Tokenised Assets

Pathways for Emerging Market and Developing Economies

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Cambridge Centre for Alternative Finance

UNIVERSITY OF CAMBRIDGE Judge Business School

Financial Innovation for Impact

With the support of

Foreign, Commonwealth & Development Office


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Foreword

The tokenisation of real-world assets has moved from concept to live implementation. Traditional financial institutions and financial market infrastructures are exploring distributed ledger-based rails alongside – and in some cases integrated with – existing systems.

The application of distributed ledger technology to finance has the potential to shape the fabric of the system, changing the actors and processes involved in issuance, transfer, custody and settlement in ways that demand a fundamental rethink of financial regulation. As in previous phases of technological change in finance, a shift to tokenised markets will be determined as much by policy, legal and institutional design as by the technology itself.

Given the constraints and opportunities, what are the pathways for market participants and regulators? These are questions this report explores.

The present regulatory landscape is varied and evolving. Regulatory approaches range from the extension of existing securities frameworks to bespoke regimes. Often rules apply to primary market issuance, but are less developed for custody, transfer and post-trade activities. Questions around operational resilience, settlement finality and consumer protection have yet to be comprehensively addressed and may influence what value tokenisation can realistically deliver.

The rethink of regulation is not happening – and should not happen – in uniform terms. Advanced economies, with mature financial markets and modernised wholesale market infrastructure, have different constraints and incentives from EMDEs, where informal activity is larger, cross-border flows are costlier, and digital financial services have already scaled rapidly through mobile money and fintech-led models. For the former, tokenisation is a question of integration and modernisation; for the latter, a question of whether it can expand who participates in finance, and on what terms. In EMDEs, tokenisation promises to broaden access to financial markets, support financing for micro, small and medium-sized enterprises, and connect domestic projects to international pools of capital.

We are grateful for the support of the Foreign, Commonwealth & Development Office, and for the engagement of the regulators and market participants who contributed to this work. This study is intended to support better-grounded decisions by policymakers, regulators and market participants on how tokenisation can be governed and developed in EMDEs.

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Executive Summary

This study examines the conditions under which the tokenisation of real-world assets (RWAs) can scale responsibly in emerging markets and developing economies (EMDEs). It assesses the market, legal, regulatory and infrastructure factors shaping adoption, taking into account the structural features of capital markets in those economies, including limited liquidity, narrow investor bases, less developed institutional environments, and fragmented infrastructures.

Through a comparative analysis of the state of asset tokenisation in emerging markets, this report evaluates where tokenisation may offer a credible value proposition across stages of the asset lifecycle as well as different asset classes. Real estate, securities and commodities are the subjects of further, in-depth analysis.

This study comes amidst growing evidence that market participants and infrastructures are increasingly exploring the use of Distributed Ledger Technology (DLT) in traditional financial markets. After a decade in which experimentation was concentrated primarily in cryptoasset markets, market participants' focus has broadened to include traditional asset classes and market functions.

The study draws on desk-based research across 23 EMDE jurisdictions, complemented by a survey of regulators. This was further complemented through more than 20 semi-structured interviews with regulators and policymakers as well as interviews with market participants and ecosystem actors. The results were refined through a series of closed-door virtual roundtables.

Key findings of the report include:

Classification of assets and tokenisation approaches

- Tokenised assets exist along a spectrum of design choices. These choices relate to ledger architecture, issuance pathway, custody arrangements, as well as the extent to which lifecycle functions move on-chain, the openness of the underlying network and the distribution channels through which instruments are accessed.
- Classification of tokenised assets requires a multi-dimensional assessment, including an assessment of the underlying asset, the rights attached to the token, the issuance pathway, the custody model, the ledger design and the settlement mechanism.
- While there are different ways in which tokenised arrangements can be structured, four main tokenisation approaches currently dominate markets: native issuance, custodial, collateralised and synthetic structures.

Opportunities and value proposition

- The value proposition of tokenisation derives less from fractionalisation, a key enabler in Advanced Economies (AEs), than from its potential to reduce the administrative costs of small denomination offerings, automate compliance and servicing, improve post-trade processes, support more continuous secondary-market activity and enable composability across platforms.
- A pronounced perception gap exists between industry and regulators: market participants report high levels of strategic priority (4.5/5) and organisational readiness (4.4/5) for tokenisation. However, regulators assess market activity as significantly lower (2.1/5), despite assigning it a relatively high strategic importance (3.9/5).
- Broadening of access to capital is a primary adoption driver for EMDE market participants. Regulators view tokenisation through a financial sovereignty lens, seeking to retain domestic capital from offshore platforms and foreign-denominated instruments. Bringing these together provides an important opportunity.
- A minimum viable ecosystem for scaled adoption comprises appropriate regulatory frameworks, credible settlement infrastructure, mature DPI enablers, the availability of industry functions across the tokenisation lifecycle, and secondary-market and redemption arrangements.
- The asset classes deemed most likely to scale first are those characterised by illiquidity, high intermediation costs and fragmented infrastructure, particularly real estate, public securities, fixed-income instruments and commodities.

Challenges and risks

- Many of the risks present in products and activities in conventional markets persist in tokenised form, but often manifest differently. For instance, fragmentation across competing, non-interoperable DLT networks and the prevalence of custom-built smart-contract standards risk splitting liquidity. Growing interlinkages between tokenised instruments and the broader cryptoasset ecosystem also create new transmission channels for financial stability shocks. Existing supervisory tools may not capture these risks.
- Secondary-market activity for tokenised instruments in EMDEs remains limited, reflecting a self-reinforcing dynamic in which low liquidity discourages participation and weak participation further suppresses liquidity. This challenge is compounded by a lack of on-chain settlement instruments.
- Regulatory and legal frameworks designed for assets in certificate or book-entry form do not always translate clearly to tokenised representations, particularly in EMDEs. The variety of structuring options tokenisation unlocks can also create ambiguity over investor rights and recovery prospects.
- Operational and cybersecurity risks can manifest at the network level (ie node-management vulnerabilities, forking, etc), the smart-contract level (ie coding errors, bugs, etc) or the token level (theft/loss of private keys, custodial failures etc). Programmability can amplify these risks and windows of vulnerability that conventional business-continuity arrangements may not address.
- While fractional ownership models can broaden retail access, many EMDEs face low financial literacy and limited investor protection safeguards. More complex tokenised products, combined with inadequate disclosure standards and weak governance, can heighten consumer exposure to fraud, misselling and operational failure.
- Tokenisation can reconfigure instead of eliminating components of the asset lifecycle, consolidating activities such as clearing and custody into new formats. This shifts supervisory focus towards outsourcing arrangements and the identification of critical third parties.

Policy, regulatory and infrastructure enablers

- Regulatory approaches relating to **RWA**s can be grouped in three broad categories: the extension of existing securities frameworks, bespoke virtual or cryptoasset service providers regimes, and anti-money laundering registration frameworks focused on intermediaries and transactional flows. Applied in isolation, none of these approaches captures the full lifecycle of a tokenised asset.
- In the majority of jurisdictions analysed, regulators have yet to set out and clarify what, when and how regulation applies to tokenised instruments. Where the rules do exist, they focus on primary market issuance. Rules on custody, transfer and post-trade activities remain under-specified.
- The most effective regulatory responses combine experimentation with institutional coordination. Sandbox-based approaches remain the preferred mechanism for testing tokenisation use cases.
- Legal uncertainty persists over the property rights attached to tokens, the enforceability of smart contracts, the status of private keys, and the reconciliation of operational and legal settlement finality.
- Interoperability across Digital Public Infrastructure (**DPI**) layers (including payments, digital identity, registries and data systems) is the defining feature of a viable tokenised market development.

Assessing the value proposition

- A pronounced perception gap exists between industry and regulators: market participants report high levels of strategic priority (4.5/5) and organisational readiness (4.4/5) for tokenisation. However, regulators assess market activity as significantly lower (2.1/5), despite assigning it a relatively high strategic importance (3.9/5).
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This study was conducted by the Cambridge Centre for Alternative Finance (**CCAF**) and Financial Innovation for Impact (**Fii**). with support from the Foreign, Commonwealth & Development Office. It builds on a growing body of CCAF research on digital asset markets, including earlier reports on cryptoasset regulation, central bank digital currencies and tokenised money.[1]

1. For a view of CCAF research on these topics, please visit **https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications**

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- Digital Assets Group
- Libeara
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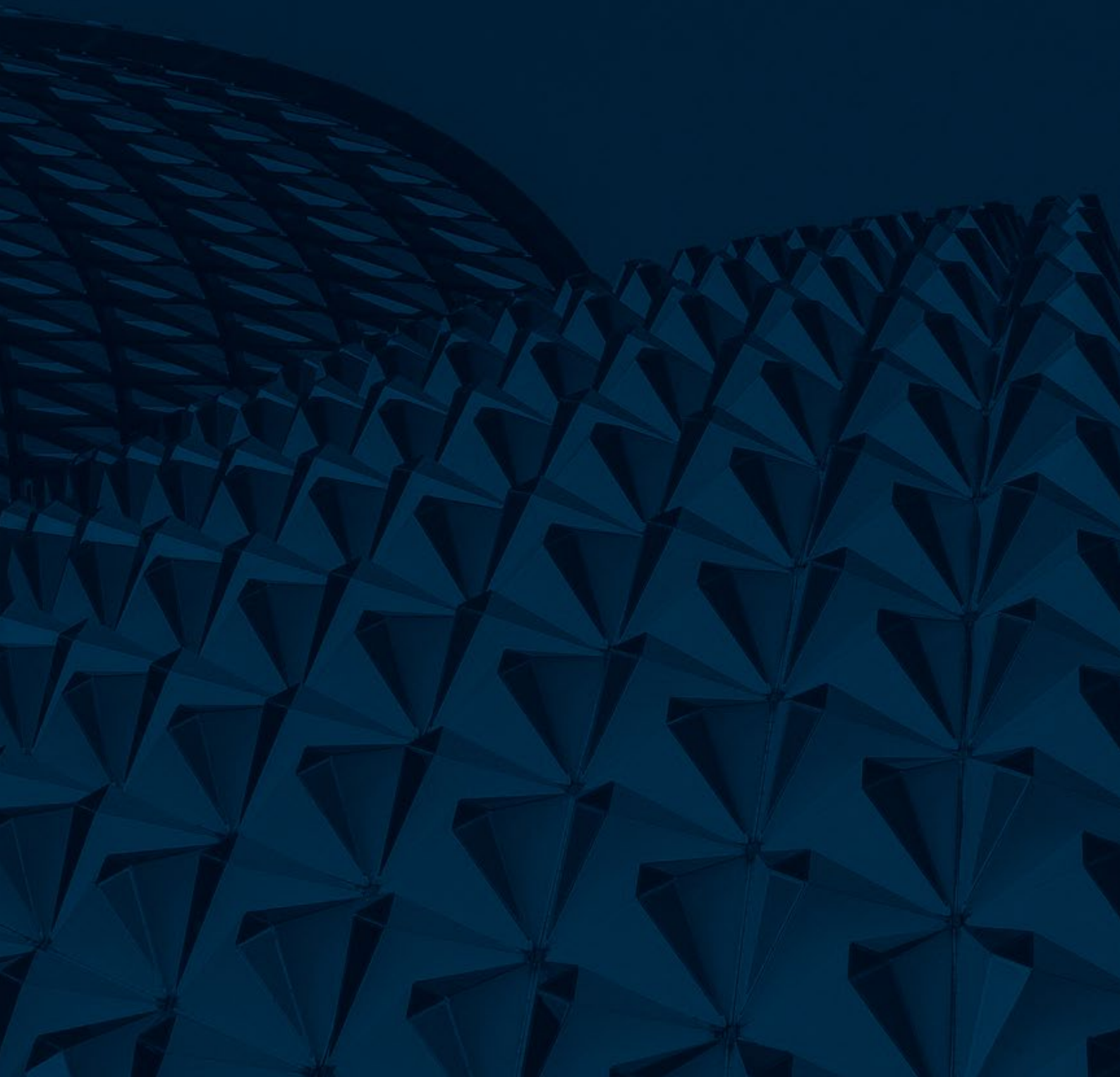
Disclaimer

The views and perspectives shared by individuals interviewed for this research do not represent the formal positions of their respective organisations.

1. Introduction



1.1. Overview: Setting the context

Tokenisation underlies a fundamental shift in the understanding of financial markets as we know today. Enabled by Distributed Ledger Technology (DLT), smart contracts and adjacent advances in cryptography (particularly blockchain approaches), cloud infrastructure and Application Programming Interfaces (**APIs**), tokenisation is no longer a 'digital wrapper' which improves efficiency in traditional markets or an extreme alternative to traditional finance. Instead it is a foundational shift in the infrastructure that underpins issuance, trading, custody and settlement across asset classes in the financial system today, as well as in the way users interact with money and finance, particularly in emerging market and developing economies (EMDEs).

After over 15 years of experimentation in cryptoassets and Decentralised Finance (**DeFi**), the long-term realisable value is shifting towards a combination of monetary and payment frameworks and instruments along with a focus on Real-World Assets (RWAs): financial and non-financial instruments whose value is anchored in legal claims on off-chain rights. In parallel, incumbent financial institutions are moving from proofs of concept and pilots to live implementation in an increasing range of areas, while market infrastructures are exploring DLT-based rails or even beginning to offer them on an integrated basis with traditional systems, as in the context of Project Ensemble. As in other phases of technological change in finance, this evolution will be shaped as much by policy, legal, regulatory and institutional design and market structures as by technology and market dynamics.

1.2. An EMDE perspective on RWA tokenisation

Much of the public debate on tokenisation has been shaped by priorities in advanced markets – fractionalisation, modernising wholesale market infrastructure, improving efficiency of back-office operations, or enabling new forms of institutional liquidity. While these themes are important, they are not aligned with constraints and opportunities of RWA tokenisation in EMDEs. In EMDEs, aspects such as the development and depth of domestic capital markets, large informal sectors and higher costs of cross-border movement of capital and remittances are more relevant. Market development in EMDEs also differs – digital financial services have already scaled rapidly via mobile money, agent networks and fintech-led innovations in many of these markets: in many markets, wallet based approaches for younger demographics already outnumber traditional financial accounts.

Tokenisation can build on these foundations by widening the set of investable assets (including historically illiquid or underutilised assets), maximising efficiencies for micro, small and medium-sized enterprises (**MSMEs**) (for instance, via tokenised invoice financing, trade receivables etc) and by linking domestic projects to diversified pools of capital internationally. At the same time, it can open new channels for capital formation and support more inclusive access to investment opportunities and credit, especially where legacy market infrastructure is fragmented or costly.

Various policy trade-offs follow from the direction of these developments – a permissive approach may attract experimentation, but could undermine market integrity or monetary sovereignty if settlement relies on unregulated forms of tokenised money. A restrictive approach may protect consumers but dampen innovation. These trade-offs can be exacerbated given tokenised assets can be issued, traded and custodied across jurisdictions.

EMDEs are well positioned to leapfrog existing infrastructure and systems and adopt regulatory initiatives tailored to their economic structures and policy goals, to seize the benefits and mitigate the risks of tokenisation. The key question is how this can be guided responsibly, while addressing the operational, financial stability, consumer protection, and financial integrity risks involved.

1.3. Key objectives and motivations

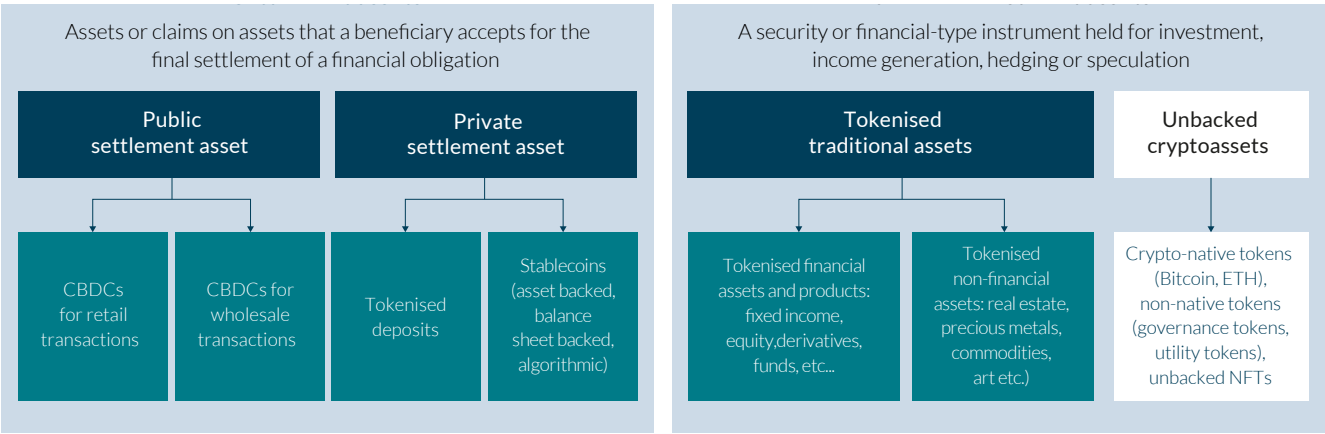
Against this backdrop, the report has three overarching objectives:

- identify promising use cases for RWA tokenisation in EMDEs, including which asset classes are being tokenised;
- investigate legal, regulatory, policy and infrastructure pathways that can enable responsible scaling, including the role of public-sector initiatives (such as policy strategies, regulatory responses, and tokenised money projects);
- draw lessons from first movers and representative jurisdictions and contribute to the growing evidence base on how financial innovation can be harnessed for inclusive growth and deepening of capital markets.

1.4. Scope of assets covered in this study

The landscape of tokenised instruments is broad, encompassing traded or investment assets (an instrument held for investment, income generation, hedging or speculation) and settlement assets (assets or claims that a beneficiary accepts for settlement of a financial obligation). Within this broad delineation, many further categorisations can be made, as shown below.

Figure 1.1: An overview of tokenised instruments categories[2]



2. Adapted from European Central Bank, 'Tokenisation and the future of finance: the role of central bank money' (Nov, 2025), available here.

This report focuses on a sub-category of traded or investment assets – specifically, tokenised traditional assets[3] (ie tokenised financial and non-financial assets). Non-exhaustively, this includes tokenised capital market products (ie bonds, equities, funds, structured products etc), real estate, invoices and receivables, commodities and agricultural assets, and environmental assets such as carbon credits. In other words, any asset whose economic value is grounded in real-economy activity or enforceable off-chain rights can be covered within this scope. This study does not seek to catalogue all such experiments in EMDEs. Its focus is on certain asset classes and activities that are most relevant to EMDEs.

Tokenised settlement assets (such as central bank digital currencies (CBDCs), tokenised deposits, stablecoins etc) are excluded from the scope of this study and addressed only insofar as they interact with the tokenisation of traditional assets.[4] Likewise, the study aims to exclude unbacked tokens without underlying economic value for speculative use cases, although this can often be superfluous given the conflating boundaries between cryptoassets and tokenised traditional assets.

1.5. Report methodology

The study combines desk-based research, combined with semi-structured interviews and a series of roundtable discussions and surveys conducted for regulators on Cambridge Centre for Alternative Finance (CCAF)'s Regulatory Knowledge Exchange (**RKE**).[5] The desk research reviewed the existing literature on this topic and provided the current landscape in RWA tokenisation, market structures and regulatory approaches in EMDEs.

Primary research was conducted through:

- semi-structured interviews with market participants and ecosystem actors involved in tokenisation of RWA (fintechs, development finance institutions, investors, asset managers) and regulators, in selected jurisdictions;
- a survey of regulators via CCAF RKE network;
- a series of closed-door virtual roundtables with market participants and regulators on asset tokenisation.[6]

3. **BCBS** defines 'traditional assets' as assets already captured within the Basel Framework that are not classified as cryptoassets such as cash, deposits, loans, etc. See, **BCBS**, 'Prudential treatment of cryptoasset exposures' (2022), available **here**.
4. See, Cambridge Centre for Alternative Finance (CCAF), 'Tokenised Money: Use Cases, Interoperability and Regulation' (2026), available **here**.
5. The RKE is a peer-led and community driven platform for public and financial authorities to connect and collaborate on their approach to digital financial services and digital public infrastructure. See here: **https://rke.ccaf.io**
6. Three roundtables, comprising of regulators and market participants were held to support this research: (a) 'Tokenisation as a Driver for Growth and Financial Inclusion: Lessons from Emerging Markets' held at the Point Zero Forum in Zurich on May 7, 2025, summary available **here**), (b) 'Tokenisation: The Big Questions' on February 3, 2026 (virtually), and (c) 'Tokenisation of Real World Assets: Pathways for EMDEs', held at Inclusive Fintech Forum in Kigali on March 11, 2026.

1.6. How this report is organised

The remainder of the report is structured as follows.

- Chapter 2 proposes definitions and various dimensions to classify tokenised assets as well as examines token attributes, tokenisation models, and underlying infrastructure;
- Chapter 3 examines the risks, opportunities and challenges for RWA tokenisation. It outlines market conditions and constraints, evaluates benefits and risks, and discusses adoption dynamics, barriers and drivers;
- Chapter 4 provides a market review of current tokenisation activity in emerging markets and an in-depth examination into asset classes and lifecycle activities impacted from tokenisation;
- Chapter 5 surveys the policy, legal and regulatory considerations for real-world asset tokenisation and introduces a toolkit to support regulators and policymakers;
- Chapter 6 examines digital infrastructures (ie payment systems, digital identity, and data-sharing infrastructure) that enable tokenisation;
- In Chapter 7, we assess the value proposition for tokenisation in EMDEs, considering infrastructure implications, costs, changes in the role of market participants, and choice of settlement assets as well as provide recommendations for long-term adoption.

2. Conceptual Foundations

2.1. Defining 'tokenisation'

Digitalisation has been a core feature of financial markets transformation for decades. Tokenisation further digitalises the financial system, where unlike traditional assets that rely on a chain of intermediaries to perform economic functions and capture the transfer of ownership, tokenisation embeds ownership and transfer directly into the asset itself. This marks an evolution in the way assets are represented and transferred in financial markets.

The programmable nature of tokens and related operations, as well as an open and flexible technology stack to build financial products and services, provides tokenised forms of assets with a set of new properties distinct from their 'electronic' or 'physical' counterparts (see Table 2.1).

Table 2.1: Evolution of the way that economic value is represented and transferred

Category	1. Physical/Tangible	2. Electronic	3. Digital assets	
			Tokenised Assets	Native tokens[7]
Example	Paper share certificate	Shares held in a brokerage account	Tokenised security	Security token
Form	Physical asset embodying a set of rights	Data string, representing a set of rights, recorded via private ledger inside closed information system.	Representative tokens on a shared, programmable ledger (DLT or non-DLT) as part of an open information system.	Data string, representing a set of rights, recorded via shared/ distributed and programmable ledger ((DLT or non-DLT) as part of an open information system.
Issuance	Off-chain, manual	Off-chain, electronic	On-chain, Linked to off-chain asset (non-native)	On-chain, native
Proof of ownership	Evidenced by off-chain records	Records held by central securities depository (CSD), custodian, or registrar	On-chain or off-chain records may be the sole or supplementary source of truth	On-chain records as golden source of truth (for reporting, transparency requirements etc)
Holding	Physical possession (bearer instrument)	Intermediated by nature (nominal account)	Direct (via custodial wallets) or off-chain (held with physical custodial arrangements)	Direct via cryptographic key (self-hosted or non-custodial) or custodial wallets
Components	Conventional asset	Dematerialised instrument	Reference asset + token[8]	Token only
Functionality	Medium-dependent limited to basic ownership and transfer	Static (idle)	Dynamic (interoperable) Programmable Automatable Composable	
Settlement	via centralised intermediaries and required delivery of physical asset (up to T+5 for certain assets)	via centralised intermediaries and financial market infrastructures, coordinating book-entry updates across a chain of distinct private ledgers (typically T+2)	Atomic settlement achieved through updating ledger on distributed ledgers + updating and reconciling off-chain records	Atomic settlement achieved through updating ledger on distributed ledgers
Custody	via qualified custodian	via qualified custodian	Custodian (asset) + Flexible custodial arrangements (token)	via flexible custodial arrangements[9]

7. Note that there is no consensus on the definition of a native token in literature, although we refer to it as tokens which are issued only on the ledger and are backed by off-ledger assets that do not serve as their unit of account. For a detailed assessment, see Agur et al (**IMF**), 'Tokenization and Financial Market Inefficiencies' (2025), available here.
8. While the term 'tokenisation' is broadly understood to mean tokens that represents a direct right in (or claim on) an underlying asset, in broader usage it could often be used more loosely to describe any on-chain instrument whose value or payoff is linked to an underlying, including synthetic exposures. This conflation can blur the boundaries between cryptoassets and tokenised instruments and create investor-protection and disclosure concerns.
9. There are a variety of delivery models under this approach, for instance, non-custodial (comprising of software or hardware wallets) or intermediated custody (comprising of direct, subordinated or hybrid custody). Within direct custody, it is possible to have custodial or intermediated non-custodial arrangements. A combination of these methods can also be utilised.

In its essence, a token represents something of value – a claim (of ownership, on cashflows, a right to redemption or other entitlements defined in law) on, or a digitised version of, a real-world asset – that can be legally and/or operationally exchanged on a shared and programmable ledger.[10] By this definition, tokenisation is broadly understood as creation, issuance, or representation of assets on a digital token ledger or programmable platform. Assets recorded in shared, programmable ledgers are designated as tokens or digital assets.

Although there is some convergence, this is not a unanimously accepted definition.[11] Tokenisation models exist on a spectrum – varying according to several design parameters (see Table 2.2): the underlying type of ledger technology, the extent to which end-to-end processes (issuance, trading, settlement, servicing) are brought on-chain versus remaining in traditional systems, the degree to which the ledger is public or permissioned, and the distribution channels supported etc. In addition, tokenisation does not inherently require an infrastructure dependent on DLT – token ownership can be recorded on private, permissioned, or centralised ledgers (besides the fact that the technology underpinning smart contracts predates adoption of DLTs).

Three features distinguish tokenisation from conventional assets:

- programmability (automated execution of financial sector claims without human intervention);
- shared ledgers (which replace bilateral reconciliation);
- settlement finality (in near real time).[12]

10. We refer to the definition of token ledgers used in Aldasoro et al (**BIS**), 'The tokenisation continuum' (2023), available **here**, Committee on Payments and Market Infrastructures (**CPMI**), 'Tokenisation in the context of money and other assets: concepts and implications for central banks' (2024), available **here**, and the Financial Stability Board (**FSB**), 'The Financial Stability Implications of Tokenisation' (2024), available **here**.

11. Various definitions have been proposed by standard setting bodies which converge on this definition. See for instance, the BIS definition as "the process of recording claims on financial or real assets that exist on a traditional ledger on a programmable platform"; International Organization of Securities Commissions (**IOSCO**) as "the process of digitally representing an asset or ownership of an asset" and 'token' is the "represent[tion of] an asset or ownership of an asset. Such assets can be currencies, commodities, securities or properties"; BIS and Committee of Payments and Market Infrastructures (CPMI) "the process of generating and recording a digital representation of traditional assets on a programmable platform."; Basel Committee on Banking Supervision (BCBS) "the process of representing claims digitally on a programmable platform, which has the potential to facilitate new ways of using financial assets to serve end users and unlock new arrangements that frictions in the monetary system have thus far made impractical."; Organisation for Economic Cooperation and Development (**OECD**) "the digital representation of physical assets on distributed ledgers (also referred to as digital twins) or the issuance of native tokens on the blockchain…" and Financial Stability Board (FSB) "the process of creating a digital representation (token) of an asset and putting it on a distributed ledger."

12. See, Adrian (International Monetary Fund), 'Tokenised Finance' (April, 2026), available **here**.

Table 2.2: The Spectrum of Tokenisation[13]

Dimension	Traditional Security	Partially Tokenised	Fully Tokenised
Type of distributed ledger technology used	No **DLT** required. Centralised databases at **CSD**, custodian banks, and registrar (each maintains separate records)	Permissioned DLT (eg Canton, Hyperledger Besu) used alongside existing CSD infrastructure. DLT layer handles selected functions.	Public permissionless or permissioned DLT as sole system of record.
Issuance Process	Off-chain (for ex: legal documentation, book-building via investment banks, allocation, etc)	Origination is primarily off-chain. Tokens are minted on-chain post-issuance as representation on DLT. Dual records maintained.	On chain: smart contract defines terms of issuance. Issuance, allocation, and primary distribution occur natively on the ledger.
Record-Keeping / Golden Source	CSD is the authoritative record (alongside custodians, broker-dealers etc). Reconciliation required across all parties.	CSD remains golden source for legal ownership. DLT provides a synchronised mirror used for operational purposes (eg collateral, reporting etc).	On-chain record is the sole source of truth with no off-chain register.
Trading	Executed via exchanges or over the counter. Matched through trading platforms. Clearing via centralised counterparties	Trading can occur on traditional or DLT-integrated venues. Post-trade matching may use smart contracts, but execution is largely off-chain.	Trading on DLT-integrated trading venues or on-chain decentralised exchanges. Automated matching and execution. No separate clearing step required.
Settlement	T+1 or T+2. Settlement via CSD with cash leg through real-time gross settlement (**RTGS**) or commercial bank money. **DvP** through messaging (eg **SWIFT**).	Token leg settles on-chain (potentially T+0). Cash leg may still settle off-chain via traditional payment rails (including via a synchronisation mechanism with the RTGS to facilitate atomic settlement).	Atomic DvP: both asset and cash legs settle simultaneously on-chain using tokenised money (wCBDC, stablecoin, deposit token etc.). Instantaneous gross settlement, T+0 (with netting) or intraday (with netting)
Custody Arrangement	Qualified custodian holds assets on behalf of investors. Tiered structure: global custodian > sub-custodian > CSD.	Traditional custodian holds underlying/ reference asset. Token may be held in a digital wallet managed by the custodian or investor.	Flexible: self-custody (investor holds private keys), institutional custody via multi-party computation/multisig, or embedded custody within the platform.
Coupon / Servicing	Issuer instructs paying agent. The paying agent distributes via CSD to custodians and ultimately to investors.	Coupon calculated on-chain. Distribution may be automated via smart contract and actual payment flows through traditional cash rails where there is no on-chain cash instrument.	Fully automated: smart contract calculates and distributes coupons in tokenised money directly to wallet holders. Individual coupon flows can also be tokenised.
Compliance	Each intermediary performs own know your customer (**KYC**) and anti-money laundering (**AML**) checks. Transfer restrictions enforced via custodian controls and exchange rules.	On-chain whitelisting for token transfers. KYC may be performed off-chain and synced on-chain.	Compliance logic encoded in smart contract.
Interoperability	Siloed: each CSD, exchange, and custodian operates independently. Cross-border transfer requires correspondent chains.	Blockchain oracles and API connections between DLT layer and other market infrastructures. Limited cross-chain capability, primarily within a single network.	Blockchain oracles, cross-chain bridges and protocols, wrapped tokens, or network-of-networks architectures can enable multi-ledger interoperability.

13. Note: The spectrum is not discrete; many implementations blend elements across columns. A partially tokenised bond may be 'more tokenised' on some dimensions (eg settlement) and 'less tokenised' on others (e.g. issuance).

2.2. Developing a taxonomy of tokenised instruments

There have been numerous attempts to devise an encompassing classification system that categorises and describes tokenised instruments,[14] although no widely accepted taxonomy has emerged so far. This is relevant as classification of tokenised instruments and their functionality is an important first step for regulators in extending existing regulatory principles and imposing rules specific to each asset class, considering the risks they pose.

In determining the classification of tokenised instruments, a preferred approach among regulators has been to look at the economic and financial functions performed by tokens and establish some basic differences. While some classify tokens according to the underlying technology and/or their technical attributes (for instance, a tokenised asset is defined and classified according to its digital form, as a new asset class, which is typically subject to a bespoke set of rules), other classification approaches anchor within existing regulatory regimes by focusing on the legal character of claims.

When used in isolation, current classification approaches can be limiting, as:

- tokenised instruments that cannot be classified under existing legal categories will remain outside a regulatory perimeter despite raising issues which would support their inclusion or may be brought within a regulatory perimeter when not appropriate;
- the dynamic nature of some tokenised instruments means they may simultaneously fall into multiple regulatory categories. As a result, regulators may conflate the form and nature of a tokenised asset and create overlapping or contradicting obligations;
- tokenised instruments may possess characteristics or perform functions that are novel and are not addressed by existing rules, whether or not appropriate.

A consensus around terminology and classification is critical to prevent this conflation. The following indicative set of dimensions (in Table 2.3) can help assess regulators to determine an appropriate classification for various tokenised instruments.

14. These classifications span across legal, regulatory and technical dimensions. See indicatively, International Organization of Securities Commissions (IOSCO), 'Tokenisation of Financial Assets' (November 2025), available **here**; CCAF, 'Legal and Regulatory Considerations for Digital Assets (2020), available here; RWA.xyz Blog, 'A New Framework for Tokenised Assets: Distributed & Represented' (March 2026), available here; U.S. Securities and Exchange Commission, 'Statement on Tokenised Securities' (January 2026), available **here**; World Economic Forum, 'Asset Tokenisation in Financial Markets: The Next Generation of Value Exchange' (2025), available **here**; among others.

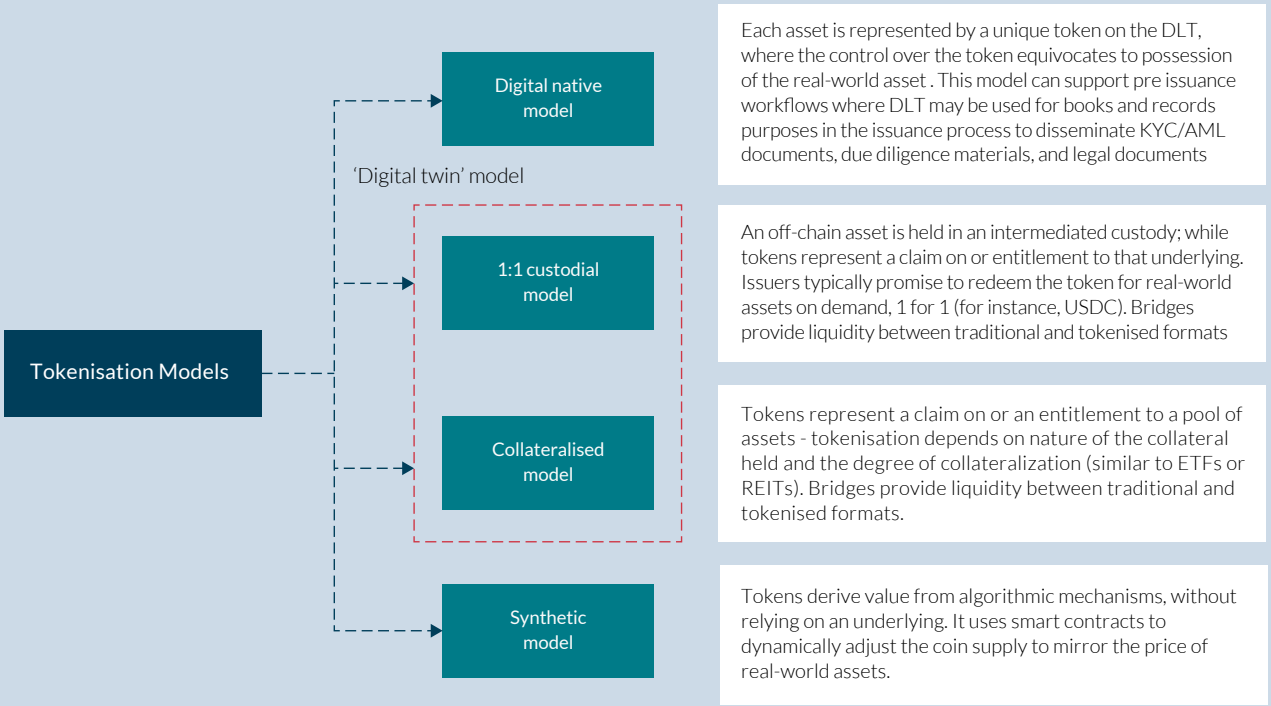
Table 2.3. Indicative dimensions for classifying tokenised assets

Dimensions	Key questions	Examples
Asset category	Does the token clearly identify the underlying asset, specifying its category (e.g.eg bond, equity), issuer details, unique identifiers, available quantity and characteristics essential for valuation, accounting and trading?	• Securities • Government securities • Investment fund • Commodities • Real estate • Derivatives • Tokenised money
Rights conferred	Does the token detail legal and economic entitlements granted to the token holder, such as dividend payouts, voting participation, redemption capabilities or interest payments?	• Direct ownership or entitlement interests (ie full rights associated with underlying securities) • Contractual cash-flow rights (ie claims to future payment streams without ownership rights conferred) • Access or usage rights (ie rights to use goods, services, or resources) • Synthetic exposure (ie economic returns linked to reference assets without ownership or issuer claims) etc.
Issuance	Does the token arise from a new native digital issuance, represent a new virtual tokenisation of an existing on- or off-chain asset, or result from the destruction and reissuance (migration) of an existing asset onto a ledger?	• New issuance (native) • New virtual representation of an existing asset (non-native) (includes either tokens connected with virtual assets/ services or offchain assets/services) • Destruction of an existing asset and reissuance on a ledger (migration)
Type of backing	Is the token redeemable against a reference asset or not?	• Backed by financial instrument • Backed by non-financial instrument
Infrastructure	On what type of ledger infrastructure is the token issued and maintained (eg, public-permissioned, public-permissionless, or private-permissioned), and how does this affect validation, governance, access, and transaction finality?	• Public-Permissioned (Hybrid) • Public-Permissionless • Private-Permissioned
Intended use case and benefits	Is the token designed to function as a distributed asset transferable across wallets and platforms, or as a represented asset confined to the issuing platform, and what functional, liquidity, or efficiency benefits does this structure provide?	• Distributed Assets (ie tokenised assets that can be moved to wallets outside the issuing platform and transferred between wallets) • Represented Assets (ie tokenised assets that cannot be moved to wallets outside the issuing platform or transferred between wallets)
Nature of link between the token and the underlying asset	What legal, structural, or technical mechanism establishes and maintains the relationship between the token and its underlying asset (eg, trust-minimised design, special purpose vehicle (SPV)/ fund structure, or debt-based claim), and how are redemption rights and asset backing enforced?	• Trust-minimised (ex: wrapped tokens) • Trust/Fund/SPV (ex: asset referenced tokens, on-chain treasuries) • Debt (ex: tokenised deposits, stablecoins) • [...]

2.3. Tokenisation models and issuance pathways

While still evolving, current tokenisation models can be classified into four types:

Figure 2.1: Overview of tokenisation models



- In the native issuance model, each asset is represented by a unique token on the **DLT**, where the control over the token equivocates to possession of the real-world asset[15] – for example, a bond whose master register lives on a distributed ledger.
- In a 1:1 custodial model, an off-chain asset is held in an intermediated custody, while tokens represent a claim on or entitlement to that underlying off-chain asset. Issuers typically promise to redeem the token for real-world assets on demand, 1 for 1. This is the dominant model for stablecoins, tokenised money market funds, and many tokenised bonds.
- In a collateralised model, tokens represent a claim on or an entitlement to a pool of assets, as against a 1 for 1 collateralisation in the custodial model. The nature of the collateral held (whether the collateral used to tokenise a real-world asset is the same asset or different assets) and the degree of collateralisation (whether the token is over-, exact-, or under-collateralised) determine the degree to which an asset is tokenised.
- Synthetic model uses blockchain oracles to link off-data such as price feeds or specific market events, to ensure tokens reflect prices of real-world assets.

