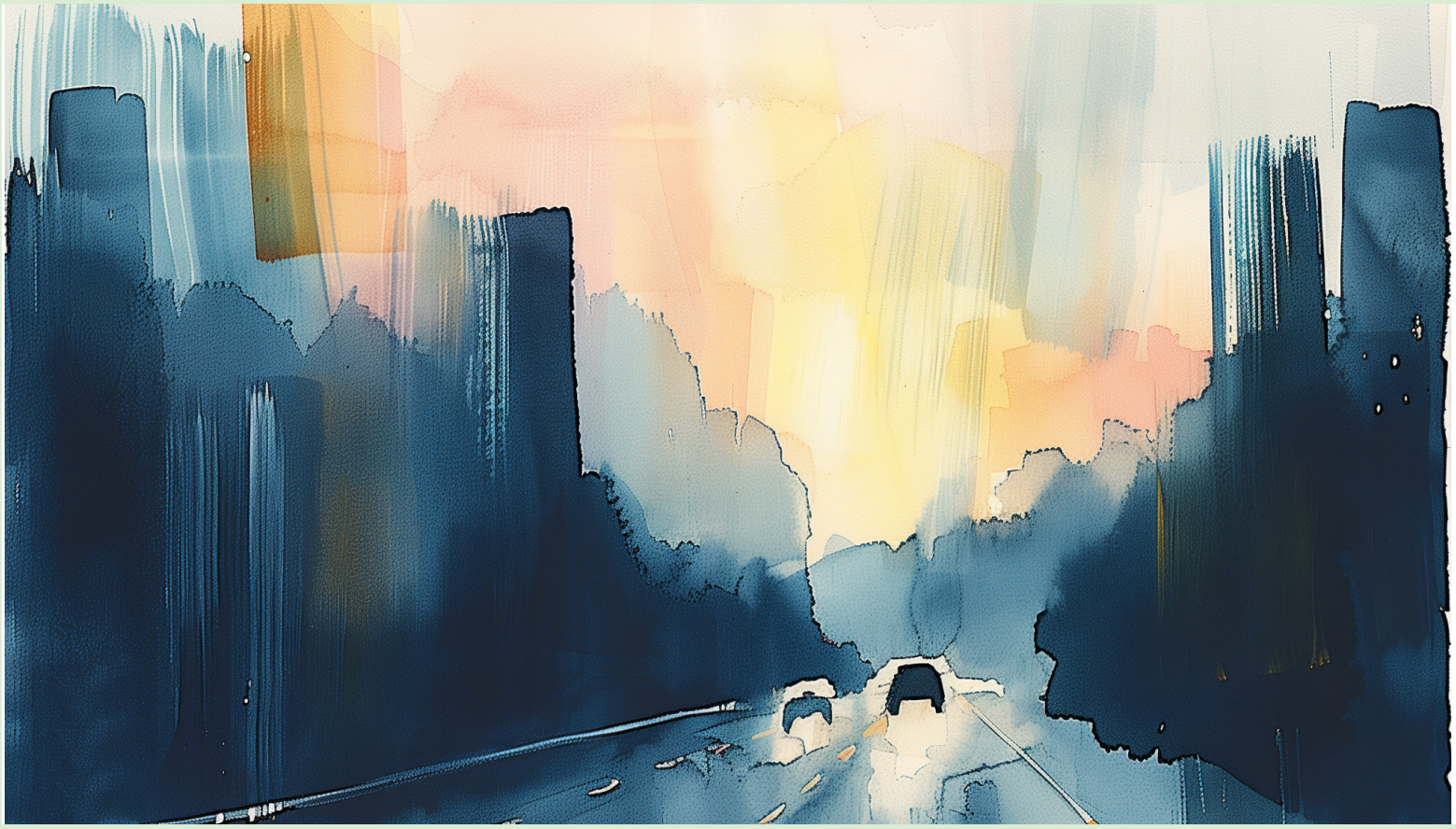
Digital Asset Tokenisation Guide



Future of Finance

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Editor's Letter

Whatever they do about tokenisation, incumbents are doomed

The inaugural Future of Finance Digital Asset Tokenisation Guide (DATG) is published at a time when confidence in a fully tokenised future is not high. As the cover story depicts, using data drawn from the Future of Finance database, the number of fund and security token issues is limited, almost all are asset-backed rather than native, and there is a marked reluctance to address the all-important equity market.

Progress so far has depended on a handful of regulated financial institutions, some of which are now visibly losing their internal funding as well as their enthusiasm. Talented individuals are moving on to more immediately lucrative possibilities. Many of the tokenisation FinTechs which ignited the initial interest have stalled too, and some have failed altogether as their venture capital backers also lose faith in rapid adoption of tokenised finance.

Hopes that asset managers would lead the drive to tokenisation were inflated by the encouraging remarks of the CEOs of a pair of household names. But they were soon deflated by the predictably narrow focus of the more adventurous asset managers in terms of asset classes, including the launch of products that are hard to admire: Bitcoin spot market exchange traded funds (ETFs).

An unambitious pair of papers from the Investment Association in London (IA) (which effectively concluded that meaningful change must await legal and regulatory reform) and the Association Française de la Gestion financière in Paris (AGF) (which argued that it may be time for French asset managers to start thinking seriously about tokenisation) were not encouraging either.

True, as an article in this first issue of the Future of Finance DATG explains, tokenisation is making unexpected progress in Japan. But, even there, asset-backing is the default model and real estate is the overwhelming choice of asset class.

So reasons to be cheerful about tokenisation must be found outside existing practices. Such reasons do exist. One of them is that what is happening and not happening in the token markets today is exactly what we should expect in an established industry facing a disruptive technological innovation.

Tokenisation is not exotic but is built of everyday components

Establishment voices in the established securities and funds industries tend to portray tokenisation as interesting but exotic. In fact, tokenisation is not some providential (or calamitous) intervention from a parallel universe. It is a digital technology made up of components that have existed for years. Three of those components are crucial to its long-term success.

The first is digital technology itself. With enough time and memory, computers can simulate any physically possible environment, making digital computation the most powerful general-

purpose technology in the history of humanity. The securities and funds industries cannot escape its impact indefinitely any more than manufacturing could escape the invention of electricity or transport the invention of the internal combustion engine.

Tokenisation is not some providential (or calamitous) intervention from a parallel universe. It is a digital technology made up of components that have existed for years. Three of those components are crucial to its long-term success.

The second crucial component is the Internet. It is easy to forget that the blockchains which host tokens are an Internet technology. The Internet is itself a compound technology made up of processors and servers, telecommunications equipment and communications standards, but its most important characteristic is its openness. Because it is an open protocol, the Internet cannot be controlled and closed by any profit-seeking private interest, enabling the applications available through it to be built, accessed and used by anyone.

It is this feature which endows the Internet with the incentive power of network effects: as more people use the Internet the value of the Internet increases for everybody. The value of this feature is impossible to over-state. The reason the token universes that have existed for years in the multi-player gaming industry remain embryonic is that they are closed networks.

The companies that own computer games make money by ensuring that their customers cannot travel outside the game and the tokens earned from the game can be spent only within the game. Security and fund tokens, by contrast, must be accessible from any network, and portable to any network, or they will fail.

The third crucial component is Open-Source software. Because it can be used, modified and enhanced by anybody, Open-Source software is "composable." It does not have to be reinvented every time a developer wants to build an application for use on the Internet. As the Ethereum website puts it, "all apps are built on the same blockchain with a shared global state, meaning they can build off each other (like Lego bricks). This allows for better products and experiences and assurances that no-one can remove any tools apps rely upon."

Incumbent firms in the securities and funds industries are playing familiar roles

It is these three components that have made it possible for tokenisation engines and token exchanges to emerge, along with a host of supporting products and services, including data vendors that can feed the valuation tools and smart contracts that tokens rely on.

In short, there is a horde of new entrants contending to exploit tokenisation as an innovation. Most will fail; some already have. But those that survive will become the dominant design of tokenisation - and take it into large scale production. This is not mere assertion or foolhardy prediction. It is what the entire history of technological innovation tells us.

That history also tells us that the response by incumbents to technological innovations is often inimical to long-term survival because it is condemned to be cautious. Incumbents have revenues and customers. To seek to nurture them, rather than embark on a rapid and wholesale transition to a new technological paradigm, is a condition of remaining in business.

It is also a necessary defence against new entrants that wish to compete those customers and revenues away. When Joseph Schumpeter observed that incumbents do not merely succumb to his "perennial gale of creative destruction" but "can and will fight progress itself,"[1] he meant only that it is natural for established firms to protect the value of their existing assets and revenues from potential threats.

In doing so, they possess the advantage that a successful innovation must disrupt more than the prevailing technology. It must also disturb existing relationships (between customers and suppliers but also between employers and employees, whose instincts will in most cases be even more conservative than those of management) and ways of doing things (the issuance, trading, settlement, servicing and safekeeping of financial assets are deeply embedded processes that can only be disrupted completely and not piecemeal).

The need to continue to service existing clients, and to protect revenues, and to meet payroll, and the sheer complexity of replacing even a part of an existing process with a new technology explains why it is so hard for incumbents to innovate.

The management of the technology budgets of the major global banks betrays this fact. They all draw clear a distinction between what is spent on Running the Bank and what is spent on Changing the Bank. And the sums spent on Running the Bank always outweigh the sums spent on Changing the Bank five or even ten-fold.

In this respect, companies are not different from individuals. What we own makes demands and creates liabilities that we cannot ignore. It is also human nature to over-value what we have, to fear what we may lose and to expect others to appreciate the value of what we provide for them as much as we do.

When Steve Sasson presented his prototype of a hand-held digital camera to the senior management of Kodak back in the 1970s, they were understandably unable to envisage the personal computer, the Internet or the mobile telephone, chiefly because their attachment to the existing product set blinded them to these future possibilities. "Where would you store these images?" he was asked. "You're not making a print. People love prints. People don't want to look at their pictures on a television set."

The moment of maximum performance is the moment of maximum weakness

This institutionalised myopia is, paradoxically, the principal reason for believing that tokenisation will eventually succeed. If a technology requires new capabilities, and incumbents are

1. Joseph A Schumpeter, *Capitalism, Socialism and Democracy,* Allen & Unwin, 1957, pages 84 and 96.

institutionally incapable of mastering them, the technology must ultimately prove fatal for the incumbents.

If tokenisation requires a transfer agent to reconcile digital and analogue registers, or a fund accountant to check security token as well as security prices before striking a NAV, or an asset manager to do no more than add a tokenised share class to an existing fund, a tokenised future is not a threatening one for incumbents.

But if tokenisation requires transfer agents to settle fund subscriptions and redemptions instantly in digital money, fund accountants to value commitments rather than portfolios, and asset managers to sell commitments rather than risk-adjusted market returns, a tokenised future will mark most if not all incumbents for extinction.

So it is not hard to fathom why incumbents prefer asset-backed tokens to native tokens, and to tokenise assets which lack an existing infrastructure and set of service providers. By restricting the scope of change in their existing business and confining it to areas where there is little or nothing to change in the first place, incumbents can minimise the amount of change overall.

In any industry, the dominant firms are always going to prefer no change to change and incremental change to radical innovation. Ironically, new entrants indulge this tendency. For them, the current owners of the customers and the revenues appear dauntingly large and entrenched. So challengers condemn themselves to proceed at the pace set by the incumbents.

If a technology requires new capabilities, and incumbents are institutionally incapable of mastering them, the technology must ultimately prove fatal for the incumbents.

This inadvertent conspiracy explains the proliferation of unequal "partnerships" between incumbents and challengers, and the willingness of incumbents to contribute to Proofs of Concept (PoCs) and Pilot Tests organised by new entrants. Incumbents can learn a little from a PoC or Pilot Test, and attract favourable publicity for appearing progressive, while in practice doing little to alter the status quo.

The impact of tokenisation is restricted initially to a burnishing of existing products and services to make them more competitive with the promises of tokenisation. Shrinking settlement timetables from trade date plus two days (T+2) to trade date plus one day (T+1) falls into this category. So do the promises to reduce settlement fails, discussed in the third and final article in this inaugural edition of the DATG.

Incremental improvements are unlikely to inoculate the existing system against destruction by atomic settlement of digital objects on blockchain networks. History shows that incumbents are remarkably adept at defending entrenched technologies and established processes, and that their products and services often reach their peak performance at the very juncture where they at last become obsolete. Innovation, as a source of failure in business as well as success, has many mansions.

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Unlocking Value on Balance Sheets

Written by: Ralf Kubli

Rethinking tokenisation for non-financial firms

Introduction

Tokenisation is currently heavily focused on simple financial instruments, but it could deliver far more wide-reaching consequences in a much greater range of industries. If an impact on the real economy beyond financial institutions is to be realised, tokenisation must not only expand from cash and cash equivalents to all financial assets, but also to intangible and tangible assets expand the universe of reliably collateralisable assets.

Tokenisation will allow for easy and efficient collateralisation of many more financial assets, tangible assets and intangible assets. It will also allow for the creation of more assets and significantly expand the asset base of individuals, firms and the world, which can be used in financing transactions. Tokenisation hugely increases the range of intangible and tangible assets that can be made bankable and financeable.

Financial assets are by nature digital. In order for tokenisation of financial assets to truly deliver the promises of blockchain technology, we must remember that financial contracts are the fundamental basis of all finance. These can and must be standardised in tokenised assets - starting at the lowest granular level possible, i.e. the cash flow level.

The combination of blockchain/DLT technology with the open source ACTUS financial standard will enable a dramatic expansion of financial instruments, near-automated securitisation and granularly constructed portfolios allowing for customisable risk-return based on the appetite capital providers.

The killer use case of tokenisation - from cash netting to the entire balance sheet

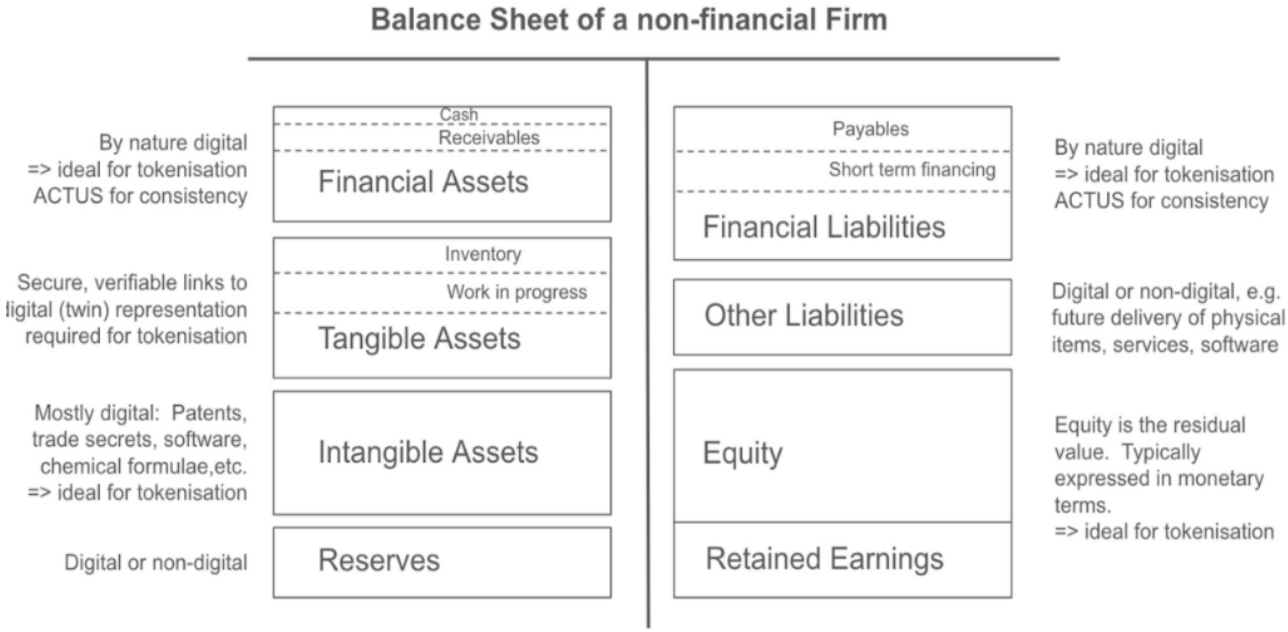
It is no surprise that among first financial institutions to recognise the value of digitally represented cash and deposits on shared ledgers were those serving large-non financial clients with cash and cash netting needs in multinational settings. The earliest public use cases were UBS and J.P. Morgan. The power of an immutable and secure representation of certain facts about account balances and the movement of cash and cash equivalents within seconds on a highly secure shared ledger across jurisdictions, is evident to anyone involved in banking for multinational corporations.

Today, this use case is well developed inside many banks and extends to capital markets with tokenisation of cash and cash equivalents (Treasuries and similar). The attractiveness lies in the simplicity of the underlying instrument, whether it's cash on a bank account, money market funds, U.S. Treasuries, or deposits on a bank account. Once tokenised, collateralisation in repo contracts or netting operations can be simplified significantly, automated and shortened in time, as they are executed on distributed but shared ledgers.

When considering the needs of non-financial firms, liquidity and treasury operations are a critical part of every firm's management function. Typically, non-financial firms, however, hold a small portion of their total balance sheet value in cash, cash equivalents or financial assets. Therefore, for tokenisation to be a relevant driver of financial innovation it must not only efficiently expand beyond cash and cash equivalents to debt, structured instruments and derivatives, i.e. all financial assets, but also tangible and intangible assets which typically constitute a larger portion of balance sheet value of non-financial firms.

Non-financial firm balance sheets, digitisation, and tokenisation

When exploring the potential of expanding the universe of assets to be used as collateral in financial instruments, a special look at the items on a typical balance sheet is required. The underlying form factor of an asset on a given balance sheet will determine the ease with which the asset can be tokenised. However, many items on non-financial firms' balance sheets are already digital in nature today, greatly facilitating their representation with tokens.



There are many well established and highly automated processes for using financial and tangible assets from a balance sheet as financing collateral; for example, (overnight) repo transactions by large corporations or collateralised lending against fixed assets. Certain other processes, like short term working capital financing or obtaining long term credit from a local bank, can vary greatly in degrees of automation and efficiency for the parties involved. Yet, the use of certain intangible and tangible assets on the balance sheet of non-financial firms as collateral is highly complex to execute, such as borrowing against IP or inventory (from raw materials to finished goods) which are on a firm's balance sheet.

In the context of the innovations and progress being made in DLT solutions, tokenisation will be able to reach far beyond traditional financial engineering and cost management techniques. By incorporating programmatic blockchain-based solutions, the financial industry will drive more efficient and expanded collateralisation, enabling capital access, asset utilisation and, ultimately, liquidity for an expanded universe of assets found on non-financial firms' balance sheets.

