutions offer tokenised deposits or money market funds, they do so within ecosystems containing tens of millions of existing customers with whom they already maintain relationships.

As adoption of JPMD or BUIDL grows, the internal 'on us' markets become more liquid. Two JPMorgan institutional clients can settle a dollar or euro transaction instantly on the bank's balance sheet without touching external payment systems. As more clients join, the likelihood that two transacting parties will both use JPMorgan increases, further reducing settlement times and costs.

We might imagine an even more powerful scenario: a few internationally active systemic banks decide to accept each other's tokenised deposits instantly at par. In effect, they would create a digital version of the 19th-century US cheque-clearing houses, which expedited payment settlement, imposed credit standards on members, and even acted as private lenders of last resort during panics.[195] Such a 21st-century clearinghouse would create a too-big-to-fail juggernaut that offers instant global settlement across multiple currencies. Stablecoin issuers could not compete against this coalition.[196]

4.12 THE CROSS-BORDER USE CASE

Stablecoin advocates often point to cross-border payments as their most promising application. Cross-border payments remain slower and more expensive than domestic payments, particularly for smaller transactions to countries with less-developed financial infrastructure. Could stablecoins carve out a lasting niche in this market?

The evidence suggests otherwise. The World Bank reports that the global average cost that a savvy consumer with access to sufficiently complete information could pay (the SmaRT average) is 3.25% for a $200 remittance and 2.21% for a $500 remittance.[197] So, any efficiency advantages of stablecoins appear to evaporate when one accounts for the associated costs of small retail transactions.

Corridor-specific evidence sharpens this picture. Frost (2026) used 'mystery shopping' to compare a Swiss franc–euro cross-border transfer via USDC stablecoin (cost: 1.67%; time: 48 minutes), a conventional bank wire transfer (UBS to ABN AMRO – cost: 1.73%; time: 86 minutes), and a digital wallet (Wise – cost: 0.86%; time: 25 minutes).

195 For a discussion of how clearinghouses in the United States operated prior to the establishment of the Federal Reserve, and the pitfalls of the system, see Jaremski (2018).
196 The Bank for International Settlements' Project Agora – a multi-central-bank and commercial bank initiative – represents an early step toward exactly such a shared tokenised deposit infrastructure.
197 See World Bank (2025).

The stablecoin route was marginally cheaper and faster than the legacy bank transfer, but more expensive and slower than the digital wallet, and the overall process was considerably less transparent. The relevant benchmark for stablecoins is not only traditional wire transfers but also the modern fintech alternatives that are already available – and which outperform stablecoins on cost, speed, and ease of use for retail customers.[198]

That said, there is evidence that stablecoins have gained a foothold in cross-border payment, especially in specific high-volume remittance corridors. Aldasoro et al. (2026), using data from Auer et al. (2025), report quarterly cross-border flows exceeding $400 billion for USDT and USDC. Bitso, a Latin American crypto exchange, reports processing over $6.5 billion in US-to-Mexico remittances in 2024, representing more than 10% of the total remittance flow between the two countries.[199] This suggests that corridor-specific factors – including the depth of the unbanked population, existing fintech infrastructure, and competitive dynamics – may determine whether stablecoins can carve out a lasting niche.

More broadly, cross-border stablecoin flows have grown substantially since 2022, with the Asia-Pacific region leading in absolute volume and Africa, the Middle East, and Latin America showing higher activity relative to economic size – and flows between EMDEs differ markedly from traditional SWIFT-routed patterns.[200] However, the efficiency gains from stablecoins' continuous operation are substantially eroded by on- and off-ramp fees, foreign exchange conversion costs, and fragmentation across blockchains and issuers – consistent with the corridor-specific evidence from Frost (2026).

In addition to private-sector initiatives, central banks have established bilateral payment arrangements to reduce friction in specific corridors. And tokenised deposits offer potential advantages over both traditional correspondent banking and stablecoins. Two institutional clients of the same global bank – one in Europe, one in the United States – could instantly settle a payment in dollars or euros on the bank's balance sheet without touching external systems. The transaction would achieve immediate finality in central-bank money (through the bank's reserve accounts) while leveraging the bank's established infrastructure for currency conversion, regulatory compliance, and dispute resolution.

198 Breeden (2026) provides another example: in Q1 2025, the average cost of a $200 remittance from the UK stood at 5.2% - the third lowest in the G20. She concludes that fintech and stablecoin alternatives have not yet delivered transformational change for retail remittance customers.

199 See Bitso (2025).

200 See Figure 7 in Aldasoro et al. (2026), which draws on Auer et al. (2025) for the underlying flow estimates. Measurement is challenging given the pseudonymous nature of blockchain transactions, but multiple approaches yield consistent results.

4.13 COMPETITIVE DYNAMICS

The competitive outlook for stablecoins outside the crypto ecosystem appears bleak. Traditional financial institutions combine superior infrastructure, established trust, global reach, network externalities, regulatory integration, and government backing. They can offer tokenised versions of deposits and money market funds that provide the programmability and instant settlement that stablecoin advocates tout while maintaining all the advantages of traditional finance. For institutional clients in particular, the choice seems clear: a tokenised JPMorgan deposit or a BlackRock money market fund dominates a stablecoin on virtually every relevant dimension.

Stablecoins may continue to serve important functions within the crypto ecosystem, facilitating trading across different cryptocurrencies and providing a stable-value bridge between traditional finance and crypto investments. They may also serve users in jurisdictions with unstable currencies and limited access to dollar banking services.[201] But as general-purpose payment instruments competing against tokenised deposits and money market funds in mainstream finance, stablecoins face overwhelming disadvantages that no amount of technological innovation is likely to overcome.

4.14 CONCLUSIONS

Our analysis of digital monies leads to several conclusions. First, central banks play a critical role if private liabilities are to function well as money. The key properties – particularly singleness and elasticity – require that people be able to convert private liabilities into public money on demand, and that issuers have access to central bank settlement and liquidity facilities. Settlement finality requires settlement in central bank money. Access to the lender of last resort permits an elastic supply during periods of stress. Private liabilities that lack these features may serve niche purposes but are unlikely to compete broadly against more perfect forms of money.

Second, traditional forms of digital money will likely prevail over stablecoins. Commercial banks have inherent advantages: reputations for integrity, deposit insurance, access to central bank facilities, established regulatory frameworks, global infrastructure and technology, established compliance functions capable of meeting KYC and AML standards, and the ability to pay interest. As banks and global fund managers tokenise their deposits and money market funds, offering the programmability of blockchain-based systems while retaining the safety and efficiency of traditional intermediation, stablecoins will find it increasingly difficult to compete. Stablecoins may survive in the crypto ecosystem and retain a role in jurisdictions with highly unstable currencies or limited access to dollar banking services, but they are unlikely to achieve mainstream acceptance for everyday payments or cross-border transactions.

201 While we do not focus on it here, stablecoins like Tether may continue to be the currency of choice for people engaging in illicit activities.

Third, programmability represents a genuine innovation that could improve certain types of transactions. Tokenised deposits and tokenised money market funds combine programmability with the safety of traditional finance. This combination could prove superior to standalone stablecoins for most use cases. Tokenised bank liabilities can provide all the benefits that blockchain enthusiasts envision – conditional payments, automated settlement, and integration with smart contracts – without the risks of stablecoins.

The cross-border use case remains a challenge for stablecoins. Traditional correspondent banking is costly and slow, particularly for small payments to countries with less-developed financial systems. Could stablecoins carve out a niche in cross-border remittances or trade finance? We doubt it. They face stiff competition from improved traditional systems and from tokenised deposits issued by global banks.

The regulation of digital monies should focus on ensuring that these innovations serve the public interest by enabling faster, cheaper, and more accessible payments while preserving financial stability and protecting consumers. This means welcoming innovation in payment systems, including tokenisation and programmability, while insisting that issuers of money-like liabilities meet the same regulatory standards as traditional banks and global fund managers. It means providing clear rules that give innovators confidence they can operate legally while protecting users from fraud, theft, and loss. And it means preserving the central bank's essential roles in providing settlement finality and serving as the lender of last resort.

One final implication deserves emphasis. Stablecoins operate across jurisdictions, create opportunities for regulatory arbitrage, and complicate oversight and resolution when issuance, reserve management, and use span multiple legal systems. MiCA, the GENIUS Act, and the Bank of England proposals reflect divergent regulatory philosophies. That divergence gives issuers scope to choose the most permissive jurisdiction. Containing this risk requires international coordination on common minimum standards. The alternative – regulatory competition to attract stablecoin issuers – would undermine the financial stability objectives that all three frameworks nominally share.

CHAPTER 5

Discussions

5.1 DISCUSSION OF CHAPTER 2 "DIGITAL MONEY AND MONETARY ARCHITECTURE", BY DAVID ANDOLFATTO

Overview

Chapter 2 of the report provides us with a useful service. It begins with the observation that digitalisation of payments is often framed as a technological story. While there is merit to this framing, it argues that it is too narrow. The recent wave of digitalisation presents an opportunity to step back and reconsider the 'architecture' of the monetary system. By this, it means the institutional arrangements that govern who issues money, who has access to it, and how payments and credit are organised. The core issues are institutional, not technological.

In Chapter's 2 account, with which I largely agree, digitalisation matters because it shifts the constraints under which the current monetary architecture operates. For example, as government cash becomes less usable, the system tilts toward private money issued by banks and, potentially, new entrants. This shift raises familiar concerns about seigniorage, privacy, resilience, monetary sovereignty, and the singleness of money.

The chapter's central contribution is to move beyond these concerns and pose a more fundamental question: does the current architecture – one in which fractional reserve banks issue deposits as the dominant form of money – represent an efficient arrangement, or is it a historical artifact that is no longer optimal? Drawing on a neutrality result from Brunnermeier and Niepelt (2019), it is argued that, under appropriate policy design, substituting public for private money need not disrupt credit provision or real economic outcomes. This, in turn, opens the door to a reorganisation of the system in which payments and credit are no longer bundled in bank deposits. The constraint, as the chapter emphasises, is not feasibility in principle, but implementation in practice – specifically, how the underlying distributive conflicts are resolved.