15. As an example, for a real estate, if the land registry moved to a DLT, the issued token can represent land ownership or if the issuing firm registers the tokens as the native form of its equity, the token can represent the stock certificate.

Within each of these, it is also relevant to consider the configuration of roles, functions and mechanisms that govern how tokenised financial services are delivered – for instance, the type of financial service provided (eg, trading, credit services, lending etc), the operational approach[16] (eg, onchain, off-chain or hybrid), the design of market mechanisms (e.g., order books vs. automated market makers [17]) and supporting ancillary services (eg, bridges, token wrappers and oracles).

From an issuance standpoint, these models can be further mapped to three pathways:

- an asset is created directly on-chain with no prior off-chain existence (for example, a sovereign digital bond issued natively on a permissioned ledger);
- an existing off-chain asset is represented by a new on-chain token. The off-chain asset remains the primary record, with the token acting as a digital twin (for example, a tokenised representation of a fund instrument);
- an existing asset is destroyed in its original form and re-issued on a ledger (for example, a bond that is cancelled in the off-chain registry and re-issued as a native digital security on a DLT-based central securities depository).

2.4. Tokenisation infrastructure

At the minimum, the infrastructure underpinning tokenisation comprises (a) one or more shared and programmable ledgers on which tokens are issued and maintained, (b) smart contracts that encode asset logic, (c) settlement assets used for payment (which may be integral or parallel), and (d) blockchain oracles and interoperability mechanisms connecting on-chain and off-chain environments.

Shared and programmable ledgers

While the use of DLT is not an essential requirement to enable tokenisation, DLT remains one of the most prominent technological implementation pathway for tokenisation of traditional assets. Currently, programmable ledgers serve as a foundational infrastructure that enables the recording, validation and execution of transactions in tokenised instruments.

DLT architectures are commonly differentiated along two dimensions: network accessibility (public vs. private) and user privileges (permissioned vs. permissionless). Notably, in shared ledgers, transacting parties control the assets recorded and instruct the ledger to directly update ownership in transactions. This is markedly different from the way transactions are recorded and processed in the double-entry booking keeping systems, where assets exist in closed ledgers, individually maintained by banks and securities depositories and other intermediaries.[18]

The choice of ledger has distinct trade-offs – while public permissionless networks offer high transparency, they may introduce challenges related to data confidentiality, transaction finality and regulatory compliance. Public permissioned networks mitigate some of these concerns by enabling only verified and authorised participants to interact with specific components of the network. On the other hand, private permissioned platforms are inherently restricted in access and participation to approved entities.[19]

16. A tokenised bond issuance platform may automate issuance and transfer on-chain, for instance, while managing coupon payments and fiat settlement off-chain.
17. AMMs takes the form of a liquidity pool and are the sole counterparty to transactions across different participants. See, Bagnulo, Hernando-Veciana, and Smyrniotis, 'Pooling Liquidity Pools in AMMs' (February 2025), available here.
18. In a shared ledger, the three processes can be collapsed into one, allowing for exchanges in real time and reducing the need for intermediaries or changing their role.
19. While permissioned systems increase concentration risk, it offers substantial efficiency gains as settlement risk is reduced given cash and asset transfers occur on a single platform. See, Adrian (International Monetary Fund), 'Tokenised Finance' (April, 2026), available here.

Smart contracts

Smart contracts are self-executing[20] code deployed on shared and programmable ledgers that encode the rules governing tokens. A key feature of smart contracts is composability (ie a combination and re-use of programmed instructions in new ways, for the creation of new products and transactions) which provides the conceptual basis for replicating and automating financial processes within a single execution environment.

While composability enhances efficiency, it can also introduce risks, for instance, unchecked composability could enable the creation of complex derivative chains, potentially introducing systemic risk through interconnected on-chain products.

Settlement assets

The choice of settlement asset is the foundation for any tokenised market. While options for on-chain settlement assets are still in development, four broad categories have emerged – wholesale CBDCs (representing a direct claim against the central bank), synthetic CBDCs (a settlement asset in central bank money but a liability on a commercial organisation), tokenised deposits (which are the digital equivalent of a traditional commercial bank deposits issued on shared ledgers) and stablecoins. Each of these four types of settlement asset options has distinct trade-offs for tokenised markets (as examined in the next chapter).[21]

Blockchain oracles and other interoperability mechanisms

As DLTs are closed systems, oracle networks are a key mechanism to facilitate bidirectional data flows into and between DLT environments. By providing verified data feeds to be accessed and read by smart contracts, oracles extend the functionality of tokenised assets, as pre-programmed oracles can dynamically respond to market events that sit outside the blockchain environment.

Oracles are fundamental to tokenisation functionality and have developed beyond providing price-feeds. Today, oracle networks can act as an orchestration layer to enable cross-chain transfers and settlement for tokenised assets. This is critical to the effectiveness of interoperability mechanism, as cross-chain transfers include both the asset and relevant instructions to ensure the continuity of operations.

It is unlikely that a single blockchain will be used for tokenisation, there are multiple blockchains being developed with more specialised features, each suiting different tokenisation use cases. A single and general-purpose blockchain network will not be able to scale sufficiently to support existing market volume and cadence, so interoperability mechanisms are a pre-requisite for tokenised financial systems, as they are needed to prevent fragmentation of market operations and liquidity.[22]

20. Smart contracts themselves do not autonomously act to execute code without external stimuli. It requires conditions embedded in the code to be triggered, which would result from user transactions, time-based events, or price feeds retrieved from blockchain oracles.

21. See CCAF, 'Wholesale Central Bank Digital Currencies: Approaches, Implementation Strategies and Use Cases' (Dec, 2024), available **here**; CCAF, 'Tokenised Money: Use Cases, Interoperability and Regulation' (2026), available **here**.

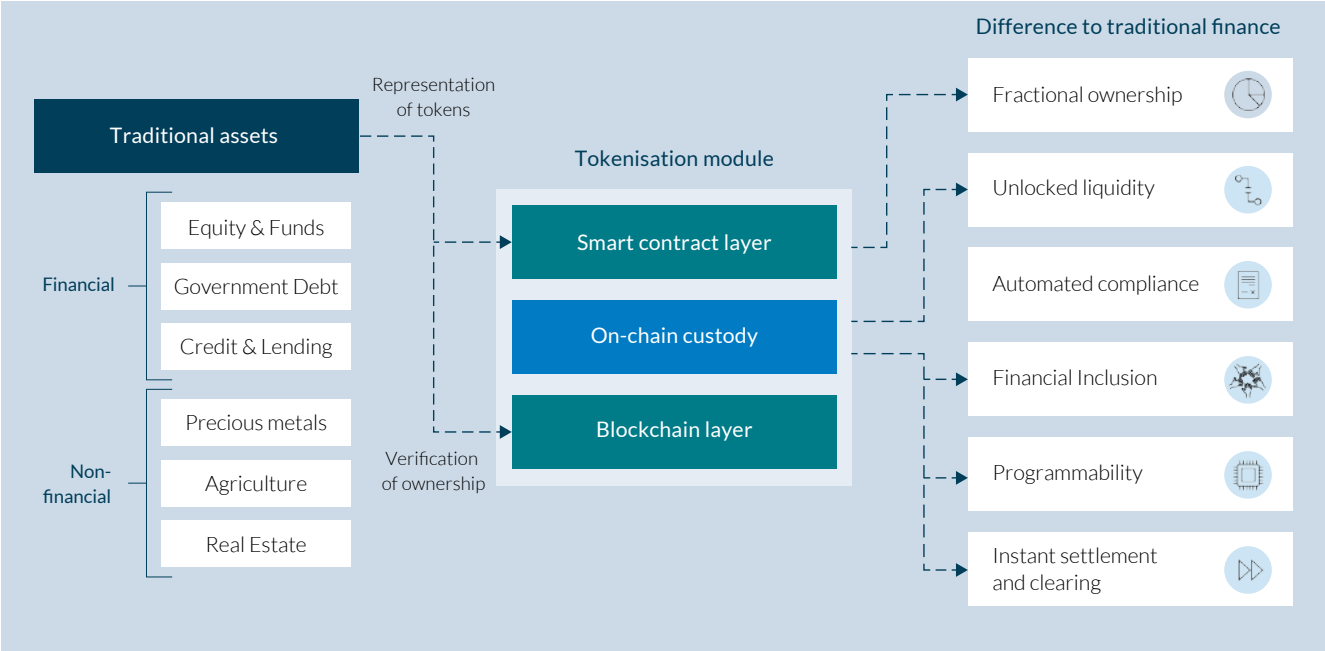
22. Experiments have been conducted recently to orchestrate tokenised asset transactions as a single, coordinated process across both blockchain platforms and traditional systems. See for example, Swift's interoperability initiatives with BNP Paribas Securities Services, Intesa Sanpaolo and Societe Generale – FORGE, on exchange and settlement of tokenised bonds while supporting payments in both fiat and digital currencies, **here**; with UBS Asset Management and Chainlink on bridging tokenised assets with existing payment systems, **here**; with Citi on settling payments between fiat and digital currencies, **here**; with HSBC and Ant International, enabling ISO 20022-based blockchain interoperability on our network, **here**; and with Northern Trust and the Reserve Bank of Australia on exchanging digital asset transactions via a commercial bank account, **here**.

3. Risks, Benefits and Opportunities

3.1. Introduction

The case for tokenisation of real-world assets is compelling in theory: tokenisation can reduce frictions such as information asymmetries, product issuance and search costs, counterparty risks, and high transaction costs that pervade traditional capital markets.[23] While there is some evidence to this,[24] the gap between the potential and adoption is still wide.[25]

Figure 3.1. Tokenisation's value proposition



Much of this current momentum around tokenisation is concentrated in Advanced Economies (AEs) with mature infrastructures, influential incumbents and deep liquidity pools. As against this, activity in EMDEs remains comparatively limited as they face structural barriers. For EMDE regulators, the relevance of tokenisation depends less on technological novelty and more on whether it addresses binding market failures without creating new systemic vulnerabilities.

In this chapter, we discuss these structural barriers, what tokenisation might change, and what stands in the way.

23. See, Agur et al (IMF), 'Tokenization and Financial Market Inefficiencies' (2025), available here.
24. Boston Consulting Group (BCG) estimates tokenised assets could reach USD 16 trillion – roughly 10 percent of global GDP – by 2030. See, BCG, 'The Impact of Distributed Ledger Technology in Capital Markets' (Aug, 2025), available here (hereafter 'BCG report').
25. For example, a 2025 IOSCO survey found that 91% of responding jurisdictions reported nil or very limited commercialised tokenisation use cases. See, IOSCO, 'Tokenization of Financial Assets' (November, 2025), available here. In another study for institutional investors, 55% cited deployment costs as the primary barrier to adopting distributed ledger technology, while others pointed to unclear feature benefits and a deficit of internal expertise. See, Calastone, 'Decoding the Economics of Tokenization: Transforming Cost Dynamics in Asset Management' (2025), available here.

3.2. Capital market conditions in EMDEs: An overview

The depth, efficiency and resilience of capital markets are contingent on a number of structural parameters. Underdeveloped or inefficient markets can lead to macroeconomic vulnerabilities, limited investor bases, lack of capital formation and fundamentally constrained capital-market infrastructure.

The table below examines structural constraints prevalent in EMDEs, drawing on insights from interviews, survey data and desk research.

Table 3.1. Structural constraints in capital markets in EMDEs and Insights from CCAF survey/ interviews

Structural Constraints	Barriers	Insights from CCAF Interviews / Surveys on incremental benefits from tokenisation
Market Fragmentation and Liquidity Constraints	Capital markets in many EMDEs are characterised by shallow secondary markets, fragmented registries and limited price discovery.	Lack of interoperability – a direct consequence of market fragmentation – was rated the highest-severity risk at 3.93/5. Interviewees consistently identified secondary market liquidity as the single most persistent infrastructure gap.
Market Architecture, Intermediation Costs and Post trade inefficiencies	Elevated costs of capital in EMDEs reflect a combination of high intermediation margins and information asymmetries. Multiple layers of intermediaries add cumulative costs to issuance and trading. Cross-border payments in EMDEs can be up to 10x more expensive than domestic transactions,[26] and settlement for some asset classes can extend to T+5. Post-trade processes are dependent on multiple intermediaries, global and local custodians, and CSDs, which results in operational frictions, particularly in time-sensitive transactions such as repos and collateral transfers. Besides, deferrals between trade and settlement execution also introduce counterparty credit risk.	Market participants rated the proposition that tokenisation reduces lifecycle costs versus traditional EMDE issuance at 3.83/5 (n=8), with much of the implied saving arising at the clearing, settlement and reconciliation stages. However, reduction of cost functions as a necessary enabler rather than the core value proposition. At the same time, infrastructure providers rated cost reduction higher than intermediaries and associations, consistent with the view that cost advantages accrue primarily at the infrastructure layer. One infrastructure provider noted that DLT-based infrastructure is "far, far more affordable" than traditional setups in EMDE markets.
Access to capital markets	Many EMDEs face elevated public debt-to-GDP ratios, which constrain fiscal space and crowd out private investment. Government borrowing absorbs a disproportionate share of domestic bank credit, raising interest rates for private borrowers. Limited access to international capital markets compounds the challenge, particularly for lower-income economies and those facing currency depreciation pressures.	Access to capital emerged as the dominant driver in the surveys: 63% of market participants cited "democratisation and access to capital" as the primary driver of tokenisation adoption, and 38% cited "new investor base (diaspora/offshore)".
Governance Constraints	Limited investor protection, weak disclosures and contract enforcement heighten information asymmetries. Traditional reporting infrastructure is often unreliable and creates frictions.	Governance-related risks were frequently cited – for example, market integrity (44%) and AML/CFT (44%) were the two most cited risks overall. Notably, regulators focus on systemic and investor-protection dimensions of governance, while market participants are more concerned with compliance and technical interoperability.
Exposure to Global Monetary Conditions	EMDEs are structurally exposed to global monetary policy cycles, with capital flows sensitive to advanced-economy interest rate differentials. Currency mismatches amplify vulnerability to external shocks. Sudden capital outflows can trigger liquidity crises and sharp currency depreciations.	EMDE regulators and market participants view tokenisation as a strategic tool for financial sovereignty. Regulators rated tokenisation's centrality to current priorities at 3.85/5, with 63% scoring 4 or 5. One infrastructure provider observed that "we see more and more countries looking at the technology as a means to keep capital in-house."
Underdeveloped Alternative Financing Channels	Alternative financing mechanisms, such as venture capital, private equity, etc. remain structurally underdeveloped in many EMDEs. Weak insolvency regimes and limited creditor-rights frameworks constrain non-bank financing growth. MSMEs, which form the backbone of most EMDEs, face particularly acute financing gaps due to collateral requirements, information opacity and high transaction costs relative to loan sizes.	The survey data reveals strong demand for tokenisation across alternative asset classes that are currently underserved in EMDE capital markets. Real estate was the most frequently cited use case for tokenisation (72% of all respondents), followed by securities (61%) and funds (39%). Fixed income and government bonds were cited by 39% and commodities by 33%. Interviewees noted that DLT-based infrastructure is "far more affordable" than traditional financial infrastructure for greenfield EMDE markets, lowering the barrier to establishing new financing channels.

26. See Smets (BIS), 'Cross-border payments – a catalyst for global integration and growth' (2025), available here.

3.3. Intermediation and impact on capital markets in EMDEs

3.3.1. Intermediation in capital markets and implications from tokenisation

Financial intermediation is often understood as the activity of institutions standing between the suppliers and users of capital. In this sense, intermediaries channel funds between savers and borrowers, reducing the frictions that would arise if those parties were to transact directly and, in the case of banks, performing maturity transformation.

The term 'intermediation' can encompass the roles performed by market participants and market infrastructures that make transactions possible, complete, reliable and governable across the capital market cycle. Brokers, dealers, custodians, central securities depositories, clearing houses and settlement systems, among others, do not merely connect counterparties. They also verify instructions, support the transfer and safekeeping of assets, maintain records of entitlements, perform critical risk management functions, and embed market activity within a framework of legal and operational certainty.[27]

This broader and functional understanding of intermediation is necessary in order to examine the implications of tokenisation for capital market's multi-layered structure. Tokenisation cuts across market segments horizontally, affecting multiple activities and processes. Its effects may range from reducing or eliminating certain forms of intermediation to reconstituting them and creating new ones, with important implications for control and accountability.

3.3.2. How tokenisation affects the organisation of intermediation

In principle, tokenisation is associated with the prospect of functional disintermediation, that is, the reduction or elimination of intermediary layers, roles or processes within market activity. Shared ledgers may reduce reliance on multiple records and reconciliations, while programmability may make it possible to automate activities previously carried out through institutional processes.

The expectation that DLT-based arrangements may generate efficiency gains, more streamlined market structures and shorter chains of intermediation is reflected not only in market discourse, but also in official policy discussions.[28],[29] Claims that tokenisation may disintermediate capital markets should nevertheless not obscure the fact that some market and regulatory needs may not be fully addressed through the new technology, and that intermediation models may evolve rather than disappear altogether.

27. **CPSS-IOSCO**, 'Principles for Financial Market Infrastructures' (2012).
28. See, World Economic Forum, 'Asset Tokenisation in Financial Markets: The Next Generation of Value Exchange' (2025), available **here**.
29. OECD, 'Tokenisation of Assets and Distributed Ledger Technologies in Financial Markets: Potential Impediments to Market Development and Policy Implications' (2025), available **here**.

For analytical purposes, it is useful to distinguish between the mechanisms through which tokenisation may affect intermediation and the structural outcomes that those mechanisms may produce.

- **A first mechanism is the automation of activities over a programable technology stack**. Distributed ledgers and smart contracts may allow certain actions to be embedded in code or system-based execution, including transfers of tokenised assets, transfer restrictions, and elements of post-trade workflows such as settlement and reconciliation. This is one of the main reasons tokenisation is associated with efficiency gains. Automation does not always result in disintermediation. An activity may be automated while remaining dependent on institutional governance, legal rules, permissions, data feeds or system operators. Smart contracts may change the mode of performance without resolving questions of legal basis, control or ex post responsibility. From the perspective of market structure, the significance of automation lies not in the disappearance of intermediation as such, but in the possibility that activities once performed through organisational processes may be shifted into code, with corresponding changes in who controls them and how accountability is organised.[30]
- **A second mechanism is the redistribution of holding and control functions**. Tokenisation may alter how assets are held, recorded and controlled, thereby changing the role of custodians and, potentially, clearing houses, central securities depositories and settlement systems. In some settings, more direct forms of holding and control may become possible, including through self-hosted wallets. In others, custody may continue but in altered form, with control distributed differently across intermediaries, infrastructures and end users. Custody models are therefore better understood as existing along a spectrum than as a binary between direct holding and full intermediation.[31] This mechanism is especially relevant because it affects the infrastructure of ownership and transfer rather than merely front-end market access.
- **A third mechanism is the emergence of new infrastructure and service dependencies**. Tokenisation may reduce reliance on some traditional intermediaries while generating reliance on other actors and systems that become critical to the operation of tokenised markets. These third parties often perform a key role in connecting on-chain and off-chain systems. They may include tokenisation platforms, wallet providers, oracle networks, interoperability arrangements, settlement-asset solutions, and other technical or infrastructural control points.[32] In this way, older dependencies may be replaced by new ones.

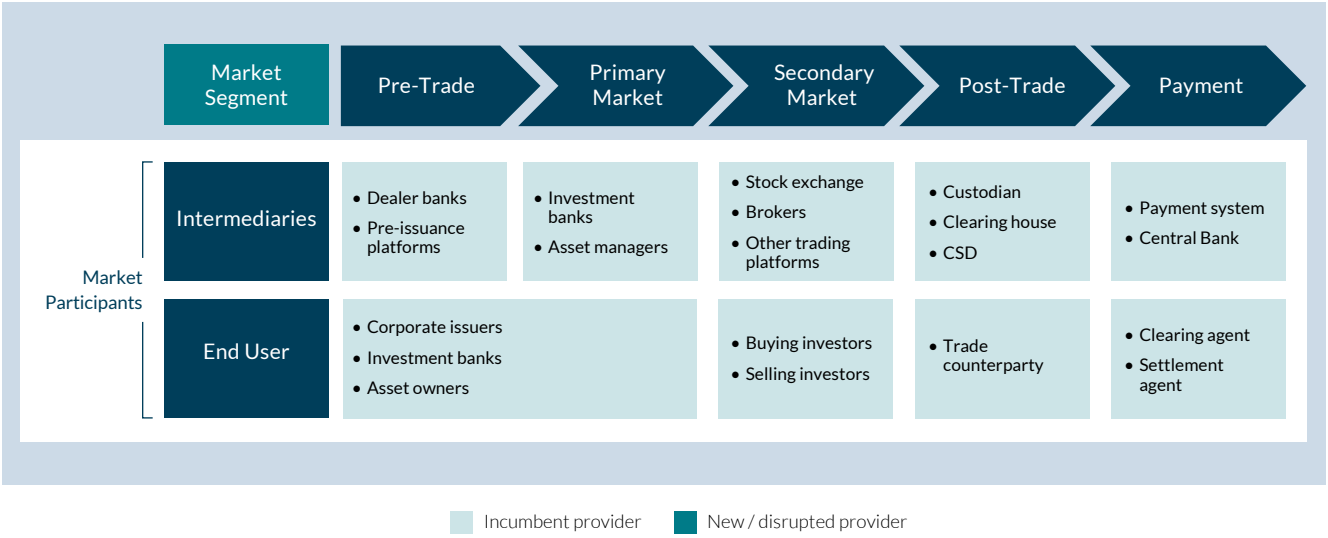
3.3.3. Changing market structures and roles

Capital markets are an organised ecosystem with mechanisms to transfer, allocate and manage financial resources and facilitate related activities. To simplify its structure, intermediaries will establish and facilitate economic flows between the supply of capital and demand for capital. This structure is supported by layered segments, primary and secondary markets that enable the creation and trading of financial instruments, and financial market infrastructures that support post-trade lifecycle events, clearing and settlement, and ongoing safeguarding and servicing of financial instruments.

30. International Organization of Securities Commissions, 'Final Report with Policy Recommendations for Decentralized Finance (DeFi)' (2023), available here.
31. See, Cambridge Centre for Alternative Finance, DeFi Navigator, available at https://ccaf.io/defi
32. Autorité de contrôle prudentiel et de resolution, ''Decentralised'' or ''Disintermediated'' Finance: What Regulatory Response?' (2023), available here.

Each market segment performs functions that support the subsequent layers, creating interdependent relationships.

Figure 3.2. Market participants in traditional markets



- The primary market concerns the issuance of financial instruments through origination, structuring, underwriting and bookbuilding, enabling capital raising and capital formation through investor subscription and distribution;
- The secondary market concerns the trading of financial instruments through continuous multilateral or bilateral exchange, supported by market-making activity that transforms liquidity and enables the transfer of risk between market participants;
- Post-trade functions provide the operational backbone for both primary and secondary markets, managing lifecycle events such as clearing, counterparty risk through collateral arrangements, and settlement;
- Payments, custody and asset servicing provide the administration, maintenance and safekeeping of financial assets, while also serving as a recordkeeping layer alongside central bank accounts and operations.

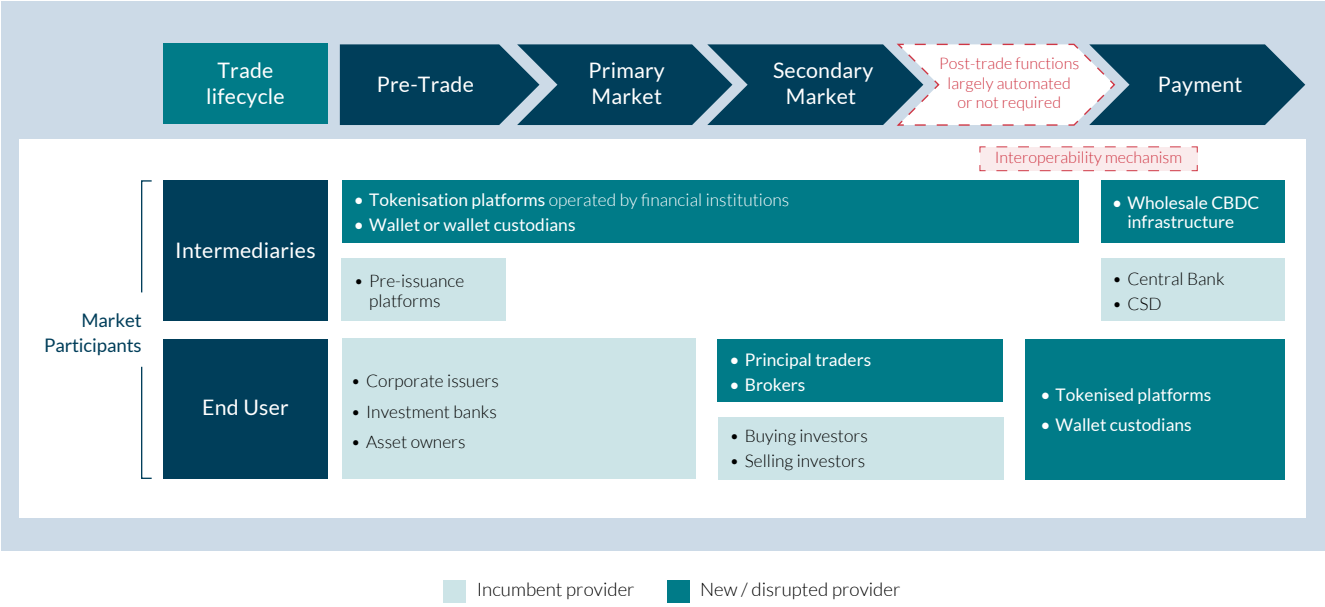
Across the market segments, there are two categories of participants. First, end users who are beneficiaries of financial services and products. Second, intermediaries who provide the financial service and product.

In addition, information services play a critical role and act as the 'cement between the bricks' in this architecture. These include software systems, communication networks, and data benchmarking, generation and storage solutions.

As against this baseline, tokenisation may alter the allocation of functions, control points and dependencies across the capital market cycle, by shifting the trust in intermediation to trust in shared infrastructures and embedded rules. In other words, tokenisation can relocate key functions of market infrastructure – issuance, transfer restrictions, settlement finality, and lifecycle events – into a transparent, auditable and, to varying degrees, automated systems.

Notably, it can collapse some traditionally segregated capital market functions into a single, continuous arrangement. The most widely discussed instance of this is the merging of execution and post-trade functions, which combines the roles of a multilateral trading facility and a settlement system into a single operator, as shown in the diagram below.

Figure 3.3. Market participants in tokenised markets



While such consolidation could deliver significant efficiency gains, it can also exacerbate risks from concentration and competition, and lead to conflicts of interest. For instance, in a scenario where post trade functions are largely automated,[33] trading venues could begin to compete with central securities depositories in providing settlement services, while CSDs could move upstream by aggregating liquidity in competition with exchanges.

A further structural development is the potential role of automated market makers (AMMs) in bridging liquidity – by converting traditional financial instruments into tokenised form and vice versa, while also providing liquidity across fragmented pools.

Alongside disintermediation, tokenisation may also 'reintermediate' new roles [34] – a lending protocol, for example, could separate liquidity provision, collateral management, and interest rate determination across distinct entities or smart contracts. This reconfiguration introduces questions around infrastructure governance, accountability, risk management, and consumer protection that existing regulatory frameworks may not fully address.

As we noted above, the extent of these changes largely depends on the choice of tokenisation model. In a "digital twin" model, for instance, the traditional CSD ledger may remain the authoritative record of ownership given its established legal standing, with the local custodian proposing transaction and ownership changes to the distributed ledger and the CSD verifying that both records match. Whereas, for digitally native assets, the distributed ledger becomes the sole "golden" record of truth. The CSD role in such cases may shift predominantly towards governance – enforcing data standards, determining validation mechanics, and arbitrating disputes – while custodians and other direct ledger participants assume a larger role in proposing and validating ownership updates.

33. This may happen in the first instance for centralised counterparties, whose core functions include netting, margining, and default management can be encoded in smart contracts.

34. See, IOSCO, 'Policy Recommendations for Crypto and Digital Asset Markets: Final Report', available here.

A functional tokenised ecosystem may comprise two types of actors: (a) those which may fall within the scope of regulated financial services, and (b) third-party service providers[35] (ie infrastructure service providers, data and analytics platforms or security/access service providers) who may typically sit outside the regulatory perimeter. While the taxonomy of services in the latter category remains fluid, early initiatives globally suggest they are critical to ensuring data integrity, interoperability, and operational continuity. As tokenised markets evolve, the scope of these actors (or 'critical third parties') will continue to expand.

3.4. Key risks and opportunities

Given the evolving nature of tokenisation, a thoughtful and balanced examination of the value proposition tokenisation provides in emerging markets is essential. The following analysis draws on insights from the interviews conducted by CCAF on key risks and opportunities flowing from tokenisation.[36]

This reflects the view that adoption is still limited and use-case specific, with opportunities and risks depending heavily on implementation design, market structure, and legal architecture.

In evaluating the opportunities and risks from tokenisation initiatives across asset classes, regulators and policymakers may find an assessment framework based on Risk Benefit Analysis (RBA) and Multiple-Criteria Decision Analysis (MCDA) helpful. We provide for an indicative framework in Annex 2 of this report.

Figure 3.4. Risks and opportunities associated with tokenisation

Risks associated with tokenisation

- Technology-related and operational ones (scalability; settlement finality; lack of interoperability; network stability; cyber-risks)
- Governance-related risks (accountability; control and validations; identification-related issues)
- Regulatory risks (e.g. non-compliance)
- Legal risks (e.g. ownership rights)
- Impact on liquidity (bifurcation); price discovery (delinking)
- Transmission of volatility from crypto- to traditional markets for reference assets
- Financial stability risks: liquidity and maturity mismatch; leverage; asset price and quality etc.

Potential opportunities of tokenisation

- Efficiency gains (cost; speed) and productivity gains
- Fractionalisation
- Improved potential tradability of assets with near-absent liquidity
- Faster and potentially more efficient clearing and settlement (DvP)
- Programmability (e.g. automation and conditionality of transactions)
- Enhanced collateral management (mobility; access and posting; reconciliations)
- Enabling "always on" transactions
- Product innovation

35. These may include platform services such as the provision of underlying DLT and the development of smart contracts, blockchain analytics, transaction monitoring, market intelligence, blockchain oracles and other related services, or providers which supply cryptographic key management, access control and multi-party computation services. These ancillary services are essential to the functioning of tokenised markets – for instance, cross-platform asset transfer and verification protocols facilitate interoperability across different networks, token wrapping mechanisms define the conditions under which an underlying asset may be utilised, and blockchain oracles enable smart contracts to execute conditional logic based on real-world events or external data feeds.

36. Although empirical data remains limited, available evidence suggests that the benefits of tokenisation are not merely theoretical. HKMA found economically significant reductions in underwriting fees (approximately 25.8%), yield spreads (23.9%), and bid-ask spreads (5.3%) for tokenised bonds relative to comparable conventional instruments. See, Leung et al, 'An assessment on the benefits of bond tokenisation' (2023), available here. Research under Project Guardian suggests that programmability-driven reductions in cash drag could deliver approximately 24 basis points in cost savings. See, Monetary Authority of Singapore, 'Project Guardian Enabling Open and Interoperable Networks' (2023), available here.

3.4.1 Risks and challenges

In principle, the economic substance of a tokenised asset is, in most cases, the same as that of their conventional counterparts. It therefore follows that many of the risks present in conventional products and activities are also evident in tokenised markets, albeit in ways in which tokenisation may introduce or amplify these vulnerabilities. In this sense, the nature of risks arising from current applications of tokenisation falls chiefly into existing risk taxonomies: legal, operational and technology risks, and to a lesser extent, credit and liquidity risks.

For tokenised assets, however, a primary differentiating factor is the use of distributed ledgers as the technological medium, which can cause familiar risks to manifest in different forms or amplify certain risk categories. We note below that these risks do not materialise uniformly across tokenised arrangements. They are highly contextual, depending on the choice of DLT network architecture, the tokenisation structure adopted, the activities for which the asset is used, and the manner in which it interacts with other assets in the tokenised environment.

These risks comprise (non-exhaustively) of:

- **Fragmentation of tokenised markets and interoperability concerns**

  Current tokenisation landscape is characterised by a proliferation of competing, non-natively interoperable DLT networks.[37] In addition, smart-contract standards are often custom-built and difficult to interpret across systems. When assets and users are spread across multiple networks, this could fragment liquidity. In this sense, a lack of interoperability does not only create technical concerns, but it can also pose challenges in scaling tokenisation. As the Financial Stability Board (FSB) notes, shareability and programmability can also facilitate wider and faster transmission of shocks. [38] Early signs of interlinkages within tokenised markets are already evident: tokenised **MMFs** are increasingly used as stablecoin reserve assets or collateral for crypto transactions, as well as for traditional financial instruments.

  For EMDEs, this is of particular relevance as fragmentation can be amplified due to existing structural constraints (as described in Section 3.2). Where developed markets can absorb some degree of liquidity splitting across platforms, EMDE markets risk further erosion of market depth.

- **Regulatory and legal uncertainty**

  From interviews conducted by CCAF, it is clear that while established regulatory frameworks exist for assets in certificate or book-entry form, the application of these frameworks to tokenised representations is often uncertain, especially in emerging markets. The variety of structuring options for tokenised instruments can create confusion about investor rights and recovery prospects.[39] We analyse these issues in more detail in Chapter 5.

37. IOSCO reports that as of May 2025, financial service entities had adopted at least 72 distributed or programmable ledgers, driven by ten market forces accelerating deployment. See, IOSCO, 'Tokenization of Financial Assets' (November, 2025), available **here**. The OECD has further noted that the majority of these networks are private permissioned ledgers that are not interoperable with one another. See, OECD, 'Tokenisation of Assets and Distributed Ledger Technologies in Financial Markets: Potential Impediments to Market Development and Policy Implications' (2025), available **here**.
38. Financial Stability Board (FSB), 'The Financial Stability Implications of Tokenisation' (2024), available **here**.
39. For non-native tokens, investors may face significant risks where the linkages between tokens and underlying assets are not always transparent or easily understood, with some non-native tokens structured to provide only synthetic exposure rather than direct asset backing. See, IOSCO, 'Tokenization of Financial Assets' (November, 2025), available **here**.

- **Operational and cybersecurity risks**

  Operational risks from tokenised assets manifest through multiple channels: at the network level (node-management vulnerabilities, forking risks, 51% consensus attacks, network congestion etc), at the smart-contract level (coding errors, exploitation of bugs, legal uncertainty around code-as-contract), and at the token level (loss of private-key or theft, custodial failures etc.).

  As also noted before, the speed of execution enabled by programmability can amplify existing operational risks. Moreover, issues with DLT infrastructure may not be immediately identifiable, creating windows of vulnerability that conventional business-continuity solutions may not address.

- **Financial stability risks**

  While some aspects of tokenised markets (such as atomic settlement and transparency) mitigate risks around counterparty and price discovery, the speed and automation exacerbate existing risks or introduces new risks to financial stability. A composable and interconnected tokenised system can result in contagion spreading more quickly (for eg, liquidation cascades [40]). This can complicate supervision and resolution tools given the cross-border nature of tokenised finance. For instance, existing monitoring tools may not capture the dynamics of automated margining, liquidity fragmentation, or algorithmic feedback loops – regulators therefore require tools which can track liquidity in real time on shared ledgers.

- **Consumer-protection risks**

  While tokenisation enables retail investors to participate through fractional ownership models, many EMDEs have low financial literacy and limited investor protection safeguards against tokenised instruments.

  It is possible that more complex financial products given the increased financialisation of assets can exacerbate investor protection risks, as investors are more likely to insufficiently diversify idiosyncratic risks from their portfolios when making trading decisions while at the same time being less incentivised to seek the advice of qualified intermediaries given the additional search effort and costs involved. Combined with inadequate disclosure standards and weak governance mechanisms, this can expose consumers to the risk of fraud, misselling, operational failures etc.

- **Data-privacy and transparency tensions**

  Another challenge arises from the transparency of public DLT networks – the immutability and visibility of on-chain transaction data can cause confidentiality breaches and pose challenges with data-protection requirements. Interviews have also highlighted that the transparency of public chains can create liquidity and market-integrity risks.[41] At the same time, DLT networks can enhance pseudonymity by replacing identifying information with artificial identifiers, which can complicate KYC checks.

- **Reintermediation**

  As highlighted in Section 3.3, tokenisation can introduce new process flows, intermediaries with novel roles (such as tokenisation platforms), and changes to how activities such as clearing and custody are performed – all of which can cause existing risks to manifest differently or new risks to emerge. While tokenisation collapses steps in the transaction flow and asset lifecycle, these steps do not disappear completely, instead they are consolidated into new formats, such as technology infrastructure providers. This emphasises the focus on outsourcing arrangements and the identification of critical third parties.

40. A liquidation cascade occurs when an initial wave of automated sell-offs drives asset prices down further, triggering subsequent forced liquidations.

41. For example, visible transaction flows can exacerbate redemption runs. See Financial Stability Board (FSB), 'The Financial Stability Implications of Tokenisation' (2024), available here.

3.4.2 Opportunities

Tokenised instruments, combined with programmability through smart contracts and the capacity for atomic settlement, can address several well-documented frictions in EMDEs, including information asymmetries, search costs, counterparty risks, and the operational complexity of multi-intermediary post-trade chains.

- **Fractionalisation and expanded access**

  By enabling the division of assets into smaller, tradeable units, tokenisation lowers minimum investment thresholds and expands the range of investors able to participate in asset classes. Note that while fractionalisation is frequently cited as a key benefit of tokenisation, it is not exclusive to DLT – conventional finance already achieves fractional ownership through securitisation, REITs, mutual funds etc. As a matter of fact, both the Financial Stability Board (FSB) and the International Monetary Fund (IMF) have noted that while tokenisation is one potential means to achieve these features, it is not the only means.[42]

- **Enhanced liquidity**

  Tokenisation has the potential to improve liquidity for traditionally illiquid asset classes – real estate, commodities, and private equity – by facilitating secondary trading of fractional interests on a 24/7 basis across platforms. This could help address the structural liquidity constraints that characterise many EMDE markets. However, it is essential to distinguish between the liquidity of the token and the liquidity of the underlying asset, which are not the same.

- **Shared system of records and transparency**

  A shared, immutable record of transactions and ownership can drive efficiencies by reducing information asymmetry. This is particularly valuable in EMDEs where disclosure standards are inconsistent and are characterised by high information asymmetries. The ability for a shared system to serve as a 'golden source of truth' can reduce reconciliation needs, trade errors, and information discrepancies. However, maintaining coherence between on-chain records and off-chain systems remains a challenge, and ambiguity about the legal enforceability of such records can undermine the intended benefits.

- **Programmability and operational efficiency**

  By embedding smart contracts, asset-servicing tasks across the entire lifecycle of a financial asset can be automated – including for instance, compliance checks, interest and dividend calculations, margin calls, corporate actions etc. Ledgers which are shared and programmable deliver concurrent, real-time communication to multiple parties and facilitate efficiencies in price discovery, settlement, and liquidation mechanisms.

  We spoke about the benefits of programmability in detail in our report on tokenised private money.[43] It is, however, worth noting that while programmability features allow tokenised instruments to achieve near-instantaneous settlement at lower cost, this can inadvertently make liquidity management more complex due to the need for pre-positioning of assets and the elimination of netting arrangements.[44] In this sense, programmability introduces a 'paradox' – the risk that smart contracts, constrained in their ability to adapt to unanticipated market events such as contagion effects, may introduce systemic rigidity rather than making markets more flexible.