Two foundational technologies – Blockchain/DLT and the ACTUS financial standard

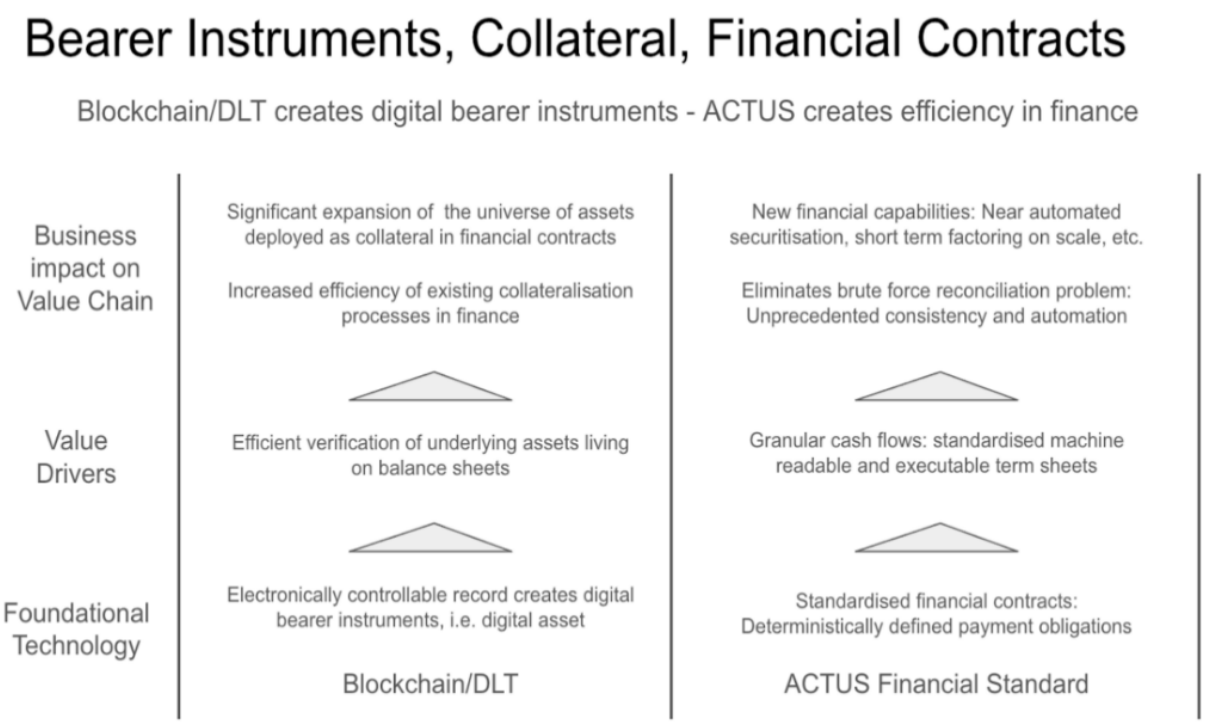
Unlocking of balance sheet value of non-financial firms and the subsequent step change in capital market innovation will be driven by the unique characteristics of blockchain/DLT asserting facts in shared and immutable ledgers, as well as a key innovation in finance, the open source ACTUS financial standard. This enables transparency, automation and securitisation of financial instruments currently unachievable.

The two foundational technologies explained:

Blockchain/DLT with its capabilities to provide an assurance layer for all kinds of facts (financial and otherwise) is allowing for more efficient collateralisation in existing processes while, at the same time, enabling a significant expansion of items to be reliably used as collateral by non-financial firms for financial instruments.

The open source ACTUS financial standard provides and defines machine readable and machine executable standardised financial contracts (financial term sheets), allowing for a granular understanding of the payment obligations of all parties to financial contracts. In other words, a deterministic definition of all cash flows.

Both foundational technologies will independently have a profound impact on the way non-financial firms will be able to unlock value on their balance sheets. When combined, however, they will have a truly transformative effect on financial systems' functionalities, with blockchain/DLT driving efficiency and expansion of reliably collateralisable balance sheet items, and ACTUS-based financial contracts providing granular understanding of the cash flow obligations of all parties and. The result is significantly expanded opportunities to unlock value on balance sheets and access liquidity for non-financial firms.



New possibilities for non-financial firms, investment banks and capital providers

Once CFOs of large non-financial firms understand the efficiency of tokenised cash and cash equivalents for netting, repo, and treasury management at scale, it will cease to be a 'nice-to-have': they will demand that their financial services partners utilise it. In addition, the same CFOs will soon understand the significant opportunity to increase access to capital when more items on their balance sheets can be collateralised thanks to tokenisation as described above.

Investment banks and capital providers will be equally receptive to the opportunities presented, as critical challenges in refinancing and capital markets are addressed by the combination of blockchain/DLT and the ACTUS standard.

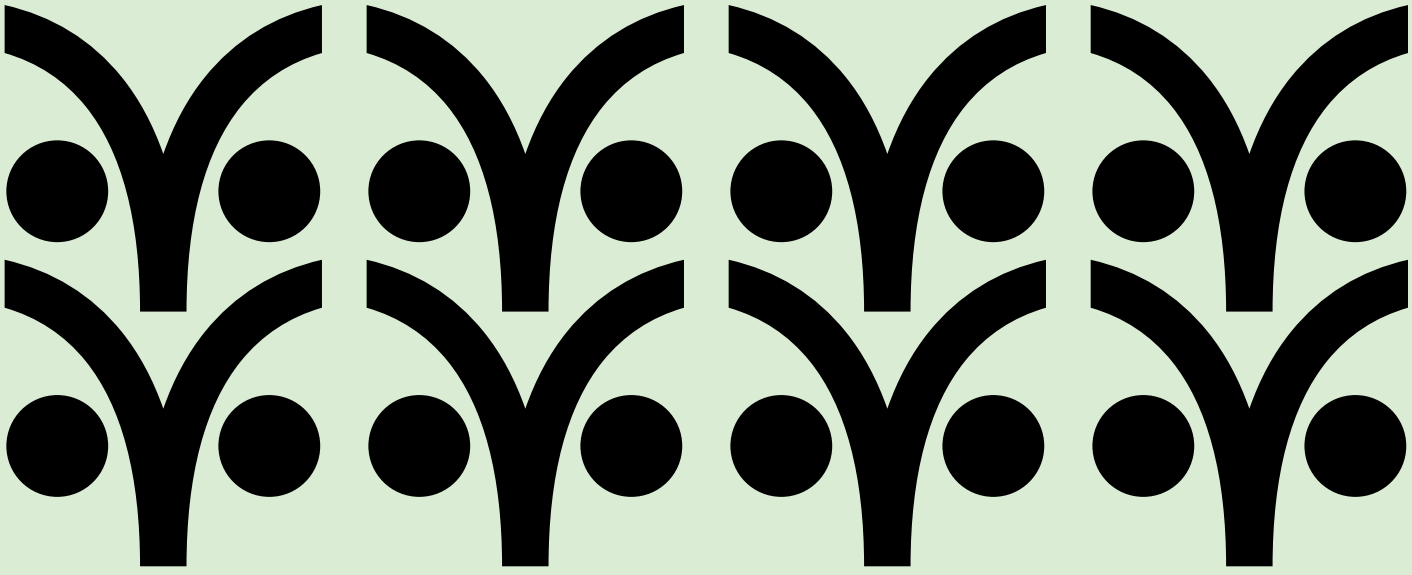
Not only will current collateralisation processes become more efficient, but also the universe of reliably collateralisable assets (both tangible and intangible) will expand dramatically. This will result in dramatically more financial instruments issued and managed by investment banks (i.e. more through the same pipes).

The financial instruments themselves will achieve a new quality too, thanks to granular understanding and the machine verifiable state of the financial contract (i.e. higher fidelity financial assets through the same pipes). Tokenisation of financial assets with the ACTUS financial standard will result in the following step changes in finance:

- **Significantly more financial assets can be issued**
- **Massive expansion of all kinds of asset-backed securities (ABS)**
- **Financial assets, previously not securitisable, can be securitised at scale and at lower cost**
- **Financial assets can be securitised at higher risk-adjusted yields**
- **Granular portfolio construction based on any risk/return profile; i.e. portfolio of one becomes reality at scale and at low cost**
- **Company-wide risk management and systemic risk management will be possible again**
- **Efficient price discovery and post-trade automation**

The use case of tokenization to unlock untapped value on balance sheets for non-financial firms is extremely compelling. As CFOs recognise these realities, they will inevitably become the drivers for innovation, enabling access to more capital and, ultimately, liquidity on a much more attractive risk-adjusted basis.

For true tokenisation to triumph a public initiative is needed



The tokenisation of securities and funds is the blockchain revolution that is failing to happen. Without network effects, it never will. With an accidental combination of fearful incumbents and unambitious challengers conspiring against the openness that network effects require, it is time for the public sector to take the lead.

Tokenisation is not working. Or at least not in ways that will enable it to scale. Blockchains are an Internet technology, and the Internet is a network of networks. Which is why Internet success stories, from Amazon to Facebook to TikTok, have grown through network effects: the more people that use a service, the more valuable it becomes to the users.

What tokenisation needs to take off into self-sustaining growth is network effects. To be specific, the success of tokenisation depends on more and more issuers finding more and more investors. As that happens, network effects will take hold and shift the growth trajectory of tokenised assets on to a quadratic – and eventually, perhaps, an exponential - path into the future.

Securities and fund token markets are trivial in scale

But the starting point today is trivial. One recent estimate puts the global market capitalisation of both security and fund tokens at a mere US$33.8 billion in March 2024.[2] That modest figure amounts to 0.004 per cent of the value of all outstanding bonds (US$129.8 trillion at end-2022) and equities (US$101.2 trillion),[3] mutual (US$63.1 trillion)[4] and exchange-traded (US$80.6 trillion) funds and over-the-counter derivatives (US$618 trillion).[5]

To reach the US$5 trillion of tokenised securities and funds predicted for 2030 by Citi[6], the tokenisation markets will need to grow nearly 150-fold. To attain the US$16.1 trillion predicted for

2. STOmarket.com
3. Sifma, 2023 Capital Markets Fact Book, pages 11 and 13.
4. Investment Company Institute, Worldwide Public Tables, 2023: Q4, Table 1.
5. Sifma, 2023 Capital Markets Fact Book, page 15.
6. Citi, *Money, Tokens, and Games: Blockchain's Next Billion Users and Trillions in Value*, March 2023, page 9.

the same date by Boston Consulting Group (BCG), the markets will need to grow nearly 500-fold.[7] Reaching these goals implies compound annual growth rates of 130-180 per cent, which are unachievable without network effects.

These are demonstrably absent today. A review of the Future of Finance databases of significant "events" in securities and funds tokenisation finds that, although activity has increased steadily since 2016 (see Chart 1 in the Sidebar "What the Future of Finance Tokenisation Databases Say"), more than half of events recorded are not issues of tokens. Majorities are Proofs of Concept (PoCs) or Pilot Tests which do not go into production or largely cosmetic public relations exercises (see Chart 2 in the Sidebar "What the Future of Finance Tokenisation Databases Say").

Much progress is more apparent than real

An official experiment, the European Union Distributed Ledger Technology (DLT) Pilot Regime, introduced in March 2023 to encourage financial market infrastructures to test blockchain technology in the issuance, trading and settlement of tokenised securities, managed in its first year to attract just four applications (two trading platforms in Germany and a settlement system from each of the Czech Republic and the Netherlands) and a further eight inquiries.[8]

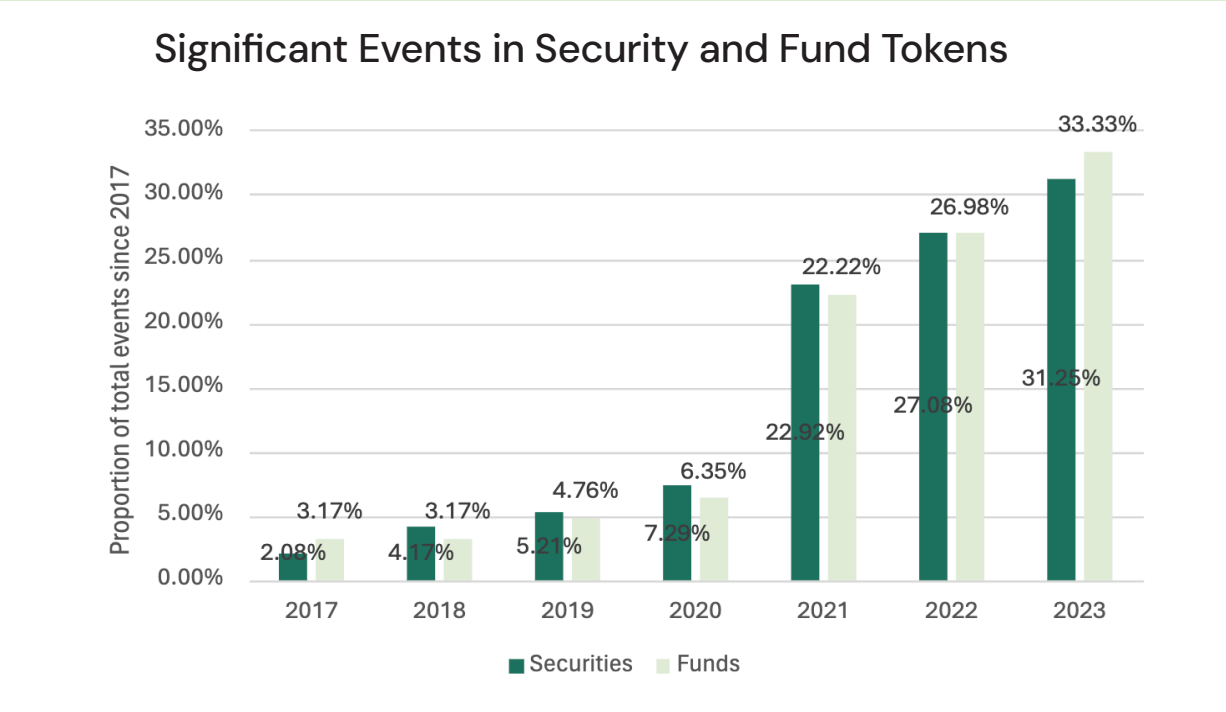
7. BCG and ADDX, *Relevance of on-chain asset tokenisation in `crypto winter,'* September 2022, page 7.

8. Letter from Verena Ross, executive director of the European Securities and Markets Authority (ESMA) to the European Council, Commission and Parliament, 3 April 2024.

What the Future of Finance Tokenisation Databases Say

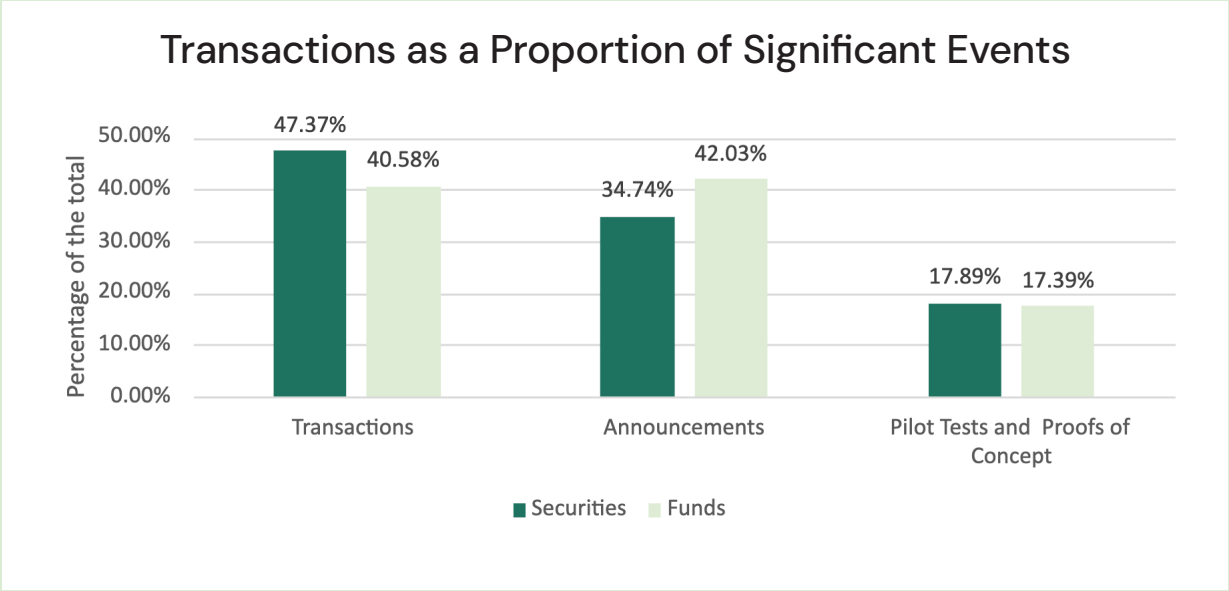
The Future of Finance databases cover securities and fund tokenisation "events." In other words, they monitor not just token issues, but Proofs of Concept (PoCs) and Pilot Tests, platform launches, partnerships, acquisitions, legal and regulatory changes and other significant announcements. Collectively the events suggest that activity is growing (see Chart 1).

Chart 1



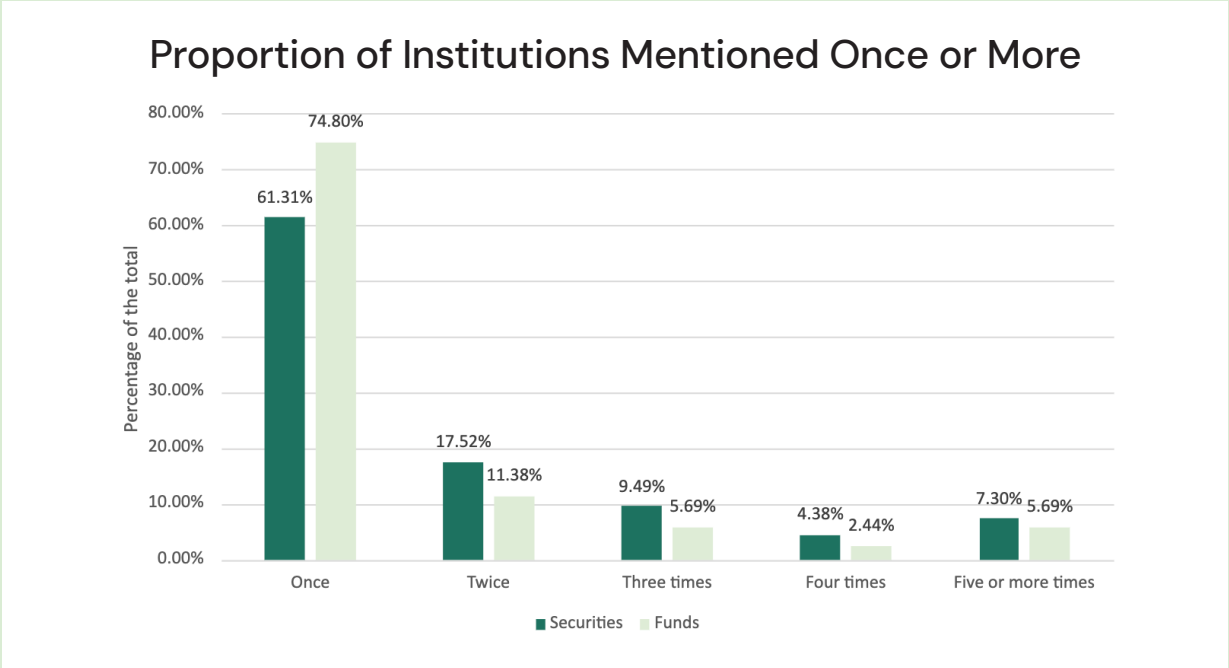
But a database covering seven years of events since 2017 still contains less than 10,000 data points, and in both the securities and the fund markets, majorities of the "events" are not records of tokens actually being issued or exchanged (see Chart 2). Alongside token transactions lies a great deal of posturing and a modicum of continued experimentation.

Chart 2



The databases also show that activity is concentrated among a relatively narrow group of financial institutions that are prepared to pioneer tokenisation. 260 separate firms are mentioned at least once in the databases but, for two out of three of them, a single instance is all they manage (see Chart 3). This is a counter-intuitive finding, not just because most institutions claim to favour a collaborative approach to tokenisation, but because tokenisation is built on blockchain - an open-source, composable digital technology whose success depends on network effects.