I enjoyed reading this chapter and appreciate the perspective the authors bring to these issues. I focus my comments on two aspects of the analysis, one narrow and one broad. The narrow issue concerns the disappearance of cash. The chapter outlines several commonly cited concerns, and I take some time to push back on them. The broader issue concerns the restructuring of the monetary architecture and the chapter's version of the Chicago Plan. Before turning to these topics, however, I briefly address a definitional point regarding digitalisation.

Digitalisation

It is useful to pause and ask what is meant by the phrase 'digital money'. After all, most money used in retail payments and wholesale settlement systems already exists in digital form. According to Chapter 2, the term refers instead to the rapid proliferation of new payment systems operating outside the traditional banking infrastructure, including cryptocurrencies, stablecoins, and central bank digital currencies (CBDCs). Innovations associated with these emergent structures include tokenisation, programmable money, and smart contracts.

I think this is a useful framing. It does, however, risk overstating the novelty of the current moment. The ongoing 'digitalisation' of money and payments is, in my view, better understood as the latest phase of a much longer process of technological change. Money and banking are, at their core, exercises in secure messaging and accounting. The key innovations in money and banking have always been tied to improvements in communication, data storage, and recordkeeping.

From this perspective, the more fundamental transformation occurred decades earlier with the transition from paper-based to electronic recordkeeping. That shift reshaped the organisation of financial institutions, the structure of payment networks, and even the implementation of monetary policy. The internet and related technologies have extended this process, but they have not fundamentally altered its nature. This is good news because it suggests we can draw on the lessons of history to navigate the next phase of change in money and banking.

The fundamental innovation today is the decentralised autonomous organisation (DAO) as exemplified by Bitcoin.[202] A DAO is an organisation governed by rules encoded in open-source software. There is no central authority; governance is embedded in code. Participation is permissionless and can be anonymous. Users access the system freely, while contributors help maintain it, typically compensated in a tradable native token that functions as money. At a basic level, these systems are database management systems, commonly referred to as blockchains. Bitcoin is the canonical example: a payment system with no central operator, where access is open and rules governing issuance and settlement are enforced by code.

The permissionless access and use properties of blockchains allow DAO-issued digital bearer instruments to circulate on global payment rails outside the conventional banking system. Offshore entities such as Tether use existing blockchains to manage dollar denominated stablecoins, and onshore entities such as Circle do the same. These developments are already reshaping the policy landscape. The GENIUS Act, for example, rules out a US-based CBDC and permits the issuance of private digital bearer instruments, while leaving questions related to KYC and AML enforcement only partially resolved.

202 I discuss the implications of this innovation in more in Andolfatto (2024).

In any case, even if this moment is not unique, it illustrates a broader point: technological innovation does not simply improve the existing system; it alters the feasible set of institutional arrangements. Innovations such as distributed ledgers do not, in themselves, dictate a particular architecture. They do, however, relax existing constraints and expand the set of feasible arrangements, making it easier to envision systems in which public money plays a larger or smaller role at the retail level, or in which payments and credit are more cleanly separated. What ultimately emerges is a matter of policy design.

Digitalisation and public money

A natural concern is the gradual disappearance of cash and its implications for the monetary system. As digital payment methods proliferate, the use of physical currency declines, potentially eroding a form of public money that has historically served as a safe, universally accessible means of payment. This raises issues related to financial inclusion, privacy, and the resilience of the payments system, particularly in stress scenarios where access to digital infrastructure may be impaired.

The specific risks highlighted by Chapter 2 regarding the disappearance of cash are a loss of (1) seigniorage, (2) privacy, (3) trust and singleness, (4) choice and resilience, and (5) sovereignty. While the risks need to be taken seriously, my own view is that they are mostly overstated. Let me explain why.

Seigniorage

Seigniorage revenue for most governments in advanced economies is small. And even if it is not, any seigniorage transferred to the private sector can, in principle, be taxed like other forms of corporate income. In the United States, the demand for US Treasury securities to back dollar-denominated stablecoins is likely to increase global demand for Treasury bills, permitting the federal government to extract additional 'bond seigniorage' that may well exceed any loss of seigniorage on paper currency.

Privacy

Privacy is an odd concern given the lengths to which governments have gone to discourage the use of cash, for example by limiting issuance to small (and with inflation, ever smaller) denominations. That said, issues of data privacy and ownership are real and relevant. But these concerns are not new. They have long been present and can be addressed through appropriate regulation, such as open banking frameworks in the United Kingdom.

Trust and singleness

The idea that holding a physical manifestation of central bank liabilities reinforces trust may be relevant for generations accustomed to cash. But its relevance is likely diminishing for younger cohorts, who are accustomed to digital representations of value. Concerns about the loss of singleness also appear overstated. To the extent they arise, the central bank can preserve par equivalence by standing ready to convert digital money into government cash on demand.

Choice and resilience

The disappearance of government cash would reduce the set of available payment instruments. But this contraction would be market driven. A policy response is warranted only if it generates a meaningful negative externality. In any case, the decline of cash need not eliminate access to it; maintaining a limited, on-demand option may constitute a sufficient response. Similar considerations apply to resilience. Concerns about payment disruptions during power outages, for example, can be addressed through targeted design features rather than by preserving cash at scale.[203]

Sovereignty

Monetary sovereignty refers, at a basic level, to a jurisdiction's ability to define the unit of account, transmit monetary policy, and maintain control over its payments system. In advanced economies, the primary concern is not a sudden loss of control over inflation or interest rates, but rather the payments layer. If domestic transactions increasingly migrate to foreign issued platforms or foreign currency stablecoins, a portion of economic activity may move beyond the effective regulatory reach of domestic authorities.

In this sense, preserving sovereignty is largely a question of maintaining control over domestic payment rails. Authorities have several tools at their disposal: they can regulate access points between the banking system and external platforms, impose KYC and AML requirements on intermediaries, restrict the domestic use of foreign currency-denominated instruments, or offer competing public infrastructure such as a CBDC or fast payment system. These measures target the interface between users and payment networks, which is where effective control is exercised.

Importantly, I think this issue is only loosely connected to the disappearance of cash. The presence of physical currency, in my view, is neither necessary nor sufficient to maintain control over payments. What matters is the regulatory and institutional framework governing access to and use of the payment system.

Separating money from credit

The discussion above alludes to the role a CBDC might play in mitigating some of the potential costs associated with the disappearance of cash. But the chapter takes the argument further. Rather than viewing CBDC as simply a response to the crowding out of cash payments, it is framed as a tool to address pre-existing structural weaknesses in the monetary architecture. The problems are rooted in the inherent fragility of fractional reserve banking. Here again, the issue is institutional, not technological.

203 For example, offline payment functionality, redundant communication channels, and prefunded liquidity buffers can preserve transactional capacity during outages.

The current monetary architecture assigns to commercial banks the primary role in managing the money supply, supported by central bank settlement services. Banks create money in the form of deposits through lending and the purchase of securities. This institutional arrangement bundles money and credit. The implication is that disruptions on the credit side of the economy can spill over to the payments system. A credit crisis can impair payments, with knock-on effects that propagate throughout the economy.

The policy response to this inherent fragility has taken several forms, including federal deposit insurance, restrictions on bank balance sheets, and oversight by federal and state regulators. Yet despite these safeguards, episodes such as the collapse of Silicon Valley Bank in March 2023 continue to recur. In that case, extraordinary measures, including the extension of deposit guarantees beyond insured limits and the creation of emergency lending facilities, were required to contain the fallout. This episode makes clear that the system remains dependent on discretionary backstops.

Following almost every banking crisis, economists return to the Chicago Plan proposal to separate money from credit.[204] Chapter 2 argues that the current wave of digitalisation provides an opportunity to revisit this idea. The Chicago Plan proposes separating money from credit by requiring 100% reserve backing for deposits, thereby eliminating private money creation and insulating the payments system from banking instability. Under such an arrangement, banks would no longer create money to finance loans. As a result, banking crises would not disrupt the payments system, which would instead be operated by the central bank, with payment intermediaries transacting exclusively in CBDC.

Discussions of CBDC are often derailed by the claim that shifting money out of bank deposits would impair bank lending. But this objection conflates two distinct issues. If the concern is the loss of deposit funding, one can instead imagine replacing it with central bank funding on comparable terms. Once this substitution is allowed, CBDC can be evaluated on its own merits, rather than through its incidental effects on bank funding costs. This is where the neutrality result becomes relevant.

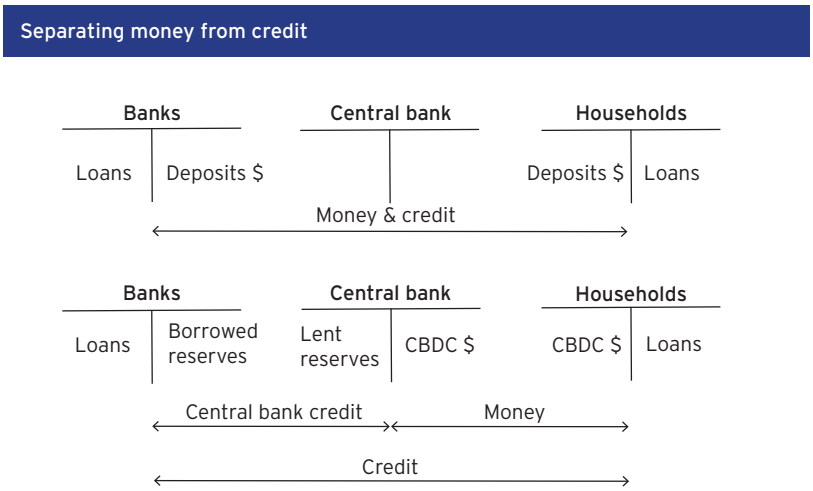
Mechanically, when households convert deposits into CBDC, banks lose deposit funding and the central bank assumes the corresponding liability. If the central bank then lends these funds back to banks, for example through standing facilities or term funding operations, deposit funding is effectively replaced with central bank credit. Under this arrangement, banks continue to extend loans, but their liabilities shift from deposits to borrowing from the central bank.