42. See, Agur et al (IMF), 'Tokenization and Financial Market Inefficiencies' (2025), available **here**; Financial Stability Board (FSB), 'The Financial Stability Implications of Tokenisation' (2024), available **here**.
43. See, Cambridge Centre for Alternative Finance (CCAF), 'Tokenised Money: Use Cases, Interoperability and Regulation' (2026), available **here**.
44. See, BCG report.

- **Flexible custodial arrangements**

  Tokenisation enables a spectrum of custodial models – from direct custody through intermediated arrangements to self-custody. This flexibility is possible at both technical layers and accounting layers. The choice of custody arrangement can impact the application of regulatory requirements, depending on the tokenised asset and the regime applicable to the custodian.[45]

- **Automated settlement**

  DLT-based settlements can make markets more efficient by putting transactions, assets, and settlement instruments on a shared ledger, which reduces reconciliation needs and enables programmable, automated settlement. This supports features like atomic or near-instant settlement, lowering settlement delays, counterparty risk, and operational costs, while improving liquidity and capital efficiency by freeing up collateral. There are several DLT-based settlement options, each with distinct policy considerations (see Table 3.2).

Table 3.2: Settlement options for tokenised assets

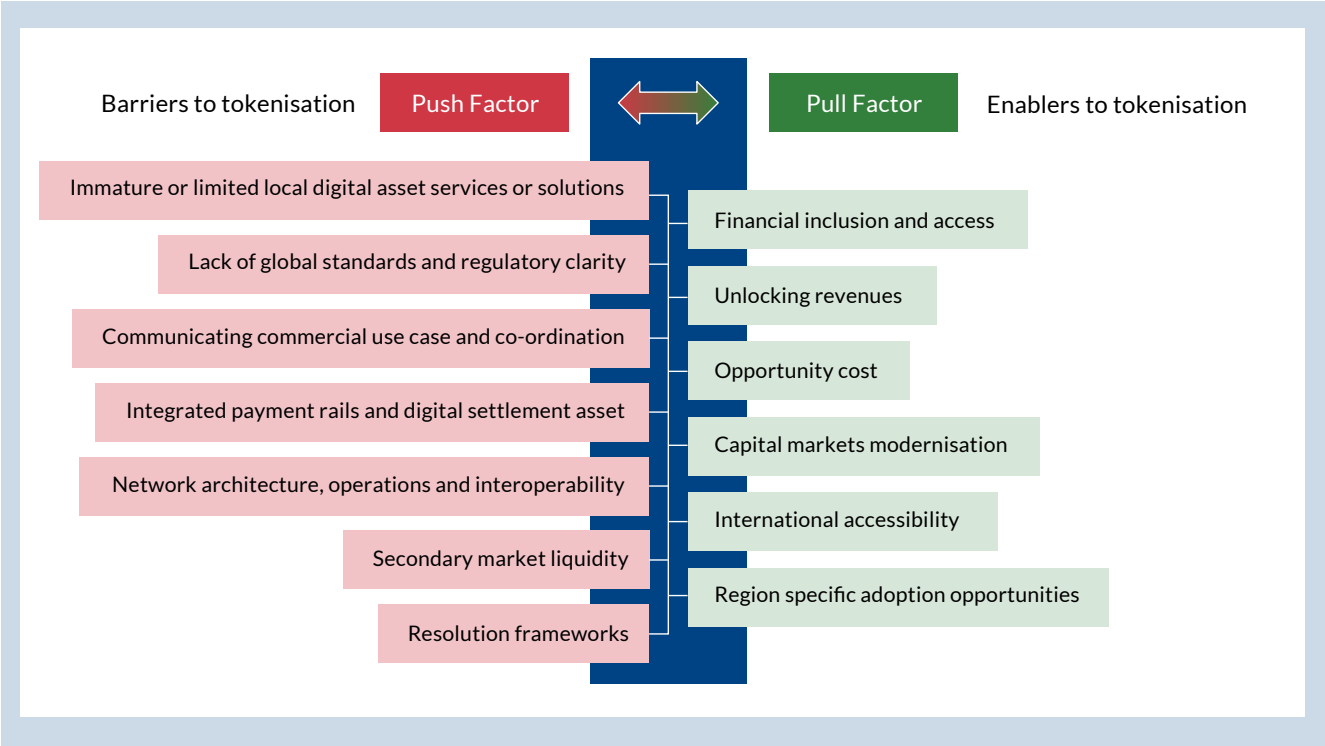
	Wholesale CBDCs	Synthetic CBDCs	Tokenised Deposits	Stablecoins
Holders Rights	Against Central Bank	Against issuer, backed by central bank reserves	Against Commercial Bank, which has access to CB liquidity and deposit insurance	Against issuer and/or backing assets
Reserves	Full	Full	Fractional	Full
Issuer	Central Bank	Regulated FMI	Commercial Bank or Licensed Financial Institution	Private companies and some banks
Identification of user	Required	Required	Required	Not Required
Cross border capability	Potentially high (mBridge, Agora)	Limited (dependent on central bank agreement)	Limited within bank network or via inter-bank settlement (Partior/RLN)	High
Form	Token or Account	Token	Account (or Token in the case of Deposit Tokens)	Token
Settlement Finality	Immediate and final on transfer	High, supported by central bank	Guaranteed by issuing bank	Conditional based on issuer protocol; probabilistic settlement on public chain
Liquidity	High, direct access to central reserves	Moderate to high depending on omnibus account funding	High based on deposit liquidity	High, generally on-chain; redemption risks in periods of market stress
Regulatory Compliance	Central bank compliance and control	Central Bank and Payment Systems Regulator	Strictly regulated	Regulations vary according to jurisdiction

45. As an example, certain types of financial institutions subject to specific regulatory requirements such as collective investment schemes and asset managers are not permitted to operate a direct custody model, and these entities may be required by law to engage qualified third-party custodians for client assets.

3.5. Adoption challenges

Despite growing market interest, the adoption of tokenisation in EMDEs remains limited. This section examines these dynamics, the challenges that constrain scale and the drivers that could accelerate adoption.[46]

Figure 3.5: Drivers and barriers to adoption of tokenised assets



3.5.1. Barriers to adoption

The proliferation of competing, non-interoperable DLT networks is a significant structural barrier to scalability of tokenised markets in emerging economies. In addition, given that the cash leg of most tokenised transactions still settles off-chain, this prevents tokenised instruments from wide scale adoption. The fragmentation of responsibilities across the main stages of tokenisation (ie issuer, asset manager, tokenisation platform provider, and wallet service providers) could also undermine the benefits of disintermediation by instead, re-intermediating market participants.

In addition, without credible on-chain settlement assets, tokenised markets cannot achieve seamless delivery vs payment (DvP). In such cases, adoption can scale only when market participants assess that the benefits of faster settlement velocity outweigh the liquidity and operational costs of transition.

46. OECD, 'Tokenisation of Assets and Distributed Ledger Technologies in Financial Markets: Potential Impediments to Market Development and Policy Implications' (2025), available here.

While tokenising assets opens up opportunities once reserved for institutional investors, it also raises unresolved governance questions. Alongside familiar concerns about investor protection, the choice of DLT adds further complexity – tokenisation may occur on permissioned platforms or on permissionless ones where governance is embedded in code rather than identifiable institutions, meaning safeguards like AML controls and financial stability protections are not automatically built in. This increases risks from opaque protocol upgrades and can fragment markets when there are 'hard forks'. At the same time, it also creates tensions between user privacy and auditability. These features may push regulators towards activity-based supervision, common standards and interoperability between ledgers, and the application of existing rules to gatekeepers such as wallet providers and virtual asset service providers.

Additionally, secondary market liquidity for tokenised assets remains shallow. While token creation and issuance have evolved, the impact on distribution and secondary trading has been limited. A major driver of this is a substantial upfront investment.[47] For EMDEs, there are additional opportunity costs: resources allocated to tokenisation may divert from other pressing financial-sector priorities. In time, the economics are likely to reverse as tokenisation platforms will cost less to run than legacy systems as interoperability and scale improve.[48] A related aspect to this is the fact that infrastructure for tokenised assets (particularly areas such as custody) remains fragmented across regions and asset classes.

Tokenisation does not merely digitalise existing processes – it can also restructure capital markets. Hosting both assets and investors on a common DLT network makes the integration of currently segregated functions (issuance, trading, clearing, settlement, custody) operationally feasible. This could yield significant efficiency gains but may also lead to increased financialisation of assets.

Finally, resolution frameworks, which are designed for market infrastructures that are jurisdictionally bound, remain a barrier to scaling tokenised markets. As transactions in tokenised markets take place on shared ledgers that can operate across borders and assets/liabilities move quickly without a clear geographic location, this creates a mismatch as resolution regimes still depend on jurisdictional control over firms and assets which are locally situated.[49]

3.5.2. Drivers of adoption

There are several drivers which can accelerate adoption of tokenisation in EMDEs. For instance, where large segments of the population remain excluded from formal financial services, tokenisation offers a direct pathway to broader market participation. This is amplified where existing digital infrastructure (eg digital identity, real-time payment rails and data-sharing frameworks) provides a strong foundation for onboarding new participants (see Chapter 6).

EMDEs with nascent financial infrastructure have an opportunity to modernise markets with DLT-enabled systems rather than replicating the legacy architecture of advanced economies. For such markets where transaction costs are high and are operationally fragmented, the efficiency gains from tokenisation are substantial. When combined with growing involvement of major global financial institutions, this can accelerate change. Notably, international initiatives to develop common standards, shared infrastructure, and interoperability frameworks provide pathways for emerging markets to participate in global tokenised markets without bearing the full cost of development. Besides, certain asset classes may present region-specific opportunities – for instance, commodities (precious metals, carbon credits etc) have shown adoption patterns which are shaped by the maturity of local markets and regulatory developments.

These drivers are not homogenous across markets and asset classes, and in many instances, the ecosystem will operate alongside traditional infrastructure in the near term.

47. Industry estimates suggest a focused use case can cost USD 2 million or less, but full integration across custody, trading, compliance, and multiple asset classes requires USD 15–20 million for a mid-size bank and up to USD 100 million for a Tier 1 institution. See, BCG report.

48. Brazil's Pix system, for instance, with initial development costs of approximately USD 4 million generating savings of USD 5.7 billion in its first year – illustrates the asymmetric returns that well-designed digital infrastructure can deliver.

49. Adrian (International Monetary Fund), 'Tokenised Finance' (April, 2026), available **here**.

3.6. Risks

In principle, the economic substance of a tokenised asset is, in most cases, the same as that of their conventional counterparts. It therefore follows that many of the risks present in conventional products and activities are also evident in tokenised markets, albeit in ways in which tokenisation may introduce or amplify these vulnerabilities. In this sense, the nature of risks arising from current applications of tokenisation falls chiefly into existing risk taxonomies: legal, operational and technology risks, and to a lesser extent, credit and liquidity risks.

For tokenised assets, however, a primary differentiating factor is the use of distributed ledgers as the technological medium, which can cause familiar risks to manifest in different forms or amplify certain risk categories. We note below that these risks do not materialise uniformly across tokenised arrangements. They are highly contextual, depending on the choice of DLT network architecture, the tokenisation structure adopted, the activities for which the asset is used, and the manner in which it interacts with other assets in the tokenised environment.

These risks comprise (non-exhaustively) of:

- **Fragmentation of tokenised markets and interoperability concerns**

  Current tokenisation landscape is characterised by a proliferation of competing, non-natively interoperable DLT networks.[50] In addition, smart-contract standards are often custom-built and difficult to interpret across systems. When assets and users are spread across multiple networks, this could fragment liquidity. In this sense, a lack of interoperability does not only create technical concerns, but it can also pose challenges in scaling tokenisation. As the Financial Stability Board (FSB) notes, shareability and programmability can also facilitate wider and faster transmission of shocks.[51] Early signs of interlinkages within tokenised markets are already evident: tokenised MMFs are increasingly used as stablecoin reserve assets or collateral for crypto transactions, as well as for traditional financial instruments.

  For EMDEs, this is of particular relevance as fragmentation can be amplified due to existing structural constraints (as described in Section 3.2). Where developed markets can absorb some degree of liquidity splitting across platforms, EMDE markets risk further erosion of market depth.

- **Regulatory and legal uncertainty**

  From interviews conducted by CCAF, it is clear that while established regulatory frameworks exist for assets in certificate or book-entry form, the application of these frameworks to tokenised representations is often uncertain, especially in emerging markets. The variety of structuring options for tokenised instruments can create confusion about investor rights and recovery prospects.[52] We analyse these issues in more detail in Chapter 5.

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- **Operational and cybersecurity risks**

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➤ **Consumer-protection risks**

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  It is possible that more complex financial products given the increased financialisation of assets can exacerbate investor protection risks, as investors are more likely to insufficiently diversify idiosyncratic risks from their portfolios when making trading decisions while at the same time being less incentivised to seek the advice of qualified intermediaries given the additional search effort and costs involved. Combined with inadequate disclosure standards and weak governance mechanisms, this can expose consumers to the risk of fraud, misselling, operational failures etc.

- **Data-privacy and transparency tensions**

  Another challenge arises from the transparency of public DLT networks—the immutability and visibility of on-chain transaction data can cause confidentiality breaches and pose challenges with data-protection requirements. Interviews have also highlighted that the transparency of public chains can create liquidity and market-integrity risks.[54] At the same time, DLT networks can enhance pseudonymity by replacing identifying information with artificial identifiers, which can complicate KYC checks.

- **Reintermediation**

  As highlighted in Section 3.3, tokenisation can introduce new process flows, intermediaries with novel roles (such as tokenisation platforms), and changes to how activities such as clearing and custody are performed—all of which can cause existing risks to manifest differently or new risks to emerge. While tokenisation collapses steps in the transaction flow and asset lifecycle, these steps do not disappear completely, instead they are consolidated into new formats, such as technology infrastructure providers. This emphasises the focus on outsourcing arrangements and the identification of critical third parties.

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54. For example, visible transaction flows can exacerbate redemption runs. See Financial Stability Board (FSB), 'The Financial Stability Implications of Tokenisation' (2024), available here.

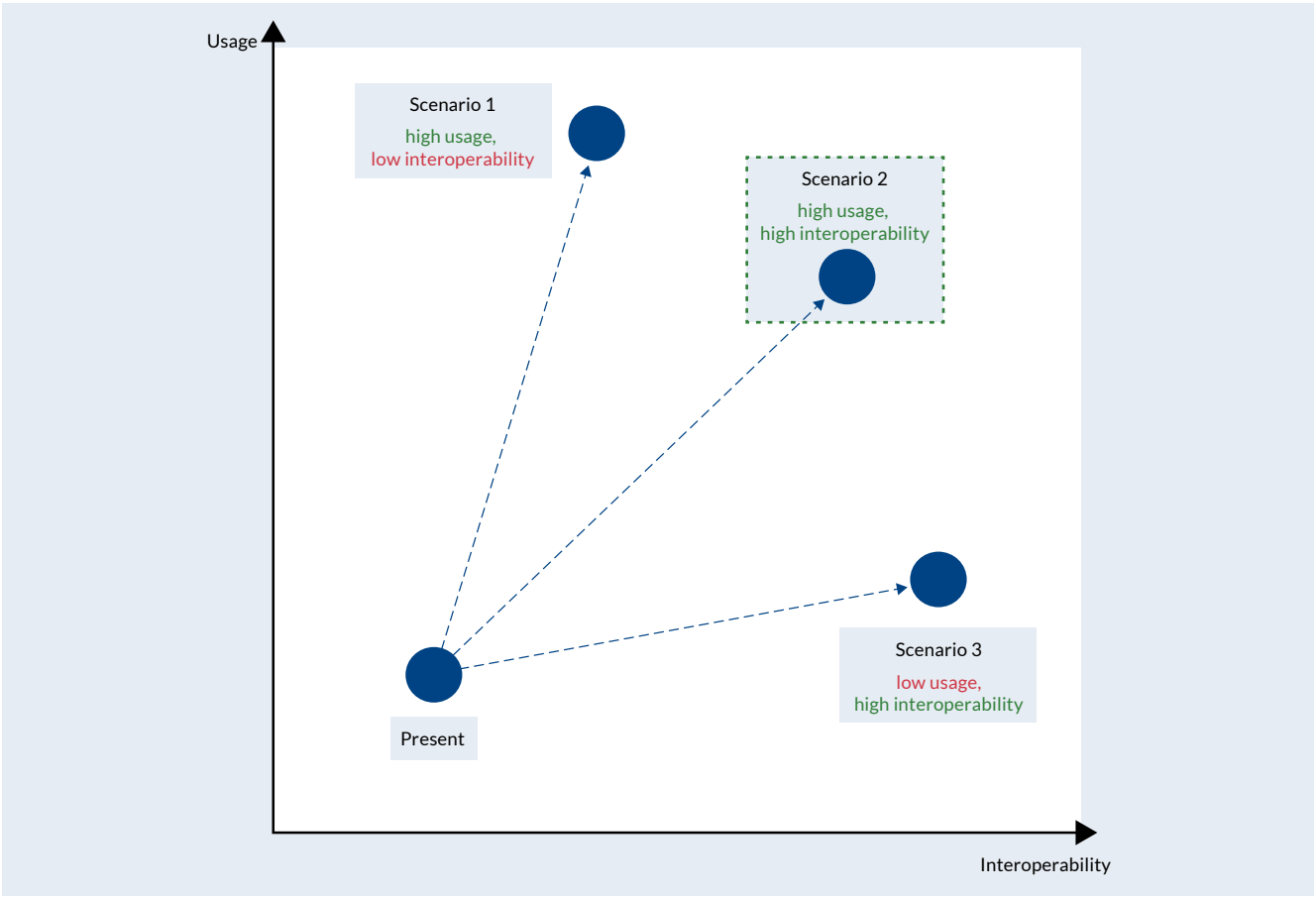
3.7. Future Outlook

While there are many variables that define the outlook for the digitalisation of capital markets, two factors are particularly noteworthy: (a) the level of tokenisation usage and (b) the degree of technological interoperability.

Usage captures the rate at which capital markets implement solutions that leverage tokenisation technologies to improve existing market functions and infrastructures, and the degree of technological integration. This variable also measures the necessary infrastructure and regulatory frameworks for tokenised markets to scale and be embedded as business-as-usual operations.

Interoperability refers to the degree to which participants of tokenised platforms and markets can easily interact with each other and seamlessly transfer assets without technological friction. Orchestration across different blockchain networks allow for ease of information sharing and transfer of tokenised assets. This variable also includes the necessary interoperability mechanisms that make it easier for non-tokenised markets to interact with those that are tokenised.

Figure 3.6: Three scenarios for the future state of tokenisation in capital markets

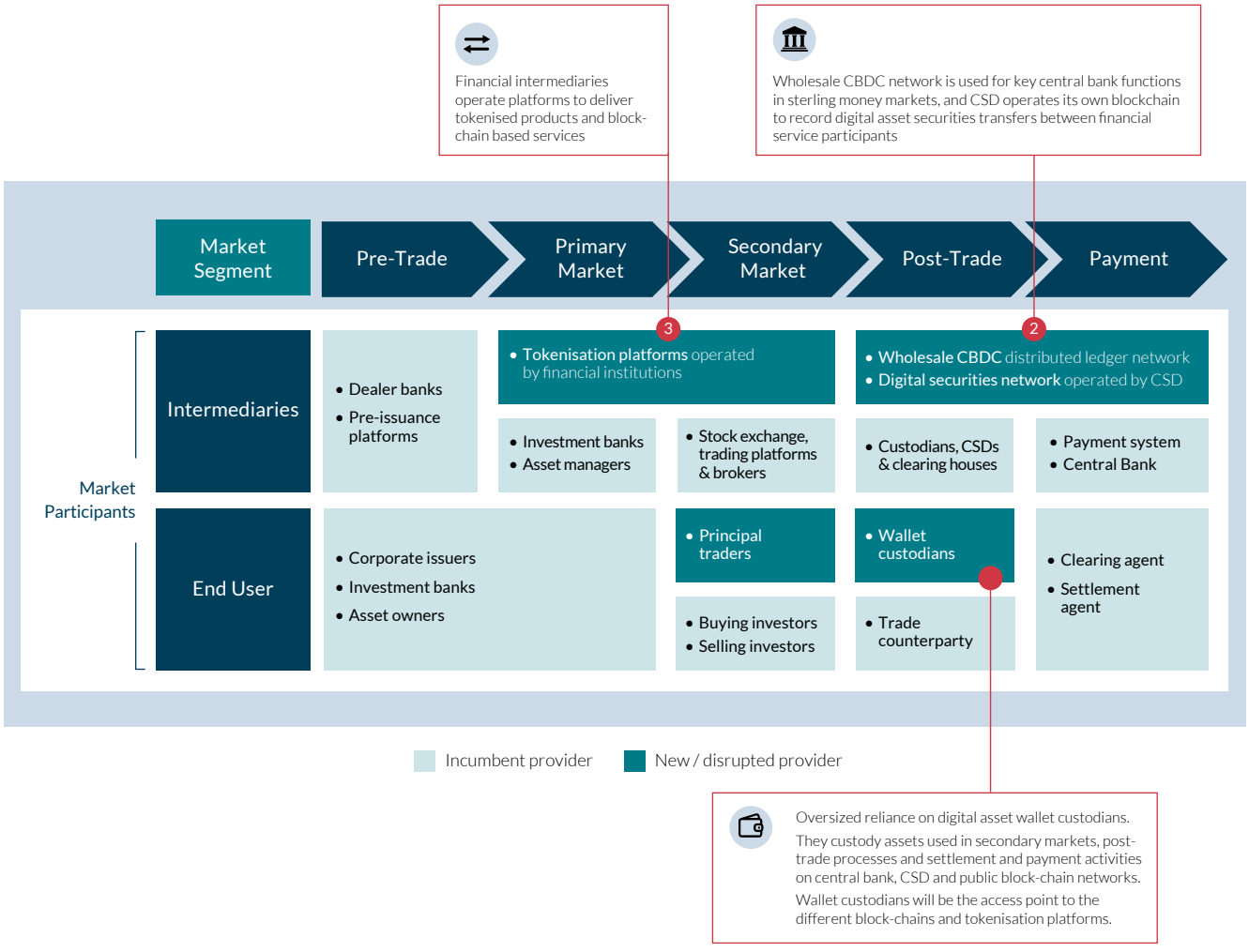


Although the two variables could in principle produce four combinations, the analysis below focuses on three scenarios in which tokenisation has sufficient relevance to affect market architecture. A low-usage, low-interoperability outcome is excluded because it would represent limited adoption without meaningful architectural implications.

In our opinion, the future of tokenised markets will depend on the push and pull factors of adoption outlined above, as well as realisation of the opportunities on the spectrum of possibilities as follows.

- **Where usage is high, but interoperability is low**: In the scenario of high usage, low interoperability, tokenisation is highly integrated with the delivery of financial services.[55] Tokenised solutions have been implemented at scale and across the different market segments because there is access to wholesale CBDCs and new forms of digital (DLT-based) financial market infrastructures. These infrastructures develop following regulatory reforms and initiatives to move away from legacy infrastructure and post-trade processes to more efficient and programmable rails. However, strict regulations safeguard and segregate existing responsibilities. This means traditional intermediaries continue to exist, particularly as operations and DLT networks need to be ring-fenced and controlled to meet regulatory requirements, contributing to a low interoperability environment. As a result, there is a small number of new market entrants and limited disruption to existing intermediaries. This end-state reduces fragmentation. Any remaining operation of legacy systems is considered a transitional cost to ensure continuity and resilience of financial markets.

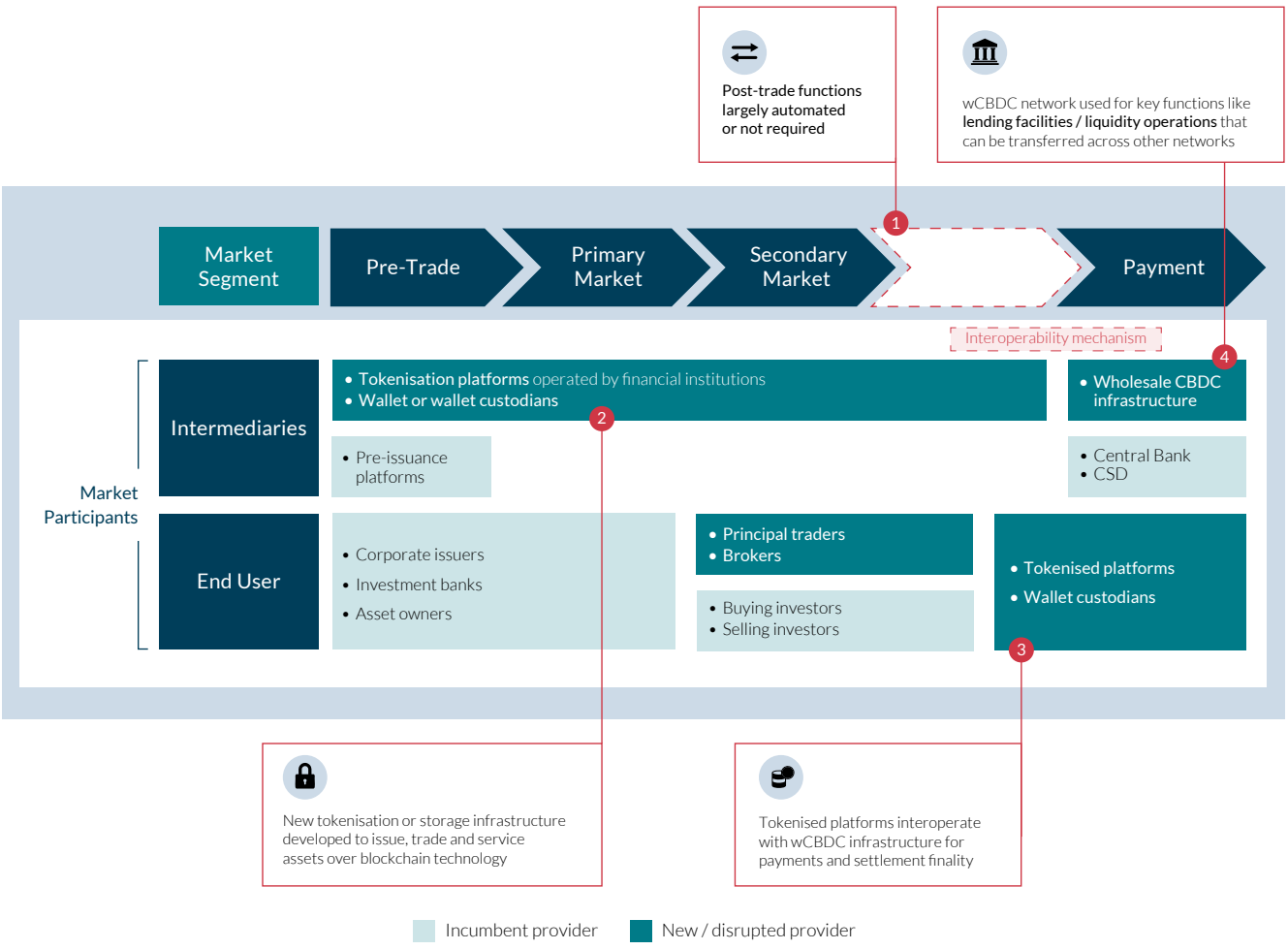
Figure 3.7: Architecture of capital markets in high usage and low interoperability scenario



55. This scenario assumes that regulated financial institutions and FMIs adopt tokenisation at scale, supported by wholesale CBDC, CSD-operated DLT networks and private or public-permissioned infrastructures. Adoption is driven by regulatory reforms and institutional investment in programmable settlement and post-trade processes. However, interoperability remains limited because tokenised networks are ringfenced for regulatory, operational and resilience reasons. As a result, traditional intermediaries remain central, while wallet custodians and technology service providers become more important access and infrastructure layers.

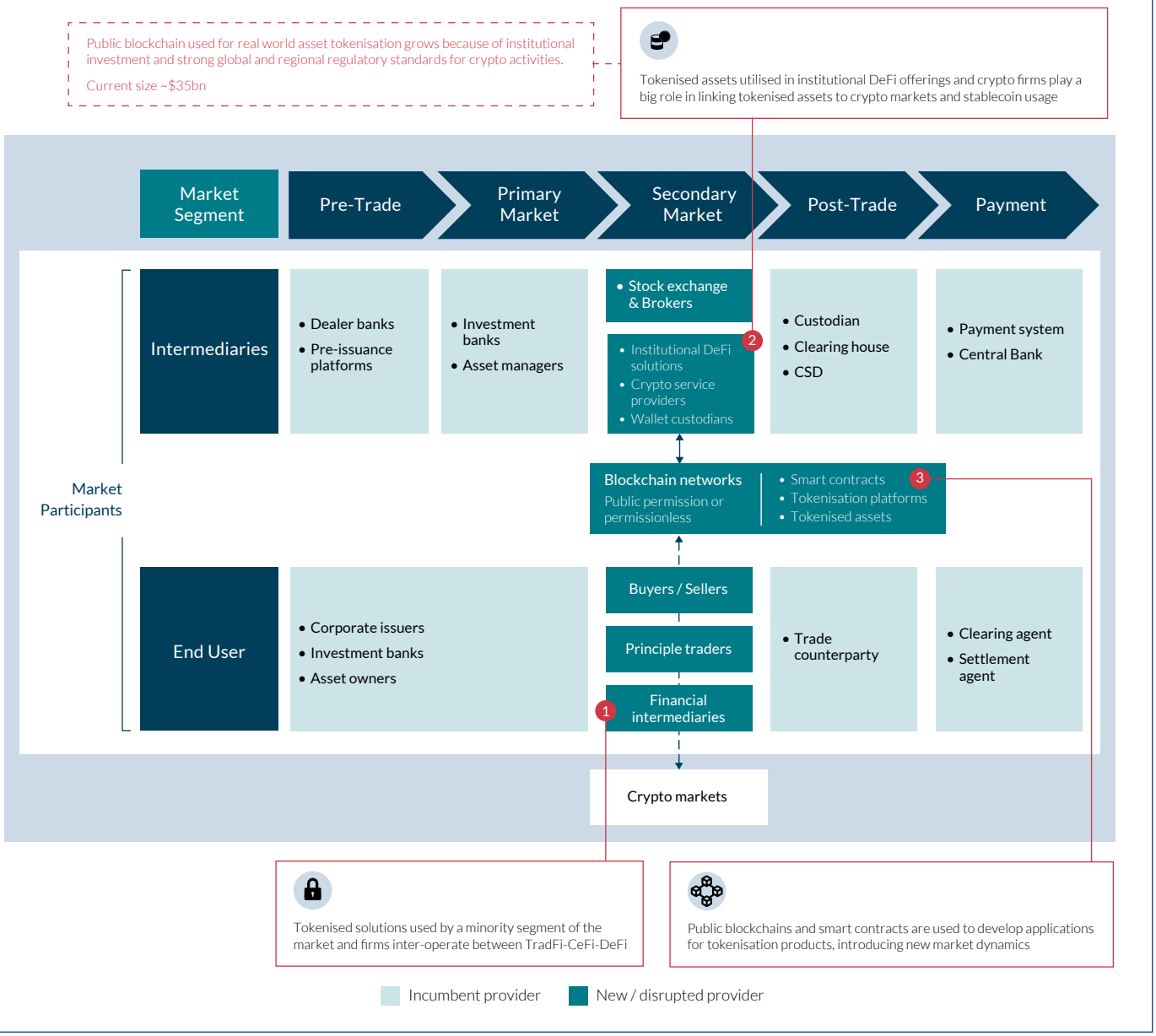
- **Where usage is high, and interoperability is high**: In this scenario, traditional financial intermediaries exist in a limited capacity. Disintermediation of post-trade services means that financial market infrastructures are replaced or adapt to become technology providers, resulting in the redundancy of the post-trade market segment. Traditional chains of intermediation collapse, as activities are vertically integrated within a single interoperable tokenisation platform. Financial intermediaries develop applications to deliver existing or new products and services to their clients. These clients can self-custody or rely on a custodian to manage their blockchain wallet. Smart contracts perform a central operational role by automating financial activities and post-trade processes, including execution, collateral management, settlement and asset servicing. This also enables new market mechanisms, such as automated market maker-based liquidity pools, which may replace or compete with traditional forms of liquidity provision. At the same time, a wholesale central bank digital currency (CBDC) network functions as a core settlement and liquidity layer, interoperating with tokenised platforms to support payment and settlement finality. This environment allows many new market entrants (eg, oracle networks). Because of the critical functions performed by technology service and infrastructure providers, financial regulators take a more direct approach to regulation, to ensure operational resilience and soundness of these new intermediaries, within which financial activity is concentrated.

Figure 3.8. Architecture of capital markets with high usage and high interoperability



- **Where usage is low, but interoperability is high**: In this scenario, institutional crypto and DeFi providers play a key role in connecting tokenised markets with cryptoasset markets. Both tokenised and cryptoassets operate on the same underlying public permissionless blockchains, allowing participants that engage with tokenised products and services to benefit from the innovations and efficiencies developed in the cryptoasset ecosystem. Tokenised solutions are used by a minority of market participants, with firms operating across traditional finance, centralised cryptoasset markets and decentralised finance. Tokenised assets are primarily used within institutional DeFi offerings and other public blockchain-based applications. Public blockchains and smart contracts provide the infrastructure for these products, introducing new market dynamics derived from the cryptoasset ecosystem, including direct wallet-based access, programmable execution and interaction with stablecoin liquidity. However, because adoption by traditional financial institutions remains limited, these dynamics are largely contained within the tokenised sub-sector rather than reshaping capital markets as a whole.

Figure 3.9: Architecture of capital markets in low usage, high interoperability scenario



The eventual structure of tokenised capital markets will be shaped by at least three forces. First, technology that may not only automate existing activities but also generate new dependencies and new categories of intermediaries (ie reintermediation). Second, market participants, both incumbents and challengers, who may respond differently to these possibilities, either seeking to embed tokenisation within existing infrastructures and business models or using it to bypass, unbundle or reconfigure them. Third, regulators, who may influence these developments through legal and regulatory reform, supervisory expectations and infrastructure policy initiatives, including by prescribing forms of intermediation and eliminating others. The resulting pattern of change may differ materially across market segments and jurisdictions.

4. Products and Activities

4.1. Overview

There is growing empirical literature that tokenisation can impact financial markets by (a) creating new asset classes (ie financial sector products), (b) disrupting the various stages along the lifecycle of a financial asset (ie financial sector activities) and (c) increasing function/features of existing markets.

In this chapter, we present findings on the impact tokenisation can have on these fronts. We also deep dive into three use cases that are driving the adoption of tokenisation of RWAs in emerging markets: real estate, equities, and commodities.

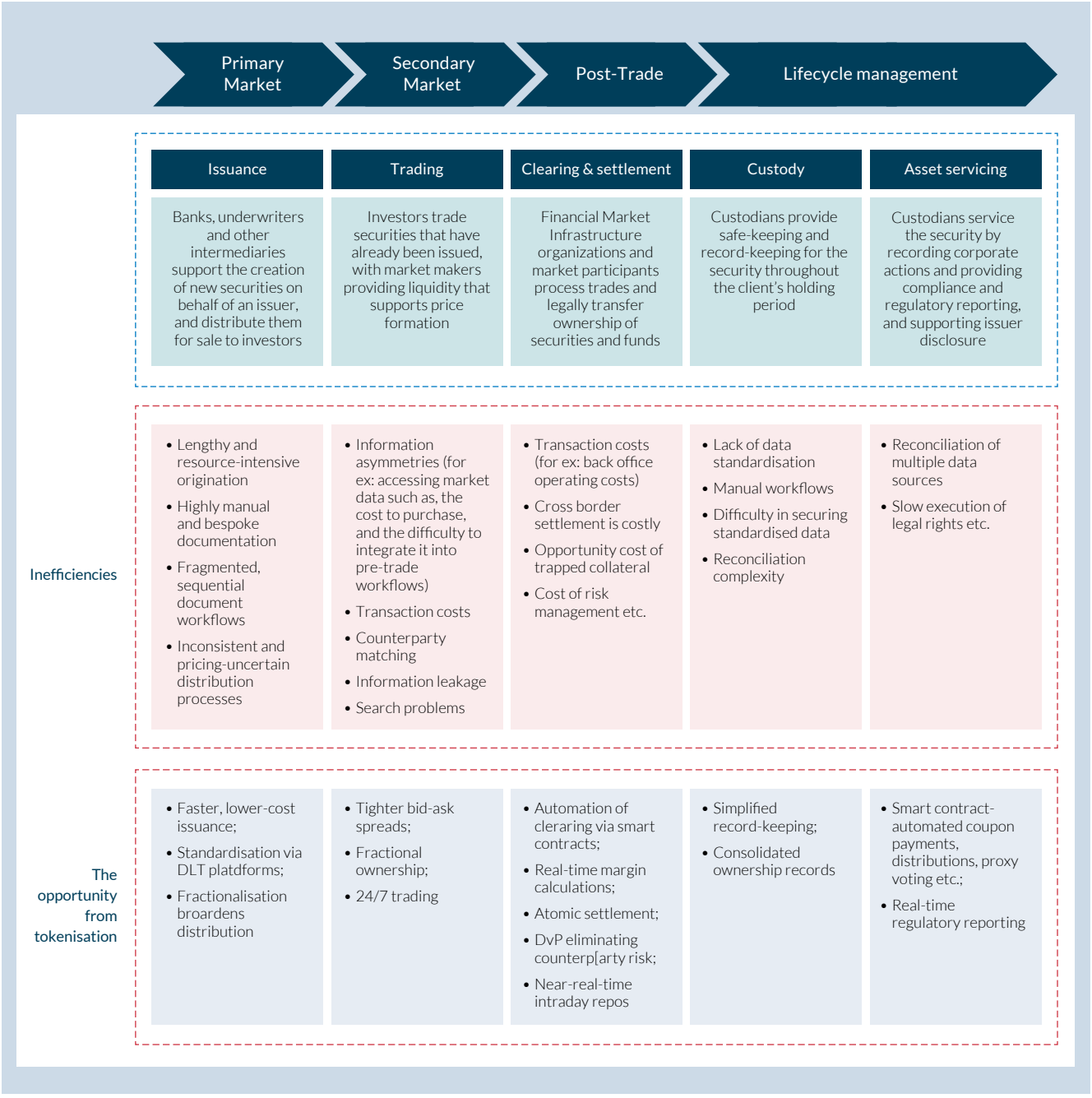
Together, these sections assess the current state of adoption, the models through which tokenisation is being deployed, and the material differences between what has been demonstrated in pilots and what has been scaled commercially.

4.2. Impact on lifecycle activities

The financial asset lifecycle encompasses five stages: primary market issuance, secondary trading, post-trade clearing and settlement, custody, and asset servicing. An understanding of the extent to which tokenisation impacts the lifecycle of an asset would allow regulators and policymakers to craft desirable policy responses and evaluate their approach to regulating tokenised instruments.

See Figure 4.1 for an overview of existing inefficiencies in financial markets and the opportunity from tokenisation.

Figure 4.1: Existing inefficiencies in financial markets



4.2.1 Primary market issuance

In EMDEs, primary market issuance has typically been characterised by highly manual, bespoke and sequential workflows that must be reconciled across organisations.[56]

DLT does not fundamentally disrupt this process (see Figure 4.2).[57] It may, however, bring more substantive change at the infrastructure level. For instance, DLT-based asset lifecycle management platforms can offer efficiencies such as standardisation and electronification of issuance workflows.[58] This not only reduces iteration times (for instance, the fact that securities can be minted at the time of distribution) but also enables frequent and lower-cost issuance of traditional instruments. In markets where distribution of financial instruments have traditionally been accessible only to institutional investors, minimum investment sizes due to fractionalisation benefits from tokenisation can improve access for retail investors.