Chart 3

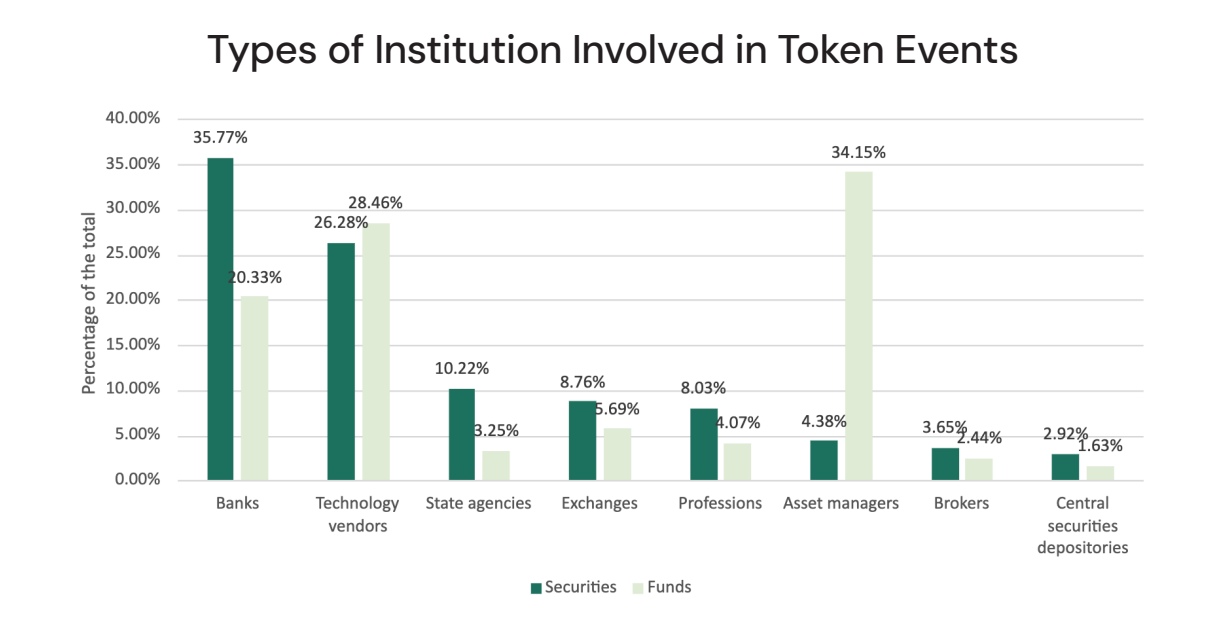


Even against the low bar of being mentioned at least five times, the databases find a mere 17 financial institutions are engaged in tokenisation at a more than superficial level. Just six banks (Goldman Sachs, Credit Agricole, HSBC, J.P. Morgan, Société Générale and UBS) are mentioned more than five times in the security token database. In funds tokenisation, no bank enjoys even that accolade. Among exchanges, just four – ADDX and SGX in Singapore and SDX and Luxembourg Stock Exchange in Europe – account for three out of four appearances in the data.

In funds (see Chart 4), where asset managers are widely assumed to be enthusiastic about issuing tokenised funds, just three managers account for a quarter of all activity and a dozen for half of it – and their interest demonstrably revolves around distribution (gathering more assets to manage) rather than investment (obtaining higher returns for their investors).

Sell-side pioneers interested in teasing out the requirements of the buy-side are in practice re-learning something they knew already: that asset managers see the potential of tokenisation but will not invest to bring it about and – still more predictably - expect to be able to invest in digital assets without making any changes to the systems and processes they use in traditional financial markets.

Chart 4



Nor are most asset managers acting directly to propel tokenisation forward. The majority are participating at the invitation of the sell-side, which is assuming the risk and cost of building platforms they hope the buy-side will one day use.

Banks and technology vendors account for two thirds of the institutions active in securities tokens and nearly half the institutions active in tokenised funds (see Chart 4). Even in funds

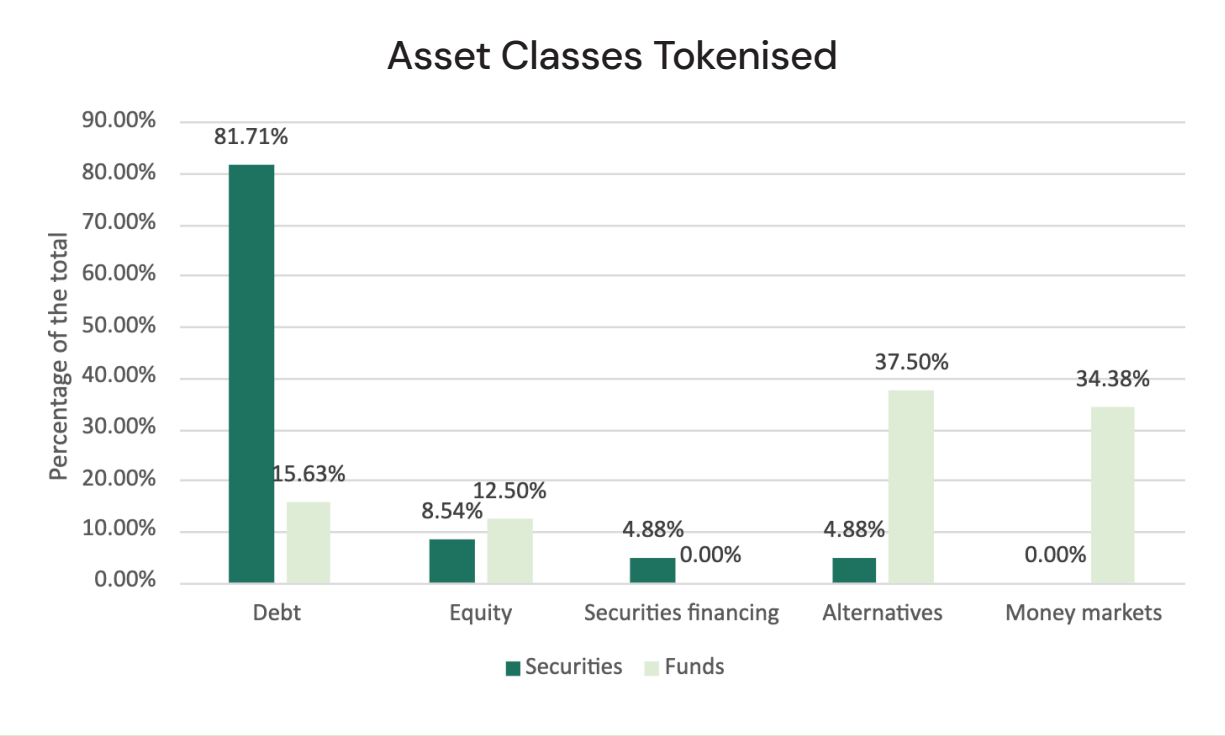
tokenisation, where asset managers have most to gain as issuers, banks and technology vendors easily outweigh asset managers as drivers of change.

In developed equity markets, by contrast, there are already options to trade major stocks around-the-clock and the marginal cost of buying ten or 100 shares versus 1,000 is nugatory. So investing to tokenise equities looks as if it will yield a lower return than debt. Debt is also more useful than equity as collateral, but often hard to mobilise, especially across borders, where it is usually trapped in custodian banks and central securities depositories (CSDs). The level of interest in tokenising securities financing transactions (Chart 5) reflects this opportunity.

In fund tokenisation there is an equally clear bias towards alternatives and money market funds. Alternatives (real estate, private equity, hedge funds) not only lack standardised infrastructure but have minimum ticket sizes that restrict distribution. Tokenisation can in theory improve operational efficiency and (via fractionalisation) broaden distribution of alternative funds to investors with less money to invest.

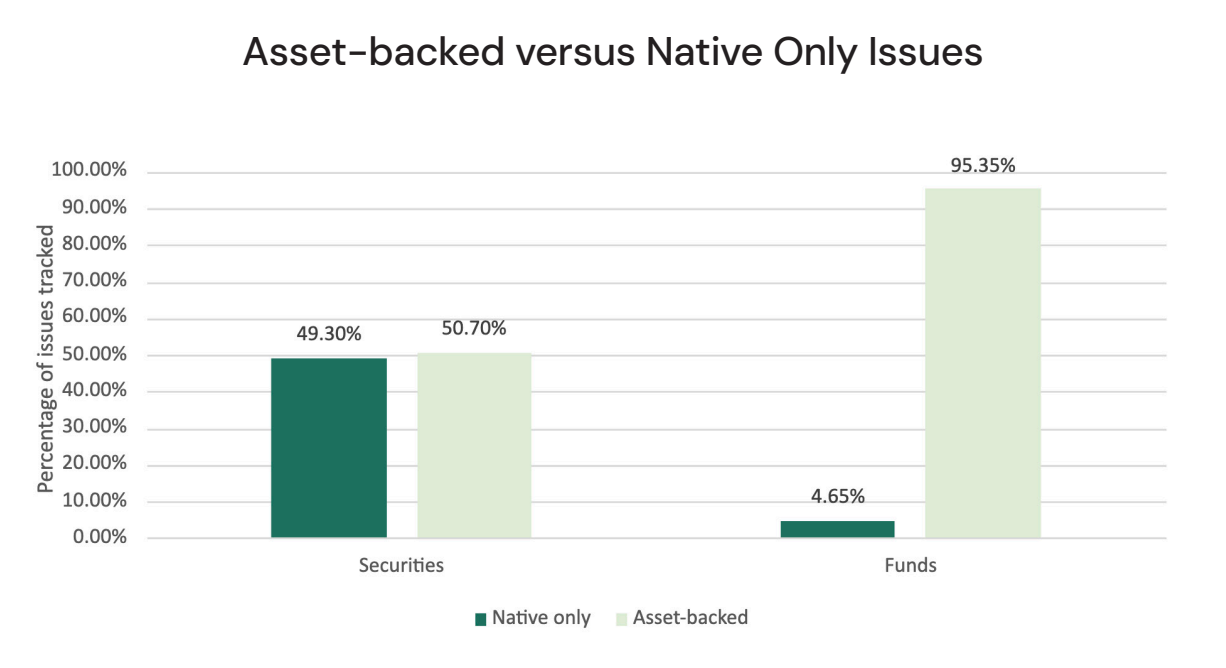
Tokenised money market funds, on the other hand, can be sold to digital asset traders that need vehicles to park cash without re-entering the traditional banking sector (tokenised money market funds are, in effect, an alternative to Stablecoins). Tokenised money market funds can also be used by the same trading houses as collateral for credit. At current yields, they are easy to sell to end-investors too.

Chart 5



These preferences express the lack of ambition in a more profound sense too. For the most part, the assets that are being tokenised exist already. This is obvious in the case of real estate, commodities and fine art, all of which are ultimately physical. But it is equally true of hedge and private equity and mutual and indeed real estate funds, which continue to be available in analogue as well as tokenised or digital form.

Chart 6



Of the tokenised fund issues captured by the Future of Finance database, more than 95 per cent are what can be called "asset-backed" tokenisations: the funds continue to exist in their traditional form and tokens can be exchanged for the traditional alternative (see Chart 6). This is less true of the security token issues captured in the database, half of which are available in tokenised form only, but the implication is still clear: two out of three tokenisations recorded in the Future of Finance database are "asset-backed."

Even progress that appears solid melts into air on closer inspection. There was considerable excitement, for example, about the high volume of structured notes being issued in digital form in Germany under the *Gesetz zur Einführung von elektronischen Wertpapiere* (eWpG) law on electronic securities (see the Sidebar "Securities Token Laws and Regulations in Seven Jurisdictions"). They turned out to be digital in terms of issuance only. The assets are otherwise settled and serviced in the same way, and by the same institutions, as traditional securities.[9]

Of course, none of these initiatives is useless. They have created a repository of practical knowledge of how to issue, buy and sell, settle and safekeep security, fund and cash tokens. Most experiments are collaborative. By facilitating the sharing of knowledge and ideas, collaboration accelerates progress, because firms can contribute what they do best and successes generated by one firm can be used by others.

But the value of continuing such exploratory activity is questionable. Indeed, it is difficult to resist the conclusion that many participants in these projects are using them not to make progress in tokenisation but to feign interest in it. Most members of a consortium contribute little or nothing and are interested mainly proving that they are "doing something" about tokenisation or at best in acquiring knowledge at low cost.

With more passengers than drivers, collaborations decay over time. Participants resent the fact that they are paying or contributing more than others. Projects get distorted by their growing appetite to tailor the outcome to meet their particular needs. A reluctance to share any useful "intellectual property" created sets in, undermining the rationale of working together. If perpetual collaboration is not designed to slow progress down, it might as well be.

Real progress depends on a handful of incumbent institutions

The superficiality of engagement with tokenisation at most institutions is starkly evident in the Future of Finance databases. These show that consistent involvement is confined to a group of just six banks and four exchanges. Two out of three firms that take part in a tokenisation "event" have yet to participate in another one (see Chart 3 in the Sidebar "What the Future of Finance Tokenisation Databases Say").

Asset managers, which are vital as buyers of tokenised securities and issuers of tokenised funds, are scarcely engaged at all in the tokenisation of securities (see Chart 4 in the Sidebar "What the Future of Finance Tokenisation Databases Say"). They are involved of necessity in the issuance of tokenised funds but are (with few exceptions) adamant that it is up to the sell-side to make token issuance and investment as painless for them as possible.

Worse, in tokenising funds, asset managers have become by default the principal proponents of the least disruptive form of tokenisation: the "asset-backed" variety, in which the token is a mere digital representation of the original asset. Investors in "asset-backed" tokens own no more than title to the underlying asset, which must continue to exist, whether it is a physical asset such as a building or an abstract asset such as a security or a fund.

9. See Future of Finance, Digital Asset Custody Guide, Issue 2, *Regulation Matters*, pages 40–41.

Almost all the tokenised funds captured by the Future of Finance databases are asset-backed (see Chart 6 in the Sidebar "What the Future of Finance Tokenisation Databases Say"). The tokenised variant can be no more than an additional class of share in the original fund, as if tokenisation is a matter comparable to choosing the currency or schedule of fees. But even in the case of the security tokens captured by the databases, half are asset-backed.

Most tokenisations are superficial

This matters, because an "asset-backed" token is not an asset in its own right. An "asset-backed" token is comparable to the "depositary receipts" offered by custodian banks to investors wanting to hold foreign securities in custody in their own currency, or the "wrapped" equities offered to investors by cryptocurrency exchanges, or the "tokenised deposits" issued by banks against their balance sheet liabilities as a form of digital money.

A genuine token, on the other hand, exists in digital form only. Its value depends not on anything external but solely on the stream of income it pays (also in tokens) and its value when exchanged between sellers and buyers. It is a true digital asset, not a representation of a conventional asset, or title to another asset. It is closer in conception to the "native" coins issued to fund blockchain networks such as Bitcoin (Bitcoin), Ethereum (Ether) or Solana (Solana).

In software terms, true tokens are "executable objects" that cannot exist outside computers. In English law, such tokens fit neither of the existing legal categories of property, where possession must be either physical (such as a gold coin) or enforceable by law (such as a security). Indeed, the United Kingdom Law Commission, a statutory body that recommends reforms of the laws of England and Wales, has had to invent a new form of property to accommodate tokens as true digital assets. They are, according to the Commission, "data objects."[10] In other words, they are strings of data that are inseparable from the digital systems in which they reside.

Blockchains are not databases and tokens are not entries in databases

The digital systems on which tokens reside are blockchains. Though they are often described as databases, blockchains are not databases. They are actually computers – or at least virtual computers (the Ethereum Virtual Machine is not mis-named) that rely on networks of physical computers. It is because they are computers that blockchains charge "gas fees" for use of computing time and why they face criticism for excessive electricity consumption.

One implication of this is that, contrary to popular perceptions, true tokens are not entries in a database but "executable objects" in a computer. The transactions which change the status of who owns what are less like changing entries in a ledger than the standard computational process of changing from one "state" to another in response to inputs in order to arrive at one of a finite number of "states": the true "state" of the data.[11]

10. Law Commission, *Digital Assets: Consultation paper*, 28 July 2022, paragraph 5.18, pages 80-81 and paragraph 10.33, page 164.

11. Users of blockchains are incentivised to do the computational work needed to arrive at the "true state" by the rewards paid in Proof of Work and Proof of Stake schemes.

These returns to the true "state" are why blockchains can be described as "immutable ledgers." Effectively, tokens sit on digital ledgers. All transfers of value are executed by flows of tokens between addresses on digital ledgers. Those flows can be initiated automatically by "smart contracts" embedded in the tokens.

"Smart contracts" can self-execute a payment, for example, when a third-party data source (an "oracle") indicates an event has occurred (such as a record date for a dividend payment) or conditions are satisfied (such as a decline in the price of collateral triggering a margin call).

Tokens can also interact with third-party "smart contracts" stored on blockchains, enabling services supplied by third parties – the decentralised applications, or DApps, that enable users of Decentralised Finance (DeFi) protocols to borrow, lend, trade, invest and pay with cryptocurrency tokens are an example – to be executed automatically.

In effect, tokens held on blockchains and tokens transferred between addresses on blockchains transform both the ownership and the transaction processes in asset markets. Purchases and sales, and the subsequent updating of records of ownership, are subsumed into a single process.

The transactions, and the registered owners, can then be shared with all parties to a transaction simultaneously.

Because tokens are simply strings of data (or code) they can express anything. Cash, debt, equity, derivatives, funds, indeed any financial asset that can be conceived, can be created and combined as flows not of cash but of tokens.

Tokens can express any financial asset or liability in standard components

In this sense tokens are "composable" in the same way that Open-Source code is "composable": the code has to be written once only and can then be re-used and combined to create new products. This "composability" is what accounts for the speed of innovation in the cryptocurrency markets.

The openness and "composability" of code also makes possible the "single programmable platform" or "unified ledger." This idea was first articulated for digital payments by a private sector group - the Regulated Liability Network, or RLN[12] - in November 2022 before being seconded by the International Monetary Fund (IMF) in the same month as the "X-C platform" [13] and by the Bank for International Settlements (BIS) in a paper of June 2023.[14]

Tokens are composable in the same way that Open-Source code is composable. This ability to re-use existing components accelerates product development.

A unified ledger would be not a single ledger but a network of multiple ledgers specialising in different asset classes (including cash) but which operate to the same technical standards, making them inter-operable.

On such a network of networks, tokens and flows of tokens equivalent to the traditional forms of cash, securities and funds could be issued, settled "atomically" - the simultaneous exchange of digital assets for digital money, with the transfer of one contingent upon the transfer of the other - and safekept and serviced in the same way.

In sum, true tokens issued on to interoperable blockchain ledgers would be "composable" into combinations of assets (for investors) and their countervailing liabilities (for issuers) that can be tailored to specific needs and objectives. In theory, portfolios could be constructed that meet the individual needs of retail investors. Likewise, issuers could structure equity capital raisings or debt financings that match exactly their outgoings.

12. The Regulated Liability Network, *Digital Sovereign Currency*, White Paper 15 November 2022.

13. International Monetary Fund, *A Multi-Currency Exchange and Contracting Platform*, prepared by Tobias Adrian, Federico Grinberg, Tommaso Mancini-Griffoli, Robert M. Townsend, and Nicolas Zhan, Working Paper WP/22/217, November 2022.

14. BIS Annual Economic Report, 20 June 2023, Chapter III, *Blueprint for the future monetary system: improving the old, enabling the new,* pages 85-118. See also the speech by Agustín Carstens, General Manager of the BIS, *The future monetary system: from vision to reality*, at the CBDC & Future Monetary System Seminar, Seoul, Korea, on 23 November 2023.