204 See, for example, Benes and Kumhof (2012).

If central bank lending is provided on terms comparable to deposits, banks are insulated from adverse funding effects and any associated impact on lending. At the same time, the arrangement decouples money from credit by shifting the payments system onto the central bank's balance sheet while leaving credit intermediation with banks. The Brunnermeier–Niepelt neutrality result suggests that such policy changes should be evaluated on a consolidated basis. Many critiques of CBDC implicitly assume that displaced deposits cannot be replaced in this way.

Figure 1 provides a rough schematic describing the current architecture (top panel) vis-à-vis the revised Chicago Plan architecture (bottom panel).

FIGURE 1 **SEPARATING MONEY FROM CREDIT**



Under the current system, households approach banks for loans, and banks create the deposit money needed to fund them. In principle, the system could operate with the central bank providing intraday credit, with banks in aggregate carrying zero reserves overnight. In this case, money and credit are tightly linked, and the central bank could, if it chose to, conduct monetary policy and operate the payments system with a relatively small balance sheet.

Under the revised Chicago Plan, households obtain loans from banks, but banks fund these loans by borrowing reserves. At the same time, the central bank issues CBDC directly to households by crediting their accounts. In this arrangement, the payments system operates between the central bank and households, remaining insulated from the credit market. In this case, the central bank operates with a relatively large balance sheet.

Again, the purpose of this thought exercise is not to recommend the revised Chicago Plan as a means of placating commercial banks. Rather, it serves to evaluate the plan on its merits, abstracting from the narrow interests of the banking sector. In short, the plan would:

1. eliminate fractional reserve banking (and its associated fragility);
2. insulate the payments system from bank failures and crises;
3. remove the need for deposit insurance;
4. reduce the need for stringent bank supervision and balance sheet restrictions;
5. strengthen monetary sovereignty; and
6. enable the implementation of desired data privacy protocols, smart contracts, and related innovations on a central balance sheet.

While the neutrality result is compelling in theory, its practical implementation raises several concerns. The argument relies on the central bank's ability to recycle CBDC funds back to banks on deposit-equivalent terms, but this presumes a level of precision and coordination that may be difficult to achieve in practice. As well, in a stress event, deposit outflows into CBDC could occur rapidly, while the corresponding expansion of central bank lending may lag, exposing banks to funding pressure precisely when conditions are most fragile.

There are also financial stability considerations. By lowering frictions in the movement of funds, CBDC may accelerate run dynamics rather than eliminate them. The ability to shift instantly into public money could make deposit flight faster and more synchronised. At the same time, concentrating payments on public infrastructure could raises its own risks, including operational and cyber vulnerabilities.

More fundamentally, the neutrality result abstracts from the institutional features that make deposit funding distinct. Deposits are not merely a source of finance; they are embedded in a broader ecosystem of relationships, information, and payment services. Replacing them with central bank funding may preserve balance sheet identities, but it may also alter behaviour in ways that are difficult to model ex ante.

Finally, the proposal raises political economy considerations. The neutrality result presumes that any change in seigniorage or funding structure is offset through appropriate policy adjustments. In practice, these offsets may be incomplete or politically constrained, implying that the reform could alter the distribution of rents and expand the role of the central bank in financial intermediation. These considerations may ultimately constitute the binding constraint on implementation.

One way to address these concerns is to view the proposal not as an all-or-nothing reform, but as a supplement to the existing system. CBDC need not displace bank deposits entirely. Instead, it can operate as a parallel form of public money, providing an additional payment option while leaving the core structure of bank intermediation intact. In this formulation, CBDC functions as a public backstop or outside option,

enhancing competition and resilience without requiring a wholesale reorganisation of the monetary system. The question then is not whether to replace the current architecture, but how to design a system in which public and private forms of money can coexist in a stable and efficient manner.

5.2 DISCUSSION OF CHAPTER 2 "DIGITAL MONEY AND MONETARY ARCHITECTURE", BY ULRICH BINDSEIL

Introduction

Chapter 2 offers an excellent and comprehensive overview of how digitalisation is reshaping the monetary architecture and the key policy questions that follow from this transformation. It is well structured, balanced, and analytically thorough. In what follows, I will first offer a few comments on specific statements where I would introduce additional nuance. I will then develop a complementary perspective, arguing that the link between theory and real-world implementation is not a secondary concern, but maybe the even more relevant challenge.

Advancing from conceptual frameworks to actual policy outcomes requires confronting political economy constraints. It is not sufficient for economists to describe what an optimal monetary system would look like; they must also explain why observed outcomes systematically diverge from this benchmark, and why convergence toward the 'optimal' solution is often slow or absent. This requires shifting part of the analytical focus from normative design to the forces that shape real-world feasibility.

In areas where economic policy directly affects industries and the broader public, this implies a more explicit consideration of strategic interactions. What incentives and strategies guide major industry players, including large firms and their representative associations? How are consumer preferences formed and how stable are they? What role does public opinion play in enabling or constraining policy choices? How does regulation both respond to and shape these dynamics? Equally, economists themselves are not neutral observers: their institutional positions and intellectual priors can influence both the framing of debates and the range of policy options considered.

Finally, one must ask what can realistically be expected from public discourse, which ultimately feeds into legislative processes and the actions of elected officials tasked with addressing market failures. Against this backdrop, I will revisit the ongoing debate in the euro area on a retail central bank digital currency (CBDC), drawing in particular on my own recent paper on the public discourse on retail payment topics,[205] to illustrate how these political economy considerations shape both the trajectory and the substance of current policy discussions.

205 See Bindseil (2026).

Comments on the chapter

First, I was struck by the use of the term "fiat money". The chapter writes that "[l]ike fiat money – which is no longer redeemable against gold or other assets – cryptocurrencies rely on collective belief and usability rather than explicit backing". This formulation echoes a line of argument often advanced by crypto-lobbyists and libertarian thinkers, who seek to place instruments such as bitcoin on an equal conceptual footing with central bank money. However, in fact this framing is not confined to such circles and dates from before the invention of crypto-currencies. Freixas and Rochet argued already in 1998[206] that "... fiat money has no fundamental value... Because it yields no coupon or dividend, the fundamental value of fiat currency is zero ... fiat money is similar to a bubble: it has a positive price but a zero fundamental value".

That leading economists had argued in this way long before the rise of bitcoin does not, however, make them better from a central banker's perspective. Central bank money is not 'unbacked' in any economically meaningful sense. Even in the absence of a formal convertibility promise into gold or another asset, it is supported by the central bank's balance sheet: its assets, its income-generating capacity, and ultimately its institutional and legal foundations. To claim that fiat money is not backed is effectively like arguing that financial claims in general lack value, and that it would make no difference whether a central bank operates with positive capital (assets exceeding liabilities) or with deeply negative capital equal to the full value of its liabilities. If that were truly the case, it would point to a fundamental problem in our entire monetary and financial system.

The confusion here stems from equating the absence of a fixed redemption promise with the absence of backing. These are distinct concepts. Central bank money is not redeemable into a specific asset, but it is underpinned by what can be described as a 'purchasing power promise', that is, a commitment to maintain its value in terms of a broad consumer basket over time, albeit not at a strictly constant level. This framework explicitly allows for non-zero inflation and reflects a deliberate and widely accepted design choice in modern monetary policy. There is no obvious reason why such a commitment should be considered less credible than a promise of convertibility into a particular asset or commodity. Both types of promise ultimately rest on legal and institutional arrangements and can, in principle, be upheld or violated. In sum, it is not appropriate to suggest that central bank money and bitcoin are equivalent in terms of their fundamental value, or that both derive their value solely from 'collective belief'. Such a claim overlooks the institutional, balance sheet, and policy frameworks that give central bank money its distinctive and resilient economic foundation.

206 See Freixas and Rochet (1998).

Second, I do not fully agree with the statement that "[retail] central bank digital currency represents a deliberate architectural reform". This claim is developed further in the chapter, where it is argued that "while the current monetary architecture reflects a politico-economic equilibrium, the introduction of rCBDC has the potential to shift that equilibrium and redistribute rents away from banks and their customers". This characterisation overstates the disruptive nature of retail CBDC. At its core, the issuance of CBDC can be understood as a conservative and adaptive measure aimed at preserving the role of central bank money in an evolving technological environment. If anything, the more radical departure would be to refrain from issuing CBDC altogether. In a context where payments are increasingly digital, choosing not to provide a public form of digital money for retail use would amount to abandoning the long-standing coexistence of public and private money in everyday transactions. Such a shift would itself constitute a profound change of the monetary architecture. To be sure, one could conceive of a 'maximalist' CBDC designed to displace commercial bank money entirely, for instance on the grounds that private money creation is inherently unstable. Such a design would indeed qualify as a far-reaching monetary reform. But this is not the relevant benchmark for most current policy discussions.

The more realistic question is whether central banks should continue to provide public money in forms that remain usable and relevant in a digital economy. From this perspective, the framing of CBDC as a radical and risky innovation, as often advanced by banking sector representatives, appears strategic. It contrasts sharply with the sector's own history of rapid and largely uncontested technological adaptation. Commercial banks have long since transitioned from paper-based to electronic forms of money and payments, fundamentally reshaping how money is used without this being portrayed as an 'architectural disruption'.

Against this background, it is not obvious why a similar technological adaptation by central banks should be viewed differently. Indeed, one might argue that neutrality lies in allowing all forms of money – public and private – to evolve in line with technological progress and changing consumer preferences. Preventing central banks from doing so, while private actors continue to innovate, would itself introduce a non-neutral distortion with potentially significant long-term consequences for the structure of the monetary system.

Third, I would like to raise a terminological concern regarding the use of the term "wholesale CBDC". The chapter writes: "CBDC refers to digital money issued by the central bank. Wholesale CBDC (wCBDC) is a form of central bank reserves, designed for use by financial institutions for interbank settlements and large-value transactions. It is best understood as a technological upgrade of an existing instrument – reserves – that enables features such as atomic settlement and improved interoperability across platforms and helps reduce frictions, operational risks, and reconciliation costs in wholesale financial market." While this description is accurate in substance, the terminology itself has become increasingly problematic and, in practice, is now largely being abandoned. Following political developments – most notably, actions during the

Trump administration targeting "CBDC", which in fact referred primarily to retail CBDC – many institutions, including international organisations engaged in monetary policy work, have moved away from the term "wholesale CBDC". The European Central Bank, for example, has avoided this terminology since 2020, and with good reason. The earlier parallel use of "retail CBDC" and "wholesale CBDC" can, in retrospect, be seen as a serious obstacle to conceptual clarity and to a well-functioning public debate. The two terms suggest a symmetry that does not, in fact, exist. "Wholesale CBDC" refers to changing the technology underpinning existing electronic central bank reserves to something relying with distributed ledger technology. By contrast, "retail CBDC" concerns the provision of a new form of central bank money for the general public, complementing cash, and is not intrinsically tied to any specific technological infrastructure. Mixing these two fundamentally different issues under a common label has contributed to confusion, both analytically and in policy discussions. It has blurred the distinction between (i) upgrading the technical architecture of wholesale payment systems and (ii) introducing a new category of money accessible to households and firms. These are separate policy questions, involving different objectives, stakeholders, and trade-offs.