56. As estimated in a recent study, a standard bond issuance may involve close to one hundred participants executing approximately two hundred discrete tasks, with settlement extending to T+5 in some asset classes. See, BCG report.
57. There may, however, be varying degrees of impact depending on the asset classes. See for example, for **FX**, Monetary Authority of Singapore (**MAS**), Project Guardian: Use of Tokenised Bank Liabilities for Transaction Banking (July, 2025), available **here**; as well as for funds, Financial Conduct Authority (FCA), 'Progressing Fund Tokenisation' (CP 25/28) (October 2025), available **here**.
58. Some examples of platforms aiming to streamline and automate primary issuance workflows include Agora (for cross border payments), Nivaura and Origin Markets (for debt capital markets) as well as Ipreo and Directbooks (for fixed income issuance).

Figure 4.2: Impact of tokenisation on issuance activities in capital markets

	STAGE 1 Origination	STAGE 2 Structuring	STAGE 3 Distribution
Frictions	**Current-state frictions**	**Current-state frictions**	**Current-state frictions**
	Transaction costs Issuance is a lengthy process. Registrars and custodians impose operational costs and fees for recordkeeping.	**Transaction costs** Legal documentation is bespoke to each issuance and asset class. Production is highly manual and multi-party, adding considerable cost, time, and operational risk.	**Search friction** Distribution processes vary across asset classes with no common standard. Soft-sounding, roadshows, and notifications rely on manual coordination by banks.
	Information asymmetry Issuers know more about prospects than potential buyers; investment banks act as credibility bridges but add cost.	**Information asymmetry** Numerous – often opposed – legal counsels introduce sequential document workflows requiring cross-organisation reconciliation; information gaps persist between parties throughout the negotiation process.	**Market power** Separate ledgers make it costly for investors to switch intermediaries, subduing competitive pressure on fees. High minimum ticket sizes exclude smaller investors.
	Search friction Issuers may not know which investors are interested or how to reach them; settlement up to T+5 in some classes.	**Counterparty risk** Inefficient document management can cause delays severe enough to withdraw transactions from market.	**Retail internalities** Majority of deals arranged on best-effort basis with pricing uncertainty; retail investors less incentivised to seek qualified advice given added search costs.
Opportunity	**Tokenisation opportunity**	**Tokenisation opportunity**	**Tokenisation opportunity**
	Reduced Transaction costs Shared ledger links each asset to the owner's account – no separate registrar required. For native tokens, custodian services may also be eliminated. Smart contract templates compress issuance from weeks to days.	**Transaction costs** Smart contracts encode security terms with embedded compliance logic, reducing legal overhead. Programmable auction rules auto-execute once conditions are met.	**Search friction** Shared ledger gives investors direct access, reducing reliance on broker-dealer networks.
	Product innovation Tokenisation supports the creation of bespoke instruments, automated income flows, streamlined asset servicing, leading to greater product innovation.	**Information asymmetry** Data wrapping embeds asset, issuer, and ESG data in the token itself – reducing information search costs.	**Market power** Reduced switching costs and direct participation exert competitive pressure on brokerage fees – even where intermediaries persist, the outside option disciplines pricing.
	Transparency Improved transparency and efficiency from DLT's single, immutable record accessible to all parties, reducing reconciliation needs, trade errors, and information discrepancies.	**Counterparty risk** DLT-based document workflows enable concurrent multi-party access, replacing sequential reconciliation and reducing deal withdrawal risk.	**Retail internalities** Fractionalisation lowers minimum ticket sizes, enabling diversification. Positive network externalities deepen liquidity as more investors join the ledger.

4.2.2 Secondary Trading

In some EMDEs, secondary trading is already a highly efficient process – in this sense, tokenisation is not expected to immediately restructure existing trading arrangements for mainstream financial instruments. In others, however, secondary markets are largely illiquid. There is empirical evidence that tokenisation improves liquidity in secondary markets for certain asset classes.[59] These improvements may be attributable to faster settlement, elimination of certain intermediaries, and fractionalisation into smaller denominations that lower the barriers to entry.

Despite the perceived benefits, in practice, tokenised markets in EMDEs have thus far exhibited low secondary market liquidity[60] which creates a 'chicken and egg' problem: low liquidity discourages investors from holding tokenised financial instruments for active trading, which in turn limits secondary market liquidity.

For certain asset classes such as funds, secondary markets may offer a more transformative potential – for instance, tokenised funds could be traded continuously rather than redeemed through the fund manager at periodic intervals, which may improve price discovery and reduce information asymmetry.[61]

In the long run, tokenisation could shift trading away from centralised exchanges towards programmable, DLT-based models such as automated market makers. AMMs promise an 'always-on' liquidity and lower counterparty dependence by letting investors trade against pooled liquidity rather than against each other, although these gains come with new and complex risks (such as investor harm and market integrity concerns) that differ from those in traditional markets.[62]

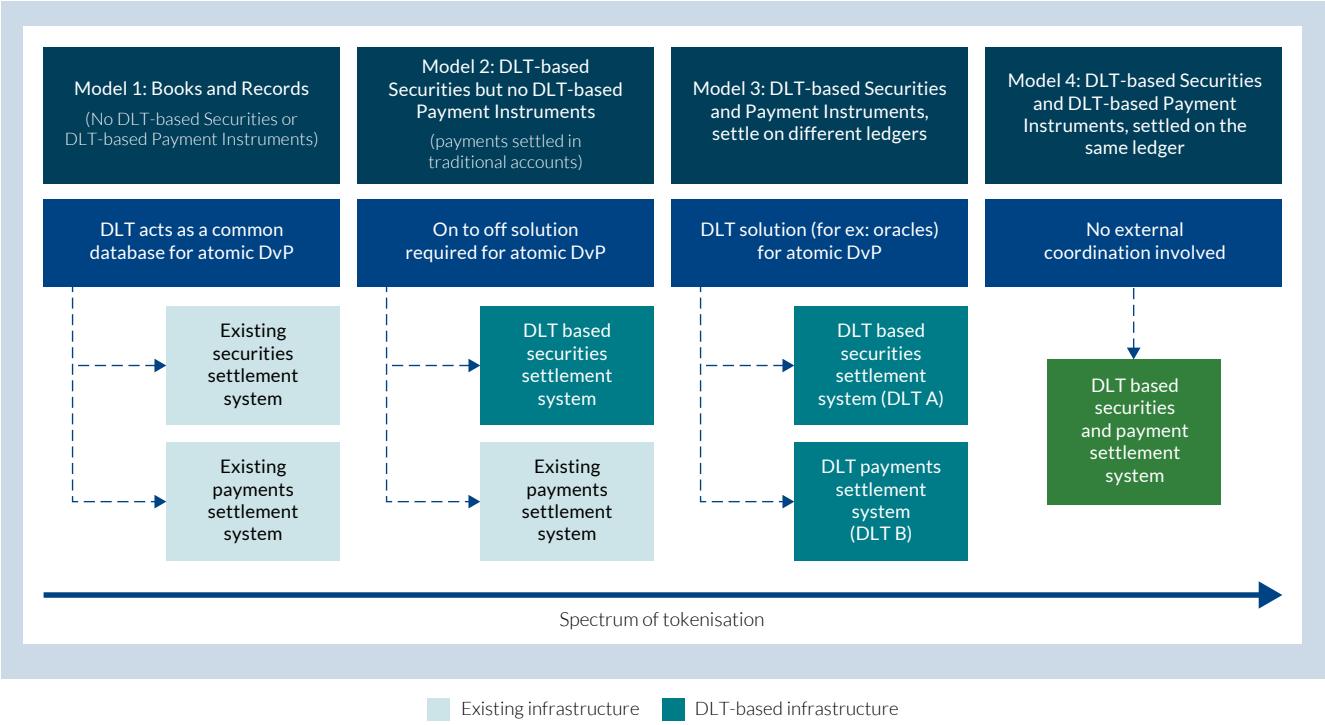
4.2.3 Post-trade: clearing and settlement

Tokenisation's operational benefits are perhaps most clearly demonstrated in post-trade activities. Traditional clearing and settlement processes involve multiple intermediaries (central counterparties, brokers, custodians, central securities depositories etc) coordinating through sequential processes that introduce delays, add costs from reconciliation and increase counterparty risks.[63]

While still at nascent stages, four forms of settlement models are emerging because of tokenisation (see Figure 4.3) that can reduce these inefficiencies.

59. For instance, studies suggest that tokenised bonds have exhibited bid-ask spreads approximately 5.3% lower than those of conventional equivalents, a figure that increases to around 10.8% where tokenised bonds are accessible to retail investors. See, Leung et al, 'An assessment on the benefits of bond tokenisation' (2023), available **here**.
60. In these markets, the main inefficiencies are counterparty matching, information leakage, and price information asymmetry. See for instance, Agur et al (IMF), 'Tokenization and Financial Market Inefficiencies' (2025), available **here**.
61. However, this also creates a risk of disconnect between the apparent liquidity of the token and the true liquidity of the underlying assets, a concern particularly relevant for closed-ended funds investing in illiquid instruments such as private equity or real estate.
62. Bank of Canada and Ontario Securities Commission, 'The Ecology of Automated Market Makers' (2024), available **here**.
63. Compliance costs associated with post-trade processing account for more than 1% of revenue at most financial institutions. Cross-border settlement can cost nearly 10 times as much as domestic settlement. See, Smets (BIS), 'Cross-border payments – a catalyst for global integration and growth' (2025), available **here**.

Figure 4.3: Post-trade clearing and settlement tokenisation models[64]



For the purported benefits of tokenisation to fully materialise at post-trade, however, the payment rails need to be fully integrated with the DLT network. In many emerging markets, the absence of such integration is a key impediment.[65]

4.2.4 Custody

In tokenised environments, custodians play a critical role by guaranteeing the backing of tokens issued with off-chain and/or onchain native assets. Typically, custody involves two core functions: (a) record-keeping of transactions, and (b) the safekeeping of client assets segregated from the custodian's own balance sheet.

Given these core functions, the custody of tokenised assets can either serve function (a) only (ie recordkeeping of transactions) with safekeeping of client assets performed within the traditional market infrastructure ('recordkeeping only approach'), or safeguard both digital twin tokens and digital native tokenised assets, in addition to maintaining existing account-based custody capabilities ('fully digital custody approach').

In both models, the co-existence of traditional book-entry processes in addition to DLT-based processes means that tokenisation would potentially increase operational complexity for custodians, besides imposing additional technical infrastructure requirements (at least in the near term).

64. Adapted from BCG, 'The Impact of Distributed Ledger Technology in Capital Markets' (Aug, 2025), available here.

65. An ideal payment instrument for DvP would be wholesale CBDC, still at exploration or pilot phase in most jurisdictions. Tokenised deposits and appropriately designed stablecoins are alternatives, but each carries counterparty and liquidity risks, and private tokenised monies may entail departures from par, violating the 'singleness of money.' See Bear, Hussain et al, 'Wholesale Central Bank Digital Currencies: Approaches, Implementation Strategies and Use Cases' (Dec, 2024), available here.

Both the International Organization of Securities Commissions (IOSCO) and the OECD have identified lack of maturity or limited availability of services by custodians as a key impediment to market development in EMDEs.[66] While traditional custodian firms have increasingly started to offer digital assets custody services (such as BNY Mellon,[67] Citi,[68] HSBC etc),[69] the initial uptake has been concentrated on mainstream cryptoasset holdings rather than onboarding investors to tokenised instruments.

4.2.5 Asset servicing

Asset servicing refers to the administration of rights and obligations associated with a financial instrument after it has been traded. Traditional processes for servicing assets are manual and documentation-heavy, relying on data received through multiple custodians, agents, and depositories. Inevitably, each link in the chain can introduce a possibility of an error.

Smart contracts offer the most direct application of tokenisation to asset servicing. A shared ledger can not only create a shared 'golden source of truth', but also automate execution of asset servicing processes via smart contracts. For instance, the conditions for mandatory corporate actions such as bond coupon payments can be encoded in a smart contract at the time of issuance, which would enable payment without a sequential reconciliation between paying agent, CSD, and the custodian. Similarly, a shared distributed ledger offers regulators potential access to near-real-time transactional data, which can reduce the burden of periodic reporting and improve supervision.

4.3. Impact on Asset Classes

4.3.1 An overview of tokenised asset classes

As tokenisation moves beyond early-stage experimentation, a wide range of asset classes have been tokenised, as described below. Table 4.1 provides a non-exhaustive overview of these asset classes, with representative examples and the value proposition.[70]

66. See, IOSCO, 'Tokenization of Financial Assets' (November, 2025), available here; OECD, 'Tokenisation of Assets and Distributed Ledger Technologies in Financial Markets: Potential Impediments to Market Development and Policy Implications' (2025), available here.
67. Schwartz, 'BNY launches new blockchain accounting tool with BlackRock as first client' (2025), available here.
68. Rajkumari, 'Citi announces crypto custody in 2026, JPMorgan stays cautious' (2025), available here.
69. Allison and Reback, 'HSBC to Offer Tokenized Securities Custody Service for Institutions' (2023), available here.
70. Off-chain funds tokenise the fund wrapper (units/shares); underlying assets are managed through traditional infrastructure.

Table 4.1 : Asset classes patterns

Pattern	Sub-category	Use case	Representative examples	Value proposition
Asset issurance	Fixed income / debt	Sovereign bonds	Tokenised sovereign bonds; digital government green bonds with on-chain ESG tracking (e.g., Hong Kong HKSAR green bond)	Retail access to government debt; lower denominations; embedded ESG transparency
		Corporate bonds	Tokenised corporate bonds; digital commercial paper; native digital bond issuance with repo financing (e.g., UBS CHF 375M on SDX; AIIB $500M via Euroclear D-FMI)	Reduced issuance cost (est. 40–60%); faster settlement (T+0 vs T+5); broader investor distribution
		Municipal bonds	Tokenised sub-sovereign bonds; green municipal bonds with programmable coupon payments (e.g., City of Lugano digital bond)	Sub-sovereign capital raising; infrastructure finance; automated asset servicing
	Public equities	Public equities	Tokenised securities and security tokens; fractional share ownership; secondary trading of listed/unlisted equities (e.g., Backed Finance; Ondo tokenised equity exposure)	**SME** capital formation via STOs; fractional international portfolio exposure
	Alternative assets	Private equity	Tokenised PE fund interests; fractional LP ownership; secondary trading of locked-up positions; digital VCC fund issuance	Secondary liquidity for locked-up holdings; lower LP minimums; broader investor access
		Private debt	Tokenised private credit; uncollateralised on-chain lending based on credit history (e.g., Maple Finance; Goldfinch; Centrifuge)	SME lending in thin credit markets; on-chain credit origination; automated servicing
		Real estate	Fractional property ownership via SPV tokenisation; tokenised REIT-like wrappers; direct land registry (exptl.) (e.g., RealT; MANTRA/ DAMAC in Dubai; Propy)	Fractional ownership; diaspora/ offshore capital; transparent provenance and ownership records
		Commodities	Tokenised precious metals with 1:1 custodial backing; reserve-backed mining tokens; tokenised agri-commodities (e.g., PAXG; XAUT; Uranium308)	Gold as digital inflation hedge; mining sector financing; fractional commodity access
		Environmental assets	Carbon-credit tokens with on-chain lifecycle tracking; tokenised RECs; voluntary offsets with region-specific adoption; energy efficiency certificates	Lifecycle transparency; double-counting prevention; democratised carbon/REC market access
Securities financing	Collateral and repo markets	Intraday / term repo	On-chain intraday repo settlement; programmable repo with minute-level maturity precision (e.g., J.P. Morgan Kinexys; Broadridge DLR)	Intraday liquidity optimisation; reduced funding costs; settlement within minutes
		Collateral mobility	On-chain collateral pledging; DvP/DvD via atomic swaps; tokenised MMF shares as collateral (e.g., HQLAx; BlackRock BUIDL as collateral)	Cross-border collateral reuse; reduced over-collateralisation; real-time visibility across custodians
		Variation margin	Smart-contract-based margin management; automated margin calls with real-time position data; DLT-enabled margin posting for cleared OTC derivatives	Automated margin calls; real-time position transparency; reduced systemic risk during stress
Asset management	On-chain funds	On-chain funds	MMF shares on DLT with 24/7 settlement; tokenised PE/VC interests; fractional ownership; digital VCC issuance (e.g., BlackRock BUIDL; Franklin Templeton FOBXX; Spiko)	Lower minimums; near-instant settlement; fund tokens as collateral; broader distribution
	Off-chain funds*	Off-chain funds*	Scalable portfolio management via tokenised wrappers; digital structured products; aggregation of investment servicing; tokenised ETF and hedge fund wrappers	Broader distribution channels; reduced admin and compliance costs; integrated custody
Cross-cutting	Foreign exchange	FX settlement	Cross-border FX settlement via tokenised currencies; global treasury management; **PvP** settlement on DLT (e.g., Project Guardian FX workstream; Kinexys cross-currency)	Reduced cross-border settlement costs; faster FX settlement; programmable treasury management

While the viability of tokenising these assets depends on a number of factors (ie the legal form, the layer of deployment, the credibility of the settlement mechanism used, operational and strategic considerations etc),[71] an interplay of (a) the type of asset being tokenised (ie 'what') and (b) the functional objective it is designed to achieve (ie 'why') may be a helpful tool to prioritise asset classes/categories given desired functional objectives and local conditions (see Table 4.2 below).

Table 4.2. A categorisation of asset classes alongside functional objectives[72]

What is being tokenised?	Why is it being tokenised?						
	Democratisation /access to capital	New investor base(diaspora / offshore)	Regulatory clarity	Increased liquidity	Fractionalisation	Lower issuancecost	Faster settlement
Equities	High	High	Low	Medium	High	Medium	Medium
Fixed income	Medium	Medium	Medium	Medium	Medium	High	High
Real estate	High	High	Low	High	High	Medium	Low
Commodities	High	Medium	Medium	Medium	High	Medium	Medium
Private credit	High	Medium	Low	Medium	Medium	High	High
Funds (MMFs, PE/VC)	Medium	Medium	Medium	Medium	High	Medium	High
Environmental assets	Medium	Low	Low	Medium	Low	Medium	Medium

High relevance in EMDEs Medium relevance in EMDEs Low relevance in EMDEs

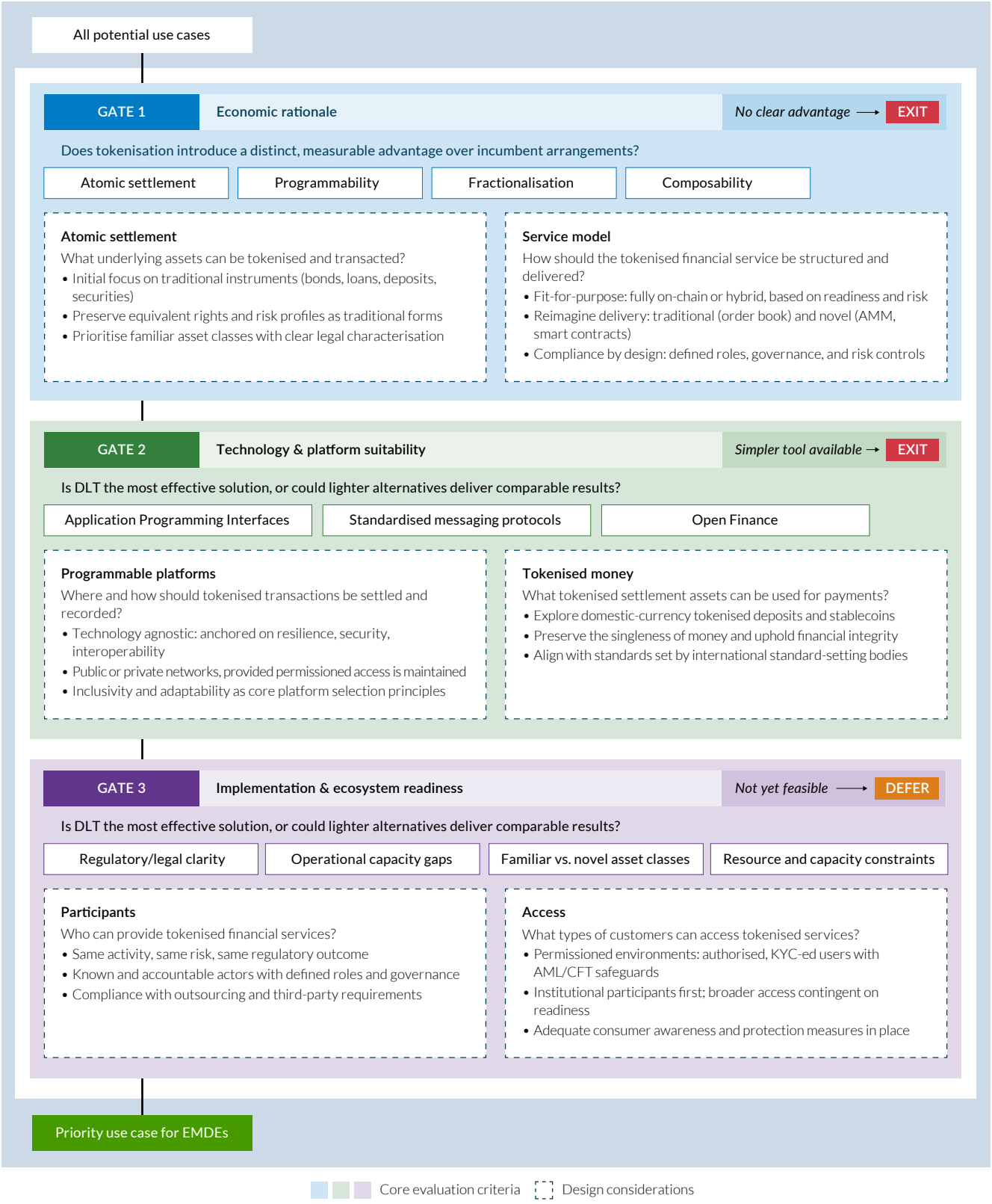
71. For instance, on the deployment dimension, two primary layers can be distinguished: (a) infrastructure-layer use cases which focus on foundational elements of DLT systems: network design, consensus protocols, data-privacy architecture, and integration with existing financial infrastructure. Examples include the Canton Network (a privacy-preserving blockchain for financial institutions) and Hyperledger Fabric (a modular enterprise-grade DLT framework). Whereas, application-layer use cases are built atop existing DLT networks and address user-facing functionalities such as asset issuance, investor onboarding, compliance automation, and lifecycle servicing. Many tokenised products span both layers.

72. This analysis is based on the interviews conducted by CCAF, diversity of tokenisation models and risk profiles, observed market activity in EMDEs and regulatory perimeters and/or considerations. 'Regulatory clarity' captures whether existing frameworks in most EMDEs accommodate the tokenisation of the asset class, not the intrinsic regulatory complexity of the asset itself. For instance, equities and real estate score 'low' because securities law and property law in most EMDEs do not yet contemplate DLT-based ownership, whereas fixed income scores 'medium' because several EMDE jurisdictions have already piloted or permitted tokenised bond issuance under existing frameworks. 'Democratisation' reflects the degree to which tokenisation addresses binding access constraints specific to EMDEs (eg, high minimum thresholds, thin domestic markets, limited intermediary networks etc).

4.3.2 Major use cases in EMDEs

While tokenisation presents opportunities to enhance financial markets in certain cases (viz bonds, money market funds, or repos that have advanced rapidly in developed markets), not all use cases are equally viable or beneficial for EMDEs. At a minimum, the following gateways should be assessed to determine feasibility of asset classes suitable for tokenisation for a particular jurisdiction (see Figure 4.4).

Figure 4.4: Assessing viability of tokenisation use cases



The assessment above can be highly context-dependent. The availability of digital infrastructures, the maturity of regulatory frameworks, and the depth of the domestic investor base, all shape which tokenisation applications are feasible and beneficial in any given jurisdiction.

In the next section, we examine in depth three asset classes that hold substantial promise for tokenisation in emerging markets – real estate, public equities and commodities.

4.4. Deep Dives

4.4.1 Real estate tokenisation

Real estate represents a unique and perhaps the most illiquid asset classes in financial markets today. Traditionally, the sector has been constrained by several factors – a combination of high capital requirements, low divisibility, complex registration processes and limited secondary market infrastructure. In principle, tokenisation offers an opportunity to address each of these constraints.

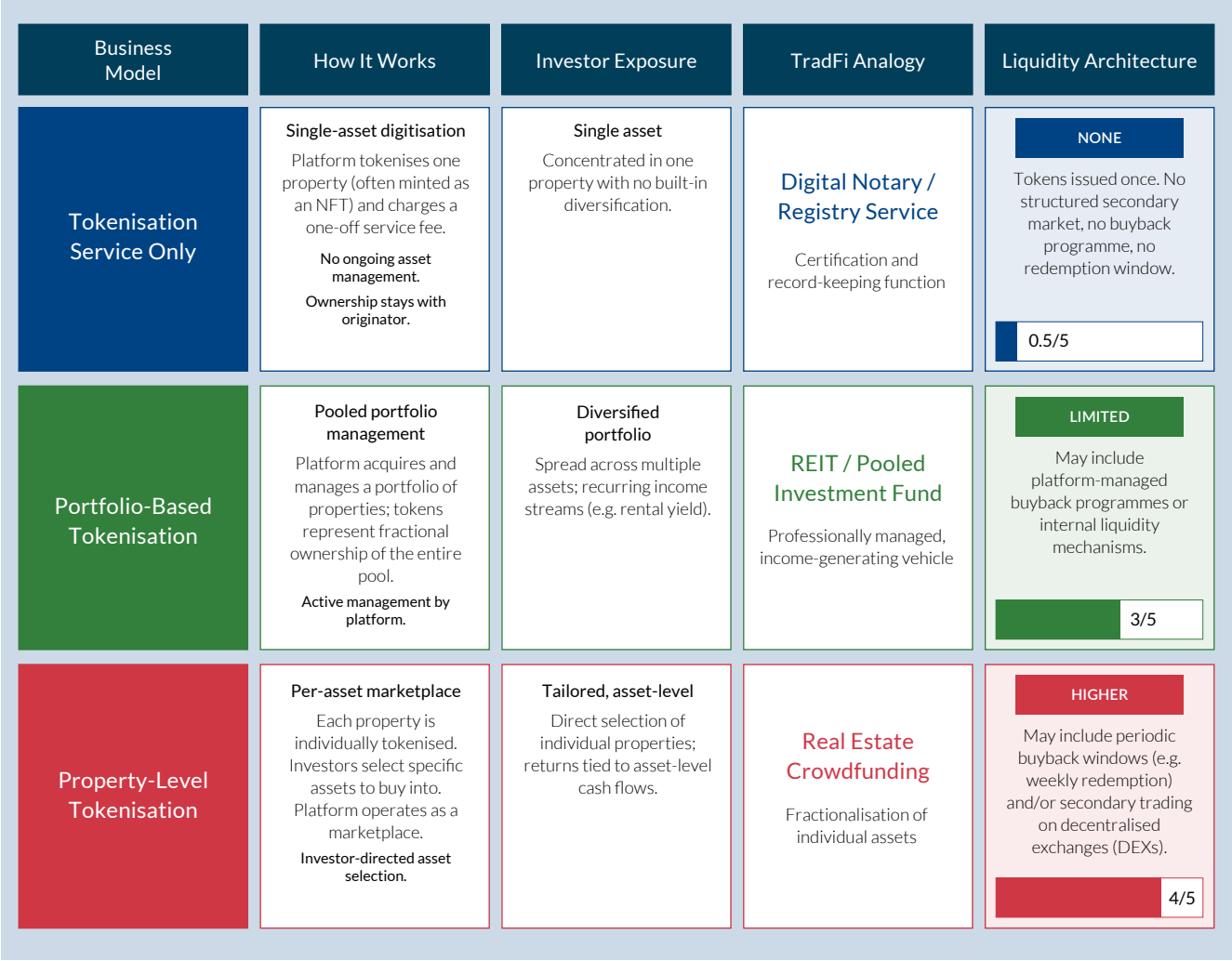
Tokenisation models

While there are varied models to tokenise real estate properties, depending on the degree of control over the property, it is possible to distinguish between three firm-specific models[73] (see Figure 4.5).

- **Tokenisation as a service**: the firm issues a token representing a property on-chain and charges a fee. Each token is effectively tied to a single asset;
- **Portfolio based**: the firm identifies, acquires and manages a portfolio of properties, then issues tokens representing fractional ownership of the whole portfolio. Token holders receive a proportional share of rental income. This model closely resembles investment funds, such as REITs;
- **Property-specific tokenisation**: the firm identifies, acquires, renovates and manages individual properties, issuing separate tokens for each one rather than pooling them. To support liquidity, platforms typically guarantee buyback of a limited number of tokens per week within a few days. Some platforms go further, acting purely as a marketplace – connecting property owners who wish to sell a stake directly with investors, without taking properties onto their own balance sheet.

73. See as well, Cornelli (BIS), 'When bricks meet bytes: does tokenisation fill gaps in traditional real estate markets?' (Nov, 2025), available here.

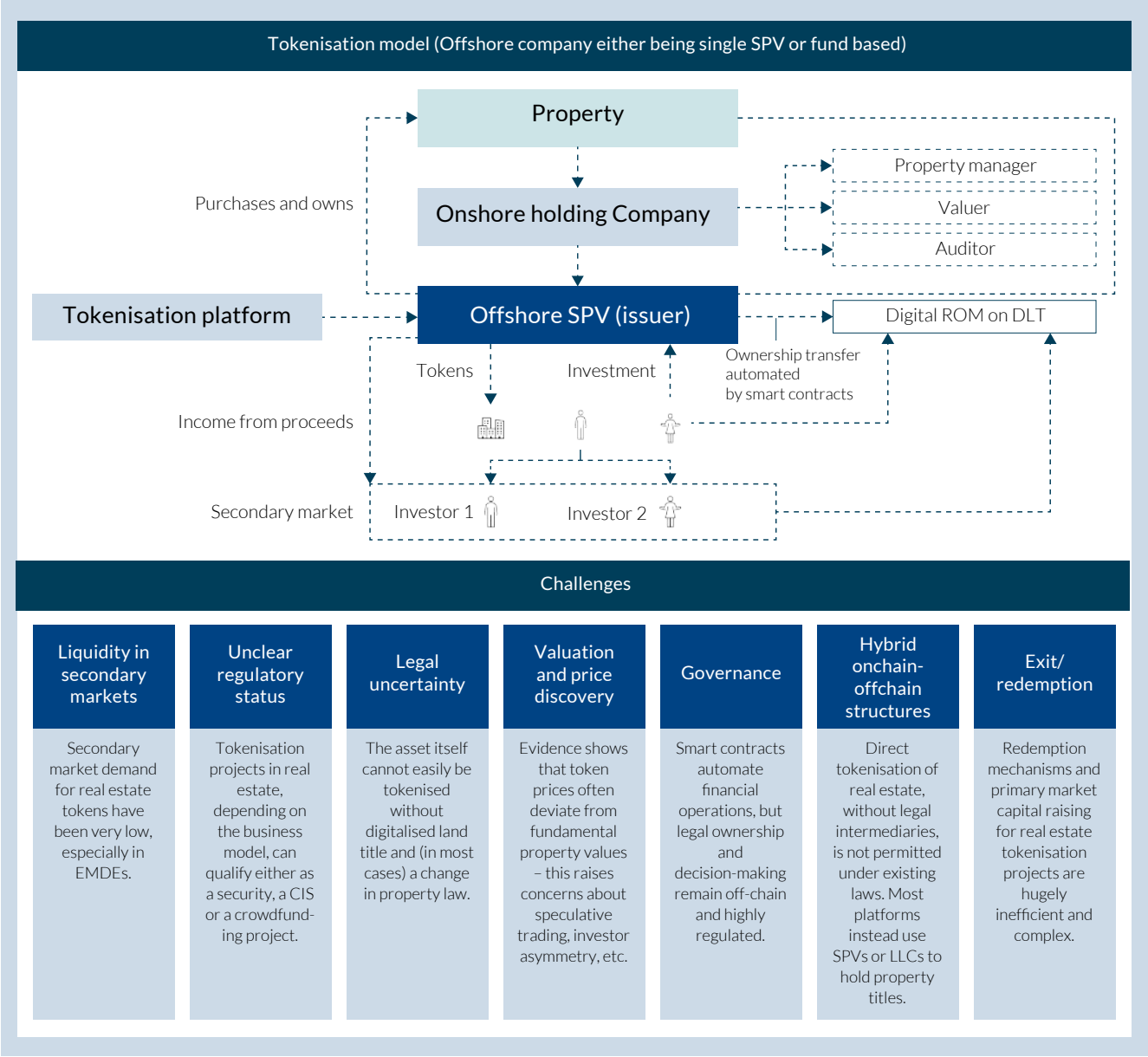
Figure 4.5: An overview of real estate tokenisation models



The form of financing can either be equity-based (investors hold shares in the entity that owns the real estate), debt-based (tokens would represent a debt instrument such as a mortgage or bond where investors are entitled to an interest), revenue-based (holders are entitled to a share in property's income) or utility-based (ie tokens grant access or usage rights to a property).

To support these models, most real estate tokenisation to date have used indirect legal structures – predominantly special purpose vehicles (SPVs) or real estate investment trust (REIT)-like wrappers. The SPV or REIT holds legal title to the property and tokens represent shares or economic interests in that entity. Figure 4.6 provides an illustrative process for tokenising real estate property and some challenges associated with it.

Figure 4.6: Real estate tokenisation structure and challenges (fund based or SPV based)



Each tokenised property sits inside a dedicated SPV, which holds the legal title and is the entity that gets tokenised.[74] Investors participate through a token offering: on payment and digital signature of the offering memorandum, tokens are automatically delivered to their wallets via smart contract.

Token ownership confers a proportional stake in the property. A net rental income – after operating costs, insurance and property taxes – is distributed weekly to token holders through a property-linked smart contract. Token price is derived by dividing the assessed property value (net of a maintenance and repair reserve) by the total tokens in issuance, and is recalculated annually to reflect any appreciation or depreciation in the underlying asset. Post-issuance, tokens can be redeemed by the platform or traded on decentralised exchanges (**DEXs**), opening participation to broader DeFi ecosystems.

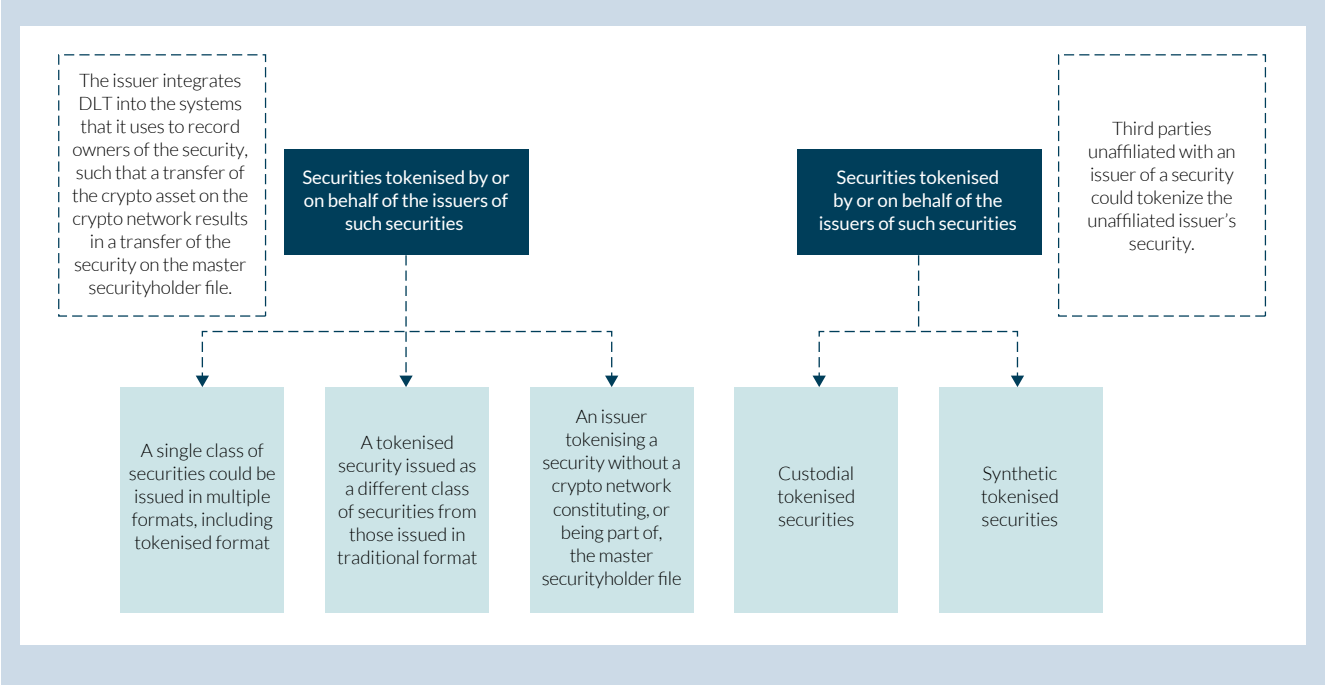
74. This is typically done using a standardised protocol such as Ethereum's ERC-20 standard. The Ethereum ERC-20 token standard is a technical framework for creating and managing tokens on the Ethereum blockchain. It establishes a set of rules and functions for tokens, ensuring compatibility and interoperability with decentralized applications and other smart contracts on the Ethereum network. For instance, features of the ERC-20 standard include functions for transferring tokens, checking token balances and approving third-party spending.

Typically, a dual registration system (comprising off-chain and on-chain registration of the property subject to tokenisation) is followed. It is worthwhile to note that direct tokenisation of land registry entries – whereby a token transfer on a distributed ledger would constitute a legally valid transfer of real property title – typically requires changes to property law and remains in early pilot stage in EMDEs.

4.4.2 Public equities

The market for tokenised equities is rapidly growing.[75] In advanced economies, public equity markets are already efficient, given established intermediation chains and settlement processes. In EMDEs, however, tokenisation offers a potential to broaden investor access and liquidity in global markets which are traditionally limited to investors in such economies.

Figure 4.7: Tokenisation models for public equities[76]



In essence, tokenised equities are digital bearer instruments backed by shares held in custody and settled on a distributed ledger. These can be structured in several ways, differing in the degree to which the token is linked to the underlying share and in the rights conferred on holders, and each of them raises distinct policy issues.

75. Monthly transfer value for tokenised public equities which exceeds USD 2.8 bn. RWA.xyz, 'Tokenised Stocks Analytics' (April, 2026), available here.

76. See for instance, Securities and Exchange Commission (US), 'Statement on Tokenised Securities' (Jan, 2026), available here.

Two foundational distinctions shape the landscape: first, whether the token is fully backed (ie wrapped, meaning that a token is issued representing an interest in a custodied underlying equity) or native (issued only on the DLT), and second, whether tokenisation is undertaken by or on behalf of the original issuer, or by an unaffiliated third party.

(i) Whether the token is fully backed or native

Under the fully backed approach, a custodian or issuer holds the corresponding shares on a one-to-one basis, making the token functionally equivalent to a depository receipt. A token representing a listed company's stock, for example, is matched by a share held in custody by the issuer's banking partner. Several prominent platforms have adopted this collateralised structure.

In the native model, the token issuer does not acquire or hold the underlying shares but instead enters into an obligation to deliver equivalent economic value to the token holder – introducing a layer of counterparty risk inherent in derivative-like arrangements.