The astonishing inefficiency of the status quo

In a universe without the legacy of the past, a system of this kind – one in which capital value took the form of combinations of tokens, and transfers of value took the form of movements of tokens, each made up of standardised components described in code - would swiftly devour the whole of the traditional money and capital markets. Why? Because the present system is astonishingly inefficient by comparison.

In the traditional financial markets every class of asset – equity, debt, funds, derivatives and alternatives – inhabits its own universe, with its own issuance, trading, settlement, custody and servicing processes. Each asset class also supports a string of specialists that lie between issuers and investors.

These intermediaries are paid for issuance (investment banks), listing (stock exchanges), safeguarding the integrity of the issue (central securities depositories, or CSDs), managing portfolios (asset managers), trading assets on behalf of asset managers (brokers), netting purchases and sales (Central Counterparty Clearing houses, or CCPs), and settling transactions and safekeeping assets (custodian banks).

Unlike blockchain-based systems such as the "single programmable platform" or "unified ledger," in which all parties to all transactions in all assets see the same information about a transaction or an asset simultaneously, the high levels of intermediation in traditional markets require repeated flows of data between the various intermediaries to reconcile, maintain and update records of transactions and ownership.

Once an order to execute a securities trade across borders is made, for example, notices (of execution), matches (of trades), confirmations (of trade details) and instructions (to settle) are processed through exchanges, global and local brokers, asset managers, CCPs, specialist matching services (such as DTCC CTM[15]), global custodian and sub-custodian banks and CSDs. Notifications (of corporate actions) and collections (of entitlements) generate further flows of data between intermediaries.

Similarly, placing an order to buy or sell shares in a fund initiates a series of exchanges of data between intermediaries that populate the space between the investor and the asset manager. Wealth managers and fund platforms use order-routing systems to send subscription, redemption and switching orders to transfer agents, which settle transactions by matching cash subscriptions with shares issued, and then update a register of who owns what.

Further flows of data ensue, to the fund accountant that values the fund every day, the depositary bank that checks the fund complies with the terms of its prospectus and its regulatory responsibilities, the auditor that certifies the financial statements of the fund, and the authorised corporate directors that are responsible for the day-to-day management of the fund.

Unlike tokens issued on to blockchain networks, where all parties are privy to the same data about assets and transactions, the data every intermediary holds in their proprietary computer systems have to be reconciled with the data held by every other intermediary in their proprietary

15. The Central Trade Matching (CTM) utility owned and operated by the American CSD, the Depository Trust and Clearing Corporation (DTCC), matches and confirms domestic and cross-border equity, fixed income and repo transactions.

computer systems. Unlike a blockchain network, every party is working on a different computer system and none has a complete view of the status of a transaction or asset (the true "state" of the data).

In traditional post-trade processing errors and omissions abound

The sheer number of parties to a transaction, each of them operating their own systems, is prone to errors and omissions which add to operational costs. If the details of a bond issue, for example, have to be keyed into a dozen different systems, mistakes are bound to occur. To minimise these, structured data formats such as FIX and SWIFT and FpML are used, but not every intermediary uses them or uses the same version.

In the euro-area, settlement fails are costing €1.7 billion in financial penalties and €1.425 billion in credit charges.

Even when data is exchanged in standard formats, mistakes are common. Further back-and-forth is required to "reconcile" the differences, so the agents to the buyer and the agents to the seller can agree what has happened. Inevitably, some transactions fail altogether because unmatched, inadequate, out-of-date or erroneous data means securities to deliver cannot be found, trade details do not match and the Standing Settlement Instructions (SSIs) that list the names of the relevant custodians and payments banks and account names and numbers are wrong.[16]

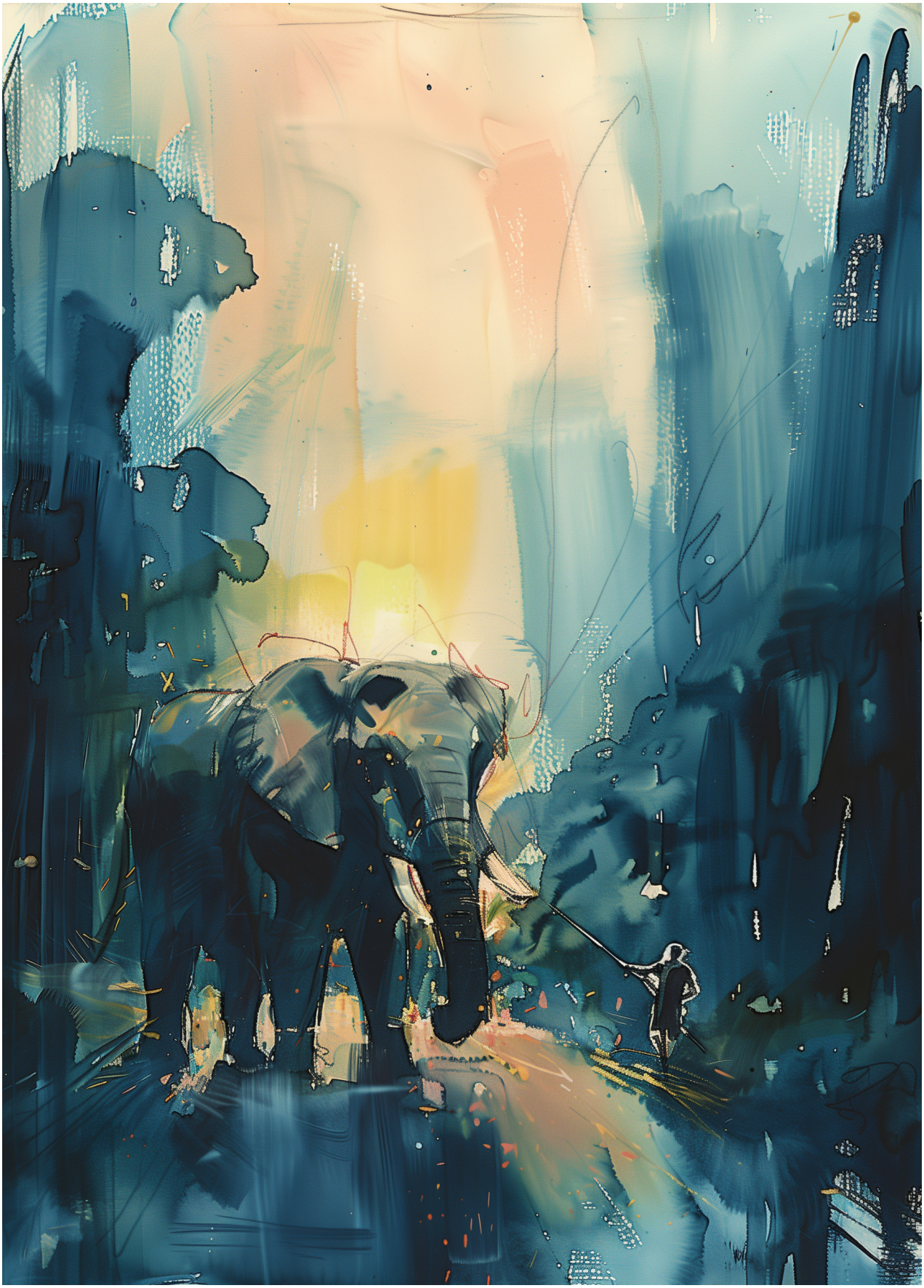
Even in a relatively efficient market such as the euro-area, 6½ per cent of trades (by both volume and value) are failing to settle on time, generating financial penalty costs of €1.7 billion and credit charges of an estimated €1.425 billion plus additional collateral maintenance and sourcing costs.[17]

HQLA-x – operators of a blockchain-based collateral management platform - estimate that collateral management inefficiencies, such as maintaining large buffers of cash and securities in multiple markets around the world to ensure transactions settle on time, currently cost (loosely defined) Tier 1 banks €50-100 million a year each.[18]

The conservatism of incumbents is explicable

The blockchain alternative has obvious advantages over these expensive and disorderly processes. The parties to a transaction would not need to compare their records with each other. In fact, they would not need to maintain their own records of ownership and transactions at all, or the systems to host them. So why does such an inefficient system persist?

16. See separate article, "Reference data is the unlikely rocket fuel propelling us into a tokenised future" on pages 61 to 85.
17. See https://futureoffinance.biz/european-capital-markets-are-inefficient-so-why-arent-european-csds-doing-more-about-it/
18. https://www.hqla-x.com/



Because it is only a short step from jettisoning records and systems to jettisoning intermediaries. After all, if self-executing "smart contracts" can replace any function with code, and transactions settle atomically, there is no need for CSDs and brokers and CCPs and custodian banks to match and net and settle trades, repair failing transactions, and distribute entitlements.

True digital asset tokens have no need of the intermediaries required to maintain, reconcile and update records of transactions and ownership. In this crucial respect, they differ sharply from "asset-backed" tokens.

This does not mean "asset-backed" tokens will disappear. They cannot, because any asset that is not purely financial in nature – a class that includes real estate, commodities, fine art and other physical objects - must retain ties to the real world. Which means asset-backed tokens will always require reconciliation between the tokens and the underlying assets, which in some cases exist only in old-fashioned accounts and book-entry registers, which must be preserved also.

The mistake is to universalise a model adapted to the physical world to contractual abstractions such as equity, debt, derivatives and funds. There, the attraction of retaining real-world practices and institutions is that it does not necessitate any alteration to the eco-system of intermediaries that extract value at various points between the issuer and the investor.

It is easy to understand the attractions of leaving the status quo undisturbed. Tension between incumbents (which have much to lose) and innovators (which have much to gain) is unavoidable, and the temptation for innovators to suppress it by "working with" incumbents is strong.

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Which is why the Future of Finance databases record incumbent stock exchanges, commercial and investment banks, custodian banks, central securities depositories (CSDs) and asset managers working with technology vendors and start-ups specialising in tokenisation (see Chart 4 in the Sidebar "What the Future of Finance Tokenisation Databases Say").

In fact, one reason why "asset-backed" tokens have become the default method of tokenisation (especially in funds) is that "asset-backed" tokens preserve intermediaries. Asset-backing means incumbent service providers can support change without putting existing revenues at risk. To further protect those revenues, incumbents are building their own tokenisation engines, to reduce the risk of losing clients to more adventurous competitors.

As the Future of Finance databases record, a number of investment banks (such as Goldman Sachs) and custodian banks (such as HSBC) have built tokenisation platforms. Stock exchanges (such as SIX), fund platforms (such as AllFunds) and fund order-routing networks (such as Calastone) have built blockchain-based services for similar reasons. But these are hedges, not bets. Their proponents do not expect the status quo to evaporate.

Tokenisation is being diverted into areas where disintermediation is not a threat

But the principal means by which existing revenues are being protected is by diverting capital and entrepreneurial energy into areas where major revenue streams are not at risk, and new revenue streams may even open up. Custodian banks are already custodying cryptocurrencies. Banks, CSDs, exchanges and (in the hope of placating incumbents) blockchain technology vendors are focused on real estate and privately managed assets as early candidates for tokenisation.

For now, the Future of Finance databases indicate the low-risk options lie in the primary market for bonds, the relatively novel green bond markets (where lack of data has led to allegations of "greenwashing" that tokenised issues can address) and a string of alternative asset classes such as private equity, hedge and real estate funds, but also loan receivables, gold and diamonds (see Chart 5 in the Sidebar "What the Future of Finance Tokenisation Databases Say").

In funds, the principal benefit of tokenisation is the opportunity to broaden the distribution of alternative strategies by lowering minimum subscription amounts. The databases record reductions from as much as US$5 million to US$10-20,000, and even to as little as US$1,000. This appeals to asset management clients, as does the prospect of convenient access to precious metals and minerals – a logic that is extensible to all manner of physical stores of value, such as fine art, fine wine, expensive watches and classic cars.

By focusing on asset classes inaccessible to retail investors (such as private equity and hedge funds) or less intermediated investments (such as gold and diamonds) or asset classes with demonstrable operational shortcomings (such as the primary market process for European bonds) tokenisation pioneers are not putting established revenues at risk (see Chart 5 in the Sidebar "What the Future of Finance Tokenisation Databases Say").

The harsh prospect of the displacement or even the extinction of incumbents can be pushed into a future that lies beyond a current "period of coexistence" of indeterminate length between the old way of doing things and the new. The idea of "backwards compatibility" is even touted as a virtue. It also provides useful cover for a policy of wait-and-see, letting the handful of eager pioneers bear the costs and take the risks.

If all else fails, there is regulation. The incumbents are regulated entities, and so are their clients, and it is plausible to argue that tokenisation lies outside current regulatory perimeters. But this is increasingly untrue. In a series of important jurisdictions – Germany, Luxembourg, Switzerland, Singapore, and the United Kingdom – law as well as regulation is far from hostile to token experiments (see Sidebar, "Securities Token Laws and Regulations in Seven Jurisdictions"). In pleading for regulatory clarity incumbents are pleading their own case, because they know they can afford the costs of compliance and start-ups cannot.

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Securities Token Laws and Regulations in Seven Jurisdictions

European Union

In the European Union, securities tokens are regulated as securities, chiefly under the second (2018) iteration of the Markets in Financial Instruments Directive (MiFID II) and the Central Securities Depositories Regulation (CSDR) but also the Prospectus Directive (2017), the Short Selling Directive (2012), the Market Abuse Directive (2014), the Transparency Directive (2004) and the Settlement Finality Directive (1998). Indeed, the flagship Markets in Crypto-Assets (MiCA) Regulation, which came partially into force on 29 June 2023 and will be fully in force by December 2024, explicitly excludes securities (as opposed to cryptocurrencies, Stablecoins and e-money). Instead, the EU is initially tackling mismatches between security tokens and current securities law and regulations via the so-called Pilot Regime, which came into force on 23 March 2023. The Pilot Regime allows market infrastructures such as established trading platforms, central counterparty clearing houses (CCPs) and central securities depositories (CSDs) and new market entrants to obtain temporary, six-year exemptions from current regulations to conduct experiments in the issuance, trading, settlement and custody of both native and non-native security and fund tokens on blockchain networks to inform future measures to bring token regulation into line with current securities regulation.[19] Market infrastructures participating must keep the capitalisation of equity issues below €500 million; bonds below €1 billion; and mutual fund assets under management below €500 million.[20] When the aggregate value of tokens traded reaches €9 billion, the market infrastructure must "transition" out of the Pilot Regime. So far, the Pilot Regime has attracted just four applications and none has yet launched a service.[21] Initial queries from potential service providers focused largely on clarifying instruments eligible for tokenisation and the regulatory reporting and record-keeping requirements.[22]

Germany

On tokenisation, Germany has acquired a reputation as the most progressive jurisdiction in Europe. The government codified the requirements necessary to obtain a digital asset custody (Kryptoverwahrgeschäft) licence – essentially, capital of €125,000 plus demonstrable competence to safekeep digital assets - from the regulator, the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) under the German Banking Act (KWG) in January 2020 (though the licence is not "passportable" and so cannot be used elsewhere in the European Union (EU)). In 2021 the German government enacted an Electronic Securities Act (Gesetz über elektronische Wertpapiere, or eWpG) which allows issuers to issue bearer bonds without a physical certificate on to electronic registers at a central securities depository (CSD) or other service provider. Though confined to bonds, the eWpG secured property rights in security tokens for investors under German law for the first time by dispensing with the previous need for physical certification. The eWpG also introduced the concept of a digital asset ownership registration function (Kryptowertpapierregisterführung) under the German Banking Act (Kreditwesengesetz– KWG). Any firm providing such registration services must obtain a licence from BaFin, which is contingent on showing capital of €730,000 – a sum which, being nearly six times that required of a digital asset custodian, testifies to the importance of the security and integrity of the digital registration function to the development of a security token market in the German context.[23] Importantly, the eWpG also amended the German Capital Investment Code (Kapitalanlagegesetzbuch – KAGB) to enable the issuance of units in funds in electronic rather than certificated form. In June 2022 the German government introduced a Regulation on Crypto Fund Units (Verordnung über Kryptofondsanteile – KryptoFAV) that permits the issuance of fund units or shares on to blockchain-based registers. The depositary to the fund, or a third party instructed by the depositary to the fund, can act as the registrar.

19. Regulation (EU) 2022/858 of the European Parliament and of The Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology and amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU.

20. European Securities and Markets Authority, Report on the DLT Pilot Regime: On the Call for Evidence on the DLT Pilot Regime and compensatory measures on supervisory data, 27 September 2022, page 11.

21. See page 17 and footnote 7 above.

22. European Securities and Markets Authority, Questions and Answers: On the implementation of Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, 2 June 2023.

23. See page 21 and Future of Finance, Digital Asset Custody Guide, Issue 2, *Regulation Matters*, pages 40-41..

Luxembourg

Luxembourg is unusual in having implemented clear regulations for using blockchains to issue native tokenised securities. By laws of 1 March 2019, 22 January 2021 and 17 March 2023 (often referred to as "Blockchain laws 1, 2 and 3") Luxembourg has encoded in law three key functions of a tokenisation market. First, the registration of ownership of security tokens in digital form only is permissible. Secondly, the issuance of security tokens on to blockchain networks is permissible. Thirdly, security tokens can be used as collateral for borrowings, which increases the attractions of holding them. A number of digital asset businesses have chosen to establish entities in Luxembourg to take advantage of this regulatory clarity.

Switzerland

The Swiss Law on Distributed Ledger Technology (DLT Law) that came into effect in August 2021 encompassed changes to ten existing laws to enable security tokens to be issued, traded and safekept on traditional as well as blockchain-based platforms. Crucially, the DLT Law introduced the concept of the transferable, ledger-based security token that can exist in digital form only, replacing a cumbersome process by which uncertificated securities (into which category securities tokens issued on to blockchains fall) could be transferred only by written assignment even if they were already recorded on an electronic register. Swiss law is less clear than some other jurisdictions on which types of tokens count as security tokens – the crucial distinction is that the token grants the holder rights against an issuer - but in practice the Swiss regulator, the Swiss Financial Market Supervisory Authority (FINMA), tends to treat any token issued and tradeable on a blockchain network, and linked either to a real-world asset or (akin to the Howey Test) to the future success of a business venture, as a security token.

Singapore

As the regulator, the Monetary Authority of Singapore (MAS) has not initiated new laws applicable to security and fund tokens. It has instead made clear that the licensing and prospectus requirements of the existing securities law – the Securities and Futures Act (SFA) of 2001 - apply to security and fund tokens. What determines whether a digital asset is a security token is whether it represents a liability of a corporate issuer (shares or bonds) or a right or interest in a fund. Fund tokens are subject to further regulation under the existing Securities and Futures Offers of Investments (Collective Investment Schemes) Regulations of 2005 and the Code on Collective Investment Schemes. Tokens backed by assets such as precious metals are regulated separately under the Commodity Trading Act (CTA) of 1992. The MAS also embarked in May 2022 on an active regulatory Sandbox initiative ("Project Guardian") in which it collaborates with market participants to run pilot schemes to explore how digital assets can be issued, traded, settled and safekept on blockchain networks while managing the risks to financial stability and integrity. One pilot proved that tokenised deposits and tokenised government bonds could be exchanged and settled on a public blockchain. A pilot to issue, distribute and service wealth management products such as structured notes and actively managed certificates in tokenised form on to blockchains was launched in November 2022.

There is no single model for bringing securities laws into line with tokenisation. Some jurisdictions apply existing laws, some adapt existing laws, and others write new laws.