More broadly, this episode illustrates the responsibility of public institutions and academic economists to exercise discipline in the introduction and use of terminology. In this case, the problematic vocabulary originated largely in the public sector, but was readily adopted by academia and industry alike. The consequences are still visible today, for example when industry representatives argue that "central banks should prioritise wholesale CBDC over retail CBDS", despite the fact that the two are not substitutes but relate to entirely different dimensions of the monetary system. Clearer language is a prerequisite for coherent analysis and informed public discourse.

A complementary perspective: Public discourse on retail payments

In my recent paper on the public discourse about retail payments,[207] I argue that public debate on payments is systematically distorted – and not just occasionally or accidentally, but for structural reasons. Four features of the payments landscape make such distortions almost inevitable.

First, payments is a network industry. This implies the existence of multiple equilibria, including stable but inferior ones. Once a particular network gains traction, it benefits from strong lock-in effects, allowing successful firms to acquire and exploit market power, often with high profitability. In such an environment, shaping expectations becomes as important as competing on fundamentals. Influencing public opinion, regulators, and legislators is therefore not a side activity but a core strategic objective: firms seek to coordinate the system on the equilibrium that best serves their own interests.

207 See Bindseil (2026).

Second, the correlation in payments between expertise and vested interest is very high. Those who understand the system best are typically those most deeply embedded in it, and therefore those with the strongest incentives to shape the debate in their favour. We central bankers and academics have only a partial knowledge. The point is not modesty; it is that genuinely disinterested expertise is scarce. What enters the public debate as 'informed analysis' is often, in reality, selectively framed and strategically motivated.

Third, there is a negative correlation between the level of noise and the intrinsic quality of a project. The loudest voices tend to come from actors promoting ideas that are far from viable – 'out-of-the-money' options or projects that lack network traction. By contrast, established and successful players – such as Visa, Mastercard, PayPal, or Apple Pay – are typically far more disciplined and selective in their communication. They have less need to generate noise precisely because their position is already secured by network effects and market power.

Fourth, payments is a heavily regulated sector with elements of public provision, both justified by concerns over competition, efficiency, and consumer protection. This makes the battle over public opinion and regulatory outcomes particularly consequential. Influencing legislation and policy design can decisively shape market structure and rents. Whether this process leads to socially desirable outcomes depends on one's view of the state. Under an optimistic perspective, a capable and benevolent legislator can correct market failures and ensure fair outcomes. Under a public choice perspective, however, regulation is itself subject to capture and may primarily serve organised interests rather than the common good.

Taken together, these four features imply that distortions in the public debate on payments are not anomalies – they are the equilibrium outcome of the system itself.

This problem also applies to the public discourse on CBDC. The resistance from the established industries against retail CBDC has been successful in some jurisdictions. A prominent example is the US Executive Order 14178 on "Strengthening American Leadership in Digital Financial Technology" of 23 January 2025, which prohibits work on CBDC in the United States. In Europe, the battle of the payments industry against the digital euro is currently being fought in particular in the European Parliament, with the rapporteur of the digital euro legislation submitting a draft report on the digital euro which has been interpreted as attempt to ensure that it will be a failure, or at least that it will appear redundant.[208] Two proposals by Rapporteur Navarete could appear particularly adverse to the digital euro. First, his report proposes a calibration method for limits on digital euro holdings which will lead to very low limits (maybe €100 per person) and which implies that the digital euro will be no store of value at all, but only a payment instrument on top of commercial bank money, which ultimately will lead

208 "Proposal for a Regulation of the European Parliament and the Council on the establishment of the digital euro", COM/2023/369 final (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0369). In November 2025, the European Parliament Rapporteur Fernando Navarete submitted his Draft Report (www.europarl.europa.eu/doceo/document/ECON-PR-778136_EN.pdf).

to the conclusion that one can have the payment instrument directly in commercial bank money and save the costs of digital euro development. Second, his proposal prioritises offline payments, which have a limited business case and are unlikely to bring the necessary network effects, and the actual deployment of the online digital euro would only take place at some stage in the future and contingent of a failure of the European payment industry having progressed on a pan-European instant payment-based instrument. It has been speculated that banking lobbyists were among the actors advocating early and strongly for the inclusion of offline functionality, not primarily to enhance user value of the digital euro but rather to steer it away from large, scalable, and commercially attractive use cases towards a narrow niche. Other stakeholders (legislators and the ECB) embraced the offline narrative for different reasons, including its perceived consistency with the framing of the digital euro as a "new form of cash", as well as arguments related to privacy and operational resilience. The drawbacks of offline functionality were largely absent from the policy debate. These include the unfavourable cost–benefit ratio of offline payments, the additional complexity imposed on an already challenging project, the substantially higher security risks associated with electronic offline transactions – particularly if they are intended to be quasi-anonymous. It is noteworthy that different stakeholders with heterogeneous interests agree to omit these matters from the public debate, i.e. are for some reasons aligned to support something, although for different reasons.

5.3 DISCUSSION OF CHAPTER 3 "TECHNOLOGY AND INTERNATIONAL CURRENCIES", BY LIVIA CHITU[209]

Introduction

Technological change has long been intertwined with the evolution of monetary and financial systems. The ongoing digital payment transformation, led by innovations such as distributed ledger technologies, smart contracts, tokenised deposits, stablecoins, central bank digital currencies, and new payment platforms, raises central questions: Will technology reshape the hierarchy of international currencies? Will it change international money in the digital payment era?

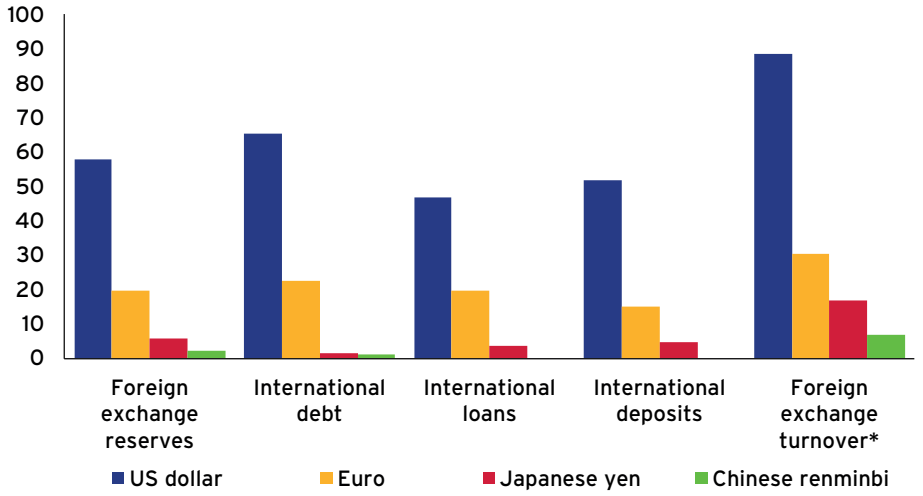
Chapter 3 makes an excellent contribution to the debate on how technological developments may shape the role of international currencies. It begins by reviewing the core functions of international currencies and examining the current position of crypto-assets and stablecoins within this framework. It then explores whether innovations such as tokenisation could alter the process of currency internationalisation and assesses the extent to which cross-border crypto-asset flows can be measured. The chapter concludes by discussing the potential macroeconomic implications of these developments, which is one of its most novel elements.

209 The views expressed here are those of the author and do not necessarily reflect those of the ECB or the Eurosystem.

My discussion will focus on whether technology will reshape the international monetary system, drawing also from earlier historical episodes.

The United States and China are both at the technological frontier currently. Despite the technological dynamism of both countries, the international monetary system remains overwhelmingly dominated by the US dollar, while the Chinese renminbi plays a very limited global role (see Figure 1). This apparently puzzling disconnect raises a broader analytical issue: to what extent does technological leadership translate into international currency leadership?

FIGURE 1 **SNAPSHOT OF THE INTERNATIONAL MONETARY SYSTEM (PERCENT)**



Sources: ECB Annual Report on the International Role of the Euro, BIS, IMF, CLS Bank International, Ilzetzki, Reinhardt and Rogoff (2019) and ECB staff calculations.

Notes: The latest data on foreign exchange reserves, international debt, international loans and international deposits are for the fourth quarter of 2024. Foreign exchange turnover data are as of April 2022 (the latest available data as they come from the triennial survey). *Since transactions in foreign exchange markets always involve two currencies, foreign exchange turnover shares add up to 200%.

Technology and international currencies: Historical evidence

Past historical episodes suggest a close, though not deterministic, relationship between technological innovation and international currency status. Periods of currency dominance have often coincided with leadership in financial, monetary and payments technologies. For instance, in Renaissance Italy, innovations such as double-entry bookkeeping, bills of exchange, and deposit banking enabled the expansion of long-distance trade and credit networks, allowing Italian city-states like Florence, Venice, and Genoa to become dominant financial centres. In turn, the coins they issued (the florin, ducat, etc.) were widely used in international trade transactions.[210] These developments laid the foundations of modern finance but reached their full scale later in Northern Europe. The Dutch Republic in the seventeenth century built on these

210 Eichengreen (2026).

innovations through the establishment of institutions such as the Bank of Amsterdam in 1609 and early securities markets.[211] These innovations made Amsterdam a leading financial centre and the Dutch guilder became the pre-eminent international currency of the 17th and 18th centuries.