A growing number of hybrid arrangements also exist, particularly around pre-listing or privately held companies, where platforms hold contractual positions or interests in special purpose vehicles rather than the shares themselves.[77]

(ii) Whether tokenisation is undertaken by or on behalf of the original issuer, or by an unaffiliated third party

Securities tokenised by or on behalf of the issuer

When a company – or an agent acting on its behalf – tokenises its own securities, it embeds DLT into its ownership records infrastructure. On-chain identifiers such as wallet addresses and token quantities are mapped to off-chain holder details, ensuring that any transfer of the digital asset simultaneously updates the legal register of ownership. Crucially, the digital wrapper does not create a new or separate security. The regulatory treatment of the instrument is unaffected by the format in which it is recorded.

Three structural variants have emerged within this category:

- The same class of security exists in both conventional and tokenised form, with holders free to convert between the two.
- The tokenised instrument is formally issued as a separate class.
- The definitive record of ownership remains in a conventional database. A digital token is issued alongside the security but carries no independent rights or entitlements. Its transfer on-chain serves only as a trigger for the issuer to update the authoritative off-chain register.

77. A critical operational feature across both models is the mint-and-redeem cycle that anchors token prices to the value of the underlying equity. To create new tokens, authorised participants deposit funds – commonly in the form of stablecoins – with the issuer, who then acquires the relevant shares on-market. To exit, holders surrender tokens in exchange for the equivalent cash value, and the corresponding shares are retired. This two-way mechanism enables market participants to exploit pricing discrepancies: when tokens trade at a premium, new issuance brings the price down; when they trade at a discount, redemptions push it back up. Securities and Exchange Commission (US), 'Statement on Tokenised Securities' (Jan, 2026), available **here**.

Third-party tokenisation

When an entity unrelated to the original issuer undertakes tokenisation, the resulting token may or may not convey an ownership interest in the underlying security. In this regard, two broad approaches have developed:

- **Custodial model**: The third party acquires and holds the underlying shares in custody, then issues tokens that evidence the holder's interest (either direct or indirect) in those custodied assets. Even here, the ledger may serve as the primary register of entitlements that feeds into an off-chain recordkeeping system.
- **Synthetic model**: The third party issues its own security that delivers economic exposure to the referenced equity without conferring any claim on the original issuer (in effect a derivative giving exposure to unlisted shares). Neither form typically carries voting, information, or other shareholder rights attached to the underlying.

In an ideal scenario, where tokenised securities exist as digital representations of real-world assets on shared ledgers, there can be various perceived benefits for emerging markets:

- Settlement (presently at T+2 or more for most emerging markets but T+1 or even T+0 in some, with a trend towards T+1) can be executed atomically. This reduces counterparty risk and operational frictions due to multiple counterparties[78] and increases transparency over ownership and transaction histories;
- The use of centralised databases to own and trade stocks will no longer be necessary;
- DvP can happen in a single transaction, with ownership records embedded directly into a single blockchain;
- Enable efficient price discovery and capital allocation given 24x7 trading;
- Improved transparency of shareholder data, etc.

Many markets however are finding that for a range of reasons, atomic settlement may not be ideal, with T+0 or T+1 providing a highly competitive alternative.

4.4.3 Commodities tokenisation

Commodities occupy a distinctive position in financial markets – unlike bonds or fund shares, they already possess intrinsic value, global market liquidity, and a well-established custodial ecosystem.

Tokenisation models

The form and structure of a tokenised commodity determines its nature, which can be assessed on two dimensions depending on how they are custodied: (a) the custody of the underlying, and (b) the custody of the token.

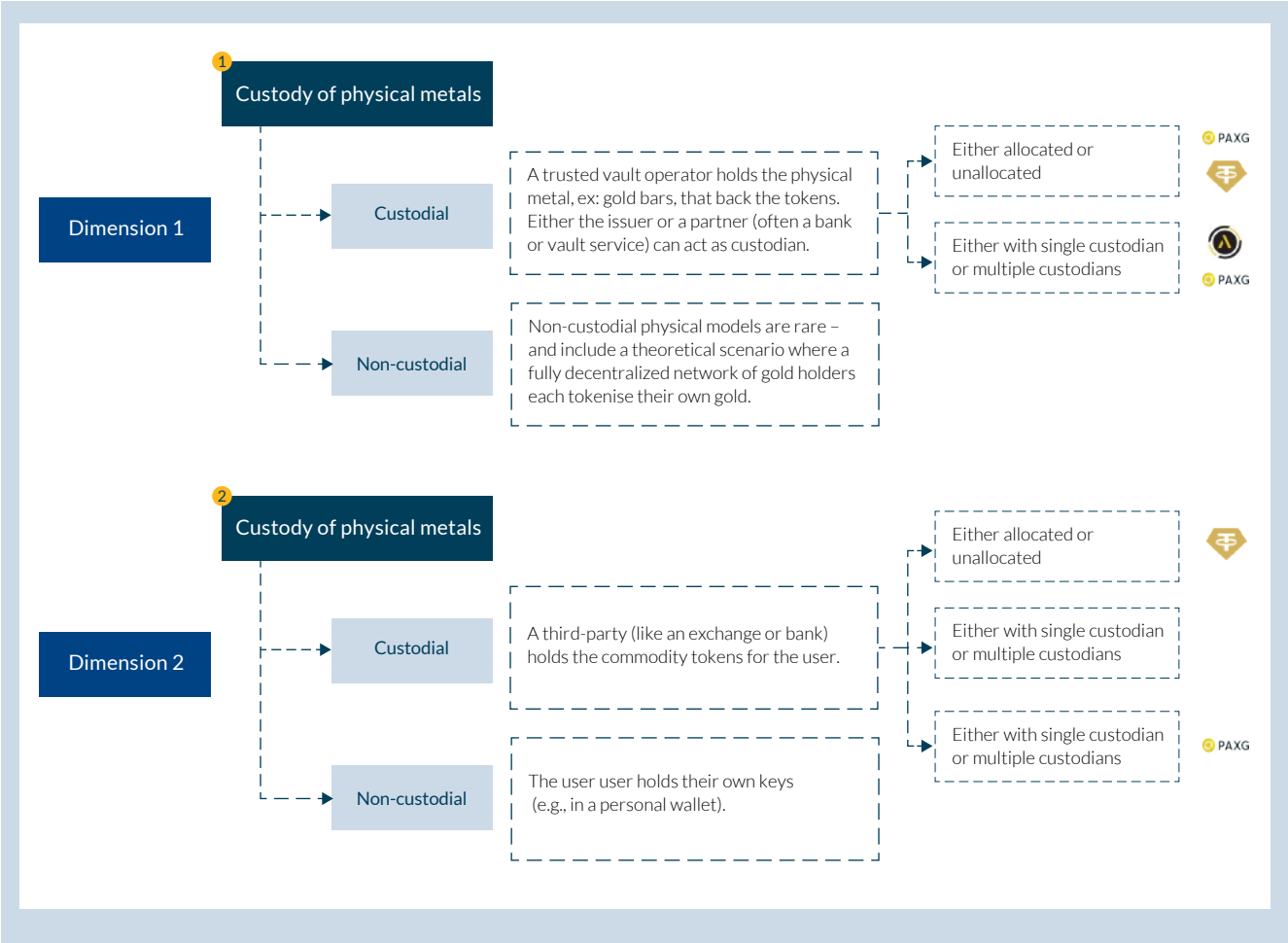
In regard to (a), the underlying can either be custodied physically – ie in vaults, and token represents a direct claim on the custodied physical commodities, or in a non-custodial method (such as a fully decentralised network). In case of the former, the custody may lie with one or many custodians and can be allocated (ie segregated for each client) or pooled (ie in a common reserve).

In regard to (b), the token representing the underlying can also be either held on a custodial or non-custodial basis.

78. For example, investors and brokers may be exposed to the risk that the settlement will fail, either because the seller lacks the shares to deliver, the buyer lacks the cash to pay or other unexpected operational and technical failures. See, Six Group, 'What Happens When a Securities Transaction Fails' (Oct, 2025), available here.

A commodity may be tokenised using a combination of either of these dimensions, each with their own trade-offs.[79] Notably, when a commodity (a tokenised gold, for instance), is tokenised, a record of its various attributes – the value, purity, weight, location of custody of the physical gold etc is created which enables the physical gold to be leveraged for investment purposes.

Figure 4.8. Custody approaches to tokenised commodities



Tokenising commodities in this manner enables a wide range of use cases in collateralisation and payments. For instance, physical gold has historically been difficult to collateralise at scale due to verification costs, transport, and security requirements – tokenisation substantially reduces these frictions. For payments, users can hold tokenised gold as a long-term store of value and swap into stablecoins or any other fiat for transactional purposes, creating a gold-based monetary system.[80] Tokenised gold also opens up a host of use cases in DeFi (such as collateralised lending and borrowing) while reducing traditional intermediation.

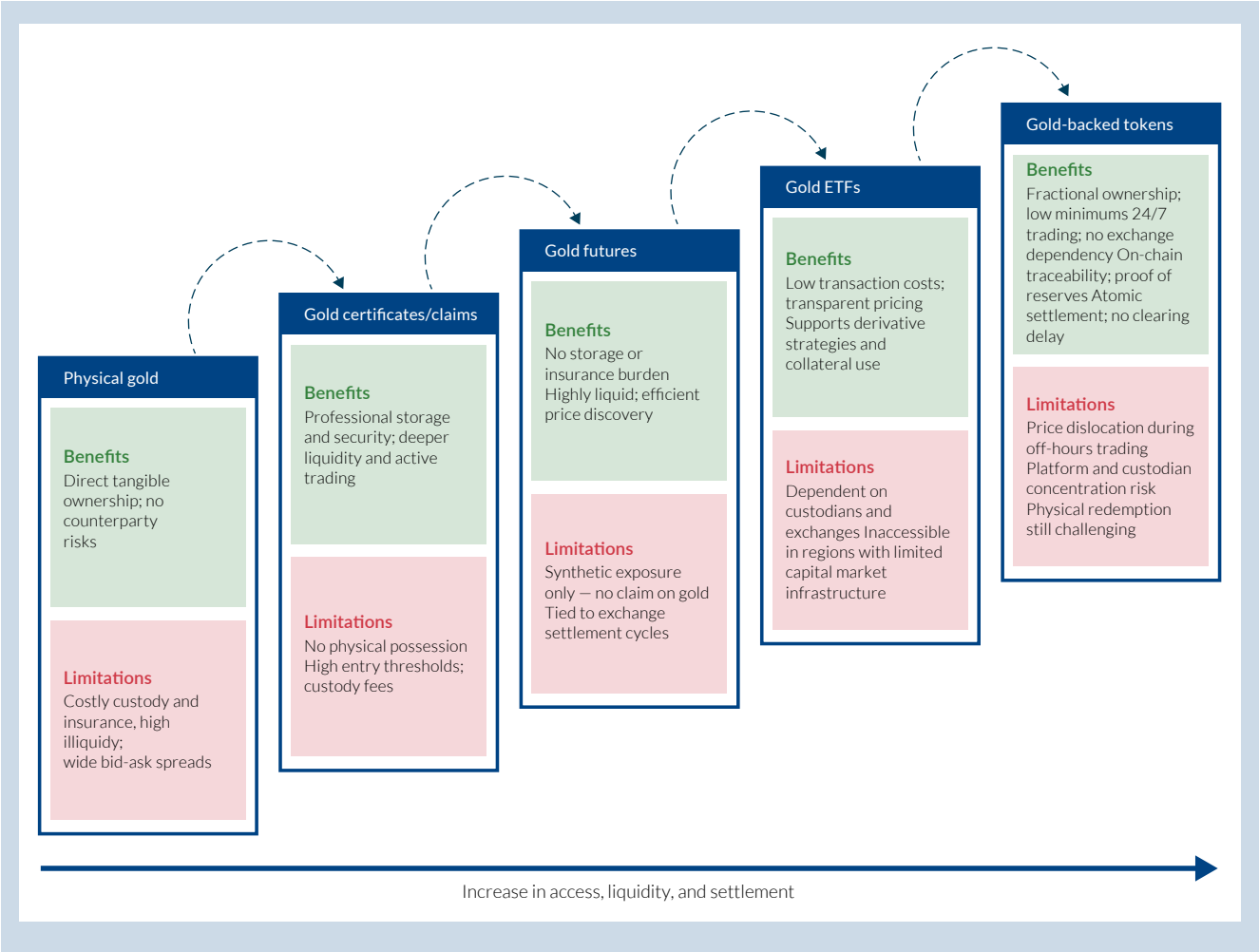
From a structuring viewpoint, entities issuing tokenised gold can adopt a range of methods, as outlined below.[81]

79. In practice, the legal structure of entities issuing tokenised gold indicates that some entities (such as Paxos Trust Company incorporated in the US) have structured gold tokens as a bailment arrangement with investors, under which each token confers direct ownership of specific identifiable gold bars held in custody, while Tether Holdings El Salvador S.A. de C.V. incorporated in El Salvador, grants holders a claim on an undivided pool of gold bars owned by the issuer, resembling a pooled entitlement.

80. See Kinesis Money, for example, available at https://kinesis.money

81. See for instance, World Economic Forum, 'Asset Tokenisation in Financial Markets' (2025), available here.

Figure 4.9: Structuring approaches to gold tokenisation



Other forms of commodities such as carbon credits, renewable energy output, energy certificates, ESG performance metrics etc hold equal promise from tokenisation. As tokenisation allows financial instruments to be programmatically linked to non-financial data and given the value of these assets depends majorly on the credibility of their measurement, reporting and verification, tokenisation could uniquely benefit these asset classes.

Especially for use cases such as carbon credit, this could enable improved transparency (given the concerns about overstated emission reductions and the actual impact of offset projects in this sector), reduction of double-counting risks through an immutable ledger record, and lower transaction costs in fragmented secondary markets. This opens the door to automated, condition-based execution which could strengthen the credibility of sustainability claims and reduce greenwashing risk.[82]

82. As an example, tokenisation may allow for a sustainability-linked sukuk to adjust its profit rate based on verified **ESG** outcome, or a green bond whose smart contract can release funds only when predefined environmental milestones are met. See, Bank Negara Malaysia, 'Asset Tokenisation in the Malaysian Financial Sector' (Oct, 2025), available **here**.

4.5. Insights from interviews with market participants

We interviewed a number of market participants ranging from industry associations to tokenisation platforms and token issuers (see Annex 3 for the interview questionnaire).

Below we set out the main insights.

Pace of adoption

There is a broad consensus that whilst asset tokenisation is progressing at a great pace in developed markets, the adoption is much slower in emerging economies.

Several reasons contribute to explain this. First, attention and investment are very much focused on the largest pools of liquidity, where scale and network effects can be most easily realised, such as the US. Second, in contrast, EMDE markets have vastly smaller liquidity pools, varying maturity in market structure, and less mature regulatory environments leading to slower adoption;

Having said that, the tokenisation potential of EMDE is significant, given they hold approximately 60% of GDP in Purchasing Power Parity terms.[83] As an indication of this potential, some interviewees commented on their expectations for unicorns to emerge from EMDE, taking advantage of the vast market opportunity, open-source models and maturing regulation.

> *"EMDE is increasingly now the domain where a lot of new fintech unicorns are emerging, taking advantage of the open-source nature of tokenisation and blockchain-based financial services."*
>
> Stablecoin and tokenised fund issuer

> *"There's a whole wave of fintech unicorns being born around the world that don't have the typical technology debt that a PayPal might have, or a big asset manager might have."*
>
> Stablecoin and tokenised fund issuer

However, notwithstanding fintech innovation and national initiatives, tokenisation at scale is unlikely to happen until global financial markets focus on opportunities in EMDE markets alongside the current focus on developed markets, because of the perceived quality of EMDE assets, their associated liquidity and the maturity of markets.

> *"Frankly, it's less driven by the country itself and the technology, it's driven more by the financial market.*
>
> Market Infrastructure Provider

> *"For emerging markets, the biggest opportunity is ease of access into these countries and ease of distribution of those assets that that's really the main opportunity for developing countries."*
>
> Market Infrastructure Provider

83. World Bank, 'Global Economic Prospects' (2026), available here.

Potential benefits

Financial inclusion was cited by several interviewees as one of the key potential benefits of tokenisation, both in terms of access to payments functionality but also in using tokenisation to develop new marketplaces, giving access to new investment opportunity etc. Armed with just a phone, an open-source mobile wallet and an internet connection, many new financial services can be made available to previously disenfranchised communities.

"A stable coin or a tokenized innovation on its own right doesn't increase financial inclusion. But what it does do is lower the cost of financial access, which if you care about these objectives in the broadest sense, then being able to render the entirety of all of the services that Wall Street might provide to the best investors in the world."

Stablecoin and tokenised fund issuer.

"It's about whether or not we could render this to billions of basic Internet connected devices and to billions of people for whom are not economically viable to deliver."

Stablecoin and tokenised fund issuer.

This is significant, in that in many EMDEs (and as well some AEs, including eg the UK), wallet usage for younger age groups is higher than traditional financial accounts.

Tokenisation may also help resolve some of the inefficiencies and frictions that exists in EMDE countries, both in their capital markets, and in trade more generally.

"If you can start creating the path towards more liquid markets, that will unlock huge potential in every single country in the world, because then it will be appealing for those large asset managers to invest into those assets, those type of companies."

Tokenisation platform

"The art of the possible in emerging and developing countries is to remove friction from economic activity and hence improve basic access and inclusion, using the programmability of tokenised assets."

Stablecoin and tokenised fund issuer.

Use cases

Apart from tokenised money (primarily in the form of stablecoins), the vast majority of tokenisation examples seen by interviewees focused on tokenised commodities, particularly gold which has far higher tokenised market cap than any other precious metal. For example, ABSA bank in South Africa is experimenting with gold-backed stablecoins as a means of settling trade transactions across the continent, given the profusion of domestic currencies.[84] Similarly, the Standard Bank of South Africa (SBSA) has explored the tokenisation of an existing exchange-traded fund (ETF) on the bank's blockchain platform to enable clients to transact on a single platform, in a safe and efficient manner.[85] HSBC has also made tokenised gold available to Hong Kong-based retail customers through its mobile bank application, and has anecdotally enjoyed great success.[86] Likewise, trade finance (eg invoice tokenisation) and real estate tokenisation were also referred to as interesting use cases.

"Stable coins being 90% of the conversation, gold being 9% of the conversation, real estate being 1% of the conversation."

Market infrastructure Provider

"You need to be able to offer that service to a lot of people to make issuing a gold token at $0.30 ticket size viable"

Market Infrastructure Provider

Real estate tokenisation was referred, in particular, to being a solution to incomplete and inaccurate land registry records, and inefficient property markets. Many examples exist across emerging markets – for example, in Thailand, RealX launched the country's first condominium-backed digital token in 2023.[87]

"Real estate is something that keeps coming up as an interesting use case. There are some initiatives that try to turn to organised real estate into essentially liquid assets that could be used in the wholesale markets and even for collateral purposes with central banks."

Industry association.

However, challenges still exist in terms of developing transparent, regulated tokenised real estate markets with liquid secondary markets.

"In emerging markets, the owner of land is not very well defined, they may have left it to 10 descendants, the will was never resolved. And so those 10 descendants jointly own all the land and none of it is for sale unless all 10 agree on it."

Market infrastructure provider.

84. Ryan, 'ABSA's bold leap into stablecoins' (2026), available here.
85. The Standard Bank of South Africa (SBSA) Test Case, available here.
86. 'HSBC Gold Token', available at https://www.hsbc.com.hk/investments/products/gold-token
87. This was a partnership between a condo developer, an investment firm and Siam Commercial Bank's Token X platform. 361 individual units across 3 condos were tokenised representing, with each token representing roughly one square inch of a condo unit giving an investor exposure to the property's rental income and potential future sale, all through token ownership using a process regulated by the Thai SEC. Kushneryk, 'Tokenization in Thailand' (2025), available here.

Bond issuance is another tokenisation example referred to several times. Such digital bonds offer increased efficiencies in book-building, issuance and settlement. Just one bank's platform (HSBC Orion) has already issued over $3.5 billion of digital bonds, with larger economies such as Hong Kong having issued a significant number of Green Bonds.[88]

"Hong Kong Monetary Authority (HKMA) issued across four different currencies and a gigantic number in terms of issuance."

Industry Association

Offering digital bonds also give some nation states the opportunity to increase domestic holdings, as in the case of Indonesia:

"It enables investors to invest in local products and potentially bring foreign investors to invest into those local products as well."

Tokenisation Platform

"40% of Indonesia's funds are still held by foreign investors. It's trying to reduce that down and increase the percentage of domestic ownership."

Tokenisation Platform

"Tokenised Bonds will allow them to reach their entire diaspora through a simple app."

Tokenisation Platform

Finally, trade finance was also cited as a key use case, both in terms of tokenisation of invoices and hence facilitating a secondary market, as well as using tokenised cash for settlement. For example, HKMA has partnered with the local Bank for International Settlements (BIS) Innovation Hub to see how tokenisation could help trade finance for MSMEs, using invoice tokenisation and smart contracts to develop programmable payments. Trade financing is also recognised as a use case in the Bank Negara Malaysia's (BNM) recent consultation paper on asset tokenisation.[89] Likewise, the Bank of Thailand collaborated with Siam Concrete Group and a subsidiary of Siam Commercial Bank to use blockchain-based CBDC for B2B payments, establishing how frictions and inefficiencies could be removed in supply-chain finance..

"Trade finance is one that's right at the top."

Industry Association

"We're working on projects in Eastern Europe around how can we enhance invoice tokenisation and invoice trading."

Industry Association

88. See, Hornstein, 'HSBC approved by UK as Digital Gilt platform provider' (2026), available here.

89. Bank Negara Malaysia, 'Asset Tokenisation in the Malaysian Financial Sector' (Oct, 2025), available here.

Implementation challenges

For asset tokenisation to have a more significant impact on EMDE economies, a number of challenges were raised as needing to be overcome. These include risks related to both technology and regulation.

On the technology front, some interviewees noted that private/permissioned chains were seeing less traction than public chains, and that the variety of blockchain technologies used created challenges around interoperability. Although the number of different chains used across EMDE countries may well consolidate over time.

> *"The discussion around needing private chains does not exist in emerging markets."*
>
> Market Infrastructure Provider

> *"Interoperability to legacy is not just about tech per se, it's about operations around legacy; settlement cycles, market convention etc."*
>
> Market Infrastructure Provider

> *"Do I see that, you know, consolidating over time into a few good chains? Yes."*
>
> Tokenisation Platform

Risk and regulatory challenges were also cited. Some commented on the geopolitical risks facing some countries and the impact that might have on inbound investment. This is particularly relevant with the recent fighting in the Middle East. Also, the consequences of stablecoin dollar dominance were mentioned, as well as the risk of capital flight from some economies. Finally, given the dependence on public ledgers, some interviewees commented on the operational resilience challenges of tokenisation initiatives, especially given the increasing regulatory focus on this topic.

> *"Start building solutions so that the capital remains in those countries because the reality of those offshoring means also that the funds are leaving the country, eg Vietnam really sees this as an opportunity."*
>
> Tokenisation platform provider

> *"The guidance to policymakers and regulators is to regulate the last mile digital wallet providers, virtual asset service providers and the standardization and harmonization of that rule."*
>
> Stablecoin and tokenised fund issuer.

> *"Operational risks associated with things being available on chain all the time, and recent blockchain outages such as the Sui blockchain."*
>
> Market Infrastructure Provider

Future Outlook

Several interviewees commented on what the future holds for asset tokenisation in EMDEs. Most interviewees expected significant growth over the next few years, but the extent of that growth depended on addressing the topic of market liquidity, the scaling of new innovative platforms, regulatory maturity and the extent of public private collaboration to develop tokenised markets.

"I would certainly forecast that over the next two to five years we're going to see much more interest from that corner."

Industry Association

"An ongoing migration from the institutional transformation that's going at the moment to really reach into the consumer marketplace as well."

Market Infrastructure Provider

"Private-public collaboration, working in partnership with the industry, identifying strategic areas of focus."

Industry Association

5. Regulating tokenised markets

5.1. Overview

Adapting existing financial regulation and institutional arrangements to enable tokenisation to scale responsibly has proven a complex challenge, for which no settled approach has yet emerged. By changing how assets are owned, recorded, held, transferred and settled, tokenisation tests the legal and regulatory frameworks designed for conventional account-based markets operating through prescribed intermediaries.

In developed markets, bespoke frameworks developed for cryptoassets, such as the **EU**'s Markets in Crypto-Assets Regulation (**MiCAR**), provide a useful reference point for addressing risks specific to the technology, particularly in relation to custody, operational resilience and, to a more limited extent, financial integrity.[90] Applying them fully to traditional assets, as a parallel regime, however, risks inconsistency, distortion of the perimeter and opportunities for regulatory arbitrage.[91] In the EU, in fact, MiCAR does not apply to cryptoassets which are in fact financial instruments, but rather only to stablecoins and non-financial cryptoassets. This is a similar approach to that which is evolving in the US, with the GENIUS Act applying only to stablecoins and new Securities and Exchange Commission (**SEC**) guidance clarifying that digital assets which are securities or commodities will be addressed by existing frameworks, while those that do not fall into these categories will fall outside the regulatory perimeter. In context, jurisdictions including the UK and Hong Kong are implementing specific regulatory frameworks for cryptoassets which are financial instruments.

As evidenced previously in this report, tokenisation concerns a range of asset classes and activities that are already subject to securities, banking, payments and market-infrastructure rules, among others. Accommodating and enabling it may therefore require changes across regulatory frameworks governing different products, activities and infrastructures. Reforms focused on a single product, activity or regulatory silo are likely to have limited effect.

A related challenge lies in coordination between authorities with different remits. This is likely to be especially acute in jurisdictions where regulatory mandates are unclear, institutional coordination mechanisms remain underdeveloped, and technical or legal capacity is limited, as is the case in several EMDEs. On the other hand, EMDEs may benefit from having fewer entrenched rules and less rigid market structures. In some cases, this may create greater room to adapt existing frameworks and sequence reform in a more pragmatic way.

This chapter examines the challenge of regulating tokenisation in a structured manner. It first sets out the main policy, legal and regulatory considerations raised by tokenised assets and activities (see **Annex 1** for an in depth overview of these considerations). The chapter benchmarks jurisdictional approaches in emerging markets to identify common patterns and divergences. Building on that analysis, the chapter proposes a toolkit to guide regulators in prioritising reform and applies it to an instance of tokenised gold. The chapter concludes with findings from interviews with regulators and policymakers.

90. European Union, Markets in Crypto-Assets Regulation (**MiCA**), available **here**.

91. International Organization of Securities Commissions (IOSCO), 'Final Report with Policy Recommendations for Decentralized Finance (DeFi)' (2023), available **here**.

5.2. Policy, legislative and regulatory layers

Public authorities can respond to tokenisation on different levels: policy, legislation and regulation. Each plays a distinct role: at the policy level, authorities set direction and priorities, including through the publication of roadmaps and other statements. At the legislative level, they can address legal recognition and property rights and define powers and mandates of regulatory authorities. At the regulatory level, they determine how rules are applied, adapted or supplemented across relevant products, activities and infrastructures. These actions are interdependent, and jurisdictions may differ in how they sequence them.

5.2.1 Policy layer

Regulatory authorities have a key role in setting the policy narrative and direction for tokenisation. The cross-cutting reality of tokenisation means that regulatory authorities need to target initiatives and policy interventions to take account of natural constraints like time, inter-disciplinary resources and workload capacity. The future state of tokenisation is not fixed, and therefore policy decisions in the short-term will be consequential in shaping how tokenised assets and systems are used to modernise financial markets and activities.

This highlights the importance of developing a policy strategy for tokenisation and communicating it to market participants. A coherent policy strategy needs clearly defined objectives and outcomes, and a holistic analysis to give more confidence in how tokenisation is positioned within the broader financial system. A significant reason why tokenisation is not taking off in many jurisdictions is due to the absence of a holistic, lifecycle approach.[92]

Regulators should provide answers to what tokenisation will aim to transform, why transformation is needed and the sequencing of tokenisation initiatives that best meet their communicated objectives and outcomes.[93] These initiatives are tested and supported by carrying out research, sectoral risk and business model analysis, industry consultations and discussions with the government. Strong attention to policy development will set the foundation for developing the necessary regulatory response to support implementation.

Policy strategies and priorities for tokenisation will vary between jurisdictions and the maturity of their financial systems. For jurisdictions with developed capital markets, tokenisation is often framed as an incremental enhancement to existing market infrastructure rather than a disruptive alternative and explores innovations in product design and delivery.[94] In EMDEs, tokenisation policy can support modernisation of the financial system and deepen capital markets by including and extending financial services to key industries (eg, commodities and agriculture).

5.2.2 Legislation layer

Legal uncertainty persists over tokenised assets and the use of blockchain and smart contract technology to augment and facilitate financial activities. Lack of clarity can be a friction to adoption.

Tokenised assets are typically subsumed within definitions of 'digital assets', 'virtual assets' or 'crypto-assets', all terms that refer to value or contractual rights being stored on distributed ledger technology or cryptographically secured and digitally represented. Because tokenisation shares technological features with other cryptoassets such as Bitcoin and stablecoins, regulatory responses that conflate these categories have downstream effects on policy and regulation, potentially yielding overlapping, competing or insufficient requirements.

92. OECD, 'Tokenisation of assets and DLT in financial markets' (2025), available here.

93. The IMF outlined that tokenisation can support financial sector development objectives, including capital market deepening, financial inclusion, infrastructure modernisation, and systemic resilience. See, Agur et al (IMF), 'Tokenization and Financial Market Inefficiencies' (2025), available here.

94. BIS, 'The Tokenisation Continuum' (BIS Bulletin No. 72, 2023). See also, composable finance by Schroders, available here and composable token flows in MAS fund framework, available here.

Particularly on ownership and transfer rights, there remains uncertainty as to the precise legal nature of the property rights associated with tokenised assets. As discussed in Chapter 2, tokens can be either issued directly or solely (as a standalone instrument) on new forms of ledger technology ('native tokens'), or they can digitally represent existing 'real-world' money and assets ('non-native tokens' or 'digital twins').[95] This high-level distinction could present various legal issues and may also require different legal treatment in particular jurisdictions.[96]

Similarly, when a tokenised asset is transferred, the transfer operation will result in the imposition or creation of varying degrees of technical encumbrances, and imposing or creating such technical encumbrances within a distributed ledger makes it possible for a person to have a factual relationship of control with a token.[97] However, there are differing views on how the legal consequences from the factual transfer, and open questions remain on how best to characterise the practical and legal consequences flowing from a transfer of a tokenised asset.

Distinctions in classifications therefore alone do not provide legal clarity, it requires assessing the different technological components of tokenisation, and how ownership and transfer of rights are determined:

- **DLT** – treatment as a ledger to record ownership and transfers, but questions are raised for public and permissionless systems, where there is no accountable entity maintaining the ledger.
- **Smart contracts** – treatment as a form of legal contract that is distinct, or as part of a binding legal contract. There may be a need for further legal clarity on whether code can be translated into standards that conform to legal texts, and if legal gaps or issues remain when accounting for programmability and portability. The treatment of code being 'law' will depend on ex-ante rules and the suitability of the jurisdiction's legal framework.[98]
- **Private cryptographic keys** – on the surface, private keys are considered as proof of access to the asset and do not necessarily imply legal or beneficial ownership. However, given the technological features that govern custody and transfer of digital assets, private keys might act as a crucial component in tandem with the DLT network ledger to verify and reconcile legal and digital ownership, especially when there lacks an independent third-party verifier (eg, CSD).
- **Atomic settlement** – settlement finality provides legal certainty that the exchange in ownership is finalised. Settlement finality currently exists as distinct operational and legal concepts that create parallel systems that need to be reconciled and coordinated with each other (see box 5.1. below).

Legislation can provide baseline clarity and the necessary powers for relevant regulatory authorities to set rules and test existing frameworks against tokenised assets and systems. Gaps in regulation may not be immediately clear, and without a legal framework that accounts for tokenised assets and systems, identification of gaps and regulatory initiatives cannot take place.

95. While native tokens are primarily regulated by the protocol on which they are issued and have no connections with any other reality outside their virtual environment, non-native tokens are connected with assets or services through smart contracts which determine the rights that token holders have.

96. Jose Garrido, Digital Tokens: A Legal Perspective (IMF Working Paper, 2023).

97. There can be three consequences arising from such a 'factual' transfer: (i) such a transfer operation will typically involve the replacing, modifying, destroying, cancelling, or eliminating of a pre-transfer token and the resulting and corresponding causal creation of a new, modified or causally related token; (ii) such a transfer operation will typically involve the imposition or creation of varying degrees of technical encumbrances in respect of the causally-related token, which will typically amount to a change of control as between the pre-transfer token and the causally-related token; and (iii) such a transfer operation will typically result in a change of state of the distributed ledger or structured record in accordance with the protocol rules of the system.

98. The UK Law Commission published advice to its government that smart contracts can form legally binding and enforceable contracts. This is due to the flexibility of English common law, where existing legal principles can be applied. See, UK Law Commission, 'Smart Contracts: Advice to Government' (2021), available here.

Box 5.1: A note on settlement finality in tokenised markets

Settlement finality – the legally defined moment at which a transaction becomes irrevocable and unconditional – is a cornerstone of financial-market infrastructure. In traditional markets, settlement is not finalised instantly but over the course of defined trade cycles and market operations. Atomic settlement is near instantaneous, however, not all DLT networks are designed equal in how settlement finality is achieved and reflected on the network.

Settlement finality on DLT can be categorised into (1) deterministic finality, which is predominantly used by smart contract-enabled blockchains (eg, Ethereum) and (2) probabilistic finality, which is used by proof-of-work blockchains (e.g., Bitcoin).

There are different types of deterministic finality, which will be based on how network consensus is achieved and the timeline needed to ensure transactions are finalised and irreversible. Layer 2 blockchains inherit the underlying blockchain's security and are used to scale activity and reduce cost. Settlement finality is achieved when layer 2 transactions are batched and posted on the underlying layer 1.

A core consideration is that the operational transfer of tokens on DLT may not coincide with final settlement as legally defined, depending on the technology features and design choices of the network. Even where the institution governing a DLT network clearly defines the point of settlement finality in its rules and contracts, the inherent feature of probabilistic settlement embedded in some network configurations – particularly public permissionless networks – can result in uncertainties around the settlement status of transactions. A transaction that appears completed on chain may not yet be legally final.

Multi-layered network architectures introduce further complexity. In arrangements using both Layer 1 and Layer 2 networks, it is not always clear whether finality is achieved when blocks are added on the Layer 2 chain or only when checkpointed to the Layer 1 network.

IOSCO's review of market practice reveals some market operators often consider finality achieved on the Layer 2 network, which creates further divergence between operational settlement and legal finality. Notably, divergent approaches to settlement finality can be seen across operators – for instance, in developed markets such as EU, CSDs such as Euroclear employ private, permissioned blockchains with deterministic transaction processing, ensuring that once recorded, a transaction outcome is final. By contrast, operators using public permissionless blockchains, particularly those with Layer 2 solutions, consider finality to be achieved at different points – some when transactions are added to the Layer 2 blockchain, others only upon verification on the Layer 1 network.

This variation has material implications for investor protection and systemic risk management, and highlights how settlement finality exist as distinct operational and legal concepts that need to be reconciled.

5.2.3 Regulation layer

Regulation is the final dependency of the tokenisation framework, it sets out how tokenisation will be regulated and under what set of rules.

Providing clarity requires well-defined regulations that address potential overlaps and disproportionality in supervisory processes, licensing and prudential requirements. Tokenisation regulation cuts across multiple activities and needs to be streamlined to ensure any tokenisation-specific rules complement and do not duplicate existing requirements.

The extent to which that regulators associate tokenisation with the crypto sector may significantly influence how tokenisation is positioned within regulatory frameworks. Tokenisation should firmly be treated as a horizontal policy area, where regulations are assessed and adapted based on the use cases identified at the policy level.

As explored in the benchmarking (Section 5.1.4) below, jurisdictions typically oscillate between three different approaches to tokenisation regulation, imposing either requirements for securities or virtual/crypto-asset service providers (**VASPs/CASPs**) or **AML/CFT** controls and oversight (**FATF**). These approaches alone cannot support a framework for tokenisation alone.

An effective approach requires regulation to be assessed and devised in relation to the multiple tokenisation use-cases. Below we outline a couple of these considerations, which include (1) identifying regulatory gaps that need to be addressed when aligning with existing regulations, and (2) regulatory intersections that need to be accounted for and adopted in a tokenisation framework.

Regulatory gaps and alignment

Tokenised assets tend to pursue regulated use cases, leveraging distributed ledgers as their foundation. Consequently, the range of entities interested in issuing them will likely overlap with the current issuer landscape and may therefore be subject to existing rules on issuance.

Since additional features can be built on top of a tokenised instrument (such as the potential for payment to be exchanged without the lengthy processing times or costly fees involving intermediaries off-the-chain in delivery of securities transactions), tokenisation may not be fully captured by the existing regulatory perimeter in a jurisdiction (in the example above, the regulatory concern would arise from absence of netting of trading in DLT-based atomic settlement, and the potential need for prefunding the account for the trade to occur [99]). For regulators, this is crucial as potential gaps in the regulatory treatment of tokenisation may give rise to regulatory arbitrage opportunities or novel risks that may not be mitigated by existing regulation. It is essential to determine whether existing regulations should be applied to new participants in tokenised asset markets or if additional requirements need to be incorporated into the current regulatory framework.

This 'alignment problem' in application of existing regulatory frameworks to tokenised assets has been observed in several instances. For instance, under the Central Securities Depository Regulation (**CSDR**) and MiFID II rules in the EU, security tokens classified as 'transferable securities' and traded on a regulated trading venue must be recorded in book-entry form within a central securities depository (CSD) (see Pilot Regime, in EU case study below). While this may be feasible for certain tokenised security structures – such as those issued at the top-tier level by a CSD – it may not be viable for other models where no legal entity exists that can be authorised as a CSD, such as instances of direct issuance where the operator maintains a register or record of claims directly on a distributed network.

Regulatory intersections

Crypto sector interlinkages with tokenisation create channels for risk to spill over. These arise from intersecting activities and participants, for example, custody arrangements on the blockchain that safeguard digital ownership rights, or the use of stablecoins as a settlement asset for tokenised financial transactions. This is where a comprehensive regulatory regime for the crypto sector can support tokenisation, as it would set requirements for digital asset custody and stablecoin issuance and distribution.

99. In fact, regulatory initiatives targeting the cryptoasset market (e.g MiCA) typically approach this practice only from the perspective of conflicts of interest. This practice, at least under certain conditions, may also have implications on fair and orderly trading and/or liquidity that could require specific measures to be taken by the trading venues (eg where disorderly conditions are taken place on-chain that significantly limit or do not allow the transfer of assets).

Take for instance, DLT-based custody – existing rules for custody when applied to tokenised assets, prove insufficient in achieving the same regulatory outcomes compared to traditional assets.

This is because DLT-based custody provides novel risks arising from:

- **Custody arrangements**: tokenised assets may require dual-custody of the reference and digital asset. Existing regulations do not address the interactions between two records of ownership and safekeeping. Requirements typically reference concepts such as 'accounts,' 'book entries,' 'credits,' and 'debits,' which do not always align with blockchain-based ledgers setting conditions needed for DLT to be consider a legal record can address the risk where on-chain and off-chain transactions accounts are not synchronised;
- **Operating models**: there is a variety of custody models that can be adopted for tokenised assets, in particular self-custody models which introduce unique risks to customers as they store and manage their own private keys, particularly for native tokens where there does not exist an offline alternative;
- **Third-party provider dependencies**: dedicated custody technology providers play an increased role in supporting custody arrangements. The reliance on outsourcing creates new risk vectors for operational resilience and continuity and heightened cybersecurity vulnerabilities.

Reforming custody regulations is, therefore, needed to address these risks and vulnerabilities, to ensure that similar consumer and market integrity protections can be achieved for tokenised assets.