United Kingdom

The Financial Conduct Authority (FCA) made clear in a policy statement of July 2019 that securities tokens that share the characteristics of securities - such as ownership rights, transferability, repayment of a specific sum of money or entitlement to a share in future profits - are regulated as securities under the Financial Services and Markets Act 2000 (FSMA) (Regulated Activities) Order 2001.[24] This means issuers, and firms active in the security token markets, must obtain a licence from the FCA and follow the rules – still set by the 2017 Prospectus Directive and the 2018 Markets in Financial Instruments Directive (MiFID II) of the European Union (EU), though these are now under review following the United Kingdom withdrawal from the EU - that govern the securities markets. A market consultation of July 2022 by Her Majesty's Treasury found token market participants were still seeking further legal and regulatory clarity over several issues, including lex situs (which jurisdiction's laws apply when tokens are held on systems scattered across multiple countries); novel features such as "smart contracts"; the poor fit between the Uncertificated Securities Regulations (which enable securities to be evidenced and transferred electronically) and tokens in terms of settlement finality; the irrelevance to tokens of terms such as "account" and "book-entry" used in current legislation; and especially the requirement under the Central Securities Depositories Regulation (CSDR) of the EU, most of which still applies in the United Kingdom, that trading venues must use a central securities depository (CSD) to settle and record transactions. But the main immediate consequence of the Treasury consultation was the inclusion in the Financial Markets and Services Act, which became law in June 2023, of language establishing a Financial Market Infrastructure (FMI) Sandbox, akin to the Pilot Regime of the EU[25]. In the Sandbox, firms can test the ability of tokens issued on to blockchains to create a cheaper, less risky, better integrated and more transparent securities market infrastructure without breaching current regulatory obligations or fragmenting the post-trade market or placing excessive demands on firms to source liquidity to settle transactions "atomically."[26] The Digital Sandbox opened on 1 August 2023. Separately, in its February 2023 paper on the future of the asset management industry in the United Kingdom, the FCA invited market participants to propose changes to regulations to encourage tokenisation of mutual fund shares or units, as opposed to tokenisation of underlying assets of a fund. The paper speculated that tokenisation could facilitate the individualisation of investment portfolios, reduce costs through disintermediation of functions such as registration, and improve liquidity in certain asset classes, notably infrastructure and real estate. In tandem with the Technology Working Group, which reports to the Treasury's Asset Management Taskforce, this led to the publication by the Investment Association of a less-than-radical multi-stage "blueprint" for the tokenisation of funds in the United Kingdom.[27] The Digitisation Taskforce set up by the government in July 2022 to explore how to improve capital-raising by enhancing relationships between issuers and investors and reducing the cost of owning, trading and settling securities, published an interim report in July 2023.[28] It recommended an end to paper share certificates; easier ways to exercise shareholder rights, including votes; and discontinuation of payment by cheque.

The Financial Conduct Authority (FCA) in the United Kingdom has drawn a clear regulatory distinction between cryptocurrencies and security tokens.

24. Financial Conduct Authority (FCA), Guidance on Cryptoassets, Feedback and Final Guidance to CP 19/3, Policy Statement PS19/22 July 2019.

25. See European Union above, page 31

26. HM Treasury, UK regulatory approach to cryptoassets, stablecoins, and distributed ledger technology in financial markets: Response to the consultation and call for evidence, April 2022.

27. The Investment Association, *UK Fund Tokenisation: A Blueprint for Implementation, Interim Report from the Technology Working Group to the Aset Management Taskforce*, November 2023.

28. Digitisation Taskforce – Interim Report, July 2023.

United States.

The federal government of the United States has not developed token-specific laws. This is because the Securities and Exchange Commission (SEC) believes and has argued consistently since the Initial Coin Offering (ICO) boom of 2017–18 that a wide variety of tokens are securities that need to be regulated under existing federal securities laws. Under those laws, an issuer may not sell securities unless the offering is either registered with the SEC or declared exempt by the SEC. Registration requires the issuer to disclose detailed information about the company, the offering, and the securities, including audited financial statements. Federal law also obliges all intermediaries engaged in the securities industry to register with the SEC or a self-regulatory organization such as the Financial Industry Regulatory Authority (FINRA). The aim of regulating intermediaries is to protect investors through measures such as obliging firms to keep customer assets separately from proprietary assets with an independent custodian and ensuring investors have access to insurance against loss via the Securities Investor Protection Corporation (SIPC) and the Federal Deposit Insurance Corporation (FDIC). The principal determinant of whether a token is a security is the Howey Test, which assesses whether a token is a security by whether there is (a) an investment of money (b) a common enterprise in which the purchaser's and the promoter's interests are aligned (c) an expectation of profit on the part of the purchaser and that those profits derive from efforts of others (e.g., the issuer of the token). A second assessment, the Reves Test, assumes a token is a security unless a similar instrument has been judicially determined to fall outside the definition of a security (the exceptions are determined by the courts on the basis of the motivations of the seller and the purchaser, the distribution of the instrument, the expectations of the investing public and any alternative regulatory status for the token). The broad application by the SEC of the Howey Test in particular to a wide range of tokens, including many cryptocurrencies most jurisdictions do not classify as securities, has proved contentious.

The logic of the Internet dictates disintermediation

But in the end, incumbents are fighting a rearguard action. What makes an innovation disruptive is precisely the fact that it disrupts the incumbents. And true tokenisation will do exactly that. Incumbents can slow its progress down but in the end tokenisation will replace existing forms of securities and funds; existing computer systems; and existing intermediaries.

That implies an uncomfortable future for specialists in portfolio management (wealth and asset managers), research and execution (brokers), listing and trading (exchanges), liquidity provision (market makers), cash payments (payments banks), netting and risk management (CCPs), issuance, trade matching and settlement (CSDs), safekeeping and asset servicing (custodian banks), registration and settlement (transfer agents), valuation (fund accountants), data (data vendors) and compliance (depositary banks and management companies).

But they have to be discomfited because it is only by eliminating these functions that blockchain can deliver a return on investment. After all, each of the intermediaries in the traditional system exacts a toll – paid ultimately, it should not be forgotten, by issuers and investors, meeting whose needs is the point and purpose of the entire system of securities and funds - in the shape of a fee or bid/offer spread or ad valorem charge.

That such an extended order of intermediation is expensive seems obvious. Whether it is inefficient as well can be debated. Institutional investors have shown a strong appetite for the continued use of intermediaries, but then they are rarely spending their own money, and resent it when they are obliged to do so (despite regulatory pressure, asset managers in particular have retained a strong penchant for charging third party costs to the fund).

There is also a literature that argues against the view that the "middleman" adds nothing but cost in financial and other markets. The more conservative voices in tokenisation are apt to allude to it when arguing against those who believe that nothing but technology needs to stand between issuers and investors.

This is not to accuse incumbents of bad faith. They are condemned to think and say what they do by the framework within which they operate. They may even believe that they add value and will in some cases be right. But in the end, even the strongest convictions must yield to the formidable logic of the Internet, which is that the key to scale is network effects, and that the key to network effects is openness.

A strategy that leavens cunctation plus limited but ostentatious investments in PoCs and Pilot Tests and partnerships will not yield network effects. Incrementalism is the default mode of the modern corporation because it increases sales without excessive investment - think Apple iPhone – and it works for a time because user needs develop more slowly than the capabilities of digital technology.

But it is precisely this fact – that bit-by-bit improvement does not keep up with technological improvements - that gives outsiders a chance to overtake incumbents. The experience of tokenisation so far will have reassured the leadership of banks and stock exchanges and CSDs that they can control the pace of change. But the history of technology suggests that current improvements to blockchain technology – including their speed and scalability – will create

opportunities for new entrants to innovate in ways that compound quickly, introducing disruptive network effects.

Incumbents are trying to build closed networks

Incumbents are of course working hard to keep new entrants out, by hoarding their client bases, using experiments and partnerships to plunder the knowledge of entrepreneurs and innovators, insisting on closed rather than open private or public "permissioned" blockchain networks and calling for greater regulatory scrutiny that smaller firms cannot afford. Unfortunately – and this may reflect the pervasive influence of the venture capital industry in funding start-ups – this is forcing many new entrants to think the same way.

The lack of inter-operability between blockchain protocols is not an accident. It reflects the determination of the founders of blockchains to make it hard for customers, assets and activity to defect to another protocol. Their model, contrary to cypherpunk mythology and Web 3.0 propaganda, is to replicate Big Tech successes like Facebook and gaming giants such as Roblox, that aim to capture and control their users (and purchase any competitors that appear threatening).

What tokenisation needs is the opposite of this. It needs open networks, not closed ones. In this case, openness means enabling anyone to establish a blockchain network that can grow without running into barriers erected by incumbents.

If the companies that are going to build the token markets cannot be confident that they will retain the long-term rewards of their effort and investment, they will not secure funding from venture capitalists and can at best aim only to sell their inventions and innovations to the incumbents. A pattern of consolidation has emerged already in digital asset custody.[29]

The case for a public blockchain infrastructure

Which prompts a disarming thought. Blockchain is an Internet technology, and the invention and early successes of the Internet depended not on private money and ingenuity but on public science and public investment.

The Internet itself was pioneered by the Defence Advanced Research Project Agency (DARPA) and the then State-owned British Post Office - both AT&T and IBM refused invitations to help, seeing it as threat to their existing business - as a decentralised communications network in the event of nuclear attack.

DARPA also funded the TCP/IP protocol that specifies how data is exchanged over the Internet. Likewise, the SMTP protocol, the network standard for sending emails, was invented by publicly funded engineer Jon Postel to enable the first user of the TCP/IP protocol – the publicly funded Advanced Research Projects Agency Network (ARPANET) - to send and receive emails.

29. See Future of Finance, Digital Asset Custody Guide, Issue 2, *Regulation Matters*, pages 5 and 14.

A governing body could issue tokens to investors of sufficient value to fund the construction and maintenance of a public blockchain infrastructure.

It was another publicly funded scientist, Tim Berners-Lee, then working at CERN, who in 1989 invented the HTTP protocol that enables the Web (the essence of the Internet for most people, because it links pages through the Internet).

All the subsequent innovations that drive the Internet – notably the privately owned browsers and emails everybody uses, but also social media and e-commerce – depend on these three free-to-use protocols.[30] In effect, TCP/IP, SMTP and HTTP turned the Internet into a general-purpose technology comparable to electricity that enabled entrepreneurs and innovators to create Amazon, Facebook, Netflix, Instagram, PayPal, YouTube, TikTok and Twitter (now X).

If tokenisation is now stymied by the imbalance of money and power between the incumbents and the innovators - which it certainly appears to be – the early history of the Internet suggests a solution. This is to build a public blockchain infrastructure open to entrepreneurs, innovators and academics to create and build anything they like (within the law).

The idea is not as outlandish as it sounds. LACChain in the Americas (led by the Inter-American Development Bank (IDB)) is a public-private initiative to build and manage inter-operable public permissioned blockchain networks open to any participant prepared to abide by the rules of the network to pursue any purpose that is not criminal.

LACChain and a similar exercise in Spain[31], do not exclude big businesses, but are based on a recognition that a neutral blockchain infrastructure that is cheap, reliable, compliant and inter-operable can encourage entrepreneurial activity in a way that private blockchain networks cannot. Such a model certainly has the potential to stimulate innovation and competition in the development of new products and services, including tokenisation.

30. The protocols are still overseen by the non-profits World Wide Web Consortium (W3C) and Internet Corporation for Assigned Names and Numbers (ICANN), and the volunteer-run Internet Engineering Task Force (IETF).

31. Alastria, a non-profit, public permissioned national blockchain network funded by a consortium of large Spanish companies, but with academic and government involvement, is developing services of common interest such as digital identities.

How to fund a public blockchain infrastructure

The question is how to establish a public blockchain infrastructure without relying on the incumbents for funding. The answer lies in the history and nature of the blockchain itself, and especially in the lessons of the Initial Coin Offering (ICO) boom of 2017-18. Ethereum, which is a general-purpose programming platform comparable to a public blockchain infrastructure, emerged from the early stages of the boom.

The boom itself proved that significant amounts of money could be raised by a process little different from crowd-funding. Although most of the money raised was lost or stolen – including US$50 million from Ethereum, prompting the "hard fork" that created Ethereum Classic – ICOs did raise US$31 billion between 2016 and 2018.[32]

That sum confirms that a governing body, organised like Ethereum as a Decentralised Autonomous Organisation (DAO), could issue tokens to investors of sufficient value to fund the construction and maintenance of a public blockchain infrastructure. If the investors included issuers, network effects would soon develop, because they would benefit from their own activity, in addition to developers scripting applications. Unlike most ICOs, the issue would fund a start-up with a revenue plan.

Tokens issued by DAOs obliterate the distinction in traditional capitalism between customers, employees, managers, shareholders and suppliers. In traditional capitalism the shareholders and the employees and managers benefit from success; in token capitalism, everybody does, including the customers, which would include both issuers and investors. That is what will drive network effects.

How incumbents might react to a public blockchain infrastructure

An interesting question is how the incumbents would react to the development of a public blockchain infrastructure. A token-funded alternative would exclude them from participation because it is axiomatic inside regulated financial institutions that investing in an issue by a DAO is impossible. This is less because of qualms about the quality and provenance of the tokens as an asset than the need to share the rewards with interests other than shareholders.

Their lack of engagement would be off-putting to potential users of a public blockchain infrastructure, especially in the absence of government or regulatory involvement. So it follows that (as with LACChain) official bodies will be needed to lend respectability and public assurance to the service. There is no reason why that should not include central banks. Making a central bank digital currency (CBDC) available on the infrastructure would reinforce network effects.

With that support, a public blockchain infrastructure would provide a viable and attractive alternative to proprietary blockchain networks. As it grew into a competitor to the traditional money and capital markets, incumbents would be forced to stop equivocating about tokenisation. As it happens, there are good reasons for them to abandon their equivocation anyway.

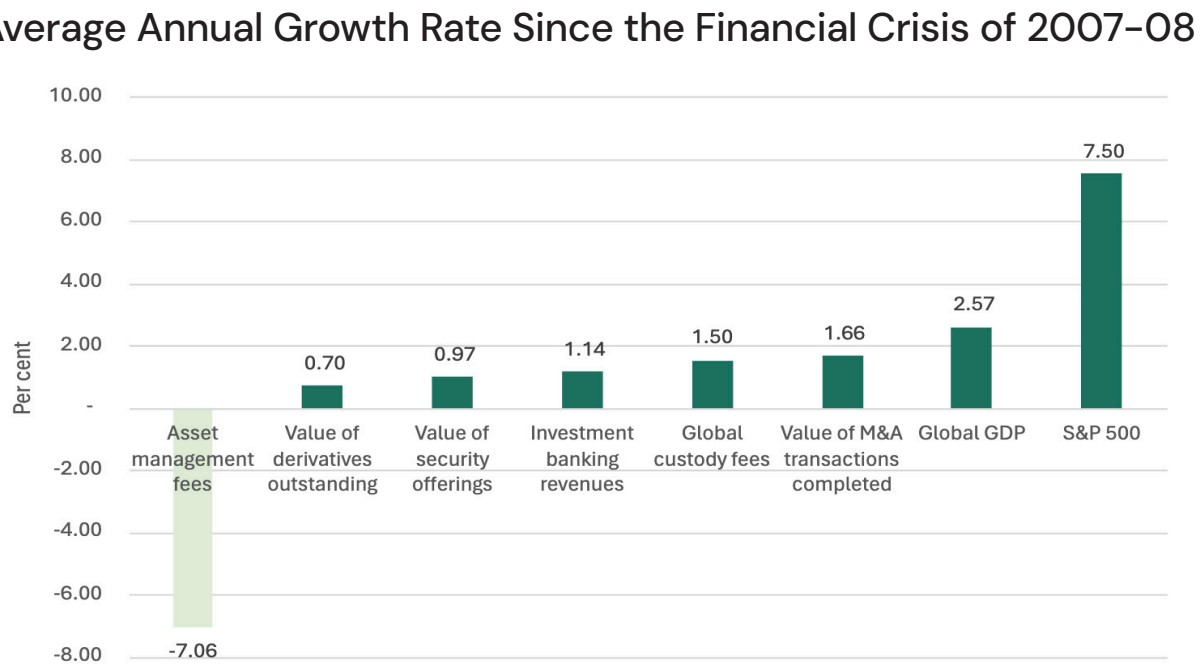
32. Franklin Allen, Antonio Fatas and Beatrice Weder di Mauro, "Was the ICO boom just a sideshow of the Bitcoin and Ether Momentum?," *Journal of International Financial Markets, Institutions & Money*, August 2022.

As Chart 1 shows, the asset management industry is in a quandary. Globally, assets under management (AuM) are stalling. Net new capital inflows are down, and most new money is also going into less profitable passive strategies. Clients are exerting strong downward pressure on fees. Yet costs are rising sharply. Consultants BCG predict that asset management profits are on course to halve unless drastic action is taken.[33]

The investment banking industry is in a less dire condition but, as Chart 1 also shows, revenues have risen far more slowly than stock markets and economies since the great financial crisis of 2007-08. The non-trading markets in which they make money, such as mergers and acquisitions and securities offerings, have also grown slowly. Re-regulation, and especially increased capital requirements, have made it much harder to make money in investment banking. In their trading franchises, investment banks are under sustained assault from independent trading platforms and market-makers which do not bear the same capital costs.

Global custodian banks also emerged from the financial crisis with an increased burden of regulatory obligations to protect investors and cut financial crime. The aftermath of the crisis added heavier operational capital requirements which are disconcerting for an historically off-balance sheet business. Regulators (especially in the United States) are now threatening to raise still further the costs of providing custody.[34] At the same time, the shortening of settlement timetables requires investment and promises to increase the costs of settlement failures.[35]

Chart 1



Sources: BCG, Sifma, World Bank, BNY Mellon and State Street, Yahoo Finance.

33. BCG, *The Tide Has Turned*, Global Asset Management 2023 – 21st Edition, May 2023, Exhibits 1 and 2, pages 1 and 3.
34. See Future of Finance, Digital Asset Custody Guide, Regulation Matters, pages 48-61.
35. See separate article, "Reference data is the unlikely rocket fuel propelling us into a tokenised future" on pages 49 to 60.

Incumbents can slow progress down but not halt it

In these circumstances, the limited interest in transformational technologies shown by asset managers, investment banks and global custodian banks, to say nothing of stock exchanges, CSDs and CCPs, in the Future of Finance databases is remarkable.