In the nineteenth century, the United Kingdom combined financial sophistication with technological advances in communication. The spread of telegraph networks and submarine cables enabled the rapid transmission of financial information, integrated global markets, and reinforced the dominance of the pound sterling. The tight connection between sterling's role as an international currency and technology is illustrated by the fact that the sterling–dollar pair is still known in market parlance as 'cable' – with the term originating in the mid-19th century when the exchange rate was transmitted via the first transatlantic submarine telegraph cable. In the twentieth century, the United States consolidated its dominant financial position through the development of the modern financial infrastructure for securities markets, electronic trading platforms (e.g. Electronic Broking Services), financial messaging systems such as Swift, clearing systems such as CHIPS, and global correspondent bank networks that combined to deepen and liquify US financial markets – and make the United States ubiquitous in clearing and settling international payments. These developments have supported the persistence of the US dollar as the dominant international currency.

However, the relationship between technological leadership and currency dominance is by no means mechanical. For example, late nineteenth-century Germany was a technological leader in industry (in chemical industry, steel production, and electrical engineering), but not the main international reserve-currency issuer. At its peak before World War I, the share of the German mark in global foreign exchange reserves was comparable to that of sterling and the French franc.[212] This illustrates a key point: technology may be necessary but not sufficient on its own to determine currency leadership. The fundamental drivers of international currency status remain essential.

The primacy of economic and institutional fundamentals

The literature on international currencies identifies several fundamental determinants of international currency status, including inertia, scale, credibility, openness, institutional integrity, and geopolitical outreach, all of which ultimately underpin trust in the currency.[213]

Technological innovation affects currency internationalisation primarily through its impact on these fundamental determinants. For instance, improvements in payment systems that reduce the time and cost to settle transactions for individuals and businesses reduce the transaction costs of using a currency. Advances in financial infrastructure

211 The Amsterdam Stock Exchange, established in 1602 by the Dutch East India Company (VOC), is widely considered the world's first modern stock exchange.
212 Eichengreen et al. (2018).
213 Eichengreen et al. (2019).

that makes wholesale payments between financial institutions can enhance market liquidity, thereby making the currency in question still more appealing. Yet these effects remain conditional on broader institutional and economic frameworks. Accordingly, technology should be understood as a complementary factor – a catalyst that amplifies existing advantages rather than a substitute for them.

What is new in the digital era?

Digital technologies are nothing new. In the payments realm they have existed for decades, dating back at least to the 1950s.[214] Historically, they superseded older, analogue technologies.[215] The shift from continuous to discrete representation of data through strings of zeros and ones underpins modern computing and connectivity, forming the backbone of today's interconnected digital systems. What is however truly novel today about digital payments are two specific features.

Distributed ledger technology and decentralisation

Distributed ledger technology (DLT) enables decentralised validation, clearing, and settlement of transactions without reliance on a central authority. Essentially, DLT allows the middleman to be cut out by allowing peer-to-peer transactions on shared ledgers, reducing reliance on traditional intermediaries in monetary, financial, and payments flows, such as correspondent bank networks. These principles were at the core of Satoshi Nakamoto's white paper that led to the foundation of Bitcoin in 2008.

Smart contracts and programmability

Smart contracts – self-executing agreements embedded in code – enable the automation of financial transactions and conditional payments. This programmability helps enhance efficiency and reduce operational risk. For instance, it can be used to reduce counterparty (or Herstatt) risk – a traditional friction in financial markets – by embedding payments versus payments in a blockchain.

Together, these innovations underpin the emergence of crypto-assets, stablecoins and tokenised financial instruments, which have the potential to transform the backbone of global finance with systemic implications, including for international currency competition.

214 Key milestones include the introduction of the first plastic payment card (Diners Club) in the 1950s, the use of electronic telecommunication networks for interbank transfers in the 1960s, the development of real-time gross settlement systems by central banks in the 1980s, and the emergence of internet banking in the 1990s. A major turning point occurred on 31 October 2008 with the introduction of Bitcoin, followed in the 2010s by the expansion of mobile payment solutions such as Apple Pay.

215 Analog technology represents information through continuous signals that directly mirror real-world phenomena such as sound or light, as seen in devices like thermometers, radio systems, or traditional telephones. By contrast, digital technology encodes information in discrete binary units (zeros and ones), enabling data to be processed, stored, and transmitted with high speed, precision, and scalability.

The 'integrity premium' in the digital age

Indeed, in the digital era the technological characteristics of monetary systems may become more directly relevant to currency competition. Hélène Rey introduced the concept of an 'integrity premium', whereby currencies supported by secure and resilient technological infrastructures may command greater international demand.[216]

In a system increasingly reliant on digital networks, the credibility of a currency may depend not only on macroeconomic fundamentals but also on cybersecurity resilience, data integrity, and robustness of the payment and settlement systems. Looking ahead, encryption technologies will have to be quantum-resistant (quantum-proof) to guarantee data integrity and prevent intrusions if and when quantum computers become operational.[217] Currencies with lower vulnerability to cyberattacks and stronger technological safeguards may attract capital inflows and benefit from lower financing costs. Conversely, technological fragilities could undermine confidence and trigger capital flight. The integrity premium thus represents a new dimension of monetary credibility, complementing traditional determinants. Importantly however, it does not replace these traditional determinants but augments them, highlighting the growing importance of technological infrastructure in sustaining monetary power.

The new view of international currency competition

How will such developments impact the role of international currencies, both incumbent units and other units that seek to challenge established ones?

Traditional models of international currency competition emphasise strong network externalities, leading to persistence and inertia in currency dominance. This perspective suggests that the international monetary system tends towards a 'winner takes all' equilibrium and a natural monopoly.

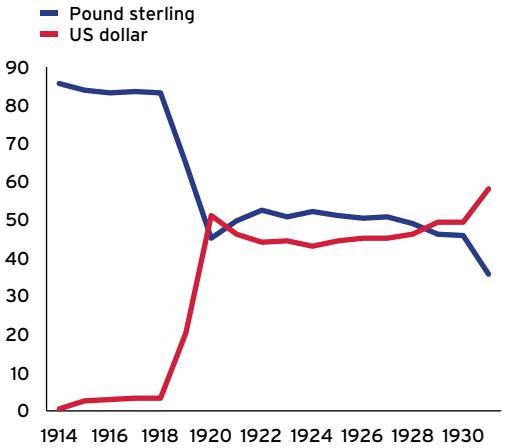
However, this view has been challenged with new historical evidence on the evolution of global currencies showing that the international monetary system was in fact often multipolar, with several currencies coexisting, and, importantly, that currency leadership transitions occurred more rapidly than previously assumed.[218] According to this new view, the US dollar had already overtaken sterling in key dimensions by the mid-1920s and not after World War II, as conventionally assumed. Technological and financial innovations played a role in these transitions by reducing transaction costs and lowering switching barriers. At the same time, these changes interacted with broader developments. Some were geopolitical, such as the outbreak of World War I, which strained the UK economy and precipitated the decline of sterling. Others pertained to institutional innovations, such as the creation of a lender of last resort in US dollars –

216 Rey (2025b).
217 Rey and Subran (2026).
218 Eichengreen et al. (2018).

the Federal Reserve System – in 1913, which gave a leg up to the US dollar. Still others involved policy support, such as the Federal Reserve actively promoting trade credit in dollars in the 1920s, or policy mistakes, such as the United Kingdom suspending in 1914 and then re-establishing convertibility to gold at an overvalued prewar parity in 1925.

In sum, while technology can facilitate transitions, it does not determine them independently.

FIGURE 2 **SHARE OF US DOLLAR AND STERLING IN THE STOCK OF GLOBAL FOREIGN PUBLIC BONDS**



Source: Eichengreen et al. (2018).

Notes: All data are made publicly available by the authors at www.GlobalCurrenciesDatabase.com (Chitu et al., 2025).

Technology and currency competition today

In the current environment, digital technologies interact with traditional drivers of currency internationalisation in several ways.

First, innovations in payment systems – including fast payment systems and stablecoins – reduce cross-border transaction costs and increase efficiency. Second, financial market innovations, such as tokenised deposits and DLT-based trading platforms, may enhance market liquidity and integration. Third, technological capabilities related to data governance and surveillance may strengthen geopolitical influence by enabling greater control over financial flows. Finally, technological progress may boost economic productivity, indirectly reinforcing the economic size and financial depth of currency-issuing countries.

Despite these recent developments, the US dollar has – so far – remained dominant, reflecting the benefits of incumbency, the unmatched depth and liquidity of US financial markets, the United States' unrivalled global military heft, and the lack of rivals possessing all the core ingredients of international currency status to a similar extent. The euro continues to play a distant second role, as euro area financial markets remain fragmented, lacking depth and liquidity.[219] And the renminbi's internationalisation remains constrained as long as China's economy is not financially fully open.

What scenarios for the future: Multipolarity or fragmentation?

Looking further ahead, technological innovation could lead to several scenarios.

The first is a more multipolar system, in which several currencies share consequential international roles. By reducing transaction costs and facilitating diversification, digital technologies may enable greater multipolarity in the international monetary system, where multiple units coexist and remain freely exchangeable.

The second is a fragmented system, characterised by competing technological ecosystems with limited interoperability. In such a scenario, geopolitical divisions and lack of interoperability could lead to the emergence of separate digital currency areas.[220]

Which scenario will materialise? Time will tell. But in all likelihood, the outcome will depend on the degree of international cooperation, particularly in establishing common technical standards and ensuring interoperability across systems.

5.4 COMMENTS ON CHAPTER 3 "INTERNATIONAL DIGITAL MONEY", BY ALBERTO MARTIN

Chapter 3 provides a very insightful and timely overview of the international monetary implications of tokenised assets. Its main strength is to place recent innovations – cryptocurrencies, stablecoins, and tokenised deposits – squarely within the broader framework of international currency use. A key message is that, despite the technological novelty, the fundamental drivers of currency dominance – network externalities, institutional credibility, and the supply of safe assets – remain largely unchanged.

In this discussion, I briefly summarise the chapter and then focus on three related issues: (i) the persistence of dollar dominance, (ii) the fiscal implications of stablecoins, and (iii) the effects on monetary policy transmission.