Box 5.2. Tokenisation and International Financial Centres

Tokenisation often forms part of a government strategy to attract capital, deepen capital markets and connect domestic assets to foreign investors.[100] In some jurisdictions, this strategy may be linked to the development of an international financial centre (**IFC**), helping create more efficient and investable markets for cross-border activity.

The scaling of tokenised markets requires legal certainty, credible regulation, dispute resolution and access to capital, all of which are features typically associated with successful financial-centre ecosystems (see Chapter 3). In that sense, IFCs may provide a more favourable institutional setting in which tokenised activity can take place.

For EMDEs, this may be especially relevant where domestic capital markets remain shallow, legal certainty is uneven, or authorities are seeking to improve the attractiveness of local markets to foreign capital (e.g. Kigali International Financial Centre).[101]

This is evident in a number of established financial centres. In Hong Kong, tokenisation has been positioned as part of a broader digital-finance and financial-market-infrastructure agenda through initiatives such as Project Ensemble.[102] In Singapore it has been linked to market-building and standards development through Project Guardian and Global Layer 1.[103] Abu Dhabi Global Market has been a first mover in the adoption of rules for tokenised investment products, within its wider strategy of financial innovation (**ADGM**, 2026 [104]).

The role of **IFC**s should not be overstated. They may help concentrate the legal, regulatory and market conditions needed for tokenised activity, but they are not a substitute for other enablers. Tokenisation will not scale if questions relating to registries, payments, market infrastructure, legal recognition and supervisory coordination remain unresolved (see Chapter 6).

100. World Economic Forum, 'Asset Tokenisation in Financial Markets: The Next Generation of Value Exchange' (2025), available **here**.
101. See for instance, Kigali International Financial Centre, Rwanda, available here: **https://kifc.rw**
102. Hong Kong Monetary Authority, 'HKMA announces the new phase of Project Ensemble to support real-value transactions in tokenised deposits and digital assets' (2025), available **here**.
103. Monetary Authority of Singapore, 'MAS Expands Industry Collaboration to Scale Asset Tokenisation for Financial Services ' (2024), available **here**.
104. Abu Dhabi Global Market (ADGM), 'Digital Assets', available **here**.

5.2.4 Analysis from benchmarking of tokenisation regulations in EMDEs

For this report, we applied a benchmarking and comparative analysis of RWA tokenisation regimes across 23 EMDEs. Our framework for benchmarking was organised into three parts: (a) mapping each jurisdiction's policy and regulatory context, institutional framework, and regulatory perimeter and taxonomy (ie the foundational conditions for tokenisation activity), (b) deep dive on use cases and regulatory initiatives which applied several analytical dimensions to specific market and regulatory implementations, namely the nature of the initiative, asset class and sectoral focus, functionality within the value chain, technology architecture, legal treatment, risk and compliance management, market infrastructure and governance, implementation and performance, supervisory and cross-border coordination, and overall maturity, and (c) assessing upcoming regulatory changes, strategic direction, innovation prospects, and lessons learned. The desk-based benchmarking was compared against primary sources (ie qualitative interviews in select jurisdictions).

Based on findings from the benchmarking, we conclude that despite a common recognition that tokenisation is a key component to developing capital markets, the approaches to regulation diverges in substantive ways. Specifically, our analysis identifies a significant gap in EMDEs in communicating or providing targeted guidance on how, when and what regulation applies to tokenised assets and systems. Where tokenisation is captured by regulation, it can lack a lifecycle approach and sufficient delineation from cryptoassets.

Given the above, there are three broad approaches to regulation of tokenised assets in EMDEs:

- **Securities-based regulation**: some jurisdictions extend their existing securities framework to tokenised assets, though this approach is largely confined to primary markets regulation on issuance and public offers. This proves insufficient for a lifecycle approach, which requires co-ordination across regulatory stakeholders responsible for different market segments and products.

  Without a lifecycle approach, tokenisation initiatives risk uneven progression, since primary market issuance is inherently dependent on secondary market trading and subsequent lifecycle activities. Therefore, when tokenisation is narrowly captured within a jurisdiction's framework, regulation might limit potential use cases to issuance and no other stages of the trade lifecycle.

- **Intermediary-based regulation (VASPs/CASPs)**: many jurisdictions have introduced dedicated licensing framework for virtual asset service providers (VASPs) that also capture tokenised assets and related activities. This approach stems from a legal framework that classifies tokenised assets under the definition of 'virtual' or cryptoassets, inextricably linking the two concepts from a policy perspective and impacting how regulatory requirements are built. While helpful, this may be insufficient for tokenisation lifecycle governance, given that each stage of tokenisation gives rise to distinct risks that a single VASP or CASP licence may not be calibrated to address.
- **AML-based regulation (FATF-only)**: in jurisdictions where regulation is anchored primarily in AML and financial intelligence frameworks, oversight focuses on intermediaries and transactional flows rather than on the structure of tokenised instruments or markets. Like the intermediary-based approach, this approach is derived from the overarching legal framework that broadly defines "virtual assets". Whilst tokenised assets are not explicitly regulated, this approach may be unsuitable to advancing tokenisation initiatives, particularly as it may create duplicative supervisory requirements for traditional financial institutions that already have AML controls in place and seek to tokenise their products or services.

Below we consolidate findings from the benchmarking on a regional level, focused across: (i) Asia-Pacific, (ii) Latin America and Caribbean, and (iii) Sub-Saharan Africa. The coverage in Asia Pacific included Hong Kong, India, Indonesia, Pakistan, the Philippines, and Thailand. Latin America and the Caribbean comprised Argentina, Brazil, Chile, Colombia, Peru, and Venezuela. Sub-Saharan Africa covered Botswana, Eswatini, Ghana, Kenya, Mauritius, Nigeria, Rwanda, South Africa, Uganda, and Zambia. Finally, Ukraine was included as an EMDE comparator in Europe.

(i) Asia-Pacific: Infrastructure-led leadership and emerging institutional responses in the region.

Some notable developments include:

- Thailand's Securities and Exchange Commission (SEC Thailand) published a three-year plan[105] to develop its capital markets, which includes the use of new technologies that support tokenisation. The Bank of Thailand has expanded its sandbox to include programmable money[106] which allows for broader testing of stablecoins, including as a settlement asset for tokenised assets.
- Hong Kong's Securities and Futures Commission (SFC) has clarified through circulars and guidance that tokenised funds and securities remain subject to existing securities regulation, with additional expectations relating to custody, disclosure, and operational controls, while the Hong Kong Monetary Authority (HKMA) has supported tokenised issuance within established market infrastructure arrangements.[107,108]
- Philippines have developed a joint regulatory framework issued by the Bangko Sentral ng Pilipinas (**BSP**) and the Securities and Exchange Commission (SEC Philippines), that defines digital and tokenised asset categories and clearly allocate supervisory responsibilities across payments, securities, and market conduct.[109] While implementation remains cautious, a clear regulatory perimeter is established for future tokenised financial instruments.

(ii) Latin America and Caribbean: Concentrated activity in the region.

- Brazil has set an example for strategic response to tokenisation by carrying out research, experimentation and infrastructure-building regulatory initiatives. Brazil's wholesale CBDC initiative, **DREX**, provided a settlement infrastructure and was supported by statutory recognition of virtual assets.[110] Furthermore, the Securities Exchange Commission (**CVM** Brazil) enables tokenised investment funds within the existing regulatory framework.
- Sandbox regime has been a regulatory lever that jurisdictions such as Colombia and Brazil have relied on to support regulatory learning and stakeholder engagement. Although explorative rather than immediate rulemaking, regulatory sandboxes is a useful and forward-looking tool that can help sequence regulatory responses to tokenisation.[111]
- Elsewhere in the region, activity remains fragmented. Argentina shows market-led innovation in agricultural and real-estate tokenisation supported by **CNV** resolutions enabling digital securities but lacks a comprehensive supervisory framework.[112] Chile, Colombia, and Peru remain at the level of policy exploration without operational frameworks.

105. SEC Thailand, 'SEC Unveils Three-Year Strategic Plan (2026–2028) Under the Theme "Building Trust, Powering Growth"' (2026), available **here**.
106. Bank of Thailand, 'Regulatory Sandbox', available here.
107. Securities and Futures Commission (Hong Kong), Circular on Tokenisation of **SFC**-authorised Investment Products, 2023–2024.
108. Hong Kong Monetary Authority, 'Tokenised Government Green Bond Issuances and related press releases, 2023–2024'.
109. BSP & SEC Philippines, ''Digital Assets Framework: Classification and Oversight,' Joint Framework' (2023).
110. Central Bank of Brazil, '**BCB** launches Drex Pilot's second phase' (2024), available **here**.
111. Central Bank of Brazil and Comissão de Valores Mobiliários (Brazil), 'Regulatory Sandbox', available **here**.
112. CNV Argentina, 'Resolutions 1069 & 1081: Digital Securities' (2025), available **here**.

(iii) Sub-Saharan Africa: Uneven progress across the region.

- South Africa has made notable developments in strengthening regulation on tokenised assets, with draft regulations published in April 2026 placing restrictions on their use and movement in South Africa, focused on managing capital flows through a risk-based approach.[113] The South African Reserve Bank completed Project Khokha 2 in 2022, successfully testing tokenised settlement assets and delivery-versus-payment mechanisms using DLT.[114] Public-sector experimentation has been complemented by private-sector initiatives, including tokenised precious-metal products and the launch of a voluntary carbon market by the Johannesburg Stock Exchange.[115] ,[116]
- Kenya proposed VASP framework[117] captures tokenised RWA issuance only, which like the securities-based approach (outlined in Section 5.1.3) focuses on primary market issuance activity and related disclosure, transparency and listing requirements. This is a first step in capturing tokenised assets as an instrument that has regulatory requirements applied. However, these requirements may not offer identical safeguards compared to traditional primary market regulations in Kenya, if there are any realisable regulatory arbitrage opportunities.
- Otherwise, engagement with tokenisation is limited but progressing slowly. Countries like Ghana, Rwanda and Uganda are pushing forward legislation for virtual assets, albeit at different stages.

113. Notably, in South Africa, under the Financial Advisory and Intermediary Services Act, 2002 (**FAIS** Act), crypto asset service providers are required to obtain a financial services provider (**FSP**) licence, while also complying with anti-money laundering obligations under the Financial Intelligence Centre Act, 2001 (**FICA**).
114. South African Reserve Bank, 'Project Khokha 2 – DLT Proof-of-Concept' (2022), available **here**.
115. Mesh.Trade, South Africa, 'Tokenised Krugerrand Product Launch' (2025), available **here**.
116. **JSE**, South Africa, 'Voluntary Carbon Market First Trades' (2025), available **here**.
117. Parliament of Kenya, 'Virtual Asset Service Providers Act, 2025', available **here**, and corresponding Virtual Asset Service Providers Regulations, 2026 (in draft form), available **here**.

5.3. Regulatory responses

To enable tokenisation, regulators can take initiatives of two major types:

1. Policy-driven levers
   - **Legislation** – Primary laws enacted to establish the legal foundation for tokenised assets and recognise the rights they represent.
   - **Regulation** – Rules issued by financial authorities that set the requirements regulated entities must meet when conducting tokenisation activities.
   - **Specific guidance** – Circulars and clarifications that close regulatory gaps and address legal grey areas.
   - **Sandbox regime** – A controlled environment in which regulators and industry can experiment with tokenisation use cases to inform adaptive policymaking.

2. Strategy-driven levers
   - **Research** – Analytical work and feasibility studies that build the evidence base for how tokenisation can be applied across financial markets.
   - **Infrastructure** – Foundational components such as settlement assets, commercial networks and cross-border payment corridors that enable tokenised assets to function at scale.
   - **Collaboration** – Public-private and cross-border partnerships that share capabilities and expertise across jurisdictions and stakeholders.
   - **Communication** – Roadmaps and shared visions that act as a 'north star" to align authorities and industry on tokenisation priorities.

Where regulatory responses have been most effective, they combine both policy or strategic initiatives.

In some cases, regulatory initiatives have not been contained to domestic markets, where efforts have been made at the global level to test cross-border use cases and strategically share capabilities and expertise. Project Guardian by the Monetary Authority of Singapore (MAS) combines a blend of both levers to develop a clear and comprehensive strategy to support public-private sector collaborations and cross-border regulatory co-operation. Testing tokenisation use cases under this framework helps inform policy development and rulemaking, and because collaboration is a key component, MAS partners with suitable jurisdictions to progress relevant use cases (for instance, co-operation with the UK Financial Conduct Authority to develop a fund tokenisation framework).

In jurisdictions that have made substantive progress with tokenisation, regulatory responses (such as Project Guardian by MAS and Project Ensemble by HKMA) with a strong strategic component tend to have a meaningful impact.

Figure 5.1. Regulatory responses to tokenisation

Tokenisation initiatives Initiatives that can be executed by a regulator to support adoption	Difficulty Complexity and cost	Impact Benefit to adoption	Regulatory lever Type of initiative	Examples
Tokenisation roadmap Outlining a plan and vision for wholesale market tokenisation, ensuring industry initiatives are targeted and coordinated to best achieve adoption and scale. This the necessary communication and clarity for a 'north star' that industry and investors can work towards.		High	Communication	
Wholesale tokenisation taskforce Cross-authority taskforce that can bring together various initiatives together and strategically develop a roadmap in collaboration with industry to identify opportunities and challenges to adoption.		High	Collaboration	
Produce clear guidance and policy analysis for tokenised assets Clarify policy and supervisory expectations by addressing regulatory gaps or legal grey areas, to give more confidence to financial institutions looking to engage in tokenisation.		Very High	Specific Guidance	
Implementation or identification of a settlement asset Address the lack of a settlement facility for tokenised assets by instituting dedicated payment/settlement asset, which could be a wholesale **CBDC** (w**CBDC** increases difficulty).		Very High	Infrastructure & Research	
Creating commercial network for tokenised assets to deepen liquidity A mechanism to scale and connect successful industry tokenisation projects amongst a network of participants and market segments to help adoption and limit fragmentation.		High	Collaboration	
Targeted sandbox regime for tokenisation policy development A public-private partnership that creates a controlled environment for tokenisation experimentation to support regulators develop new regulation or adapt/stress-test existing rules.		High	Sandbox Regime	
Regional common infrastructure and cross-border payment corridor Development of a common interoperable network of market infrastructure that allows for tokenised assets and different forms of tokenised money (e.g., **CBDC**s) to be traded across borders, improving the flow and efficiency of capital and settlement operations.		Very High	Infrastructure & Research	

Below we highlight three themes which suggest a broader shift towards enabling tokenisation use cases to drive innovation in the financial sector:

- **Strategic coordination and communication**: a tokenisation roadmap (eg, the MAS tokenisation roadmap [118]) helps establish a shared vision and fosters collaboration across authorities and industry. This acts as a 'north star' to help the financial sector and market participants ensure tokenisation initiatives are targeted in each phase of the roadmap and coordinated with relevant industry stakeholders. To complement this, a wholesale tokenisation taskforce (eg, Taiwan **FSC** RWA tokenisation task force [119]), brings together multiple initiatives and develops a roadmap collaboratively with industry to identify opportunities and challenges.
- **Policy analysis, regulatory clarity and controlled experimentation**: producing clear guidance and circulars (eg, SFC and HKMA tokenisation circulars) for tokenised assets helps clarify regulatory expectations by addressing gaps in regulation and legal grey areas, giving financial institutions greater confidence to engage in tokenisation. A targeted sandbox regime (e.g., Bank of England and FCA Digital Securities Sandbox[120]) creates a public-private engagement in a controlled environment for experimentation and adaptive policymaking, allowing regulators to develop new rules or amend existing ones.
- **Infrastructure and liquidity development**: this final theme tackles foundational infrastructure required for tokenised assets to function at scale. For instance, the implementation or identification of a settlement asset (eg, **SNB**'s Swiss Franc wholesale CBDC [121, 122]) can address the lack of a dedicated settlement facility. A commercial network for tokenised assets (eg, MAS Project Guardian [123]) provides a mechanism to connect and scale successful industry projects across participants and market segments, supporting adoption while limiting fragmentation. Finally, regional common infrastructure or cross-border payment corridors involve developing an interoperable network that allows tokenised assets and different forms of tokenised money (eg, Project Ensemble[124] or Project Agorá [125]) to be traded across borders, improving capital and settlement efficiency.

118. For example, see, MAS, 'Creating the Future of Finance: A Journey of Innovation and Collaboration' – Remarks by Mr Chia Der Jiun, Managing Director, Monetary Authority of Singapore, at the Singapore FinTech Festival 2025 on 13 November 2025' (2025), available **here**.
119. Financial Supervisory Commission (FSC) Taiwan, 'Press release: RWA Tokenization Task Force Completes Technical Feasibility Validation – the FSC's Next Phase Focuses on Regulatory Adaptation' (2025), available here; and Financial Supervisory Commission (FSC) Taiwan, 'FSC press release on establishing "Real World Asset Tokenization Task Force' (2024), available **here**.
120. Bank of England, 'Policy statement: Bank of England and FCA join approach to the Digital Securities Sandbox' (2024), available **here**.
121. Swiss National Bank, 'Press release: SNB Swiss Franc wCBDC – settling transactions with tokenised assets in central bank money' (2025), available **here**.
122. Rebecca Gerosa, Oliver Gloede and Philipp Müller (Swiss National Bank), 'SNB Economic Note No. 4/2024 Piloting monetary policy implementation on a **DLT**-based infrastructure – Issuance of digital SNB Bills' (2024), available **here**.
123. MAS, 'Press release: MAS Announces Plans to Support Commercialisation of Asset Tokenisation' (2024), available **here**.
124. HKMA, 'Press release: HKMA announces the new phase of Project Ensemble to support real-value transactions in tokenised deposits and digital assets' (2025), available **here**.
125. Bank for International Settlements, 'Project Agora: exploring tokenisation of cross-border payments' (2025), available **here**.

Regulatory Toolkit: An Example of Gold Tokenisation

Developing an approach for the tokenisation of financial activities and instruments is inherently complex for regulators, cutting across multiple financial products and market functions that span distinct policy areas under different regulatory frameworks. This reality can create operational issues, technical gaps and a lack of policy cohesion. For example, tokenised settlement assets and securities must operate together to enable tokenisation, requiring close coordination between the central bank and capital markets authority at an early stage.

To mitigate these challenges and ensure policy decisions do not remain isolated, internal cross-department or cross-authority forums (including working groups or task forces) act as coordination channels for decision making, priority identification and information sharing.

This deep dive outlines a toolkit to support the development of a regulatory approach for tokenisation. The purpose of this is to create a repeatable and flexible exercise that produces actionable 'next steps' for regulators and policymakers to help achieve desired outcomes and address pressing policy challenges, gaps and grey areas.

'Gold tokenisation' will be used as a use case to produce a high-level and holistic regulatory approach to tokenisation, that are comprised of the following steps:

1. Specify tokenisation use case and regulatory remit
2. Define desired regulatory outcomes
3. Identify regulatory levers
4. Map in-scope market segments and products
5. Identify relevant policy areas and challenges
6. Prioritise and apply regulatory levers

Regulatory approach for gold tokenisation:

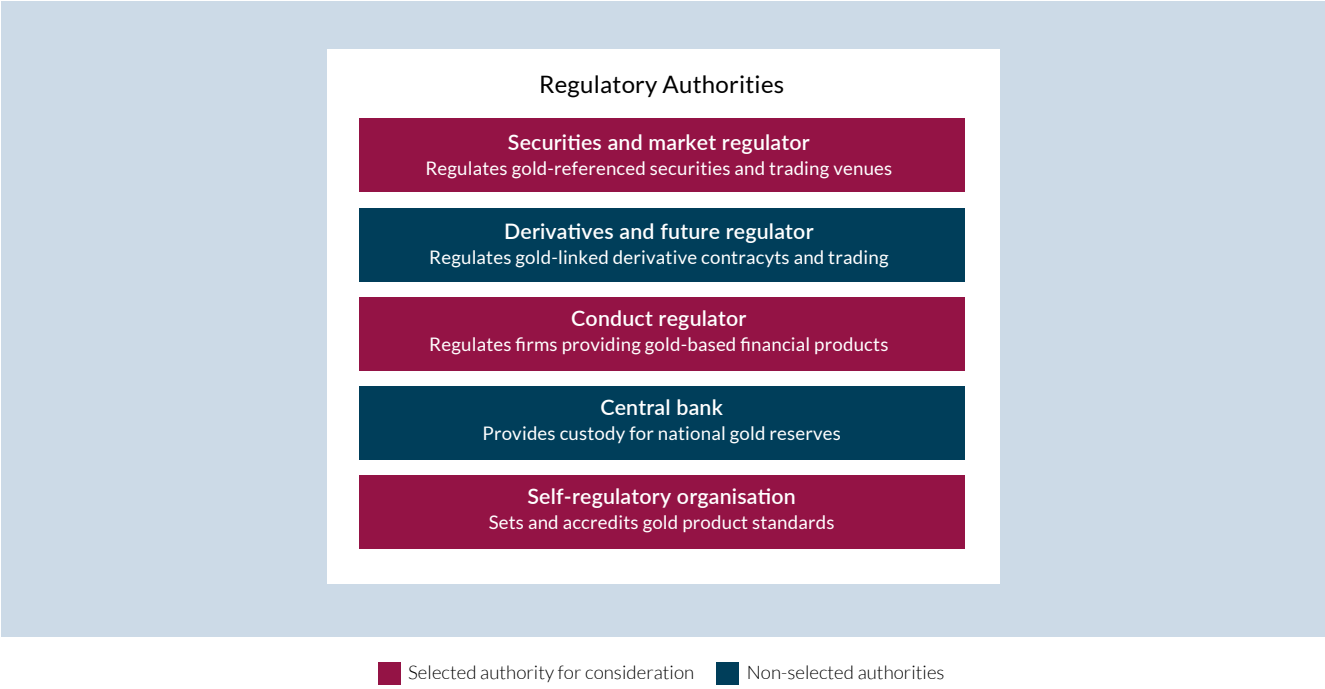
➤ **Step 1: Specify gold tokenisation use case and regulatory stakeholders**

As outlined in Chapter 2 and Section 4.3.3, there are different tokenisation models that can be adopted, and that will change the nature of the tokenised gold product. This analysis will focus on two particular structures, namely:

- **Gold-backed token (1:1 custody)**: each token directly backed by an accredited gold bar/unit.[126]
- **Gold-backed token (collateralised pool)**: each token holds a unit claim or an entitlement to pooled gold bars.

126. There are other structures that tokenised gold that are omitted from this exercise for brevity and simplicity. These include tokenised gold mutual fund; tokenised gold **ETP** notes; tokenised gold derivative contract (synthetic); tokenised gold derivative contract (physical delivery).

Figure 5.2: List of relevant regulatory stakeholders



➤ **Step 2: Define desired regulatory outcomes for gold tokenisation**

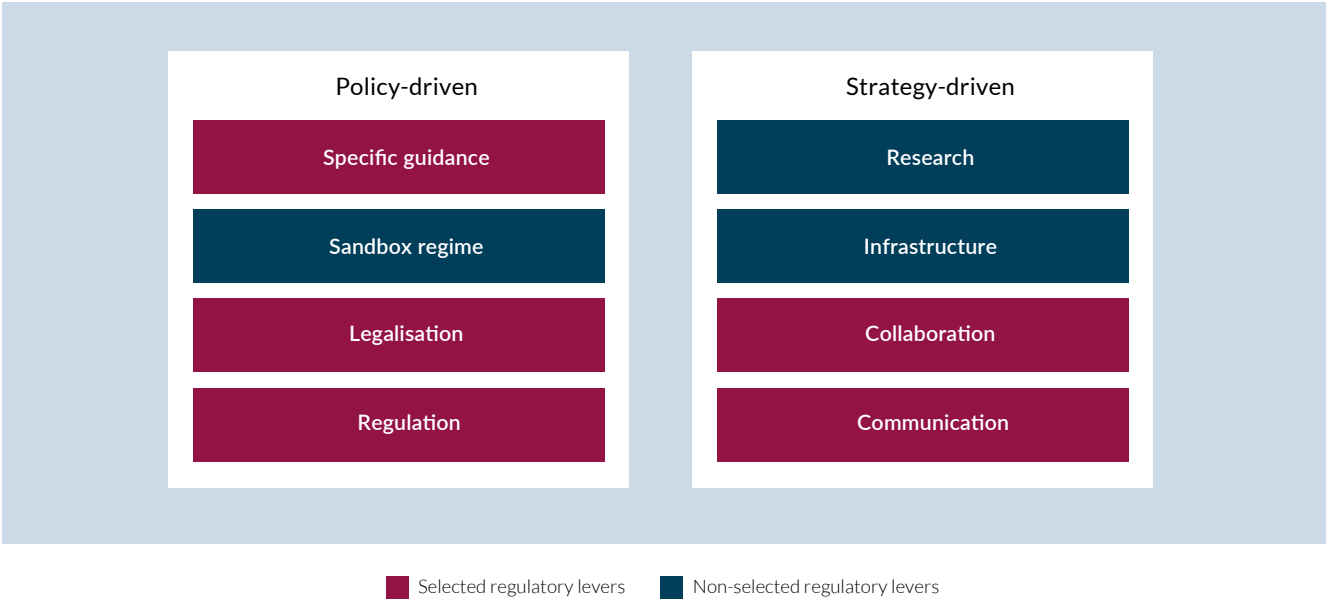
Motivators and drivers to adopt tokenisation will vary between jurisdictions and type of use case most relevant to domestic conditions of the economy and financial infrastructure. Therefore, each regulator will identify outcomes they wish to achieve through tokenisation. Gold tokenisation, in this case:

- **Deepening capital markets**: utilise capital and unlock liquidity more efficiently to support economic activity and address potential deadweight loss.
- **Infrastructure modernisation**: test and establish programmable ledgers that act as a foundation for other tokenised financial instruments, and so modernising market infrastructure.
- **Financial access and inclusion**: Underserved or non-participating consumers can engage with and be introduced to digital financial services and products using a familiar product and concept, helping them build a financial profile.
- **Innovation and competition**: develop new products and services that utilise gold as an underlying value, alongside new competitive market entrants that contribute to better consumer and market outcomes.

➤ **Step 3: Identify the regulatory levers at your disposal to enact change**

Regulatory levers are a set of policy or strategic initiatives regulators can use to mobilise tokenisation projects for financial products and activities. Multiple levers can be exercised and used in partnership with government or industry.

Figure 5.3: Types of regulatory levers

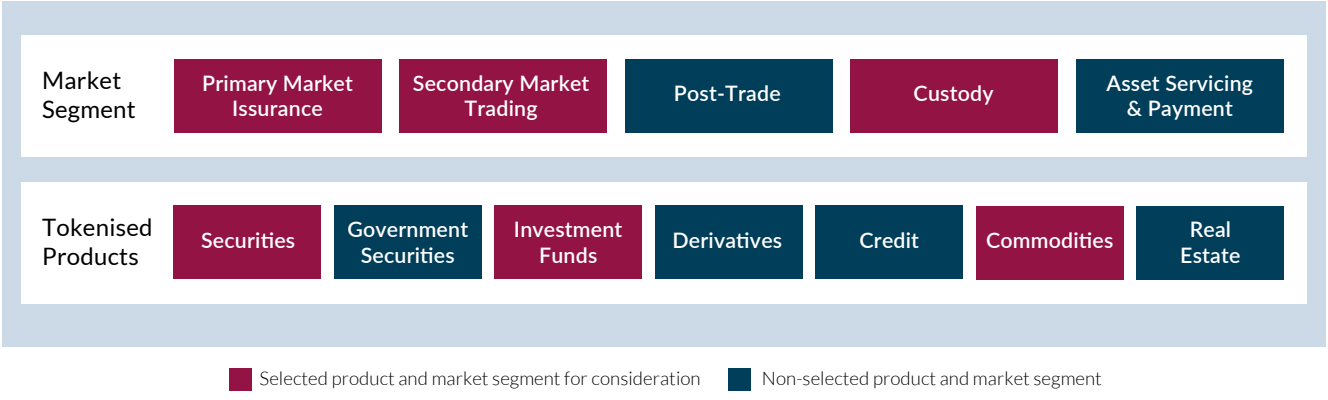


These levers can be exercised individually by the regulator, in partnership with a government and/or the private sector. Regulators are not constrained to a single lever, they are able to trigger multiple levers to support tokenisation experimentation and adoption.

➤ **Step 4: identify in-scope market segments and products**

Because there may be different design options for each tokenisation use case, it is important to identify the relevant market segments and asset classes impacted. This helps identify relevant policy areas and policy issues or gaps to address.

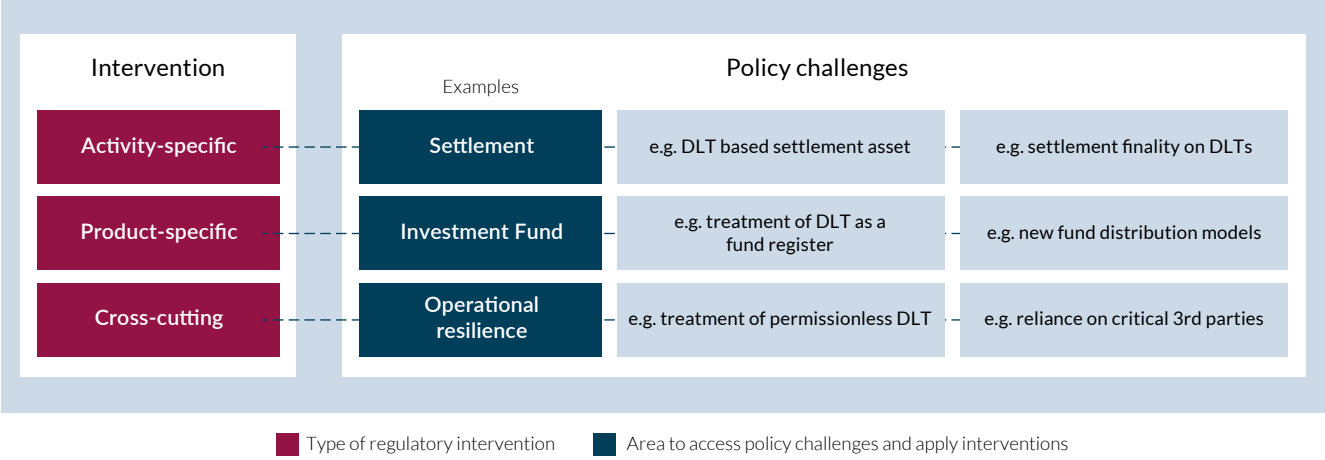
Figure 5.4: Market segments and tokenised products



For tokenised gold, the type of product and market segment is highlighted to represent the areas we wish to analyse. Depending on the type of use case, eg, tokenised gold futures, other product and market segments would be highlighted for analysis.

➤ Step 5: Identify relevant policy areas and challenges to be addressed by regulatory levers

Figure 5.5: Examples of types of policy interventions and related challenges



There are three types of interventions that help us frame the challenges related to tokenisation of gold:

- Activity-specific
- Product-specific
- Cross-cutting

These categories are used to help organise and delineate the various policy challenges and gaps identified for a given tokenisation use case. This approach reflects the holistic structure needed to confidently trigger targeted and appropriate regulatory levers.

We can apply this to the analysis of gold tokenisation:

Table 5.1: Interventions and Policy Challenges

Intervention type		Policy challenges		
Product	Security	Lack of clear classification and type of product, varying based on structure and related activities: e.g., • Exchange-traded commodity • Collective investment fund Product could trigger both classifications	Disclosures requirements and token holder claims against the issuer not well defined	Product incompatibility with CSD and dedicated secondary markets
Product	Investment fund		Treatment of DLT as fund register	Physical redemption requirements and minimum redemption units
Product	Custody	Dual custody arrangements and reconciliation between digital and physical custody layers	Existing rules do not account for DLT-specific features and risks	Self-custody token models and security complexity

The output is non-exhaustive and illustrative of the immediate range of policy challenges that need to be addressed by regulators. Step 6 will focus on applying regulatory levers to gold tokenisation, by considering policy challenges for securities and custody.

This analysis of policy issues and gaps can be iterated to additional inter-dependent areas, eg, tokenised gold as a security product will create implication for other segment such as secondary markets, post-trade activities, etc.

- **Step 6: Prioritise and apply regulatory levers to gold tokenisation use case**

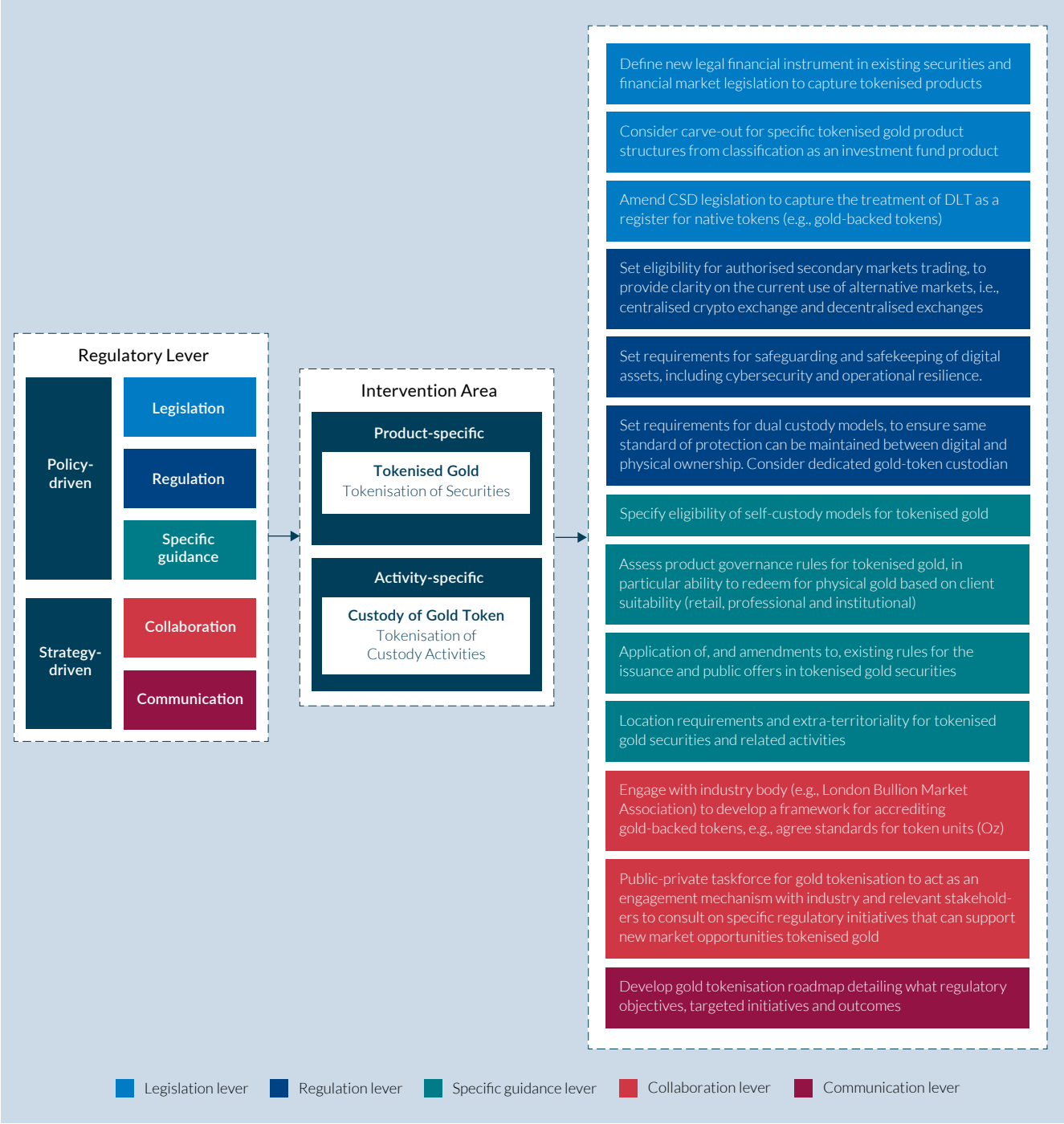
  The effectiveness of each lever will vary depending on the desired regulatory outcome and challenges. Not all levers are equal and some outcomes may hold greater priority over others. Because regulators have a time and resource constraint, a high-level assessment of effectiveness will provide a rationale for levers to prioritise and pursue.

  The figure below provides the prioritised regulatory levers, a combination of policy and strategy-driven initiatives to progress gold tokenisation and aligned with desired regulatory outcomes. Specifically, levers are used to develop interventions to address tokenised gold as a securities product and related custody activities.

  Product-specific interventions prioritise classifying tokenised gold as a type of financial instrument which also informs subsequent regulatory responses. This is done through legislative changes and collaborating with the relevant gold standard setting body, particularly as there is no single or globally recognised classification for gold tokenisation. Tokenised gold products can be arranged through various structures, adding complexity to its regulatory treatment and how it interacts with market segments for issuance and secondary market trading, which regulation and guidance can help clarify as illustrated in Figure 5.5.

  Activity-specific interventions focus on the dual-custody challenge facing gold tokenisation. In particular, developing regulation and guidance on how different custody models should be treated to ensure DLT-specific risks are addressed and parity is achieved between physical and digital custody to deliver similar outcomes for consumer protection and market integrity.

Figure 5.6: Applying regulatory levers to address policy challenges



Note: the policy interventions listed is not comprehensive and serves as indicative outputs the provides initial details that supports the initiatives behind the regulatory levers.

As demonstrated, the relationship between regulatory levers and policy areas will help determine appropriate interventions to be pursued and implemented by a regulator. This means there are multiple possible combinations of regulatory levers and type of interventions.

As a result, the following application of the toolkit is valid:

a. A single regulatory lever can be used on multiple policy areas to address underlying challenges and gaps.

b. Multiple regulatory levers can be used on a single policy area to address underlying challenges and gaps.

c. A single regulatory lever can be used on a single policy area to address underlying challenges and gaps.

d. Multiple regulatory levers can be used on multiple policy areas to address underlying challenges and gaps.

By treating tokenisation as a cross-cutting topic, the toolkit's goal is to provide a reproducible structure to inform the contents of a regulatory initiatives and make comparisons.

5.4. Insights from interviews with regulators

In Chapter 4, we presented findings from interviews with market participants. In this section, we outline insights from interviews with regulators and policymakers in APAC, Latin America and Caribbean and Sub-Saharan Africa, as well as from roundtables conducted by CCAF on this topic (see Annex 3 for the interview questionnaire).

The potential for tokenisation

Regulators typically frame tokenisation primarily as a technological evolution within existing capital markets rather than as a standalone innovation. Few common themes in how they described its potential were the ability to broaden retail access, lower the cost of financing for small and medium-sized issuers, and deepen secondary markets.

"The interest is huge. It's the hottest thing in town. From there to having a product, that's a long way."

"We had 97 firms come to us saying they wanted to tokenise. And nearly a year later, crickets, nothing."

Regulators share broadly similar views on the benefits, risks and prerequisites for tokenisation to scale in emerging markets. Several regulators singled out financial inclusion as a motivating policy objective. In the Philippines, for instance, close to 70% of the population has a digital wallet while only around 30% to 40% have a bank account[127] – a gap that tokenised instruments are already beginning to bridge.

"The interest in our sandbox is enormous, because they think that they have an asset or a project that could benefit all people."

Participants drew an explicit connection between tokenisation and the development of local capital markets, noting that fractionalisation and the changed role of intermediaries could help SMEs raise capital and lower barriers to entry for retail investors, provided underlying infrastructure is in place.

Regulatory approaches

Most regulators note that they are at an early stage of development of a regulatory framework for tokenisation, though no single regulatory model has emerged for tokenisation across regulators.