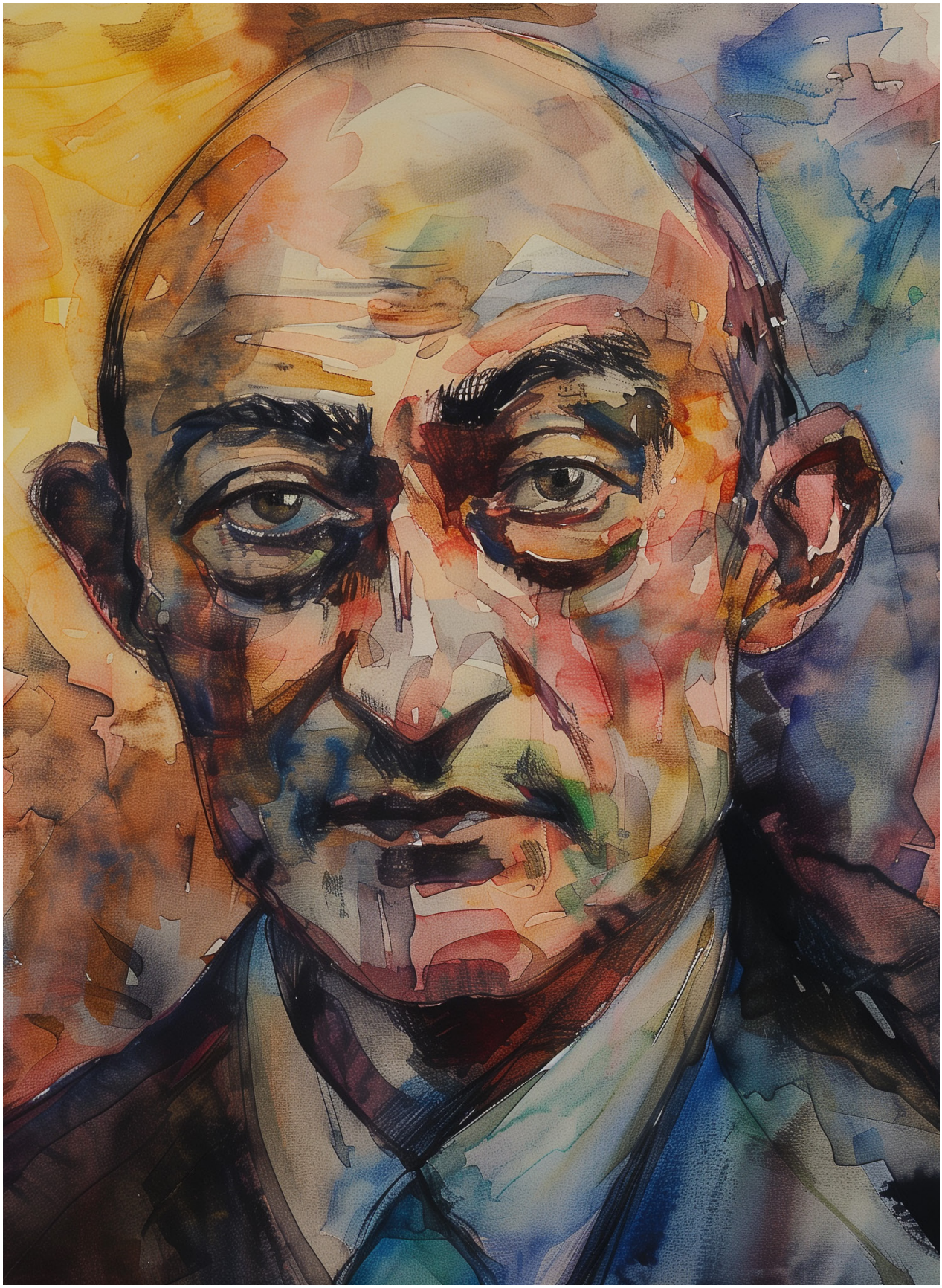
But then, as Joseph Schumpeter pointed out, the process of replacing the obsolescent or obsolete technologies and processes by newer and better ways of doing things is far more complicated than popular renditions of his theory of Creative Destruction imply.

Investment is costly and returns uncertain. Every new technology must be made to fit into existing processes, so no investment can be made in isolation from the rest of the business. Besides, changing technologies all the time would create a perpetual instability incompatible with running the existing business.

Last but far from least, the management of incumbents believe they have a duty to shareholders – which these days invariably includes themselves – to preserve the value of existing capital. As Schumpeter says, incumbents are condemned to "sabotage" cost-reducing improvements. Indeed, they "can and will fight progress itself."[36] But progress tends to win in the end.

Replacing obsolete or obsolescent technologies is expensive and destabilising and the rewards for shareholders uncertain and distant. The incentives for management to do nothing are powerful.

36. Joseph Schumpeter, Capitalism, Socialism and Democracy, Second Edition, 1947, page 96.



Sponsored article:

Leveraging Swiss DLT Law for Native Tokenisation Success Stories

Written by: Béla von Mérey

Aktionariat

This article explores the advanced regulatory framework surrounding equity tokenisation in Switzerland, offering a comprehensive overview of its practical application and the advantages it presents to Swiss startups and SMEs.

1. Switzerland's regulatory framework (Distributed Ledger Technology Law)

The Swiss DLT (Distributed Ledger Technology) law became effective on February 1, 2021. It facilitates the use of blockchain by introducing regulations for issuing and trading digital securities. Additionally, it clarifies requirements for decentralised trading platforms and recognises the legal validity of decentralised digital registers. The law aims to promote innovation and investment using blockchain while also ensuring legal clarity and protection for digital assets.

One of the key advantages provided by the DLT law is the efficient transferability of tokenised shares. With the elimination of the need for written contracts to confirm regulatory compliance, the administrative burden associated with share transfers is significantly reduced.

This legal and technical innovation unlocks a variety of benefits, paving the way for distinct use cases that will be explored in the following sections.

2. The added value that tokenisation brings to the private equity sector

In today's private equity and venture capital landscape, high entry barriers, lack of liquidity, and opaque valuations pose challenges for investors. The time-consuming and expensive onboarding process limits participation to established investment firms and business angels. Additionally, the absence of market liquidity results in prolonged holding periods and makes valuations difficult. However, by addressing these inefficiencies, blockchain can create a more inclusive and transparent investment environment, unlocking new opportunities for growth and innovation.

3. Aktionariat AG and three uses cases demonstrating the benefits of blockchain integration

We at Aktionariat AG focus on making the 99% of unlisted companies in Switzerland tradable. Leveraging the DLT-law and applying it to our toolset, we allow companies to sell their shares over their own website, facilitate the distribution of employee shares, manage their shareholders, and distribute dividends. In the current solution, companies have the capability to add liquidity for secondary trades, enabling shareholders not only to purchase shares but also to sell them. As liquid assets are known to be more valuable, we recommend that our clients allocate approximately 5-10% of the capital raised through the token offering as liquidity for potential share buybacks. This allows shareholders facing liquidity constraints to benefit from the available liquidity.

In addition to these core functionalities, every company benefits from a personalised dashboard offering a range of supplementary features, including:

- Digital Share Registry: Displaying holders of both traditional and tokenised shares.
- Corporate Event Invitation & Voting Tool: Enhancing shareholder communication and engagement.
- Market Settings: Facilitating the opening and closing of share sales.
- Tax Value Input Field: Enables Aktionariat to generate tax reports that shareholders can directly download through the app.

Below, three use cases are presented to demonstrate the concrete advantages that blockchain technology can offer to startups and SMEs:

3.1 **Farmy – Capital raise over a community** (https://www.farmy.ch/)

About the company: Farmy AG was founded in 2014 by Roman Hartmann and Tobias Schubert in Zurich and now has over 160 employees at its locations in Zurich and Lausanne as well as in its offices in Berlin and Barcelona. The technology-driven company relies on a sophisticated logistics concept that delivers products freshly and conveniently to customers throughout Switzerland and prevents food waste.

Use-Case: Farmy was exploring various avenues to finance the next phase of its company's growth. With approximately 100,000 customers, they aimed to democratise the upcoming funding round by enabling all stakeholders to partake in the company's future success. Beyond simply raising capital, this approach simultaneously strengthening the bond between customers and the brand. Utilizing our toolkit, Farmy issued shares beforehand, retained them in treasury, tokenised them, and then directly sold them through their own website. Farmy's stakeholders simply downloaded the Aktionariat App, entered their shareholder information, and purchased shares with a few clicks. The feasibility of the valuation improves with an increased volume of transactions, all of which are readily visible on the issuer's website via the Aktionariat transaction widget. These transactions are presented without exposing any personal information, solely showcasing the transaction details.

With the Aktionariat Toolset, Farmy successfully raised over 4 million within a span of two weeks.

3.2 **Trustsquare – Dividend distribution** (https://www.trustsquare.ch/)

About the company: Founded by entrepreneurs, for entrepreneurs, Trust Square provides a space where innovation can flourish. With disruptive technologies as its common denominator, the company connects founders, early-stage ventures, businesses, investors, and academics, enabling them to pursue their visions in an open, forward-thinking environment. Trust Square empowers companies to maximise their potential by offering comprehensive support for daily operations, allowing them to concentrate on their core business.

Use-Case: Previously, Trust Square provided its stakeholders with the opportunity to join the cap table, resulting in over 1000 holders of non-voting shares. However, when Trust Square sought to distribute dividends, the conventional approach proved to be both time-consuming and costly. Leveraging Aktionariat's toolset, the company enabled all non-voting shareholders to request tokenisation through the Aktionariat App. Following this tokenisation process, the company seamlessly distributed a Swiss stablecoin to all eligible tokenholders with the click of a button.

3.3 **Auviso – Employee participation** (https://auviso.ch/en/)

About the company: Auviso operates passionately in the field of event and media technology on a daily basis, amassing significant expert knowledge and experience since its inception in 2003. Auviso – audio visual solutions ag stands as one of the leading centers of excellence for audio-visual solutions in Switzerland. As a full-service provider for events and media technology installations, Auviso finds the right solution for any event and location, whether temporary or permanent.

Use-Case: Celebrating its 20th anniversary, Auviso made the decision to offer its employees the chance to invest in the company. Out of approximately 150 employees, over

40 have opted to purchase shares, demonstrating a significant commitment from nearly a third of the workforce. This move enhances the alignment between the owner-managed company and its employees.

By utilising tokenised shares, employees not only have visibility of their shares within the app but can also engage in bilateral transactions with their colleagues, eliminating the need for additional signed contracts.

To safeguard against shares being sold to third parties outside of the existing share registry, Auviso employs Aktionarat's allowlist function. This feature restricts the transfer of shares to only registered addresses within the share registry, ensuring greater control and security over the ownership structure.

4. A brief outlook – Aktionariat's next steps

As demonstrated above, blockchain technology offers numerous advantages for startups and SMEs. However, widespread adoption of the technology is not imminent, with usability remaining a critical factor. Consequently, the team at Aktionariat is diligently working to enhance the customer experience day by day. The overarching vision is to develop a product wherein users are not required to possess any knowledge about blockchain but can still harness all the benefits tailored to their preferences.

Additionally, Aktionariat is set to release a new product in 2024, solely focusing on facilitating secondaries. This product will enable issuers to reduce administrative efforts when they receive selling intentions from shareholders, streamlining communication, identifying buying interest and supporting settlements.

The infrastructure will be designed in a way, where the issuer remains in control of secondaries, while leveraging transparency and on chain settlements.

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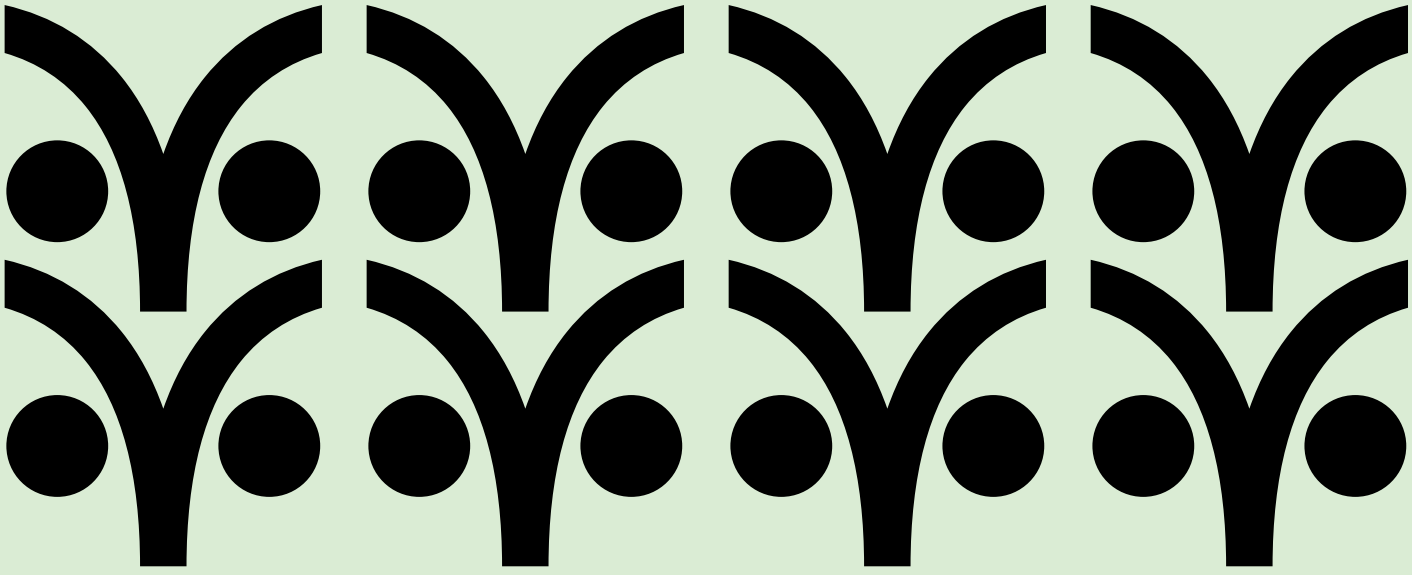
Investors in private equity and venture capital face high entry barriers, opaque valuations, illiquidity and long holding periods. By addressing these inefficiencies, blockchain can create a more inclusive and transparent investment environment, unlocking new opportunities for growth and innovation.

Aktionariat

Reference data is the unlikely rocket fuel propelling us into a tokenised future



As long as tokenised assets are issued, traded and purchased on separate blockchains, the security and fund token markets will struggle to develop scale and liquidity. It is multi-lateral and not bi-lateral links that are needed to unblock growth, and solutions are now being developed, but blockchain-based markets also need full interoperability with traditional financial markets. Here, the inefficiency of traditional post-trade processing is having paradoxical effects. It is an outcome rather than a cause of the high levels of intermediation in traditional markets and has become a barrier to tokenisation rather than an incentive to adopt it. The immediate result is clumsy workarounds to enable investors to switch between blockchain-based asset classes and traditional asset classes. But SSImple, an 18-month-old blockchain-based database for the storage, sharing and enrichment of Standing Settlement Instructions (SSIs), might just offer a way accelerate the pace of the transition of the capital markets from legacy systems to a tokenised future.

The potential value to be created by issuing and trading tokenised assets on blockchain networks is vast. In terms of equities, bonds, funds and real estate alone – to say nothing of commodities such as oil, grain and precious metals and minerals - tokenisers are contemplating a US$650 trillion global opportunity. But this lavish opportunity will remain out of reach as long as tokenised assets are issued on to blockchains that cannot communicate with each other.

Tokenised assets and tokenised asset services trapped in siloes will not grow

Multiple blockchain protocols are currently contesting for mastery of the cryptocurrency and digital asset markets. If one party to a transaction holds their asset in a wallet on Ethereum and the other holds their asset in a wallet on Hyperledger, it is impossible to exchange the assets

unless some sort of interface is built between the two blockchain networks. This is not accidental. Different blockchain protocols want to retain business on their own protocol.

But if a tokenised asset, or even data about a tokenised asset, cannot be transferred from a wallet on one blockchain network to a wallet on another, issuers and investors will limit their involvement. Why? Because they will know that blockchain technology cannot fulfil the basic function of a financial market: to establish the price at which the supply of financial assets is in balance with demand for them by enabling investors to buy assets where they are cheapest and sell them where they are dearest.

Point-to-point links between blockchains are not an adequate answer

At present, this lack of interoperability is being tackled via bi-lateral links between blockchains. The commonest links are token bridges. These work by locking a digital asset on the source blockchain and then minting the same digital asset on the other blockchain, or by "burning" the digital asset on the source blockchain and minting it on the destination blockchain, or by locking tokens in a pool on the source chain and unlocking fungible tokens held in a separate pool on the destination chain.

There are many problems with one-to-one – or, as they are sometimes called, point-to-point - links of this kind. They are expensive and time-consuming to build, maintain and develop, because the costs are not shared. They create link-specific risks of their own. They rest on different perceptions of security threats and operate to different timetables. They are not, in a word, standardised, so cannot facilitate multi-lateral links.

Unfortunately, the growth of tokenised markets through network effects hinges on the development of standardised many-to-many links. Bi-lateral links mean not all sellers and buyers can be present when a transaction is agreed, so the price cannot be efficient, because buyers and sellers that may have different perceptions of the value of the asset are absent. Fewer buyers and sellers also make it harder to buy and sell an asset, so the asset is less liquid, further distorting its price, and deterring even more market participants.

Automation by smart contracts is inhibited by the lack of cross-chain links

If the price of a tokenised asset is unreliable, this has further consequences. "Smart contracts," which are the means by which blockchain technology automates functions presently carried out by expensive intermediaries, rely on accurate and up-to-date price information from data "oracles" to initiate an action. If "oracles" are consuming inadequate price information, this leads to further market distortions.

Furthermore, since actions initiated by "smart contracts" are implemented by transfers of tokens, the actions themselves are inhibited if the transfer requires movement between blockchains. The lack of interoperability between blockchains means that the transmission of value and data through token transfers initiated by "smart contracts" embedded in other blockchain networks or

embedded in assets issued on to different blockchain networks, cannot take place if a link between them is absent.

Issuers and investors need to be confident that tokenised assets can be transferred across blockchains

Up to now, this lack of inter-operability between blockchain networks has not mattered much. It is a tiresome problem but not a critical one, because of the trivial size of the cryptocurrency and security token markets relative to the traditional financial markets. Even at their peak in 2021, the market value of cryptocurrencies did not clear US$3 trillion.[37] At the time, the global equity, bond and funds markets were worth more than 100 times as much.[38]

Ultimately the valuable token opportunity lies not in the cryptocurrency markets but in the securities and fund markets.

These disparities in size are a reminder that ultimately the valuable token opportunity lies not in the cryptocurrency markets but in the securities and fund markets (to say nothing of "real-world" assets such as real estate and commodities). But it is unrealistic to expect participants in these large, long-established markets to adopt a tokenised alternative on a large scale quickly if there is no mechanism for sparking the network effects needed to bring issuers and investors to market.

If issuers are to issue tokens, they need to be confident that institutional investors will buy their tokens. And if institutional investors are to buy tokenised securities and funds and real-world assets, they will need reassurance not only that they can switch assets between blockchain networks but that they can, during the transition, switch their exposures seamlessly between the digital asset markets and the traditional equity, fixed income and funds markets.

Legacy markets erect legacy barriers to inter-operability between blockchains and traditional markets

So there needs to be interoperability not just between blockchain networks, but between blockchain networks and traditional markets. However, at the interface between blockchain markets and traditional markets, interoperability confronts a fresh set of obstacles: legacy processes and systems and the obstructions and inefficiencies they create.

37. Coinmarketcap records a peak of US$2.86 trillion in November 2021. See https://coinmarketcap.com/charts/

38. Sifma, Capital Markets Fact Book 2023, 23 July 2023; Investment Company Institute, Worldwide Regulated Open-End Fund Assets and Flows Third Quarter 2023, 9 January 2024.

Unlike blockchains, which create a single version of every transaction and share it with all parties to that transaction, traditional securities market transactions create a record for every party to a trade: the global brokers, the local brokers, the exchange, the asset managers, the global custodians, the sub-custodians, the central counterparty clearing houses (CCPs) and the central securities depositories (CSDs).

These separate records of the same event mean data about the same transaction is processed - which can mean manual re-entry into proprietary systems - multiple times by different intermediaries as it is captured, matched, valued, margined, aggregated, netted, settled, allocated and custodied. At every stage in the repeated exchanges of data there is ample scope for errors and omissions, and consequent breaks in the reconciliation of the records.

Yet until the records are reconciled, a transaction cannot be settled, or its proceeds allocated to investors, or the assets placed in custody for safekeeping and servicing. No wonder employees working in post-trade operations are, according to R3, spending somewhere between 50 and 80 per cent of their time reconciling different records of the same transaction.