219 While euro area financial markets remain generally fragmented, Chitu et al. (2026) provide evidence that the euro area corporate bond market is as integrated as the US market, contrary to conventional wisdom. However, while it is geographically unified, the euro area corporate bond market remains much smaller than that of the United States. Deepening euro area capital markets to facilitate corporate bond issuance and allow innovative firms to scale up is therefore parts and parcel of the European Union's Savings and Investment Union. As Eichengreen et al. (2026) and Rey and Subran (2026) further argue, this is also important to elevate the euro's global status and avoid Kindleberger traps.

220 James et al. (2019).

Summary

The chapter argues that digital money primarily operates by reducing frictions in payments, particularly in cross-border transactions. In doing so, it strengthens the medium-of-exchange role of currencies, while leaving their unit-of-account function largely intact. Stablecoins, in particular, may expand access to dollar-denominated assets, facilitate remittances, and accelerate currency substitution in economies with weak monetary institutions.

At the same time, these developments have broader macroeconomic implications. They affect public finances through their impact on seigniorage, and they may alter monetary policy transmission by changing the structure of financial intermediation.

A central theme of the chapter is that these forces operate on top of strong complementarities across the different functions of international currencies. As a result, the current dollar-centric system is likely to prove highly persistent, even if the scope for fragmentation or regionalisation increases over time.

Dollar dominance and sanctions

A natural question is whether digital money weakens or reinforces the international role of the US dollar. A common view is that lower transaction costs and new payment infrastructures could facilitate the emergence of alternative currency areas.

In my view, however, there is a countervailing force that is important. A key motivation for reducing reliance on the dollar is to avoid exposure to US sanctions. But stablecoins may themselves weaken the effectiveness of sanctions by allowing agents to transact in dollars outside the traditional financial system. One salient example is Venezuela, where the state-run company has largely relied on Tether to settle oil transactions and sidestep sanctions.[221]

From the perspective of the US, dollar stablecoins can thus be interpreted as providing a form of commitment not to fully exercise the coercive power associated with dollar dominance. They allow continued use of the dollar while partially bypassing the channels through which sanctions operate. This suggests that digital money may reinforce the dollar's equilibrium use, rather than undermine it.

More generally, this highlights a broader issue: the incentives for multipolarity are not purely economic, but also geopolitical. If digital technologies relax these geopolitical constraints, they may end up strengthening the incumbent rather than facilitating entry. In that sense, the scope for a rapid transition to a multipolar system may be more limited than is sometimes suggested.

221 "Maduro's Crypto-Backed Oil Deals Put Tether at the Center of Venezuela Money Drama", *Wall Street Journal*, 10 January 2026.

Public finances and the allocation of rents

The chapter also emphasises the fiscal implications of stablecoins. By substituting for cash, it argues that stablecoins may reduce seigniorage revenues and transfer rents from the public sector to private issuers. This is particularly relevant for emerging markets, where dollar stablecoins can accelerate currency substitution and weaken fiscal capacity.

At the same time, stablecoins are typically backed by safe dollar assets, most notably US Treasuries. Their expansion therefore increases global demand for these assets and may reinforce the United States' 'exorbitant privilege'. This suggests a reallocation of rents at the global level – away from emerging market governments and towards both private intermediaries and the US fiscal authority.

I fully agree with the main points raised by the authors in this section, and have only two minor comments. First, at least in theory, the rents that accrue to stablecoins could be limited by entry and competition. In practice, however, the combination of regulatory frictions, network effects, and reputational constraints may sustain significant margins. Understanding these forces is central to determining whether the distribution of rents – between private issuers, governments, and users – is likely to be a first-order issue. Second, even if stablecoins transfer rents away from emerging market governments, they may still benefit residents by providing a better store of value than their often unstable domestic currencies.

Monetary policy and financial structure

Finally, the chapter discusses how digital money may affect monetary policy transmission. A useful way to think about this is that stablecoins affect the transmission channel of monetary policy. The chapter stresses two main points in this regard.

In developed economies, stablecoins may substitute for bank deposits, thereby forcing banks to rely more heavily on wholesale funding. Since wholesale funding is more sensitive to market conditions, it is claimed that the transmission channel of monetary policy could become both stronger and less predictable. Changes in policy rates may pass through more quickly to lending conditions, but also with greater volatility.

In emerging economies experiencing 'crypto-dollarisation', the claim is that domestic monetary policy becomes less effective because financial conditions are increasingly driven by US monetary policy. This is not a new mechanism, but stablecoins may accelerate it by lowering the frictions associated with currency substitution.

I find this discussion insightful but have three comments regarding monetary transmission. First, in developed economies, there may be countervailing forces that weaken the effectiveness of monetary policy in the presence of stablecoins. This is because, even if stablecoins substitute for bank deposits, it seems plausible that the extent to which they do so is itself contingent on monetary policy. If, for instance, a rise

in interest rates induces portfolio rebalancing away from stablecoins into deposits, the ensuing expansion in bank funding may mitigate the contractionary effect of the policy. Naturally, the ultimate effect of this rebalancing depends on the type of assets that are used to back stablecoins, and thus on regulation.

Second, the widespread use of stablecoins may reinforce the zero lower bound on monetary policy. Because negative interest rates could undermine stablecoins' promise of par convertibility, concerns about financial stability may constrain the central bank's ability to implement such policies.

Third, in emerging markets, stablecoins may – as the chapter argues – impair the transmission of monetary policy. However, currency substitution tends to increase the pass-through of exchange rate fluctuations to domestic prices, thereby potentially strengthening the exchange rate channel. Which effect dominates is therefore an open question.

Finally, there is an additional aspect of stablecoins not addressed in the chapter that may warrant further attention. To the extent that they are primarily used internationally and largely held by non-residents, stablecoins may introduce a new dimension of sovereign risk. In the case of dollar-denominated stablecoins, the US government could – under extreme circumstances – be tempted to intervene or even expropriate them. At a minimum, regulatory incentives may become distorted if a substantial share of the downside risk is borne by foreign holders.

Concluding remarks

Overall, the chapter makes a convincing case that digital money is unlikely to fundamentally alter the international monetary system in the short run. If anything, it may reinforce existing hierarchies – particularly the central role of the US dollar – while introducing new sources of risk related to regulation, financial stability, and geopolitics.

In the longer run, the possibility of a more multipolar system remains. But achieving this would require more than technological innovation; it would require the development of deep and credible safe asset markets, as well as the institutional backing that underpins trust in a currency. Ultimately, the key constraints on international currency status remain – as the chapter emphasises – tied to economic fundamentals.

5.5 DISCUSSION OF CHAPTER 4 "REGULATING DIGITAL MONIES", BY JON FROST[222]

Money is getting a makeover. While most of the money that we use today (e.g. bank deposits, e-money) is already *digital*, it is not yet *programmable*, nor (with some exceptions) available for transactions 24/7. It is, however, supported by a time-tested institutional foundation, underpinned by central banks, that allows money to function as money. With advances in blockchain technology, and with rising demand for new features (at least for some use cases), there arises competition between new digital monies. Some have called this the "digital money format war".[223] Among the private monies on offer are stablecoins, tokenised deposits, and tokenised money market funds (MMFs).[224] Chapter 4 looks into the disruptive potential of stablecoins, as compared with these alternatives. It asks how to regulate digital monies to ensure their security and efficiency while preserving financial stability.

What is money... and what should it be?

To answer this, the chapter starts by going back to basics, asking not only what money is, but what it should be. It notes three desirable features of money that promote general acceptance: singleness, transferability, and elasticity.

Two of these features – singleness and elasticity – map closely with those discussed in the chapter in the Bank for International Settlements' 2025 *Annual Economic Report* on the next-generation monetary and financial system.[225] Elasticity, in particular, is a perhaps underappreciated feature of today's monetary system. Both central banks and commercial banks provide such elasticity, both in normal times and stress periods (Table 1). For example, central banks provide settlement liquidity with features like intraday overdrafts that allow wholesale payments to be made without resulting in gridlock. In times of stress, they serve as lender of last resort. Commercial banks provide elasticity with 'regular', run-of-the-mill credit creation, and provide credit lines that borrowers (especially firms) can draw on when stress hits. Such credit lines were an important stabiliser during the Covid-19 shock in 2020, and again during the global

222 The views expressed here are those of the author and do not necessarily reflect those of the Bank for International Settlements (BIS).
223 McLaughlin (2021).
224 Tokenisation involves transforming claims into tokens on a common programmable platform; see Aldasoro et al. (2023b).
225 BIS (2025).

trade tensions starting in late 2024, allowing for a discretionary increase in the money supply to absorb shocks.[226] Incidentally, this is an area of ongoing research, looking at how undrawn credit affects firms in complex production chains[227] and how central bank liquidity affects private liquidity and credit supply.[228]

TABLE 1 **DIFFERENT TYPES OF ELASTICITY IN TODAY'S MONETARY SYSTEM**

	Central banks	Commercial banks
Normal times	Provision of intraday credit for settlement liquidity	"Regular" money creation through credit
Stress periods	Lender of last resort (LOLR) function	Credit lines

Source: Author's elaboration

The third feature – transferability – is very sensible, but is of a somewhat different nature. BIS (2025) offers *integrity* as a key feature for any monetary system to achieve; this entails that the system is protected against illicit activity, such as fraud and financial crime. To some extent, transferability (ease of use) is actually the opposite of integrity, at least when it comes to the ability of illicit actors to use money. The aim there is to *reduce* the ease of use for bad actors. But transferability is a useful benchmark to compare the attractiveness of new forms of money with the existing system, particularly when assessing differences in cost and speed of transactions with different monies.[229]

As the chapter describes well, there are open questions about whether stablecoins truly offer advantages over existing digital monies in the realm of transferability. In many jurisdictions, there are already low-cost, and even 24/7, domestic transfers. This can come from fast payment systems (FPS) – for example, Brazil's Pix, Costa Rica's SINPE Móvil or India's Unified Payments Interface (UPI)[230] – and from digital wallets such as China's AliPay and WeChat Pay or Peru's Yape and Plin.[231]

226 Banerjee et al. (2025).
227 Banerjee et al. (2026).
228 See Chavaz (2026). There is an interesting parallel with the literal elasticity provided by rubber. As Mann (2011) describes at length, the global use of rubber is a key product of the so-called Columbian Exchange. As a natural product from the *Hevea brasiliensis* tree of the Amazon basin and similar trees in Central America, the Maya had already used rubber for many purposes, notably for balls for the Mesoamerican ballgame, at the time of European contact. When the Spanish first encountered these balls, they were – according to written accounts – astounded by the capacity of an elastic ball to bounce and return to nearly the same height. Mann describes how rubber became a key commodity and a major driver (with steel and fossil fuels) of the Industrial Revolution. In much the same way that it is hard to imagine many industrial breakthroughs– from vehicle tires to machine parts to constructional materials – without the elasticity provided by rubber, it is hard to imagine today's financial system without monetary elasticity.
229 Differences in such lists of desirable features for money are common. In her slides for the conference, my co-discussant Elisabeth Noble raises questions around alignment with a modern definition of money; efficiencies; and risks to monetary policy, financial stability, consumer protection and financial sector integrity. The 2022 BIS Annual Economic Report identifies eight high-level goals for money and payment systems to fulfill: (i) safety and stability, (ii) accountability, (iii) efficiency, (iv) inclusion, (v) user control over data, (vi) integrity, (vii) adaptability and (viii) openness (BIS, 2022). Schwartz and Westermeier (2023) critically discuss the latter, and the "curiously botanical" metaphors of BIS work in describing the monetary ecosystem.
230 Aurazo et al. (2024).
231 Andia et al. (2026).