The approaches divide broadly into three camps.

- A first group is adapting existing securities and capital markets law to accommodate tokenised instruments. For instance, Argentina has put a tokenisation regime in place without passing new legislation, relying on a hybrid, "indirect" tokenisation model in which digital representations sit alongside traditional book-entry securities.[128] Similarly, Colombia's Superintendencia Financiera (SFC) has previously authorised pilots under the existing regulatory framework.[129]

127. See, Bangko Sentral ng Philipinas, 'Financial Inclusion in the Philippines', available here.

128. General Resolution No. 1069/2025, available here.

129. For instance, in 2021, the SFC launched a pilot for issuance of $110m COP blockchain bond supported by the IDB, see here.

- A second group has or is enacting bespoke legislation. Kenya has recently published its draft Virtual Asset Service Providers (VASP) Regulations, which covers issuance of tokenised real world assets.[130] Botswana's Virtual Assets Act covers asset tokens that represent underlying assets, such as real estate and commodities, while tokenised securities remain under the Securities Act, resulting in dual-licensing requirements for firms whose activities span both.
- A third and larger group is using regulatory sandboxes as a deliberate learning mechanism before committing to formal rules. They are grouped into four broad approaches:
  - **Category 1**: Bespoke sandboxes focused on tokenisation: these are sandboxes that are specifically designed to support tokenisation models (for example, **DFSA** Tokenisation sandbox,[131] Hong Kong SFC's Virtual Assets sandbox,[132] Dubai Land Department and **VARA** real-estate tokenisation sandbox,[133] and National Bank of Kazakhstan's regulatory sandbox for digital financial assets [134])
  - **Category 2**: Tokenisation sandboxes operating under revised legal frameworks: distinct from the above, these are sandboxes that are specifically designed to support tokenisation models, but which have created modified legal regimes that allow sandbox tests to be undertaken without incurring all the normal legal and regulatory obligations that may apply to a particular activity (for example, UK Digital Securities Sandbox[135] and EU DLT Pilot Regime)
  - **Category 3**: Generic sandboxes that support tokenisation tests: these are sandboxes that do not specifically focus on tokenisation, but allow the testing of propositions relating to tokenisation within existing sandbox frameworks (for example, Central Bank of Bahrain's (**CBB**) Regulatory Sandbox, Brazil Central Bank's Controlled Testing Environment for Financial and Payment Innovations' (BCB Sandbox), Canadian Securities Administrators (**CSA**)'s regulatory sandbox, Australian Securities and Investment Commission (**ASIC**)'s Enhanced Regulatory Sandbox, etc)
  - **Category 4**: Sandbox-like pilots: unlike a regulatory sandbox that receives applications for support from industry, these are models that explore specific tokenisation use cases to achieve specific outcomes (for example informing guidance) in which the regulatory authorities work with selected market participants, policy makers, and external experts (for example, MAS Project Guardian, HKMA's Project Ensemble, and BIS's Hong Kong-Innovation Hub and HKMA Project Genesis)

"We view the sandbox stage as a learning laboratory. We'll learn from practical experience and adjust."

"Tokenisation is likely to evolve, but cautiously and incrementally. Any progress will be strongly led by the regulator."

130. Draft Virtual Asset Service Providers Regulations, 2026, available **here**.
131. For an overview of the sandbox, see **here**.
132. See, SFC Regulatory Sandbox, available **here**.
133. For an overview, see **here**.
134. For an overview, see **here**.
135. See operational guidance **here**.

A notable feature across jurisdictions is a preference for permissioned over permissionless infrastructure, at least at the testing stage, though most regulators acknowledge that market participants lean the other way. One regulator reported an unresolved tension where permissionless blockchains are difficult to reconcile with traditional oversight regimes. Notably, advanced Asian markets are experimenting with layered solutions that combine permissioning on top of permissionless networks to bridge the gap.

> *"Most likely we are going to permit permissioned infrastructures, as opposed to having permissionless systems."*

Cross-agency coordination was a recurring theme. A few regulators are developing a joint sandbox to test applications that cross the boundary between the payments leg and the investment leg.[136]

Use cases

As with the market participant interviews, real estate emerged as the single most discussed tokenisation use case among regulators, followed by bonds and fixed income, gold and other commodities and (particularly in Latin America and the Caribbean) carbon credits. Most regulators report real-estate sandbox applications and described it as the "holy grail" of tokenisation in EMDEs, while also being its hardest test case.

This is complemented by survey results: real estate emerged as the most frequently cited use case for tokenisation (72.2% of survey respondents), followed by securities (61.1%) and commodities (33.3%). The interest in real estate is instructive: in many emerging markets, property represents the largest store of household wealth yet remains profoundly illiquid and inaccessible to smaller investors.

> *"Collateralising real estate is the big challenge – it's the holy grail of tokenisation."*

Some regulators however, observed the need to prioritise cross-border remittances rather than investment products as test use cases. For instance, one central bank notes:

> *"There is absolutely no interest in the government tokenising securities. We still go the hard way, the paper way."*

Implementation challenges

Regulators were strikingly consistent on the barriers that need to be overcome for tokenisation to scale, including challenges such as legal recognition of on-chain ownership, secondary-market liquidity and infrastructure, foundational digital infrastructure and identity, financial integrity risks, and market and technological readiness.

On legal recognition, regulators noted that on-chain records are not currently treated as the authoritative source of ownership. Land registries, title deeds and share registers remain off-chain, and rights attached to tokens are typically secured through parallel legal constructs such as trusts or SPVs rather than by the ledger itself.

136. For example,, Uganda.

> *"Ownership must be linked between on-chain and off-chain registers in real time."*
>
> Securities Regulator

On secondary-market liquidity, regulators reported that early pilots have generally struggled to attract consistent trading volume. At the same time, multiple regulators raised the lack of real-time interoperability between on-chain systems and traditional registries and the nascent state of national digital identity systems.

> *"Liquidity risk is a major concern; investors may not find ready exit routes."*
>
> Securities Regulator

Finally, several regulators flagged technological and market readiness as a constraint. One regulator noted that domestic licensees lack both the computing capacity and the technical expertise to operate tokenised infrastructure at scale. Despite stated interest, it is evident that incumbents have been slow to move to tokenised rails, and that in many cases the technology is not obviously more efficient than traditional alternatives – echoing a widely shared concern that, for many assets, 'the juice isn't worth the squeeze'.

> *"The incumbents are still operating in the traditional way. The technology may not be as efficient as thought."*
>
> Securities Regulator

Several interviewees stressed that tokenisation is inherently cross-border and that domestic frameworks on their own will not be sufficient. One industry association emphasised that common standards are the prerequisite for interoperability across networks and jurisdictions, and pointed to deep public-private collaboration in Hong Kong, Singapore and Australia as the emerging best-practice template for moving from sandboxes into production pilots.

> *"Common standards are the bedrock of interoperability."*
>
> Industry Association

Future Outlook

Most regulators expressed cautious optimism about the trajectory of tokenisation in their jurisdictions over the next two to five years. A common theme across the interviews was that, at this stage, regulators see themselves as the primary driver of market development rather than followers of market demand. Most expect growth to remain concentrated in a relatively small number of tested use cases (real estate, bonds, gold and selected commodities) until foundational issues are resolved.

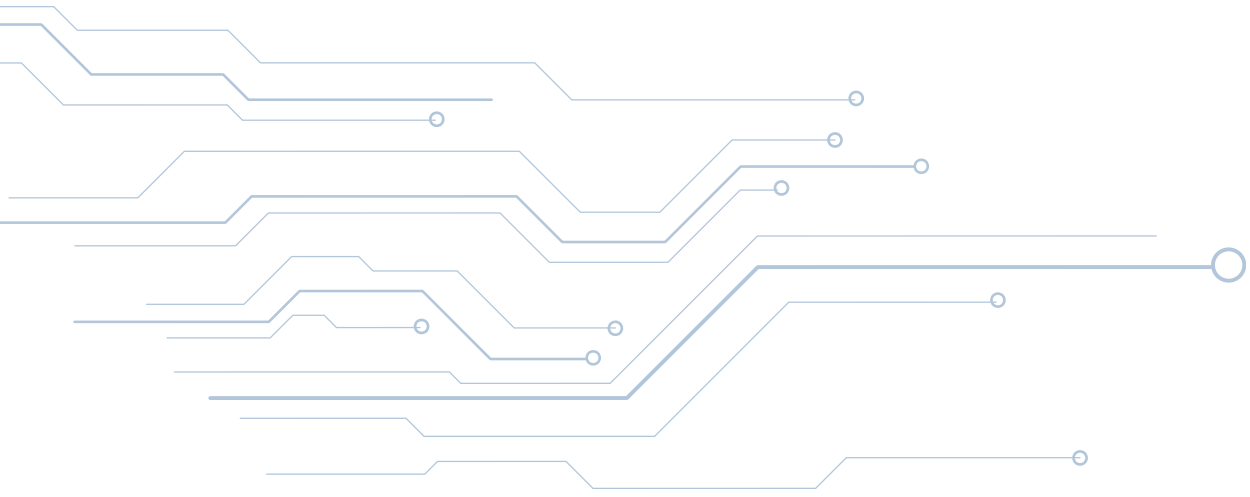
While the technology has matured significantly, but infrastructure coordination, common standards, and trust – both in the technology and in the institutions offering tokenised products – remain the critical preconditions for tokenising assets on scale.

6. Digital Infrastructure

6.1. Introduction

Digital infrastructure provides the foundational capabilities required to scale tokenised markets. An increasingly important strand of this wider category is the digital public infrastructure layer, which includes digital identity systems, payment and settlement infrastructure, data-sharing frameworks, and registries, that could provide the foundational, interoperable, public-purpose rails that are especially consequential for EMDEs. Rather than retrofitting tokenisation onto fragmented legacy infrastructure, EMDEs with strong DPI can build tokenisation on already interoperable public rails.[137] Transactions involving tokenised instruments require multiple processes – identity verification, compliance checks, registry validation, and payment settlement, to occur in near real time, often across distinct systems. Without these enabling conditions, tokenisation is likely to remain limited to pilots or implemented in a fragmented manner.[138]

This chapter provides an overview of emerging design patterns of digital infrastructure initiatives and best practices relevant for tokenisation. It focuses on three foundational components of infrastructure for tokenised asset markets: settlement assets, digital identity, and registries/data infrastructure. The chapter covers both digital public infrastructure (ie foundational public rails) and market infrastructure (ie exchanges, registries, settlement platforms). These are interdependent layers within broader digital and financial ecosystems. For clarity, settlement assets are discussed within the broader payments and settlement landscape, reflecting their role as the cash-leg of transactions and their integration with RTGS systems, instant payment systems, and emerging digital settlement instruments.



137. CCAF, Digital Public Infrastructure and Digital Financial Services: Convergence, Landscape and Regulatory Considerations (2025), available **here**. World Bank, 'Digital Public Infrastructure and Development. A World Bank Group Approach – Digital Transformation White Paper, Volume 1' (2025), available **here**.

138. BIS, 'BIS Annual Economic Report' (2023), available **here**.

6.2 Foundational infrastructure for tokenised markets

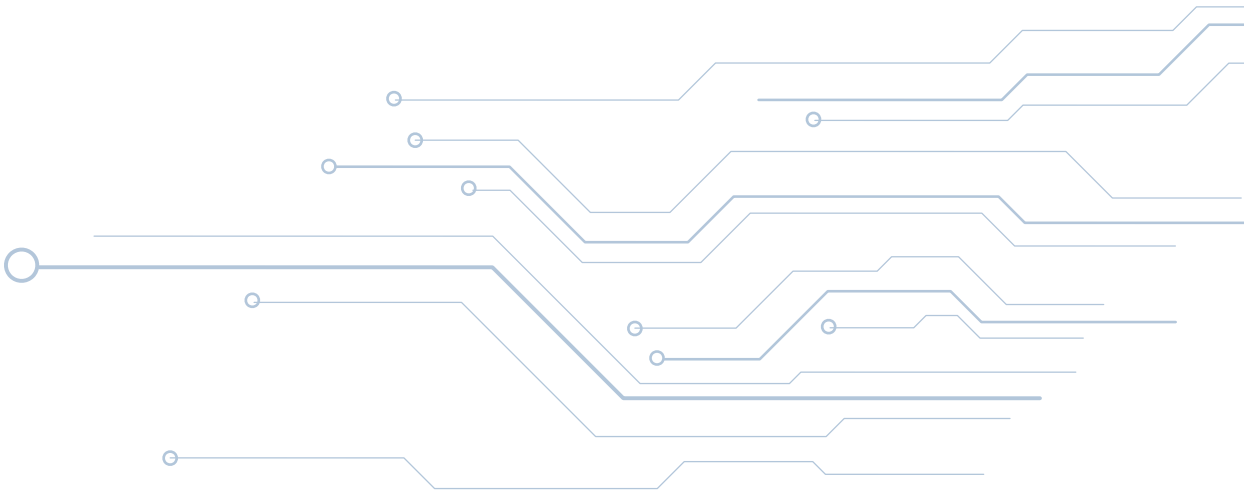
Digital Public Infrastructure represents shared digital resources that are designed for the public benefit and can be reused across sectors to avoid reinventing the wheel for each new digital service.[139] As a foundational infrastructure, three components are particularly critical for tokenised markets: settlement assets, digital identity, and registries.

6.2.1 Settlement assets

Settlement assets determine whether transactions can be completed with certainty, finality, and low risk. Since settlement assets constitute the 'cash' leg of transactions, they are critical for enabling delivery-versus-payment (DvP), reducing counterparty risk, and supporting real-time settlement across platforms.[140]

The limitations of conventional payment infrastructure can constrain performance and scalability. Where settlement is not atomic, risks such as settlement failure, counterparty risk, liquidity frictions, and operational complexity persist, limiting scalability and trust. In this respect, tokenisation can enable simultaneous execution of payment and asset transfer and reduce reconciliation costs.[141]

The choice of settlement asset has systemic implications. Central bank money offers the highest safety and settlement finality, supporting the 'singleness of money' and minimising credit and liquidity risk. Alternative instruments such as stablecoins introduce trade-offs in governance, risk, and regulation.[142] However, stablecoins have become an increasingly important parallel settlement layer in tokenised markets and cross-border payment ecosystems. Their use has expanded beyond crypto-native markets into real-world settlement and liquidity functions, although regulatory treatment remains highly heterogeneous and, in many jurisdictions, still evolving.[143]



139. World Bank. 'Digital Public Infrastructure and Development: A World Bank Group Approach' (2023), available here.
140. BIS, 'BIS Annual Economic Report 2025 – Tokenised financial system' (2025), available here.
141. BIS, 'On the future of securities settlement' (2020), available here.
142. OECD, 'Tokenisation of assets and DLT in financial markets' (2025), available here.
143. CCAF, 'Tokenised Money: Use Cases, Interoperability and Regulation' (2026), available here.

Table 6.1 summarises key payment infrastructure options and how different settlement systems support varying degrees of interoperability, programmability and risks in tokenised asset markets (note that some of the initiatives in this chapter are still pilots and may evolve as the landscape changes rapidly. At the same time, the initiatives highlighted below do not exhaustively capture the landscape of such developments in EMDEs).

Table 6.1: Infrastructure for settlement of tokenised assets

System	Implications for Tokenised Markets	Examples
CBDC (Central Bank Digital Currency): central bank–issued digital money that runs on digital or distributed infrastructure and can support programmable and atomic settlement of transactions.	Enables wholesale and retail settlement of tokenised assets, programmable public money, and atomic DvP/PvP settlement. This can improve settlement finality, provide liquidity and reduce counterparty risk but face trade-offs in the privacy scalability programmability and remain limited in deployment across most jurisdictions.	**Brazil – DREX**: Initially designed as a full DLT-based tokenised settlement and asset platform, where financial assets are issued as digital tokens and transferred on a distributed ledger, but the DLT component was later decommissioned in favour of stronger integration with Pix.[144] **Indonesia – Project Garuda**: Exploratory work on tokenised sukuk, commodities, and SME financing where underlying assets are digitised and transactions executed automatically through programmable compliance and conditional payments.[145]
Stablecoins (regulated): privately issued digital tokens backed by reserves such as fiat, enabling value transfer on programmable blockchain infrastructure.	Enables cross-border payments, tokenised asset settlement, and on-chain liquidity/collateral mobility by tokenising fiat value into transferable digital units on blockchain networks. They offer near-instant, 24/7 programmable settlement and reduced reliance on correspondent banking but introduce issuer/reserve risk and face regulatory fragmentation that limits interoperability and scale.	**Singapore – Project Guardian**: Regulatory experimentation platform exploring tokenised deposits and regulated stablecoin use for cross-border settlement. Commercial bank deposits and stablecoins are represented as digital tokens and transferred across networks under regulatory oversight This remains experimental rather than production-scale infrastructure.[146]
RTGS modernisation / hybrid systems: upgraded real-time gross settlement systems enhanced with **APIs** and interoperability layers to connect traditional money rails with tokenisation systems.	Enables integration between tokenised platforms and traditional financial infrastructure, providing settlement finality and liquidity coordination by linking real-time payment rails and core banking systems to tokenised asset platforms through APIs and interoperability layers. These strengthen trust and interoperability in hybrid systems but offer limited native programmability and often rely on external layers for atomic settlement.	**Brazil – Pix**: Instant payments system acting as cash leg settlement for tokenised experiments where Pix enables real-time fund transfers that serve as the payment leg linked to tokenised asset transactions, improving settlement speed and reducing reconciliation costs..[147]
Unified Payment Interfaces: interoperable retail payment layers that connect users, apps, and banks through real-time **API**-based payment initiation systems.	Enables retail access and onboarding into tokenised financial ecosystems by connecting users to banks and financial services through real-time, interoperable payment interfaces. They expand participation and improve accessibility through real-time bank-to-bank transfers but do not provide settlement finality or native tokenisation capabilities.	**India – UPI**: interoperable retail payments system based on UPI linking banks and payment apps through real-time API**s**, enabling real-time bank-to-bank transactions.[148]
Tokenised market infrastructure platforms: distributed ledger–based systems that support issuance, trading, clearing, and settlement of tokenised financial assets.	Enables end-to-end lifecycle management of tokenised assets (issuance, trading, clearing, settlement, servicing) by using distributed ledger platforms that integrate issuance, trading, and settlement functions within a single programmable infrastructure layer. They increase automation, efficiency, and programmability of financial markets but depend on external settlement assets and face regulatory and interoperability constraints.	**Kenya – KDX** : Market-led exchange infrastructure where digital assets and financial instruments are traded on a shared platform developed through public-private collaboration and linked settlement arrangement. This remains experimental rather than national settlement infrastructure.[149]

144. Banco Central do Brasil, 'Drex – Digital Brazilian Real', available **here**.
145. Bank of Indonesia, 'Project Garuda: Navigating The Architecture Of Digital Rupiah', available **here**.
146. Monitory Authority of Singapore, 'Project Guardian' (2025), available **here**.
147. **OMFIF**, 'Brazil is building on the success of Pix with Drex pilot' (2025), available **here**.
148. UPI, 'Seamless Payments at Your Fingertips', available **here**.
149. LiquidityFinder, 'Kenya Set to Launch Digital Exchange KDX for Tokenised Assets through DeFi Technologies Partnership with Nairobi Securities Exchange' (2025), available **here**.

6.2.2 Digital identity

Digital identity anchors transactions to verifiable and legally recognised participants. Without a reliable means of establishing who owns assets, who is transacting, and who bears rights and obligations, tokenised systems cannot ensure enforceability.[150] Digital identity therefore functions as the trust layer that underpins market integrity.

In practice, tokenised transactions depend on identity systems to support onboarding, authentication, and compliance with KYC/AML requirements. When digital identity is not established, this can increase onboarding costs and financial integrity risks.[151] Different architectures of digital identity systems, from foundational ID systems to digital and tokenised credentials, present trade-offs between privacy, usability, and verifiability.

Table 6.2: Digital identity systems for secure verification and participation in tokenised assets markets

System	Implications for Tokenised Markets	Examples
Foundational Digital ID Systems: national-scale identity systems that issue legally recognised digital identities linked to interoperable government and financial databases for authentication, onboarding, and service access.	Enables onboarding and identity verification for tokenised assets, KYC/AML automation, ownership verification, and regulated access to digital financial markets by linking verified digital identities to interoperable registries that allow institutions to authenticate users and validate compliance in real time. These deliver trusted, scalable identity, enforceable ownership, and lower compliance costs but introduce risks from centralised architectures, cybersecurity exposure, and uneven cross-border recognition.	**India – Aadhaar / India Stack**: Large-scale integrated identity system linked with payments (**UPI**) and consent-based data sharing that uses a biometric-based unique ID (Aadhaar) and an API-driven digital infrastructure (India Stack) to verify identity, enable authentication, and share data with user consent across services.[152]
Digital ID with Cross-Border Residency: identity systems that extend verified digital identity to non-residents, enabling remote access to national financial and legal systems.	Enables remote onboarding of foreign investors, cross-border participation in tokenised markets, and digital incorporation/ contracting by allowing non-resident users to verify identity and complete legal and financial processes through digitally accessible identity systems. These expand investor access and reduce onboarding frictions across borders but face risks from data privacy concerns and limited interoperability with external identity systems.	**Azerbaijan – ASAN ID & Digital Residency**: allows digital onboarding, company registration, and digital contracting for international investors accessing tokenised markets through a government-issued digital ID and residency framework that allows non-residents to verify identity, access services and complete legal and financial processes remotely.[153]
Privacy-Preserving / Tokenised Identity: identity systems that use verifiable credentials or tokenised attributes to allow selective disclosure of personal data without revealing underlying identity information.	Ensures privacy-preserving KYC/AML data, reusable credentials, and disclosure on tokenised financial platforms by using verifiable credentials that allow users to prove required attributes without revealing underlying personal data. These improve privacy, strengthen user control, and enhance compliance efficiency but remain early-stage with interoperability challenges and reliance on external credential providers.	**Bhutan – National Digital Identity (NDI)**: uses a self-sovereign identity framework built on verifiable credentials and decentralised identifiers for digitally verifiable identity and secure onboarding, supporting KYC/AML processes without repeated disclosure of underlying personal data by issuing credentials to a citizen-held digital wallet and enabling selective disclosure of required attributes, allowing institutions to confirm identity digitally while minimising data sharing through cryptographically verifiable proofs rather than exposure of the full underlying records.[154]
Dynamic/Tokenised Identity Credentials: identity systems that generate time-bound or transaction-specific credentials for real-time authentication and continuous compliance.	Enables transaction-level identity verification, fraud prevention, and real-time onboarding/ authentication in tokenised asset platforms by issuing time-bound or event-specific digital credentials that can be verified instantly for each transaction or access request. This supports continuous compliance, reduce fraud, and scale high-frequency digital transactions but introduce operational complexity and dependence on central issuance/validation systems.	**Nigeria – Virtual National Identification Number (VNIN)**: generates time-limited identity tokens for transaction-level verification, supporting secure onboarding, wallet authentication, and fraud prevention in tokenised asset markets by issuing digitally generated, time-bound verification credentials derived from the national identity systems that can be validated in a real time for each transaction or authentication event.[155]

150. FATF, 'Guidance on Digital Identity' (2020), available here.
151. World Bank, '**ID4D**: Digital Identification for Development', available here.
152. See, IndiaStack, available at https://indiastack.org
153. Digital Trade Hub of Azerbaijan, 'Become an e- or m-Resident', available at https://dth.az/become-resident
154. For more details, please refer to https://www.bhutanndi.com/
155. Nigeria National Identity Management Commission, 'National Identification Number', available at https://nimc.gov.ng/nin

6.2.3 Registries and data infrastructure

The legal validity of asset-backed tokens depends on the reliability of underlying ownership records. A token representing land, shares, or carbon credits is only as strong as the registry that defines ownership and enforceable rights. Registries therefore act as the "ground truth" of tokenised markets.[156]

In practice, most EMDE implementations follow a hybrid model in which tokens reference off-chain registries that remain the legally authoritative record, rather than constituting the legal record themselves. This distinction has important implications for settlement finality, enforceability, and the extent to which transactions can be considered fully 'atomic'.

Broader data infrastructure, such as consent-based identity systems and **IoT**-enabled data feeds, further strengthens tokenised markets by enabling secure verification, real-time compliance, and credible performance-linked assets.

In many EMDEs, registry systems are not fully digitised, particularly for land, corporate ownership, and environmental assets. This creates both a constraint and an opportunity to design next-generation systems with tokenisation in mind.[157]

Table 6.3: Data-sharing and registry infrastructure supporting reliable and verifiable tokenised assets

Data Sharing Infrastructure System	Implications for Tokenised Markets	Examples
Blockchain-Based Land and Asset Registries: distributed ledger systems that record ownership and transfer of real-world assets in immutable digital form linked to legal registries.	These enable asset tokenisation backed by verifiable ownership records, collateralisation of real-world assets, and digital proof of ownership for financial products by digitising and recording ownership data on distributed ledger systems linked to legal registries. This can strengthen trust, reduce fraud, improve collateral use, and support enforceable property rights but face risks from data quality at entry point and complex integration with legacy systems.	**Rwanda – Blockchain Land Registry Pilots**: early-stage experimental digitisation initiatives exploring blockchain-based land registry systems that record land ownership and transfers on a DLT to improve traceability, reduce fraud and test digitised title management, with limited evidence of large-scale tokenised market deployment.[158]
Integrated Property Registries with Digital Layers: digitised land and property registries connected to tokenisation platforms and broader digital government infrastructure.	Enables fractional real estate ownership, tokenised property investment products, and secondary market trading of property-backed assets by digitising property titles and representing them as divisible digital tokens that can be issued, transferred, and traded on regulated platforms. These expand investor access, enable asset fractionalisation, and support full lifecycle asset management but require multi-agency coordination and clear legal recognition of digital ownership and cross-border enforceability.	**UAE – Dubai Real Estate Tokenisation**: regulatory and industry-led initiatives enabling fractional ownership through digital infrastructure that digitise property titles into tradable units and allow investors to buy, hold and transfer fractional stakes via regulated platforms and blockchain-based records. It is still limited in scale compared to traditional property markets.[159]
Tokenised Environmental / Carbon Registries: systems that integrate verified emissions and environmental data into digital registries for issuing and managing carbon-related tokens.	Enables tokenised carbon credits, ESG-linked financial instruments, and environmental asset tracking by linking verified emissions and sustainability data to digital registries that issue and manage tradable environmental tokens. This can improve transparency, support high-integrity carbon markets, and strengthen ESG-linked finance but face risks from data standardisation challenges, verification complexity, and interoperability gaps across systems.	**Colombia – Carbon MRV Pilots**: systems integrating emissions measurement, reporting, and verification (MRV) data with blockchain to issue and manage tokenised carbon credits in voluntary carbon markets by linking verified emissions data from MRV systems to blockchain-based registries that mint, track and retire carbon credit tokens transparently.[160]
IoT-Integrated Data Infrastructure: systems that connect real-time sensor (IoT) data streams to blockchain or digital asset platforms for automated verification and asset management.	Enable performance-linked tokenised assets, real-time asset monitoring, and automated settlement triggers by integrating IoT sensor data streams with digital asset systems to continuously update asset conditions and trigger predefined actions on blockchain platforms. They improve transparency, enable automation, and support dynamic asset valuation but depend on IoT reliability, raise data integrity concerns, and lack global standards for interoperability.	**Vietnam – Blockchain Carbon MRV Pilots**: Experimental integration of IoT data with digital systems for environmental verification and carbon-related asset issuance by using IoT-enabled sensors to capture emissions and environmental data, which is them verified and recorded on blockchain systems to support issuance and tracking of carbon-related digital assets.

156. BIS, 'BIS Annual Economic Report' (2025), available here.
157. World Bank. 'Digital Public Infrastructure and Development: A World Bank Group Approach' (2023), available here.
158. Envisioning, 'Blockchain and Digital Land Registry Systems', available here.
159. Government of Dubai, 'Real Estate Tokenization', available here.
160. See for instance, Andrés Polo, Javier García-Guerrero, David Rojas-Arciniegas, Ricardo Antonio Tobón, 'A Blockchain-Based Architecture for Secure and Transparent MRV in Offshore CO_2-EOR Operations: A Case Study in the Guajira Basin, Colombia' (2025), available here.

6.3. Key enablers of tokenised asset markets in EMDEs

The lessons below distil key cross-cutting insights on how these pillars interact and what they imply for policy and implementation.

- **Digital identity systems**: countries with robust, interoperable identity systems verify users faster and at lower cost, reducing reliance on manual checks and supporting trusted participation. Strong identity also reduces fraud, strengthens ownership claims, and enables cross-border participation.[161] For example, strong digital ID systems such as India's Aadhaar and Azerbaijan's ASAN ID enable secure onboarding, trusted verification, and compliant access to financial services at scale, reducing friction in user entry and supporting participation in tokenised markets. These cases show how strong identity infrastructure may act as a foundational enabler of tokenised market growth by making verification faster, cheaper, and more reliable.
- **Interoperability across digital infrastructure layers**: even the most advanced payment systems, identity platforms, or data registries create limited value if they cannot seamlessly interact. Integrated ecosystems such as Brazil's Pix, India Stack, and Estonia's X-Road demonstrate how interoperability underpins efficient data flows, lowers onboarding and compliance friction, and delivers consistent user experiences.
- **Cross-regulatory coordination**: because settlement systems, identity frameworks, and registries are typically governed by different authorities, alignment across central banks, financial regulators, identity agencies, and registry operators may support tokenised markets. Fragmented mandates can create bottlenecks in legal recognition, data sharing, and system interoperability, while coordinated governance frameworks can significantly accelerate implementation and scale.
- **Privacy, data protection, and consent frameworks**: tokenisation creates highly composable and interconnected data flows, requiring strong safeguards to maintain user trust and system integrity. Emerging models such as Ghana's tokenised identity layer and Nigeria's vNIN demonstrate how verification can be achieved with minimal data disclosure while preserving robust authentication.
- **Public–private collaboration**: tokenisation ecosystems require coordinated action from central banks, regulators, financial institutions, technology providers, and market operators. As discussed in Chapter 5, regulatory sandboxes, pilot programmes, shared infrastructure, and multi-stakeholder working groups help identify risks, refine standards, and accelerate real-world deployment.
- **Incremental, digital infrastructure-first sequencing**: countries that strengthen identity, payments, and registry infrastructure before launching tokenisation initiatives achieve smoother implementation and broader adoption. This 'sequenced' approach ensures that tokenised assets rely on trusted systems rather than workarounds or interim solutions, and is reflected in India's digital infrastructure evolution, compared with more experimental approaches such as early-stage pilots in Rwanda or Vietnam, where tokenisation is being tested before full infrastructure maturity.

161. McKinsey estimates that digital identities can reduce onboarding costs by up to 90 percent and save financial institutions up to US$1.6 trillion globally through reducing payroll fraud losses. White et al, 'Digital identification: A key to inclusive growth' (McKinsey Global Institute Technical Report) (2019), available here.

Box 6.1. How foundational digital infrastructure enables tokenisation: Case Studies from EMDEs

Across EMDEs, several country experiences illustrate how foundational digital infrastructure can enable asset tokenisation. We examine three such case studies below.

(i) India – India Stack (Identity + Payments + Data rails)

India Stack is a layered digital public infrastructure that combines a biometric digital identity system (Aadhaar), a real-time interoperable payments network (UPI), and a data exchange layer (DEPA) that allows individuals to control (via account aggregators who are regulated consent managers) how their financial and personal data is shared across institutions.

The way India Stack works is as follows. Aadhaar provides a unique, centrally verified identity that can be authenticated instantly via biometric or OTP verification. UPI enables real-time bank-to-bank payments through mobile-based identifiers (such as virtual payment addresses), with settlement occurring instantly through a central switch operated by the payments system. The data layer allows users to authorise secure, time-bound sharing of financial and identity data between banks and service providers through API-based consent flows, eliminating repeated documentation and manual verification.

Together, these layers create a reusable infrastructure for trust, value transfer, and data verification. In tokenised markets, Aadhaar-like identity reduces onboarding friction and ensures compliant KYC, UPI provides real-time cash-leg settlement for tokenised asset transactions, and the consent layer enables automated sharing of ownership, credit, or compliance data. This combination supports faster issuance, settlement, and lifecycle management of tokenised assets by reducing reliance on manual verification and enabling programmable coordination across identity, payment, and data systems.

(ii) Brazil – Pix and Drex (Payments + programmable infrastructure)

Brazil's digital payments and tokenisation stack consists of Pix, a real-time retail payment system operated by the Central Bank of Brazil. Pix operates as an instant payment rail where individuals and firms can transfer funds 24/7 using identifiers. It also previously consisted of Drex, a pilot that originally extended digital money into programmable financial assets and smart-contract-based transactions within a regulated framework. The Central Bank of Brazil, however, decommissioned the blockchain component of Drex in August 2025 due to scaling and privacy challenges.

Pix operates as an instant payment rail where individuals and firms can transfer funds 24/7 using identifiers such as QR codes, phone numbers, or tax IDs, with settlement occurring immediately across bank accounts through the central bank's infrastructure.

Pix creates a foundation for tokenised financial markets by linking real-time payment rails with programmable settlement infrastructure. This reduces settlement risk, eliminates reconciliation delays, and enables real-time cash-leg settlement that can support DvP arrangements when coordinated with asset-leg transfer within a regulated central bank–backed environment.

(iii) Ghana – Digital identity (Ghana Card and verification systems)

Ghana's Ghana Card is a national biometric digital identity system that assigns each citizen and legal resident a unique ID linked to a central registry of demographic and biometric data managed by the National Identification Authority.

Individuals are enrolled through biometric capture (iris, fingerprints and facial data), which is stored in a central database. The Ghana Card is then used across public and private services for identity verification, where institutions can authenticate users in real time by querying the national registry using the unique ID number or biometric matching. This enables consistent KYC across financial services, telecoms, and government systems without repeated manual documentation.

As of April 2026, the National Identification Authority has activated an embedded digital payment wallet, which allows Ghana Card holders to withdraw cash from Automated Teller Machines (ATMs), make payments in stores and online, carry out international transactions in more than 200 countries, and access services such as insurance and emergency assistance.

6.4. Concluding remarks

As digital payments, identity systems, and data infrastructures expand in EMDEs, there is an opportunity to embed interoperability and open architectures from the outset. Early experiences in countries such as India, Brazil, Ghana, and Rwanda point to the potential benefits of a digital infrastructure-first approach in building more integrated digital ecosystems with relevance for future tokenisation use cases.

Key questions that still needs to be resolved include what constitutes a minimum viable DPI stack for credible tokenised markets in EMDEs, how investments across identity, payments, and registries should be sequenced, and what governance and risk frameworks are needed to ensure interoperable, privacy-preserving, and resilient systems across jurisdictions.

7. Assessing the Value Proposition

Based on interviews and desk research conducted by CCAF team, two aspects are clear: (a) for emerging markets, the question is no longer of whether tokenisation will provide an incremental change vs conventional processes, but of how and how fast, and (b) the motivations for these markets are distinct from those in advanced economies: where firms pursue marginal efficiency gains in those markets, emerging economies view tokenisation as a mechanism to address structural deficiencies in market access and financial inclusion.

7.1. Business cases and industry motivations

Surveys by the CCAF team demonstrate that regulators perceive the current market activity for tokenisation as low (averaging 2.1 out of 5), yet it is of high strategic priority on the roadmap (3.9 out of 5). This gap between aspiration and reality is perhaps the most defining characteristic of the current landscape – while regulators recognise the transformative potential, the institutional architecture to support it remains underdeveloped.

On the industry side, the contrast is even sharper. Market participants rate tokenisation's importance on their strategic roadmap at 4.5 out of 5 and report high organisational readiness (4.4 out of 5).

This high perception gap between the industry's sense of urgency and regulators' assessment of market activity echoes patterns observed in other financial technology adoption cycles. As indicated before, the further evolution of tokenised markets appears to be hampered by a 'chicken and egg' problem: private market actors are refraining from investing in and committing funds to exploring tokenised assets, while regulators seem to be waiting for more productive use cases.

Figure 7.1: The innovation gap in tokenised markets – survey data across 24 regulators and 8 market participants

"We are in the formative stages, but the interest is real. Tokenisation is not viewed as a stand-alone innovation but rather a technological approach for transacting within capital markets."

Regulator

"How do we sell more of our bonds in our currency to our people, both domestic and international? That is the genuine problem we are solving."

Market participant

Perhaps the most striking insight from the interviews is on what does not drive tokenisation: when market participants were asked to identify the primary drivers for adoption, democratisation and expanded access to capital dominated the responses. Traditional efficiency arguments (ie lower issuance costs and faster settlement) were not cited by any of the respondents as a primary driver. While cost reduction is recognised as a benefit (rated 3.8 out of 5), it is more of an enabler. These costs span several dimensions: legal (given lack of clarity), technology infrastructure (platform development or licensing, operational factors), reskilling, ongoing operational resilience requirements etc. For institutions implementing changes to conventional systems, the integration can impact internal applications in the long term.

While there is a strong business case, several structural inefficiencies recur with notable consistency. First, there is limited liquidity in secondary markets, particularly for assets such as real estate and alternative assets. Second, information asymmetry pervades capital formation processes. Third, high intermediation costs and lengthy settlement cycles compound the friction. The proliferation of intermediaries – registrars, custodians, clearing agents, correspondent banks – adds layers of cost that tokenised infrastructure could, in principle, compress. One Latin American regulator described this challenge as follows:

> *"The main problem is confidence, and more than confidence it is closure of information. When you talk to people about tokenised assets from smaller entities, they start to have doubts."*
>
> Regulator

Notably, countries are also increasingly viewing tokenisation through a financial sovereignty lens. Multiple interviewees from emerging markets noted a strategic motivation: using tokenised infrastructure to retain domestic capital that might otherwise flow to offshore platforms and foreign-denominated instruments.

> *"We see more and more countries looking at the technology as a means to keep capital in-house."*
>
> Infrastructure provider

7.2. What is the minimum viable ecosystem for tokenised markets?

While the sector is still evolving, an indicative set of components needed to support tokenisation at scale includes:

- Settlement infrastructure/assets: as mentioned before, DvP on distributed ledgers requires reliable on-chain settlement assets. The options under development (CBDCs, tokenised deposits and stablecoins) each carry distinct trade-offs (see Chapter 6 above). Several interviewees noted that this remains the single most critical gap.
- Digital infrastructure enablers: while there are best practices, digital infrastructure systems in many EMDEs are still in nascent stages of development. This dependency constrains the pace of tokenisation.
- Industry functions: A multitude of industry functions are required to support tokenisation lifecycle. These include, at the minimum: issuers, tokenisation platforms, distribution platforms and secondary markets, financial market infrastructure, custodians, transfer agents, as well as infrastructure and data service providers. Several interviews noted that absence of one or more of these players can impact development of tokenised markets.
- Custody and operational infrastructure. Many conventional custodians in emerging markets are not yet equipped to hold DLT-based instruments, and specialised digital asset custodians have limited reach in many developing markets.
- Secondary market liquidity and redemption mechanisms: as noted above, absence of viable secondary markets for tokenised assets can be a crucial disabler.