Inadequate reference data is the root cause of many legacy system settlement failures

A major source of breaks in those reconciliation processes is poor quality "reference" data. This is the semi-static data - market, customer, bank, instrument, currency and country identification codes and account details - that enable a transaction to be processed. A Bank Identification Code (BIC) or an International Securities Identification Number (ISIN) are classic examples of reference data in the traditional securities markets.

Reference data does not change much or change often but it does need to be kept up-to-date (counterparties do change their banks and account numbers), interpreted intelligently (different terms are used to describe the same things) and used correctly (it is easy, when keying reference data into a system, to transpose letters or numbers) or it is useless in automating a process.

Crucially, reference data is what feeds the Standing Settlement Instructions (SSIs) that counterparties publish to get paid or take delivery of securities efficiently. SSIs record the key information that remains the same from one transaction settlement to another – essentially, the name of the custodian or cash correspondent bank, the account number and the account name – even though the amount and the value date have changed.

The Depository Trust and Clearing Corporation (DTCC) owns and operates a centralised database of SSIs called ALERT that endeavours to keep SSIs up to date by sourcing reference data from asset managers, prime brokers and custodian banks. SWIFT runs a second SSI database (SWIFTRef) whose contents are sourced from correspondent banks.

Both these databases aim to validate and cross-check reference data all the time, but the problem of maintaining accuracy has proved impossible to solve. In the traditional financial markets, the work of maintaining and managing the reference data that underpins SSIs has become an interminable task, frustrating market participants and adding time and cost to post-trade processing.

Blockchain solves the legacy system settlement failure problem but adoption will not be rapid

In theory, wholesale adoption of blockchain technology throughout the financial markets would solve a large part of the reconciliation problem by creating a single record of every transaction at the outset, eliminating the need to reconcile different accounts of the same transaction altogether.

Wholesale adoption of blockchain would also enable transactions to settle "atomically." In other words, if there is not a simultaneous and irreversible delivery of one asset (say, a security token) against another (say, a cash token) the transaction dies. It does not fail or partially succeed, to be repaired later by operations staff finding missing cash or assets or correcting mistakes in the data about the transaction. The transaction simply never happens at all.

These are appealing prospects. However, wholesale adoption of blockchain is not a realistic possibility without decisive steps to deliver the openness and network effects on which rapid growth in the equity and bond markets depends[39] – and these will take time to be put in place. Instead, blockchain is likely to continue to be applied initially to asset classes that have never developed a comprehensive infrastructure, such as real estate and privately managed assets.

This does not mean the interoperability problem goes away. Asset managers and trading firms will still want to switch between these newly tokenised asset classes and traditional asset classes that do have a comprehensive infrastructure in place already. So there will remain a need for seamless interfaces between the new blockchain infrastructures and the legacy infrastructures.

39. See "For true tokenisation to triumph a public initiative is needed," pages 14 to 40.

Legacy settlement processes are embarrassingly inefficient and getting worse in some places

In creating those interfaces, the difficulties are exacerbated by the persistent inefficiency of legacy post-trade processes, at least in Europe. According to data published by the European Central Bank (ECB), the proportion of transactions failing to settle on time in the TARGET2-Securities settlement system rose from 2.37 per cent by value in 2019 to 6.71 per cent in 2022, and from 3.07 per cent to 6.26 per cent by volume in the same period. In 2022, over one million cash penalties were issued for failed settlement instructions per month. At an average value of €145, that amounts to €1.74 billion over the year.[40]

According to a review of the causes of settlement failure published in November 2023 by the European Central Securities Depositories Association (ECSDA), the worsening performance reflects basic operational shortcomings. Counterparties cannot find the securities they are meant to deliver. Transactions are matched too late to proceed to settlement on time. And, of course, poor-quality SSIs, thanks to inadequate or out-of-date reference data, mean crucial information is missing.[41]

In other words, post-trade operations in the traditional securities markets still rely on multiple parties reconciling their different records of the same transaction by rootling around in in-house and third-party databases for missing pieces of information before a transaction can be settled. Even if it can be found, the chances of it being out-of-date or re-keying it incorrectly are high.

Traditional settlement procedures are an archaic set of processes ill-suited to the impending truncation of settlement timetables to trade date plus one day (T+1) from the current trade date plus two days (T+2). The United States, Canada and Mexico will switch to T+1 on 27-28 May 2024, and Europe can be expected to follow suit. Without drastic improvements in settlement inefficiency, settlement failure in Europe is going to increase.

Inter-operability between blockchain networks and traditional financial networks depends on work-arounds

A further challenge is to work out how the ailing settlement process in the traditional markets can be connected "seamlessly" to blockchain networks that generate and share a single record of a transaction and settle transactions atomically. It is necessarily (if not absurdly) complicated to connect the one form of settlement to the other. Efficient automation, in other words, is unattainable.

So it is not surprising to find proponents of blockchain-traditional market interoperability not even trying to build "seamless" interfaces between such fundamentally incompatible arrangements. This has the further disadvantage of focusing the search for automatic interoperability solutions on cross-blockchain protocols only, fostering an acceptance that links between blockchains and traditional markets must be intermediated by Heath Robinson contraptions.

40. See https://futureoffinance.biz/european-capital-markets-are-inefficient-so-why-arent-european-csds-doing-more-about-it/

41. European Central Securities Depositories Association (ECSDA), Settlement efficiency considerations, November 2023.

Linking blockchains and traditional markets with Heath Robinson contraptions encourages traditional market participants and their service providers to believe they can take part in tokenisation initiatives without effort.

The purpose of these contraptions is to encourage traditional market issuers and investors to take part in tokenisation initiatives by minimising the changes they and – importantly – their service providers must make. The contraptions are workarounds that enable traditional post-trade service providers such as custodian banks and CSDs to provide tokenised asset settlement and custody services to their buy-side clients without having to make any changes to their existing systems and processes.

For example, in August 2023 SWIFT, the Brussels-based cooperative whose financial messages are at the heart of the traditional post-trade reconciliation and settlement processes, announced the results of experiments conducted with a group of mostly traditional financial institutions that included ANZ, BNP Paribas, BNY Mellon, Citi, Clearstream, Euroclear, Lloyds Banking Group, SIX Digital Exchange (SDX) and The Depository Trust & Clearing Corporation (DTCC).

The experiments proved to the satisfaction of SWIFT and its collaborators that a traditional SWIFT interface can provide a single point of access to multiple blockchain networks. In accomplishing

this, the crucial ingredient was a Cross-Chain Interoperability Protocol (CCIP), a cross-chain "router" devised by Chainlink, a blockchain "oracle" network built on Ethereum that ensures smart contracts are fed with secure and reliable data from the traditional world.

CCIP was used already by Decentralised Finance (DeFi) protocols such as Aave (a cryptocurrency lending and borrowing service) and Synthetix (a cryptocurrency derivatives trading platform that enables users to obtain synthetic exposures to cryptocurrencies) to secure tokens against being misappropriated as smart contracts transferred them from the source blockchain to the destination blockchain using the usual burn-and-mint process.

The first traditional financial institution to make use of CCIP independently is ANZ, a participant in the SWIFT experiment. ANZ wanted to test the ability of CCIP to settle the purchase of tokenised assets denominated in an Australian dollar Stablecoin (A$DC) with a Stablecoin denominated in New Zealand dollars (NZ$DC). An experiment was conducted in which CCIP duly enabled a buyer to purchase a tokenised asset with NZ$DC and the seller to be paid in A$DC.[42] In other words, ANZ proved that one form of tokenised cash on one blockchain could be exchanged "atomically" for another form of tokenised cash on another blockchain.

In the SWIFT experiment, Chainlink connected the SWIFT network to the Ethereum mainnet (or at least to its Sepolia testnet). The CCIP was then deployed on the testnet to enable firms participating in the experiment to transfer data from a source blockchain to a destination blockchain. In simulated form, tokenised assets were transferred successfully between wallets on the same blockchain, between wallets on different public blockchains and between a wallet on a public blockchain and a wallet on a private blockchain.

More prosaically, the experiment worked because CCIP was able to absorb the data in traditional SWIFT messages, re-format the content into tokens, perform "atomic" exchanges between tokens on different blockchains, and then translate what happened back into SWIFT message formats.

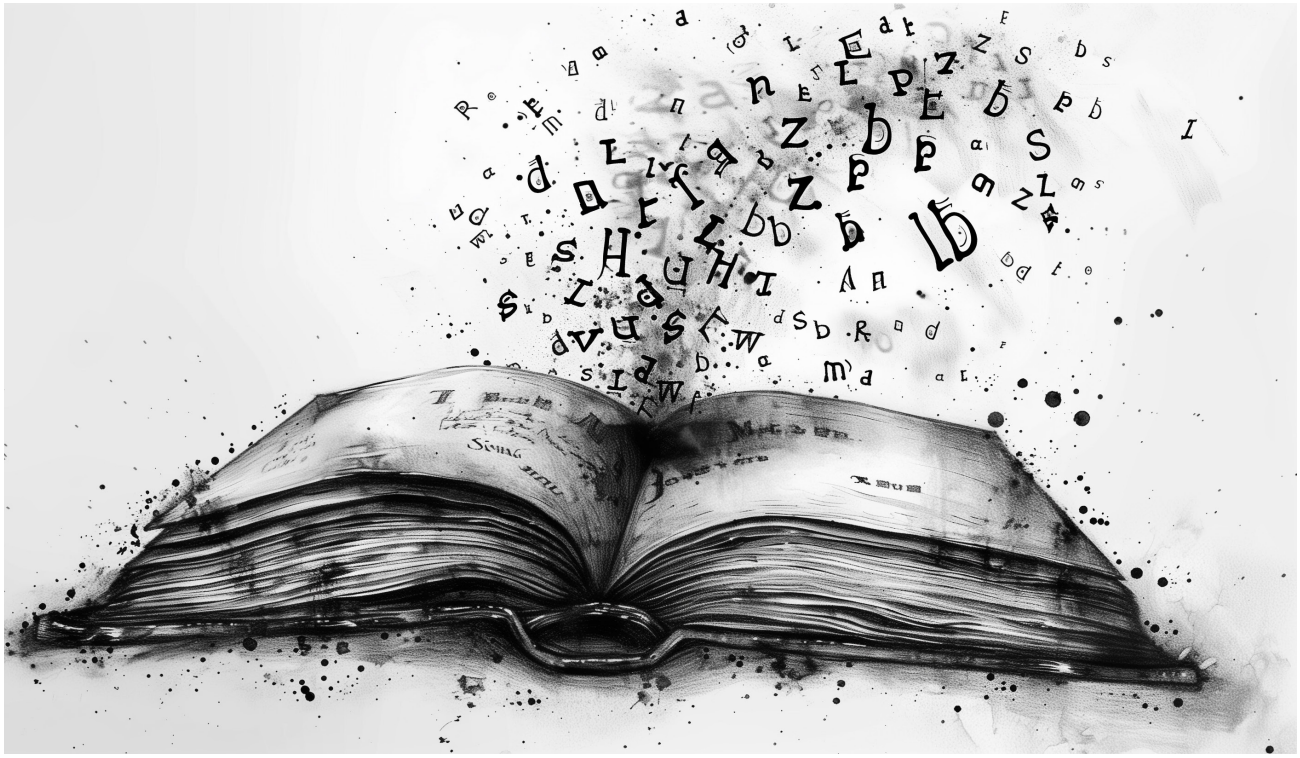
In principle, the experiment proved that any financial institution with a SWIFT connection – and there are more than 11,500 of them around the world - can transfer data from any blockchain to any another blockchain, in much the same way that they exchange messages about conventional financial transactions. A SWIFT interface with a suitable contraption attached can, in principle, become an interface to blockchain markets as well as traditional markets.

SSImple could accelerate the growth of tokenised capital markets

It sounds like a temporary workaround, and it is. Preserving SWIFT interfaces and the downstream post-trade process they feed and the traditional financial institutions that operate them is not the best way to secure the benefits of tokenisation. The best way to secure those benefits is obviously to shift all issuance and investing activity on to (inter-operable) blockchains.

To encourage that to happen, it would be helpful to make the missing SSIs that account for so many settlement failures in the traditional markets available on blockchains. The SSIs are still needed to settle transactions on-chain, and if they need to be retrieved from databases that are

42. See Chainlink, *Cross-Chain Settlement of Tokenised Assets Using Chainlink CCIP*, September 2023.



off-chain, it will be impossible for blockchain technologies to effect much improvement. SSIs need to be on-chain.

To make that happen, the SSImple start-up, founded by former DTCC executive director for ALERT Bill Meenaghan in 2022, is already hosting securities and foreign exchange market SSIs on a Corda blockchain. This is a significant step by a business whose origins lie not in inter-operability between blockchain protocols or the urge to accelerate the transition to a tokenised future, but in the realisation that blockchain technology could improve on existing SSI database services in the traditional markets.

SSImple enables custodian banks to publish their SSIs on a blockchain. They then give their buy-side clients permission to access and share them – also on the blockchain - with counterparties (such as brokers) that they work with. By this means, any change in an SSI by a custodian bank cascades automatically through the shared database, ensuring the SSIs used by asset managers and brokers are always up to date. Access is via Application Programme Interfaces (APIs).

The service is getting traction. In September 2023, SSImple announced its first contract, with Equilend, the securities lending trading platform. Equilend sell-side customers - custodian banks and prime brokers - and their buy-side counterparties are now accessing the SSIs they need to settle securities lending transactions directly from the SSImple database via an API.

Inadvertently almost, SSImple finds itself prefiguring a fully tokenised future for the capital markets. True, more accurate, up-to-date and timely SSIs will reduce settlement failure rates in traditional markets, which will reduce the risk of transfers between blockchain markets and traditional markets failing as well. But Meenaghan recognises that the larger opportunity lies in accelerating the transition from traditional markets to tokenised blockchain markets.

At the moment, SSImple is making up-to-date SSIs available to both sides of traditional securities and FX transactions. It is already extending this service to transactions agreed on or between blockchains. It is well-placed to do so, because it is putting SSIs on a blockchain already, and so has only to enlarge the data sets available.

Adding data currently off-chain to the data sets on-chain is not technically difficult but will obviously take time because it entails working with the incumbent intermediaries. “If everything was on-chain already there would be no need for SSImple, because the reference data would be there and moving as part of the process of swapping the assets,” explains Meenaghan. “For blockchains to be truly effective you have got to get to that point, but it is a long, long way off.”

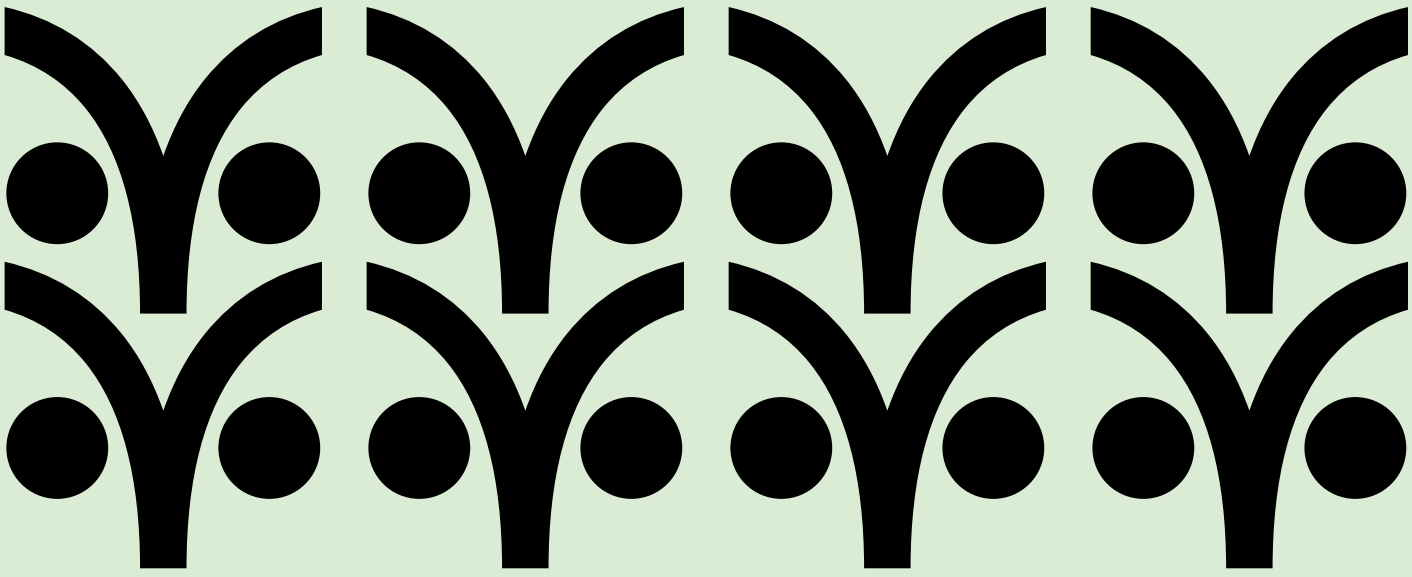
The main reason it is a long way off is that the custodian banks do not want to give up intermediating transactions, or change their SWIFT-based systems, and nor do their sell-side and buy-side clients want to accommodate or pay for change either. However, what those same clients do want is custodians that can help them trade and invest in tokenised assets. It follows that a period of coexistence in which data is both on and off blockchains is inevitable - but not unending.

Indeed, Meenaghan believes the period of coexistence that is now beginning is the necessary prelude to explosive growth in tokenised markets.

“There will never be a single blockchain with everything on it, and there will always be islands of activity where firms are protective of what is being transacted but if you are able to connect them together, so you can safely move assets from one blockchain to another, or represent changes of ownership on the same blockchain, people will have sufficient confidence in the process to increase transaction volumes from low single digits to the tens and the hundreds and eventually the millions of transactions a day.”

– Bill Meenaghan, CEO and Founder, SSImple

The unexpected reason behind the unexpected rise of tokenisation in Japan



Japan has become a market leader in security token issuance. The secrets of its rise lie in the rapid legal and regulatory reaction to a major cryptocurrency debacle ten years ago; in a characteristically Japanese capacity for collaboration across the boundary that separates the private and the public; in the willingness of major financial institutions to cooperate in building a tokenisation infrastructure; and in a marked preference for getting issues done rather than lapsing into time-consuming and resource-hungry Proofs of Concept and Pilot Tests that never go into production.

Japan was an early host of cryptocurrency trading. So much so that the first big cryptocurrency exchange to fail, a former trading card website called Mt. Gox, was based in Tokyo. By the time it filed for bankruptcy in February 2014 Mt. Gox was reputed to be handling more than two out of three Bitcoin transactions, despite the reputational awkwardness of having been the target of hackers from the beginning of its activities three years earlier.

The regulatory consequences of Mt Gox

The collapse proved seminal. It prompted the Japanese market authorities to establish a coherent regulatory framework for tokenised digital assets of all kinds, including security tokens, much earlier than other major jurisdictions.

Importantly, the authorities chose to build this framework not through the passage of omnibus legislation but via successive amendments to the existing Payment Services Act of 2009 (PSA) and the Financial Instruments and Exchange Act of 1948 (FIEA) (see the Sidebar, "The Regulatory Framework for Security and Fund Tokens in Japan").

The Regulatory Framework for Security and Fund Tokens in Japan

The Payment Services Act (PSA) 2009

So-called "crypto-assets" - essentially, cryptocurrencies and the "utility" tokens associated with the Initial Coin Offering (ICO) boom of 2017-18 - were regulated under the Payment Services Act (PSA) from April 2017.