So, beyond an on-ramp and off-ramp to the crypto ecosystem, what do stablecoins actually provide? To better assess the differences in transferability, it is useful to look to an area where stablecoins are often touted as a solution: cross-border retail payments.

Are cross-border stablecoin transfers actually cheaper and faster?

Today, there are substantial frictions in cross-border payments,[232] and it is often argued that stablecoin transfers could be cheaper and faster than existing alternatives.[233] To assess these claims, one method is to use 'mystery shopping', i.e. to collect offers or make actual transactions for a specific corridor. This can allow for a direct comparison of the cost and duration of a transaction using a traditional bank transfer, a money transfer operator (MTO) and hosted wallets using stablecoins.

Table 2 gives key data for one corridor – between Swiss francs and euros – for three CHF 200 transactions conducted in March 2026.[234] The bank transfer involved opening a single online banking app (in this case, UBS), entering the name and International Bank Account Number (IBAN) of the recipient (in this case, at ABN Amro) and the transaction value, and confirming. In this case, for a transfer executed in morning hours on a business day, it was possible to receive €86 minutes later. Costs were not clearly shown up front, but when comparing the sent and received value at current mid-market exchange rates, there was an all-in cost of 1.73%. An MTO transfer (in this case, with Wise) was cheaper and faster. This involved entering the IBAN and other details in the MTO app, which also provided a clear overview of the costs and estimated arrival time up front, and then opening an online banking app to make a bank transfer to the MTO account. The total costs were 0.86%, and the transaction time was 25 minutes.

TABLE 2 **MYSTERY SHOPPING: COSTS AND DURATION OF COMPARABLE TRANSACTIONS**

	Cost	Duration	Observations
Bank transfer (UBS, ABN Amro)	1.73%	86 minutes	Straightforward in one online banking app
MTO (Wise)	0.86%	25 minutes	Two apps; clear overview of costs and estimated arrival time
Stablecoin transfer (Bitpanda, Coinbase)	1.67%	48 minutes	Three aps; least transparent, with highest number of steps

Source: Collected by the author based on three CHF 200 transactions in March 2026.

232 Claessens and Rice (2026).
233 CPMI (2023); Kim et al. (2026).
234 Information collected by the author based on transfers between personal accounts, for research purposes. Choice of providers is arbitrary and does not entail any statement about the firms in question. Admittedly, this example involves the currencies of two high-income economies with substantial trade links and deep financial markets, where costs in the traditional system are not high.

The stablecoin transfer involved three different apps, and by far the largest number of steps: using an online banking app to pay in CHF 200 to a hosted wallet (in this case, Bitpanda), then purchasing USDC from Swiss francs (at the current market price, with a CHF 1.99 trading fee), selecting a network (Base) and transferring the USDC to another hosted wallet (Coinbase), selling the USDC to euro (at the current market price), and then transferring this to the euro bank account. In total, this involved costs of 1.67% – slightly cheaper than the bank transfer, but nearly twice the cost of the MTO – and a duration of 48 minutes. Notably, while the hosted wallets showed certain fees, and market prices, clearly, they did not show the network transaction fee, and balances were quoted sometimes in Swiss francs, sometimes in euro, and sometimes in USDC terms (and thus roughly in US dollars), making it more difficult to directly compare costs.

In short, for this particular retail transfer, stablecoin transactions were not at all cheaper than an MTO using existing technologies. Of course, this is just for one corridor. To get a sense of the potential of stablecoins as digital money in the future, it will be necessary to collect data for additional corridors. Particularly relevant would be transactions between an advanced economy (e.g. the United States) and key emerging market economies (e.g. Mexico) that are also relevant for migrant remittances.[235] It will also be relevant to look at transfers using tokenised deposits (or deposit tokens) and tokenised MMFs. This remains an area ripe for further research.

Some concluding thoughts

Whether stablecoins and other programmable monies will achieve general acceptance is an empirical question. Certainly, there are good reasons to be sceptical of stablecoins' suitability as money in their current form – even with the currently envisaged regulatory frameworks of major jurisdictions – and not to take the bold claims of stablecoin issuers and other private sector parties at face value. Still, the dividing line between "serv[ing] niche purposes" and "mainstream acceptance" may not always be clear. If stablecoins develop further, and if (FX) stablecoins are adopted in multiple emerging market and developing economy (EMDE) contexts – not only those EMDEs with "highly unstable currencies" – then this could become a very large "niche". We should not forget that together, EMDEs have 84% of the world's population.[236] Moreover, if stablecoins are used not just for payments but as the basis for a new (tokenised) financial system, with tokenised lending, real-world assets, parametric insurance, and so on, could this tip the balance and lead to greater uptake than assumed in the base case? These are open questions.

235 It is also relevant to look into different methods for stablecoin transfers into different jurisdictions, such as peer-to-peer (P2P) crypto platforms. For insights into such platforms in one key emerging market region – the Middle East and North Africa – see Archid (2025).

236 To be clear, I am not arguing that stablecoins will be accepted in all these economies nor that they should be. Indeed, if they are widely adopted in EMDEs, (FX) stablecoins could pose many macrofinancial risks (Feyen et al., 2021; Aldasoro et al., 2026. I make this point just to offer some sense of scale.

As I seal the time capsule of this current discussion, I offer a challenge to all those currently active in the debate. Let's return to this discussion five years from now. I suspect that what we see as the desirable features of money will not have changed. But I would welcome the chance to discuss whether the digital monies that we see in use then continue to fulfil these desirable features, and whether the proposals for how best to regulate digital monies are well reflected in the policies enacted in the interim.

5.6 DISCUSSION OF CHAPTER 4 "REGULATING DIGITAL MONIES", BY ELISABETH NOBLE[237]

The design of any policy framework for digital 'monies' should be anchored by an assessment of the long-term societal value to be gained from these new instruments encompassing the following interlinked questions:

- Does a digital 'money' possess, or need to possess, attributes that align with a modern definition of 'money' (as compared to being an alternative means of payment or simply a 'means of exchange') taking account of alternatives?
- Does a digital money offer meaningful potential to foster efficiencies and innovation in payments (e.g. accessibility, cost, speed, use case)?
- Do monetary policy, financial stability, consumer protection, and financial sector integrity risks arise absent action?

A taxonomy of digital monies

There are various kinds of privately issued digital 'monies' but which possess, or need to possess, the attributes of 'money'?

TABLE 1 **ILLUSTRATIVE EXAMPLES OF DIGITAL 'MONIES'**

Commercial bank deposits	Tokenised deposits	Deposit tokens	So-called 'stablecoins'	So-called 'crypto-currencies' such as Bitcoin

The answer to this question hinges in part on what one means by 'money'. The concept can be described using a functional approach or by deploying various theories (such as the State theory of money, the institutional theory of money) or via a combination of approaches.[238] For the present purpose, a 'modern' meaning of money is applied,[239] namely:

237 The views expressed are solely those of the author and do not necessarily reflect those of the European Banking Authority.
238 See Proctor (2023).
239 Elements drawn, with additions and modifications, from the definition in Proctor (2023, para. 1.72).

1. the 'thing' must be expressed by reference to a name and denominated by reference to a unit of account prescribed by the law of a state (e.g. 'euro', 'dollar' – i.e. the 'currency');
    - the currency must be intended to serve as a generally accepted measure of value and medium of exchange;
    - the legal framework must include a central bank or monetary authority responsible for issuing the currency, monetary policy transmission etc.;
2. the 'thing' must be trusted to hold its value such that if accepted for payment today, it will be accepted also tomorrow. Where issued by a private sector entity (e.g. a bank) this trust is achieved by payments settling at par against a common safe asset (central bank reserves) thus preserving the 'singleness of money'.[240]

Of the sample of 'digital monies' referred to in Table 1, clearly commercial bank deposits meet the definition: they are named/denominated in a currency and, when withdrawn and used as a means of (digital) payment, are settled via payment systems with corresponding changes to central bank reserves. Debit (and credit) card payments function similarly and thus are also digital money.

On the other hand, so-called crypto-currencies such as bitcoin, even if accepted by some as a medium of exchange (in the same way one may choose to accept a bag of carrots in exchange for a bag of potatoes), do not meet the definition. For example, they may not be denominated in a specific currency (e.g. a bitcoin is denominated in bitcoin, equal to 100 million satoshi, albeit it can have a trading price expressed in a currency). Moreover, crypto-currencies are typically highly volatile due to the composition of 'backing' assets (if any). Bearing little resemblance to money, nor utility as a widespread alternative means of payment for real economy transactions, such assets may be accommodated in the policy framework as 'investments' (for reasons of investor protection, financial sector integrity, etc).

As for tokenised deposits, deposit tokens and stablecoins a discussion is required before turning to the elements that inform the policy response.