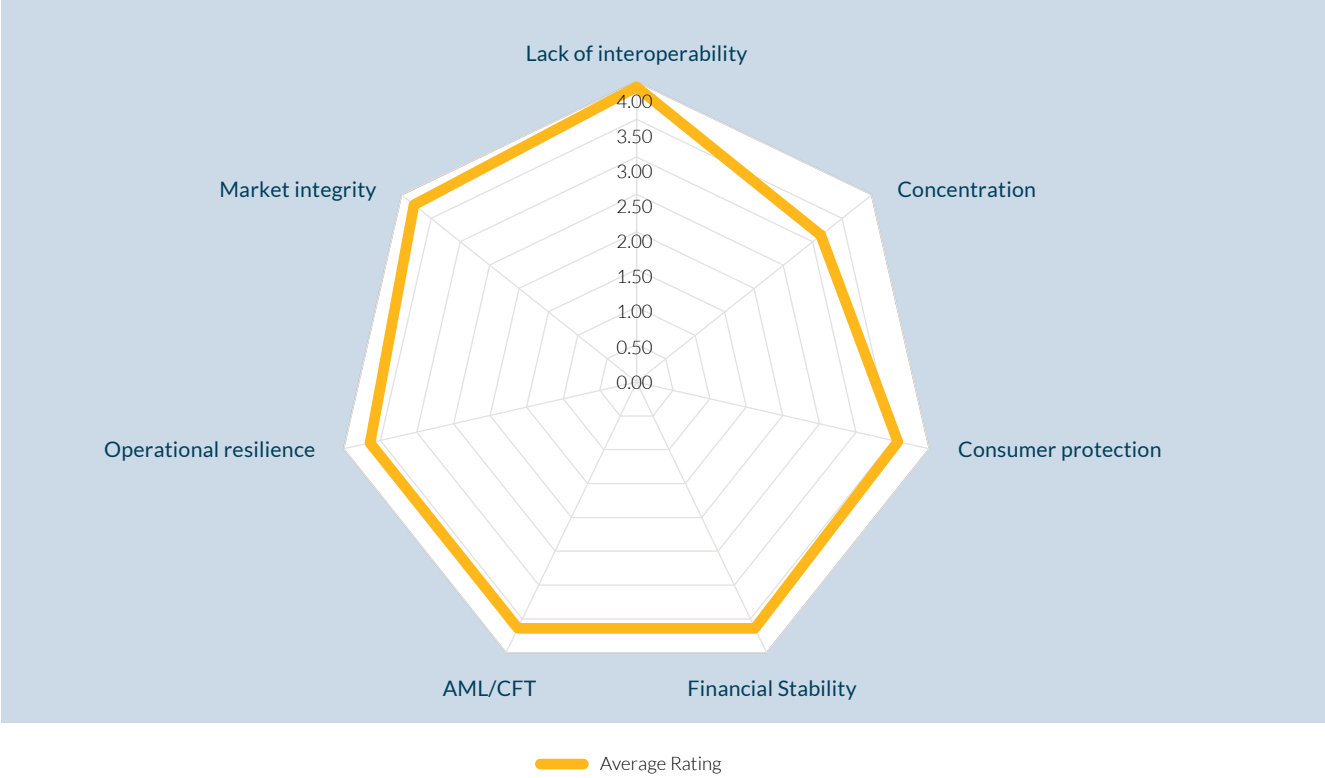
"While the technology has matured significantly, infrastructure coordination and market incentives are still missing in many settings."

Roundtable participant

7.3. Infrastructure considerations and bottlenecks

Our survey data identifies the lack of cross-platform interoperability as the highest-rated risk concern among respondents (3.9 out of 5). This is followed by market integrity and anti-money laundering/counter-terrorism financing risks (each cited by 44.4% of respondents), operational resilience (33.3%) and consumer protection (22.2%). The risk of amplification in transmission of losses through programmable, composable instruments, where shocks propagate faster across shared ledger infrastructure, is an emerging area of supervisory attention that has not yet been fully addressed in regulatory frameworks.

Figure 7.2: Risk perception among regulators and industry participants for tokenised markets (n=14)

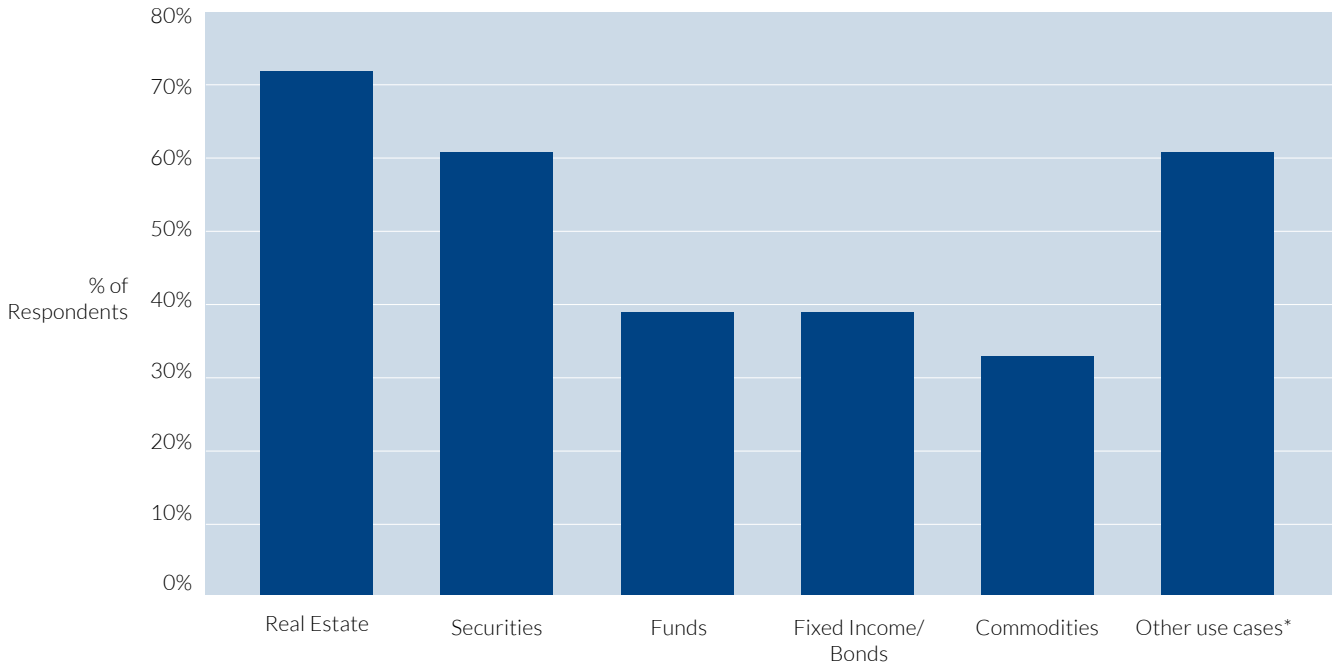


A further structural bottleneck lies in the reliance on traditional distribution and trading infrastructure even for instruments that are issued on-chain. Several interviewees noted that while issuance processes are being digitised, secondary trading and settlement continue to flow through conventional channels. This hybrid state limits the efficiency gains that a fully tokenised lifecycle would deliver.

7.4. Where is the market headed?

The asset classes most likely to scale first are those that are heavily intermediated and illiquid: as discussed before, this includes real estate, public securities, fixed income instruments and commodities.

Figure 7.3. Use cases cited by regulators and market participants (n=18)



* This includes (non-exhaustively) stablecoins/tokenised money/remittances, treasury mangement, trade financing, private equity/credit.

Interviewees also highlighted that the convergence of tokenisation with artificial intelligence could unlock more powerful use cases – where AI provides data intelligence and DLT provides the transactional infrastructure.

> *"You need to marry AI and DLT in order to create a powerful use case. AI provides the intelligence; DLT provides the market infrastructure."*
>
> Industry association

Despite the perceived differences in views between regulators and industry, the recent interest in tokenising real-world assets from both sides show that a clear case for change is emerging. The difference in views, however, further highlights the need for even more consultations and committed public/private collaboration in order to progress towards more efficient and safer markets.

8. Concluding remarks

Tokenisation's potential to reshape financial markets is both evolutionary and revolutionary. In this report, we have explored the asset classes and lifecycle activities already being brought on-chain and examined how tokenisation can expand access to capital, strengthen financial inclusion, and generate measurable benefits across the financial product lifecycle in both public and private markets. We have also reviewed the legal, regulatory, and policy frameworks emerging, including the role of public sector initiatives such as regulatory sandboxes in supporting adoption and interoperability.

Throughout this paper, we have made the argument that banks, custodians, and financial market infrastructure providers in EMDEs are uniquely positioned to shape the architecture of tokenised finance – but doing so requires them to confront a set of foundational considerations: the role that public DLT networks will play alongside permissioned infrastructure, how liquidity will be aggregated across a fragmented landscape of tokenised instruments, who will build and operate the custody infrastructure needed to move assets securely across platforms and jurisdictions, where control over wallet infrastructure will sit, how distribution channels and client access points will be structured, and how compliance obligations and digital identity frameworks will be operationalised at network level.

While numerous advances are already being made in emerging markets, several fundamental questions remain open. First, which use case will prevail? The divergence on asset classes and activities as discussed in Chapter 4 demonstrates that while helpful, the trajectory followed by advanced economies will not be very instructive for emerging markets. Second, how will interoperability be achieved? The current fragmentation of platforms and protocols works against the network effects that tokenised markets need to generate liquidity. Third, what is the appropriate balance between innovation and consumer protection? There is an apparent tension between maintaining a permissive environment to attract investment and innovation, and ensuring that retail participants – who in many EMDEs have limited financial literacy – are adequately protected. The sandbox model, adopted widely across the jurisdictions studied, provides a testing ground but graduation pathways from sandbox to open market remain unclear. Fourth, will tokenisation reduce or amplify systemic risk? The interconnection between tokenised real-world assets and crypto-asset markets (for instance, through tokenised money market funds serving as stablecoin reserve assets) creates linkages that warrant careful attention. Finally, who pays? The costs of building tokenised market infrastructure are substantial and fall unevenly across participants.

Answers to these questions will determine not just the speed of adoption but the shape of the ecosystem that emerges.

Annexes

Annex 1: Select legal, regulatory and policy considerations for tokenisation of assets

Cluster	Issue / Consideration	Key considerations
Legal	Property rights in tokenised assets	On a fundamental level, tokens can be issued directly or solely (as a standalone instrument) on new forms of ledger technology ('native tokens'), or they can digitally represent existing 'real-world' money and assets ('non-native tokens' or 'digital twins'). This high-level distinction could present various legal issues and may also require different legal treatment in particular jurisdictions. Various legal regimes have differences in their treatment of property rights in relation to tokenised assets, if any at all. This uncertainty in their recognition as property under private law makes it challenging to determine legal treatment. It might impact on the extent to which investors' have legal claims over tokenised assets, the enforceability of tokens and corresponding legal claims related to the tokens, their status in insolvency proceedings, and the extent to which investors can recover claims relating to a tokenised instrument in event of a custodian default. Beyond the threshold question as to whether tokens qualify as property under private law, it is also essential to clarify whether smart contracts written in code can give rise to binding legal obligations, or whether ownership of a token accords ownership to the underlying assets.
	Legal classification of tokens	In determining the classification of tokens, a preferred approach among regulators has been to look at the functions performed by tokens and establish some basic differences among them to delineate the scope of regulatory regimes. Functional taxonomies typically distinguish between the following types of native tokens: payments, securities and utility tokens (and sometimes also asset-referenced tokens as adopted in EU). Since tokens are flexible and can perform multiple functions simultaneously, this functional classification can have several limitations and also risk conflating form and nature. The classification of a token under a certain legal category may come with the application of a special legal and regulatory regime. For instance, when a native token is classified as a security, it may warrant further regulation under securities law to account for technological aspects, or in the case of non-native tokenised securities (ie traditional securities with a tokenisation 'wrapper'), where new risks such as ownership risks (eg how ownership interest relating to the tokenised securities is transferred and recorded) and technology risks (e.g. forking, blockchain network outages and cybersecurity risks) are introduced. An inflexible classification framework may lead to certain categories of tokens falling directly under a legal regime (such as the e-money tokens falling within a country's electronic money regime), while others, like utility tokens, will continue to exist outside established financial regulations, if the proposed regulation remains silent on their treatment.
Regulatory	Regulatory gaps and alignment	Tokenised assets tend to pursue regulated use cases, leveraging distributed ledgers as their foundation. Consequently, the range of entities interested in issuing them will likely overlap with the current issuer landscape and therefore will be subject to existing rules on issuance. Since additional features can be built on top of a tokenised instrument, tokenisation may not be fully captured by the existing regulatory perimeter in a jurisdiction. For regulators, this is crucial as potential gaps in the regulatory treatment of tokenisation may give rise to regulatory arbitrage opportunities or novel risks that may not be mitigated by existing regulation. It is therefore essential to determine whether existing regulations should be applied to new participants in tokenised asset markets or if additional requirements need to be incorporated into the current regulatory framework. This 'alignment problem' has been observed in several instances. For instance, under the Central Securities Depository Regulation (CSDR) and MiFID II rules in the EU, security tokens classified as 'transferable securities' and traded on a regulated trading venue must be recorded in book-entry form within a central securities depository (CSD). While this may be feasible for certain tokenised security structures, it may not be viable for other models where no legal entity exists that can be authorised as a CSD, such as instances of direct issuance where the operator maintains a register or record of claims directly on a distributed network.
	Custody frameworks	Another area of consideration is custodian regulation. Existing custody frameworks can present complexities in the regulatory capture of tokenised instruments, as custodianship in DLT-based networks differs significantly from traditional financial markets. Custodians of tokenised assets do not physically 'hold' the underlying security, cannot prove exclusive ownership, and may face difficulties demonstrating the existence of the tokenised security for regulatory reporting purposes. Moreover, existing regulatory frameworks frequently reference concepts such as 'accounts,' 'book entries,' 'credits,' and 'debits,' which do not always align with DLT-based systems. Further complications arise when legal treatment is determined based on the conflict of law principles applicable to traditional financial instruments – an approach that may not translate clearly to tokenised assets recorded on a DLT (in such cases, the lex situs of a cryptoasset would instead be where the person or company who owns it is domiciled).
	Prudential considerations	There are also important distinctions that can give rise to significant differences in the risk profiles of tokenised instruments as against traditional instruments. An instance of this is the application of capital requirements standards such as the Basel Committee on Banking Supervision (BCBS) standards on prudential exposures. In cases where there is an introduction of additional counterparty risk, such as if a 'wrapper' is introduced on a tokenised security as it traverses different distributed networks, this could imply that the tokenised security is a 'Category 2' asset under BCBS principles, which carries a 100% capital charge or 1250% Risk Weighting. If costly capital treatments were to be applied to tokenised securities that have wrappers issued around them, then industry participants may choose not to traverse those networks and avoid the increased counterparty risk and capital costs. The implication could be that interoperability may be reduced, and liquidity may remain fragmented across the market. More broadly, if capital requirements are even fractionally higher than those for traditional instruments, then tokenised assets may never achieve an equal footing to traditional assets.

Annex 1: Select legal, regulatory and policy considerations for tokenisation of assets (continued)

Cluster	Issue / Consideration	Key considerations
Regulatory (continued)	Role of intermediation	The concept of disintermediation through DLT, mainly at functional level, is yet to be defined and interpreted in a clear and consistent way. In fact, 'disintermediation' may often be confused (deliberately or not) with the concepts of 'automation' and 'decentralisation'. Any approach to regulate tokenisation should also acknowledge the role intermediation plays in the market for tokenised assets. While tokenisation may eliminate the need for some existing intermediaries, it may introduce new forms of intermediation that may require regulation and supervision. Entities involved in tokenisation may be new market entrants who may either lack compliance with relevant laws and regulations or fall outside regulatory oversight in certain jurisdictions. In specific use cases such as wholesale central bank digital currencies, additional problems arising from intermediation may need redressal – for instance, the need to identify an intermediary acting as the securities settlement system in decentralised networks/public distributed ledgers and establishing regulatory requirements for their governance. Regulatory changes may be needed to accommodate tokenised securities within existing legal frameworks, when, for example, the use of tokenised assets as collateral requires legal certainty around enforceability, netting, and transferability, which may necessitate updates to financial collateral regulations. Another instance is messaging standards (such as **ISO** 20022 used by CSDs), which may require adjustments to accommodate DLT applications which typically do not rely on messaging-based communication and currently lack widely accepted international standards.
	Investor protection, settlement finality and market integrity	From an investor protection standpoint, regulatory frameworks should also ensure that tokenised securities maintain the same level of investor protection as traditional securities, including considerations in relation to market abuse, fraud prevention, and compliance with AML and KYC requirements. There are also questions around settlement finality in DLT-based systems, particularly in permissionless networks where transaction finality can be probabilistic rather than absolute. A potential regulatory measure could be to require financial institutions to use permissioned or hybrid blockchain networks to ensure compliance with legal and operational requirements. Another feature of the use of DLT in tokenised securities markets that requires further consideration is that the operation of DLT and/or of the applications that are built on it are typically based on incentives (including penalties) provided to key participants (eg liquidity providers, validators, etc) and not on obligations reflected in contracts. It is important to assess whether this feature poses additional orderly functioning and/or market integrity risks and, if so, how can they be adequately addressed by regulators.
Policy	Governance and accountability in public **DLT**	At the policy level, issues around governance and accountability stem from the disintermediation and from the absence of a single established central authority in public DLT networks. A more fundamental problem is that of assigning accountability, identifying participants in distributed ledgers and bringing them into the regulatory perimeter. In specific use cases, additional problems arising from intermediation may need redressal – for instance, the need to identify an intermediary acting as the securities settlement system in decentralised networks/public distributed ledgers and establishing regulatory requirements for their governance. This issue is further complicated by the fact that the operation of a settlement/depository system is typically left outside the scope of legislative/regulatory initiatives dealing with cryptoassets (eg MiCA).
	Digital cash and settlement	When considering different approaches to digital cash issuance – such as tokenised commercial bank money, interoperability between DLT-based systems and existing payment infrastructure, and CBDCs – it is essential to ensure clear distinctions between them, along with tailored regulatory standards for each. Furthermore, the extent to which platforms for tokenised assets can connect to central bank payment infrastructures – whether through tokenised central bank currency, CBDCs, or privately issued stablecoins – remains a key policy decision that will influence DvP settlement models. Existing financial regulations contain references to money, cash, and pecuniary claims. However, these initiatives lack precise definitions, making it difficult to determine how these concepts apply to emerging forms of tokenised money. To provide certainty, guidance should clarify the permissible settlement instruments and provide direction on the use of digital cash (such as tokenised commercial bank money) for settling tokenised security transactions.
	Systemic risk and market stability	DLT-based models that rely on atomic settlement do not allow for netting of transactions, requiring prefunding of accounts before trades can be executed. In addition, tokenisation of assets may also pose systemic risks. For instance, the choice of settlement assets, particularly tokenised private money, could heighten liquidity risks, or the use of distributed ledger may introduce operational fragilities. These vulnerabilities should be adequately addressed through oversight, regulation, supervision, and enforcement. Regulatory bodies should ensure that tokenisation does not lead to unnecessary fragmentation or excessive risk exposure. Instead, regulatory structures should foster a balanced environment where tokenisation can thrive without undermining the stability and efficiency of financial markets.
	Enforcement challenges	Given the early stages of adoption of tokenisation, the extent to which a particular regulatory or policy restriction could be practically implemented on a platform's operations, such as the imposition of trading suspension, remains largely untested at a practical level. This issue is particularly challenging in markets based on public permissionless networks. Specific issues may arise from enforceability of tokenised instruments and security interests attached to them, or in enforcing any rights external to such instruments. Considerations may revolve around whether the ownership interest of the underlying assets of a tokenised instrument is legally valid under the applicable governing laws, and whether there are regular reconciliations between the records for the extrinsic rights and the records for the tokens, or whether any encumbrance affects the extrinsic rights. Enforcement challenges could also arise from the legal and technical uncertainty around legal recourse in disputes, including forced asset separations and transaction reversals in decentralised ecosystems. It may also be difficult to enforce legal and regulatory requirements on trading activities to nodes of a tokenisation platform or intermediary facilitating the issuance or the operation of the chain, when such parties are based in jurisdictions that do not have cooperation agreements with the home regulator/supervisor.

Annex 2: Risk Benefit Analysis (RBA) and MCDA

2.1. Overview:

The proposed assessment framework is built on two complementary methodologies: (i) risk-benefit analysis (**RBA**) and (ii) multi criteria decision analysis (MCDA). Such an approach can be an effective solution for regulators, and authorities in evaluating tokenisation initiatives across asset classes (real estate, commodities and government securities as an example).

Techniques such as the Cost Benefit Analysis (**CBA**) are analytical ways of comparing different forms of input or output by giving them money values. RBA, on the other hand, is a systematic decision-making method used to evaluate whether the expected advantages of a decision or policy outweigh its associated risks. From a regulatory perspective, balancing risks with the potential benefits of a policy initiative is frequently of significant importance. RBA provides a structured way to identify, quantify, and compare the potential positive and negative outcomes of an initiative. It encourages decision-makers to consider not only economic benefits but also operational resilience, customer outcomes, and long term strategic positioning. The RBA mechanism may involve systematically assessing how different policy decisions (eg regulatory frameworks, taxation, custody rules, investor protection) affect the balance between potential benefits and risks of RWA tokenisation within a given jurisdiction, in this case EMDEs.

MCDA, on the other hand, offers a formal mechanism for evaluating complex decisions that involve multiple dimensions of value and trade offs. Multicriteria decision-making is useful when decision and policy makers have to make decisions in the presence of multiple and conflicting criteria. A key feature of MCDA is its emphasis on the judgement of the decision-making team, in establishing objectives and criteria, estimating relative importance weights and, to some extent, in judging the contribution of each option to each performance criterion. Its foundation, in principle, is the decision makers' own choices of objectives, criteria, weights and assessments of achieving the objectives, although 'objective' data such as observed prices can also be included.

MCDA techniques commonly apply numerical analysis to a performance matrix in two stages:

- **Scoring**: the expected consequences of each option are assigned a numerical score on a strength of preference scale for each option for each criterion. More preferred options score higher on the scale, and less preferred options score lower. In practice, scales extending from 0 to 100 are often used, where 0 represents a real or hypothetical least preferred option, and 100 is associated with a real or hypothetical most preferred option. All options considered in the MCDA would then fall between 0 and 100.
- **Weighting**: numerical weights are assigned to define, for each criterion, the relative valuations of a shift between the top and bottom of the chosen scale.

It is not envisaged that the MCDA will necessarily be needed in the context of the assessment framework. It is however an additional step that can be included if the RBA is not (in isolation) sufficient to assist the policy making.

2.2. The Evaluation Process

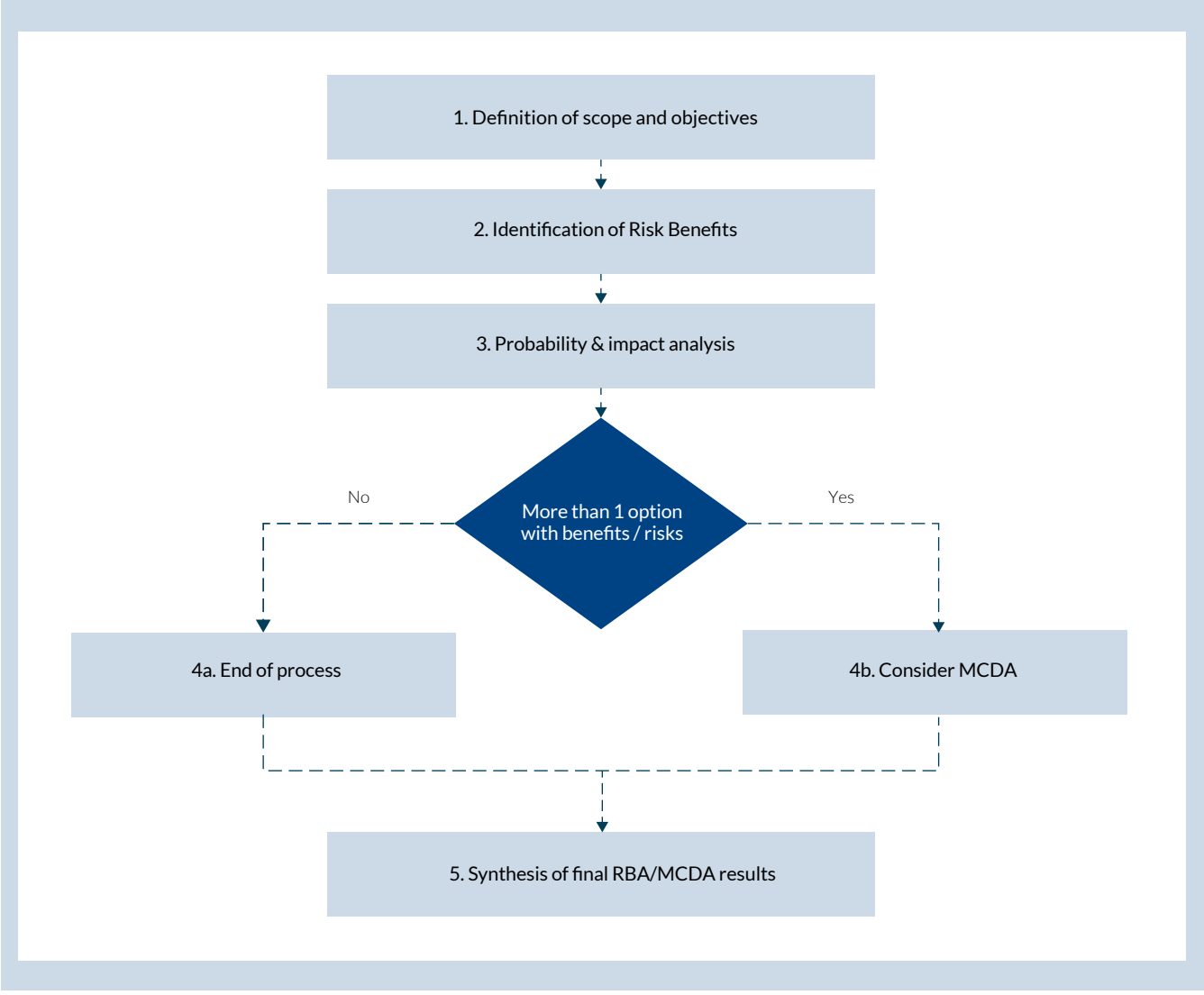
The first stage involves defining the scope and objectives of the initiative, ensuring that decision-makers have clarified their expected priorities and intended outcomes, based on their own policy plans and economy needs.

The second stage focuses on identifying risks and benefits across a broad range of dimensions, including financial, operational, technological, regulatory, customer related, and societal factors.

The third stage involves analysing the probability and impact of each risk and benefit, using both quantitative data and expert judgement in the context of the RBA.

The fourth stage applies MCDA to weigh the relative importance of different criteria and generate an overall assessment score. The final stage involves synthesising the results into a clear, evidence-based recommendation.

Figure 1: Steps on the decision making process



2.3. RBA Implementation

Step	Description	Action	Comments
1	Risk Identification	Determine the risks associated with the potential implementation of a tokenisation initiative. Stakeholders will need to evaluate the below broad risk categories in the context of their markets. Comprehensive identification is critical, as omissions in early stages often propagate into flawed assessments (Aven, 2015). Some frequently mentioned risks in the context of RWA tokenisation are: • Operational and technological risks • Financial stability risks • Legal or regulatory risks • Strategic risks (misalignment with objectives)	N/A
2	Risk Measurement and Risk Matrix	Perform a risk measurement. Risk measurement is the systematic process of analysing and evaluating risks that could affect the achievement of objectives. Risks must be evaluated along two primary dimensions: • **Likelihood (probability)**: refers to the likelihood that a risk event will occur. It is often expressed as a percentage or on a qualitative scale (eg, low, medium, high). Assessing probability requires considering historical data, expert judgement, and predictive models. • **Impact**: measures the severity of consequences if a risk materialises. Impacts can be financial, reputational, operational, legal, or other.	Likelihood and probability can be used to calculate a risk score, where likelihood and impact are scored (eg, 1–5) and multiplied to yield a risk score.
3	Benefit Identification and assessment	Evaluate benefits associated with: • **Economic efficiency** (cost reductions, increased productivity) • **Improved performance** (speed, accuracy, reliability) • **Market expansion** (new revenue streams, wider participation) • **Innovation and capability gains** • **Social or environmental benefits**: Scoring frameworks using scales from 1 to 5 are proposed for this implementation.	Benefits are the positive outcomes expected from the decision to be taken, in this case the introduction of tokenisation initiatives. As with risk, benefits may be quantifiable or qualitative. It must be noted that benefits assessment is often inseparable from value judgments and therefore requires explicit transparency. Benefits are evaluated similarly to risks, for instance, on factors such as: how large is the potential benefit (ie magnitude), how confident are we that the benefit will materialise? (ie, certainty), and how important is the benefit relative to organisational goals? (ie strategic value).
4	Comparing Risks and Benefits	Relate risks and benefits in a coherent decision structure. Approaches range from simple comparison of risk and benefit scores to more advanced techniques that include multi-criteria decision analysis (MCDA), expected utility models, and scenario-based evaluation. In the simplest form, a direct comparison which compares total risks scores to total benefit scores can be used. The aim of this comparison is to evaluate whether benefits exceed risks. An alternative approach is to perform a weighted comparison. It is possible that policy and decision makers judge that risks and benefits do not have equal importance. In that case, a weighted approach can be utilised where specific weights are applied for benefits and risks.	Table below demonstrates a template where risk and benefits are assessed using scores. It is proposed that quantification of benefits in monetary terms can be helpful if such information is available but the challenged of obtaining an accurate quantification of benefits can be significant. In both cases, it is good practice to perform a sensitivity analysis assessment to ensure that the risk benefits analysis can provide robust decision-making guidance even if the assumptions change. One of the central limitations of RBA is its sensitivity to uncertainty. Many risks are characterised by incomplete knowledge, making probability estimates difficult or unreliable. RBA may also underrepresent systemic, interdependent, or low-probability, high-impact risks.
5	Decision	Depending on policy and decision-making requirements and considering the results of the RBA, there are a range of outcomes that can be achieved: • **Proceed** (risks are low or manageable, benefits compelling) • **Proceed with mitigation** (risks are present but can be reduced) • **Redesign** (project feasible only after adjustments) • **Do not proceed** (risks outweigh benefits)	N/A

An example template for RBA is as follows:

Table: Example template for RBA

Risks					Benefits				
Risk ID	Description	Probability (1-5)	Impact (1-5)	Overall Risk Level (P*I)	Benefit ID	Description	Frequency (1-5)	Magnitude (1-5)	Benefit Value

2.4. The MCDA implementation

MCDA provides a structured method for integrating diverse criteria into a single evaluation. Within the context of MCDA, there are a wide range of ranking methods that can be used such as the Weighted Sum Model (**WSM**), the Multiple Attribute Value Theory (**MAUT**), Analytic Hierarchy Process (AHP), Evaluation Matrix (Evamix) etc, each with its own advantages and disadvantages.

For the purpose of this framework, the WSM approach is proposed due to the simplicity of its implementation. The first step in MCDA is to define the criteria that will be used to evaluate the initiative. These criteria should reflect the organisation's strategic priorities, risk appetite, and regulatory obligations. Examples may include financial viability, operational resilience, customer outcomes, regulatory compliance, technological feasibility, and alignment with long term strategy.

Each criterion is assigned a weight that reflects its relative importance. These weights can be determined through stakeholder consultation, expert judgement, or formal methods such as pairwise comparison. Once the weights are established, each risk and benefit is scored against the criteria, considering the probability and impact assessments. The weighted scores are then aggregated to produce an overall evaluation.

MCDA is particularly valuable because it makes trade-offs explicit. For example, an initiative with high financial benefits but significant operational risks may still be acceptable if the organisation has strong operational controls and a high-risk appetite in that area. Conversely, an initiative with moderate benefits but high regulatory uncertainty may be deprioritised if regulatory compliance is a critical organisational priority.

2.3. RBA Implementation

Step	Description	Action
1	Define the decision problem	Clarify what decision needs to be made. It is assumed that this step will have taken place during the development of the RBA. If not, it is critical to take place ahead of attempting to define criteria and perform any scoring.
2	Identify the alternatives	List the initiatives, scenarios, or choices being evaluated. These could be different asset classes being proposed for tokenisation or alternative strategies to introduce tokenisation of a certain asset class.
3	Establish the evaluation criteria	Determine the dimensions that matter for the decision. It is expected that some of them may be similar to the RBA. However, policy and decision makers may choose to use the RBA output as one of the criteria for different asset classes and/or for different implementation strategies.
4	Define scoring scales	Create consistent scales (for example using 1-5). These can be similar to those implemented in the RBA and should be used to assess how well each alternative option performs on each criterion.
5	Assign weights to criteria	Determine the relative importance of each criterion. This reflects organisational priorities and risk appetite. Weights typically sum to 1 (or 100%).
6	Score each alternative	Evaluate each initiative against each criterion using the defined scales. This step combines evidence, expert judgement, and analysis. It is expected that a broad stakeholder consultation may be useful to inform this scoring.
7	Calculate weighted scores and perform sensitivity analysis	Multiply each score by its criterion weight and sum the results. This produces a comparable overall score for each initiative. That approach would allow the decision or policy maker to rank the alternative options (be it different asset classes or strategies for implementation).
8	Synthesising Results and Making Recommendations	The final stage of the assessment involves synthesising the results into a clear recommendation. This includes summarising the key risks and benefits and presenting the overall RBA and MCDA (if relevant) score and ranking. The analysis should be transparent, evidence based, and traceable, enabling stakeholders to understand the rationale behind the recommendation and challenge assumptions where necessary

A simple example of an MCDA template based on WSM is shown in Table below.

Criteria	Weight	Tokenisation Option 1	Tokenisation Option 2	Tokenisation Option 3	Tokenisation Option [n]
Benefit Criterion 1					
Benefit Criterion 2					
Benefit Criterion 3					
Risk Criterion 1					
Risk Criterion 1					
Risk Criterion 1					

Annex 3: Interview Question Guide

Overview:

As part of a research project led by the CCAF, this interview is focused on identifying use cases and investigating the infrastructure and regulatory pathways to enable tokenisation in EMDEs. The study aims to better understand the ecosystem implications of RWA adoption across different sectors and use cases and key motivations, implementation and regulatory challenges and strategic outlook.

In the context of this research project, tokenisation is defined as creation, issuance, or representation of financial and non-financial assets and their subsequent secondary market trading on a digital token ledger or a programmable platform, reflecting an ownership right of the underlying asset (eg, securities). We exclude tokenised payment instruments (ie stablecoins, CBDCs, tokenised deposits) and intangible assets (e.g., copyrights and patents) from the scope for this report.

Duration:

~45 minutes

Flow:

1. Background (3–5 mins)
2. Use Case Exploration (20–25 mins – tailored to one selected use case)
3. Blitz: Optional Quantitative Questions (2–5 mins)

1: Background (3–5 mins)

Theme	Questions
Background and EMDE footprint	Could you briefly describe your organisation's engagement with tokenisation of financial/non-financial assets? Does that differ in the EMDEs, where market infrastructure, registries, and investor bases may look different from those in advanced economies?
	On a 1–5 scale, how central is tokenisation to your organisation's current priorities? Does this change if we narrow the focus to EMDE's specifically? How do you anticipate this to change in the next two years?
	Which RWA tokenisation use case(s) are most relevant to your institution? (fixed income, collateral management and repos, funds (including money market funds), tokenised financial instruments etc.). In your opinion, which of these are relevant for EMDEs, and whether there are EMDE-specific use cases you are active in? (eg, SME financing/supply chain assets, real estate/land-linked assets, agriculture/commodity-linked assets, government-linked instruments, carbon/transition finance)

2: Use Case Exploration (20–25 mins)

Criteria	Core Question(s)
Problem	What are the main frictions or inefficiencies within the current lifecycle of a financial asset that you are trying to solve with tokenisation (origination > issuance > distribution > secondary trading > settlement > servicing)?
	Which frictions are uniquely EMDE driven (eg, limited investor base, high issuance costs, weak registries, manual processes, trust deficits, settlement delays, FX constraints, documentation gaps)?
	Which of these problems imposes the most cost, delay, or complexity?
Solution and Design Choices	How does tokenisation address these general (and specific EMDE) constraints?
	What would you consider "minimum viable network" in an EMDE setting for tokenisation to scale?
Benefits and Risks	Where do you see the potential benefits of DLT with asset tokenisation, particularly for which product types and services?
	Does tokenisation measurably change access to capital (eg, lower ticket sizes, broader distribution, faster funding, improved collateral acceptance)?
Infrastructure and interoperability	What are the critical infrastructure gaps preventing tokenised assets from scaling?
	Where do you anticipate the hardest interoperability issues: DLT > traditional infrastructure, or DLT > DLT across networks? Is fragmentation across blockchains a feature or a flaw and can interoperability realistically solve it?
	Are there any specific considerations relevant from the choice of infrastructure(Canton, **GL1**, others)?
	Who should build and own the rails?
	What integration points matter most in EMDEs: local payment rails, custody arrangements, CSDs/exchanges, mobile money ecosystems, agent networks, e-KYC/digital ID, registries?
Opportunities	Beyond solving current problems, what new value or strategic benefit could tokenisation unlock for markets in general?
	Where is tokenisation of real-world assets actually proving commercial value? Are they commercially viable?
	Do you have a view on how much efficiency is being realised in pilot projects versus at scale?
	How do you envisage the role of market participants to evolve because of the shift to DLT-based processes?
Programmability	Where does programmability create the most practical value in your use cases??
	What are the technical or regulatory standards that you consider crucial to enable programmability at scale?
Challenges	What technical, regulatory, internal or external barriers currently prevent wider adoption of tokenisation in financial markets?
	How do tokenised assets differ in structure and risk – do you consider these risks unique? Which risks remain hardest to quantify or mitigate at this stage? (ex: relating to the use of DLT in hosting tokenised instruments, risks from interdependencies and lack of interoperability, lack of credible settlement assets, etc)
	Which internal stakeholder is most cautious about EMDE tokenisation (compliance, risk, legal, treasury, product), and why?
Lessons Learnt	What lessons or best practices have emerged from your experimentation or deployments so far?
	What hasn't worked (yet)- and why?
	How are asset managers and banks measuring commercial impact?
	What infrastructure and partnerships are still missing?
KPIs / Metrics	What early indicators would signal readiness for scale/persuade to adopt of DLT in financial markets?
Ecosystem Integration	What ecosystem dependencies or integration blockers affect progress of tokenisation in EMDEs? (ex: digital public infrastructures such as identity mechanism, registries etc)
	Is the tokenisation ecosystem mature enough for institutional adoption? What will it take for RWAs to move from niche to mainstream in institutional portfolios?
	[For banks and assets managers] Should banks and asset managers build tokenisation platforms themselves, or partner with fintechs and blockchain natives?
	In your view, who is best placed to lead ecosystem development in EMDEs – regulators, central banks, industry consortia, **DFIs**, exchanges/ CSDs, international financial centres – and why?
Outlook	What is your vision for tokenisation of real-world assets over the next 2–5 years?
	What could accelerate or delay that?
	Which use cases or jurisdictions are likely to scale first, and why?

3: Blitz: Optional Quantitative Questions (2–5 mins)

Theme	Question (Scale 1 = Low / 5 = High)
EMDE strategic priority	How high is tokenisation on your roadmap for EMDEs? (1–5)
Adoption Readiness	How ready is your organisation to adopt tokenisation at scale? (1-5)
Use Case Impact	How much value do you see tokenisation bringing to your selected use case in the next 2 years? (1-5)
Driver	What's the main driver in EMDEs today? (pick one) • Access to capital (MSMEs/households) • Lower issuance cost • Faster and less expensive settlement • New investor base (diaspora/offshore) • Regulatory clarity • Increased liquidity • Fractionalisation • Other
Key risks	Which of the following risks from tokenisation of assets do you consider most relevant/important in your jurisdiction? • Market concentration • Market integrity • Lack of interoperability • Operational resilience • AML/CFT and illicit finance risks • Consumer protection • Financial stability • Any other (please specify)

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