240 A definition is provided in footnote 2 of ECB (2026a): "*The "singleness of money" refers to a situation where all forms of money denominated in the same currency (e.g. central bank money and commercial bank deposits at different institutions) are fully interchangeable at a fixed one-to-one rate, irrespective of the form or issuer. This is based on the combination of (i) the use of central bank money as the ultimate settlement asset and (ii) convertibility of private monies into central bank money at par, which together ensure that within a currency area there are no fluctuating exchange rates between different monetary instruments.*" See also BIS (2025) and Bailey (2024).

Tokenised deposits and deposit tokens

Deposits are typically recorded on traditional ledger systems. While deposits are 'money' and payments can be initiated via electronic instructions (thus 'digital money'), settlement may or may not be immediate depending on factors such as (a) whether 'instant' payments are possible (as in the European Union)[241] and (b) the time at which the payment is initiated (ledgers may be updated only during business hours and not 24/7).

In view of these considerations, some banks are starting to experiment with, and roll out, 'tokenised deposit' or 'deposit token' solutions using distributed ledger technology (DLT). Such solutions may be made available to large corporate clients for relatively low-volume high-value transactions (e.g. for treasury management purposes) or deployed to support other activities (e.g. DLT-based trading).

But what are 'tokenised deposits' and 'deposit tokens' and are they 'money'?

It is important to stress that there are no commonly accepted definitions of these terms and they may be used interchangeably.[242] For the purposes of this discussion, and leveraging the descriptions set out in the European Banking Authority's 2024 report,[243] a 'tokenised deposit' is the recording of the deposit claim of a depositor against the bank on DLT instead of a traditional ledger. A 'deposit token' is something different. For example, a DLT-based token may embody a claim against a deposit account (and associated balance) recorded on a traditional ledger, but transfer from A to B does not result in a transfer of funds; rather a corresponding update of the traditional ledger is still needed. Alternatively, the token may natively record a claim against the bank with respect to some form of repayable funds. Such a token may be tokenised commercial bank money or something else (e.g. a so-called stablecoin).

A tokenised deposit can be regarded as 'money' as the recording on the DLT "does not per se alter the fundamental nature of the claim and its regulatory classification as a deposit".[244] The situation for deposit tokens is more complex because it depends on what precisely the token represents. Indeed, analysis on a case-by-case basis is essential to assess whether such tokens should be properly ascribed the label 'deposit' or whether alternative labelling is needed. What is clear is that that some of these tokens may be regarded as 'money' and others as close substitutes.

241 Regulation (EU) No 2024/886 of the European Parliament and of the Council of 13 March 2024 ... as regards instant credit transfers in euro.
242 See Cecchetti (2025).
243 See EBA (2024a), in particular the Annex on "Models for recording deposits".
244 See EBA (2024a).

Current observed examples are limited in number and scope (e.g. they are typically confined to 'intra-bank' transactions). However, growth is expected in value-added use cases, including corporate treasury management and digital asset settlement,[245] particularly where alternatives are unavailable (e.g. interoperability between DLT-based market infrastructure and central bank settlement systems).

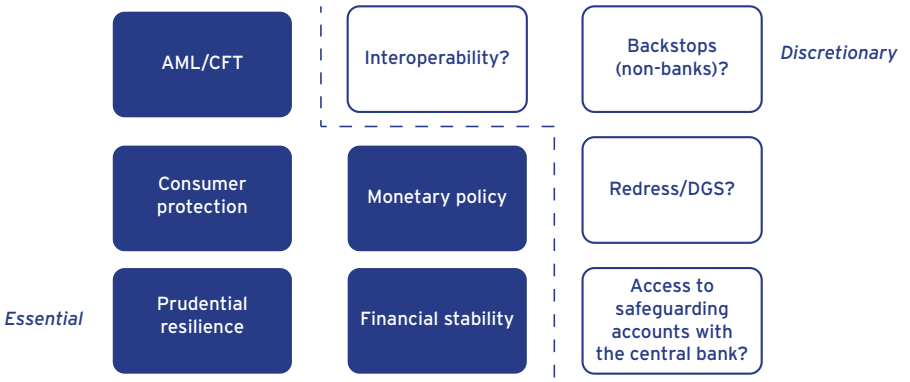
So-called stablecoins

As described by the Financial Stability Board (FSB), stablecoins are an attempt to address the high volatility of crypto-assets by tying the value to one or more other assets, including sovereign currencies.[246] As such, stablecoins have a greater potential to serve as a means of payment but can (or should) they be regarded as money?

Again, one has to look behind the label because the 'tying' mechanism and reference asset(s) may differ. For instance, one could conceive a situation in which a stablecoin purports to maintain a stable value by reference to bitcoin (stablecoin A), whereas another purports to maintain a stable value by reference to the euro (stablecoin B). Applying the definition of 'money', it is clear stablecoin A is not 'money', not least because bitcoin is not a currency. Stablecoin B, on the other hand, does meet the first limb of the definition (reference to a currency), but can it be trusted to hold its value? This is where policy choices come into play.

Recognising the potential for (some types of) stablecoins to bring societal value (e.g. in the context of cross-border payments, programmability etc) some jurisdictions have started to devise policy frameworks (e.g. the European Union, the United Kingdom, the United States). These frameworks may define how value stabilisation and settlement finality is to be achieved and, more broadly, integrate various elements to address public policy goals (see Figure 1).

FIGURE 1 **POLICY ELEMENTS**



245 See, for example, Adrian (2026) and EBA (2024a; 2025)
246 See FSB (2020).

For instance, 'essential' elements typically include measures to mitigate the risk of money laundering and terrorist financing,[247] protect consumers (e.g. via effective disclosures), improve prudential resilience (e.g. own funds, reserve requirements, redemption policies), mitigate risks to financial stability, and preserve monetary policy transmission (e.g. reserve requirements, denomination rules, issuance limits). 'Discretionary' elements may encompass measures to facilitate interoperability with existing payment systems (e.g. access by issuers to settlement accounts), provide central bank safeguarding accounts and backstops (e.g. to prevent reserve asset fire sales),[248] and extend guarantee schemes.[249]

Overall, the choices made may bring certain types of stablecoins within the ambit of 'money' or close to it as credible alternative means of payment. The precise landing point is heavily informed by context. For example, in jurisdictions where a broad range of accessible, low-cost, fast and innovative payment solutions are available and serve well societal needs, the added-value of stablecoins may be limited, and the policy response calibrated accordingly. For instance, stablecoins may not exhibit any meaningful advantage in terms of cost or speed over other available options (see Chapter 4 of this report) and the primary use (and expected continued use) may be as the 'base' asset for crypto-asset trading/investment.[250] This may imply that stablecoins may be accommodated more as an alternative means of payment (within a broad spectrum of options) or as a means of exchange. Indeed, such an approach may be both pragmatic and proportionate, as the policy elements to which reference is made above are not cost-free for the issuer, the user and, potentially, society at large.

The European Union

In the European Union, the Markets in Crypto-assets Regulation (MiCA)[251] was adopted as part of a broader strategy to facilitate responsible digital financial services.[252] It regulates, among other activities, the issue and offer to the public of electronic money tokens (EMTs) – a type of crypto-asset that purports to maintain a stable value by referencing the value of one official currency.

As at the date of the conference, 29 EMTs are in the interim register[253] issued by 19 entities, of which 17 are electronic money institutions (EMIs) (including bank subsidiaries) and two are credit institutions. Additional projects are under development, including by new entrants and banking consortia.

247 See, for example, FATF (2021).
248 See Bindseil (2025).
249 For a discussion in the context of 'traditional' e-money, see IADI (2026).
250 See, for example, ESRB (2025a).
251 Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets.
252 See European Commission (2020).
253 The register is available from the ESMA's website at www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica.

In terms of regulatory specifications, only credit institutions and EMIs can issue EMTs and are subject to various obligations, including regarding white papers and redemption plans. Focusing on the prudential requirements for EMIs, funds received in exchange for EMTs are required to be 'safeguarded' (as is the case for traditional e-money) in order to meet the requirement for redemption at par:

- at least 30% of the funds received (60% in the case of 'significant' EMTs) must be deposited in accounts with credit institutions;
- the remaining funds must be invested in secure, low-risk assets that qualify as highly liquid financial instruments ... and denominated in the same official currency as that referenced by the EMT.

Indeed, while non-bank payment service providers (including EMIs) meeting certain requirements can access TARGET, EMIs cannot access *safeguarding* accounts with Eurosystem central banks.[254]

To date, use of EMTs is centred on crypto-asset ecosystems, rather than 'real world' payments or remittances.[255] This is unsurprising. In the European Union, there is a multiplicity of cheap, fast, innovative payment options enabled by a diverse payment ecosystem comprising banks and non-banks. Wider public-led initiatives are also underway. For example, 'Pontes' will be launched in 2026 to enable DLT-based wholesale transactions to be settled in central bank money; 'Appia' will go further with the aim of building a long-term solution by natively supporting DLT settlements in central bank money.[256] Meanwhile, the ECB is preparing for the potential launch of a digital euro, subject to the conclusion of the co-legislative process.[257]

Outlook

A range of digital 'monies' are expected to serve complementary roles in today's ever-digitising economy. The means by which different types of digital 'monies' are accommodated depends on the overall societal value to be gained from new instruments taking account of the broader payments landscape and policy considerations.

254 Decision (EU) 2025/222 of the European Central Bank of 27 January 2025 on access by non-bank payment service providers to Eurosystem central bank operated payment systems and central banks accounts (ECB/2025/2).
255 See ESRB (2025a).
256 See ECB (2026b).
257 COM/2023/369 Proposal for a Regulation of the European Parliament and of the Council on the establishment of the digital euro.

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The eighth report in The Future of Banking series, part of the Banking Initiative at IESE Business School, examines the challenges digital technology poses to the framework governing money creation. Cash is disappearing from daily payments, private digital liabilities are expanding domestically and internationally, and public authorities are reevaluating the role of sovereign money. The report shifts attention from technological novelty to the institutional arrangements that make money reliable. Its central argument is that the most important questions raised by digital money concern the architecture of the monetary system: who creates money and under what safeguards, how liquidity is preserved during periods of stress, and how the rents and risks associated with money creation are distributed between public and private entities. It examines the social value of private money creation and the need for a central bank digital currency; the implications of cryptocurrencies and stablecoins for the international monetary system and their macroeconomic effects; and the regulatory approach to digital currencies and tokenisation.

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