Since then, issuing tokens, running a token exchange, providing custody services for tokens or acting as an intermediary for tokens has necessitated registration as a provider of Crypto Asset Exchange Services (CAES) with the Financial Services Agency (FSA).

There are a pair of curious omissions from this otherwise comprehensive regime. Non-Fungible Tokens (NFTs) are not regulated as financial assets and nor is the staking or lending of "crypto-assets" in order to generate an income from holdings of cryptocurrencies.

Stablecoins are also regulated under the PSA via the Amendment for the Purpose of Establishing a Stable and Efficient Funds Settlement System (which was agreed in June 2022, came into force in June 2023, and permits issues from June 2024).

The Amendment established a regulatory regime for Stablecoins issued internationally as well as domestically. Those backed by fiat currency are treated as "Electronic Payments Instruments (EPIs)" under the PSA, while those backed by "crypto-assets" are subject to the "crypto-assets" regulation. The primary objective is to favour EPIs issued by Electronic Payment Instruments Intermediaries (EPII) – namely, banks – that must register.

The Financial Instruments and Exchanges Act (FIEA) 1948

The Financial Instruments and Exchange Act (FIEA) of 1948 was long the principal law governing the regulation of securities in Japan and, as amended in May 2020, its scope now includes tokenised securities representing bonds, shares, funds and derivatives. The law somewhat clumsily characterises all these asset classes as "Electronically recorded transferable rights (ERTRs)."

Essentially, ERTRs are regulated in a fashion like traditional securities. But there are some important differences.

The regulation of traditional securities under FIEA distinguished between "Paragraph 1" financial assets (tradeable and liquid instruments such as shares, bonds and exchange-traded derivatives) and "Paragraph 2" financial assets (less tradeable and less liquid contractual rights, such as interests in investment trusts and collective investment schemes such as mutual funds).

"Paragraph 1" securities can be handled by Type I Financial Instruments Business Operators only – namely, securities companies such as Daiwa Securities and Nomura Securities. "Paragraph 2" securities, on the other hand, can be handled by Type 2 Financial Instruments Business Operators - typically, asset managers which must register with the FSA, but otherwise face less onerous requirements.

Where do ERTRs fit within this binary system? In theory, ERTRs can be issued as either "Paragraph 1" instruments (say, bonds) or "Paragraph 2" instruments (say funds). This presented the framers of the law with a dilemma. Tokens that might have been classified as "Paragraph 2" instruments in the past would be sufficiently liquid to be classified as "Paragraph 1" instruments today. A tokenised fund, for example, can be tradeable on a secondary market, unlike a conventional mutual fund, which can be purchased and redeemed by the issuer only.

The dilemma was resolved by subjecting ERTRs that would have ranked as "Paragraph 2" instruments under the old regime to the "Paragraph 1" regulatory regime. In other words, it is not just security tokens that are subject to a more rigorous regulatory regime, but fund tokens as well.

The Act on Engagement in Trust Business by Financial Institutions 1943

The custody of tokens entails both safekeeping (the storage and management of private keys) and transfer and registration (the execution of transfers of tokens and claims of beneficial ownership upon purchase or sale of tokens).

According to MUFG, which already acts as a custodian to a number of security token issues in Japan, both custody functions can be carried out safely by the same trust banks that have dominated custody in Japan since the passage of the Act on Engagement in Trust Business Activities by Financial Institutions of 1943. The regulators have vet to disagree.

The first fruits of Mt. Gox were an investigation by the Japanese Financial System Council, which set up a study group in late 2014 that evolved into a Working Group to consider what regulatory changes should be made in the wake of the debacle.

The final report of the Working Group in December 2015 emphasised the need to protect investors in cryptocurrencies, not least through segregation of assets and capital requirements. It also led to legislation in 2016 to extend the Financial Action Task Force (FATF) Anti Money Laundering (AML) recommendations to cryptocurrencies, though this is of course something Japan undertook not in response to Mt. Gox but as a supporter of the FATF recommendations.[43]

In May 2020 Japan also became the first country to regulate the emerging token markets when legislative changes proposed by the Japanese banking, securities and insurance regulator, the Financial Services Agency (FSA), were implemented by the government through amendments to the FIEA. These came into effect in May 2021.

The new measures widened the regulatory perimeter beyond cryptocurrencies to encompass "crypto-assets" and "crypto-asset" derivatives and, in line with the Working Group recommendations of December 2015, required third party custody of customer funds, and 100 per cent asset backing if the assets were held in "hot" digital wallets accessible via the Internet.[44] The May 2020 changes also required "crypto-asset" exchanges and service providers to register with the FSA.

In June 2022 Japan scored yet another first when it pioneered implementation of the global regulatory consensus on Stablecoins. The measures taken by the Japanese government effectively restricted Stablecoin issuance to banks and required Stablecoins issued outside Japan to be backed by assets in custody in Japan, which is a substantial constraint on an adventurous approach to Stablecoin collateral management. The new measures also brought digital asset custodians (as holders of the assets that underpin Stablecoins) within the scope of regulation for the first time. [45]

Between them, these successive steps - addressing cryptocurrencies, then tokens and finally Stablecoins - have imparted a degree of confidence to Japanese market participants. They have also moved the country not just beyond cryptocurrencies but beyond the seemingly endless stream of Proofs of Concept and Pilot Tests that have stymied progress in Europe in particular. In fact, Japan has become one of the most active security token jurisdictions in the world.

43. The FATF Recommendations are not compulsory and governments are left to implement them in their own way (and not every government has). See also Mai Ishikawa, "Designing Virtual Currency Regulation in Japan: Lessons from the Mt Gox Case," *Journal of Financial Regulation,* Volume 3, issue 1, March 2017.

44. Arora, Gaurav, "Cryptoasset Regulatory Framework in Japan," 27 October 2020. Available at SSRN: https://ssrn.com/abstract=3720230 or http://dx.doi.org/10.2139/ssrn.3720230

45. See "How Stablecoins are being regulated: Japan," in Future of Finance, Stablecoins: *Where They Came From, Where They Are Now and Where They are Going Next,* April 2023, page 94.

Collaboration is the key to progress in Japan

In fact, Japan is so active that tokenised issues are already a major force in the domestic capital markets. In 2023 the Japan Exchange Group (JPX) reported that approximately JP¥ 588.7 billion of new conventional securities were issued in Japan[46]. Future of Finance estimates that new token issues in 2023 were worth JP¥ 114.2 billion, a figure equivalent to 19.4 per cent of the value of conventional issues. This is a huge share of the total market for a new instrument that was unknown in the Japanese market before 2021.

Characteristically, the relatively rapid progress in security token issuance in Japan has relied on a considerable degree of cooperation between the government, the regulators and the major financial institutions.

Indeed, in addition to amending the PSA and the FIEA to provide a stable legal framework for tokenisation, the Japanese authorities have endorsed a pair of self-regulatory organisations (SROs) that they expect to contribute to the safety and integrity of the token markets.

The Japan Virtual Currency Exchange Association (JVCEA) SRO was set up in 2018 to monitor the cryptocurrency industry in Japan. The Japan Security Token Offering Association (JSTOA) SRO followed in October 2019 as the security token equivalent of the JVCEA.

46. https://www.jpx.co.jp/markets/statistics-equities/misc/06.html

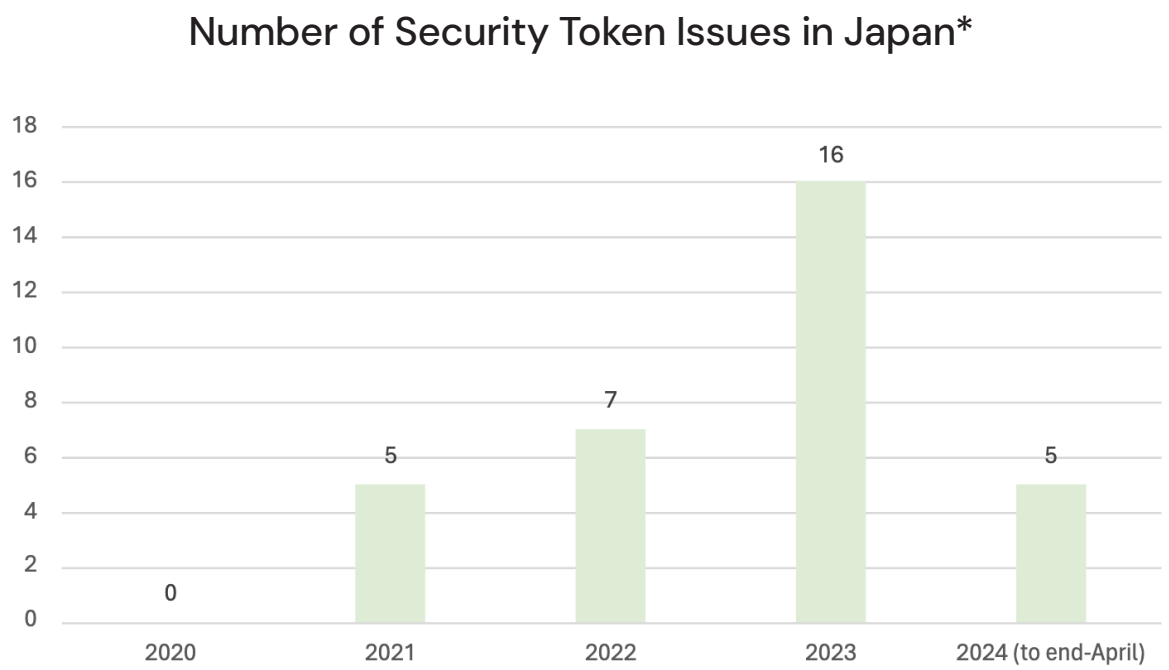
JSTOA (not to be confused with the Japan Securities Token Association (JSTA), which is a trade association dedicated to the promotion of security tokens[47]) has been formally recognised by the FSA and has broad responsibility for setting the day-to-day rules by which securities tokens are managed.

Between major financial institutions, collaboration is equally extensive. The largest and longest established Japanese banks and securities houses - such as Mitsubishi UFJ Financial Group (MUFG) and Daiwa and Nomura – have risen to the challenge issued by the amendments to the PSA and the FIEA for regulated firms to take responsibility for what happens in the token markets.

This does not mean the Japanese environment is hostile to innovators. A relative newcomer, SBI Securities, the securities arm of SBI Holdings, has been welcomed too, and become a major distributor of security tokens (see Chart 3, page 70). The firm has helped to distribute at least eight token issues worth a total of JP¥ 23.7 billion.

Collaboration clearly works. Although the number of identifiable issues is still low (see Chart 1), and the total sum raised is not high (JP¥ 155.13 billion, or about US$1 billion) Japan has almost certainly (the lack of comprehensive data for Japan, and of comparative data for other jurisdictions, makes it hard to know for sure) hosted more security token issues than any other jurisdiction.

Chart 1



*Full data for the number of issues supported by BOOSTRY is available for 2023 only.

Source: Future of Finance research

47. The JSTA is a supporting member of the JSTOA.

The asset classes that are being tokenised

Issuance was at first driven overwhelmingly by tokenised real estate vehicles and real estate projects seeking retail investors. Real estate continues to be the major source of activity, accounting for more than two thirds of issues (see Chart 2).

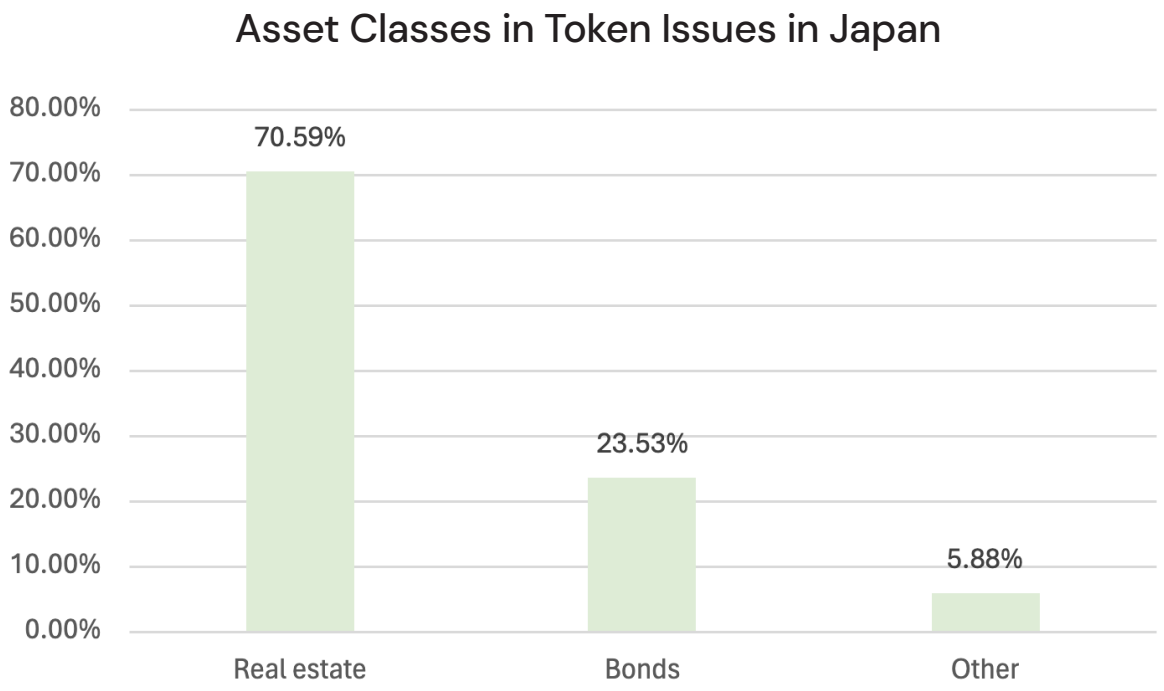
This matches tokenisation experience in the United States and elsewhere. Real estate has emerged as a tokenisable asset because it is intrinsically illiquid, lacks an operational infrastructure to turn it into securities as opposed to funds, and appeals to wealth managers looking to diversify client portfolios into an asset class with unattainably high minimum subscriptions.

Also in common with tokenisation experiences elsewhere, and especially in Europe, bonds are the second most common asset class to be tokenised in Japan. They were among the earliest security token issues (SBI Securities issued the first tokenised bond in Japan in April 2021).

Again in common with other jurisdictions, green bonds were identified comparatively early as a natural target for tokenisation in Japan. The ability of tokens to share project tracking information (the research arm of the Japan Exchange issued a green tracking bond in June 2022) is the obvious attraction.

But the flagship tokenised bond issues in Japan are those by the multinational conglomerate and household name Hitachi in December 2023 (JP¥ 10.0 billion of "digitally tracked" green bonds) and March 2024 (JP¥ 10.0 billion of five year straight green bonds) (see Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020").

Chart 2



Source: Future of Finance research

Secondary market activity has yet to develop

Issuance of security token issues is dominated by two tokenisation platforms: Progmat and BOOSTRY. Each was founded by a single major financial institution but both – in keeping with the Japanese penchant for collaboration – are now owned by a consortium (see Sidebars "Progmat, Inc." and "BOOSTRY").

Progmat, which appears to be the largest of the two – it publishes details of issues it has supported on its website, which BOOSTRY does not do - has so far supported 23 issues worth a total of JP¥ 120.96 billion (see Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020").

Research by Future of Finance has identified only four issues supported by BOOSTRY for a total value of JP¥ 10.65 billion – implying an average issue value about half the size (JP¥ 2.66 billion) of the issues supported by Progmat (JP¥ 5.26 billion). This probably under-estimates activity on BOOSTRY.

Importantly, neither Progmat nor BOOSTRY is a trading platform or exchange. In fact, trading and the liquidity it can bring to token markets has yet to develop in Japan, despite the relatively high level of issuance activity.

So far, the country has only one dedicated security token market. The Osaka Digital Exchange (ODX), which has operated as a conventional market since 2022, went live with its START Securities Token market on Christmas Day 2023. At present the market lists just two security tokens (both backed by real estate assets) and modest volumes of activity.

Like Progmat and BOOSTRY, ODX is also owned by a consortium made up of SBI Holdings (with a 59 per cent stake) plus Sumitomo Mitsui Financial Group, Nomura Holdings, Daiwa Securities Group and CBOE Worldwide Holdings Limited.

However, a second security token exchange is now in prospect. The JPX, whose Market Innovation and Research unit (JPXI) is not only a token bond issuer in its own right but developing data and market indices for the token markets, announced in April 2022 that it will launch a blockchain-based securities token market in April 2025.

JPX launched a green bond issue the same month, sensing longer term opportunities in sustainability issues. The exchange is also an investor in both Progmat and BOOSTRY (see the Sidebars "Progmat Inc." and "BOOSTRY").

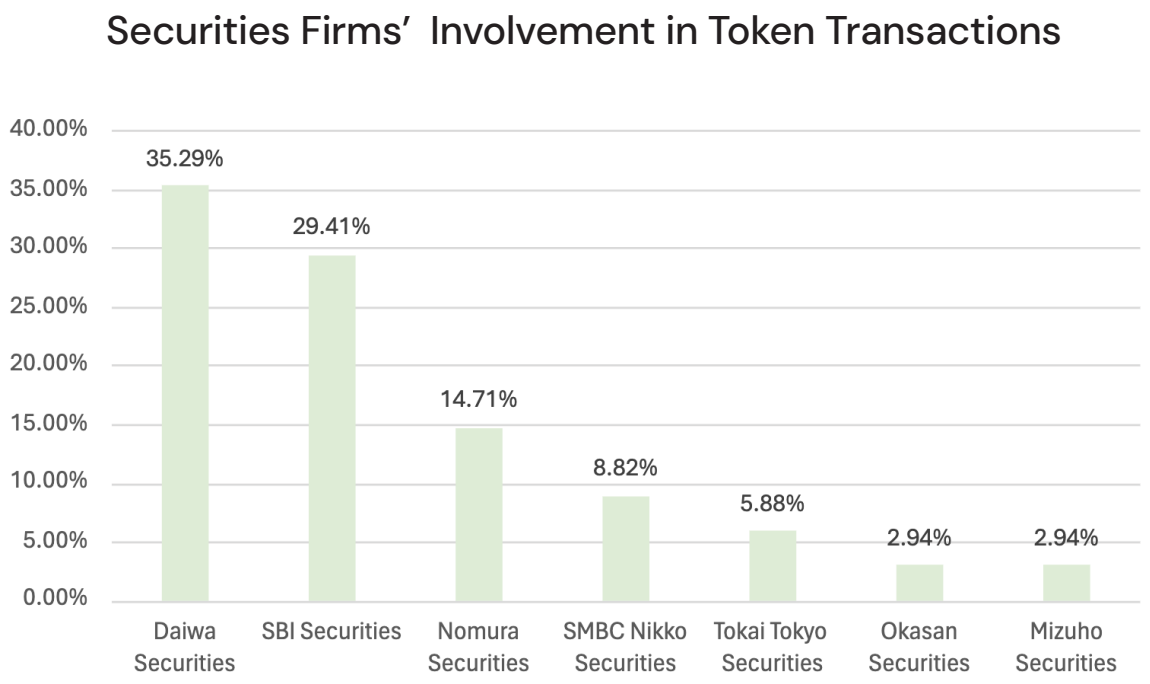
The established securities houses are the main distributors

As encouraged by the regulators, the securities houses that have dominated security distribution in Japan for decades also own security token distribution. Daiwa Securities has emerged as the market leader (see Chart 3). It has helped to launch security token issues worth JP¥ 80.1 billion.

Relative newcomer SBI Securities ranks second in terms of the number of issues but their collective value (JP¥ 23.7 billion) and average size (JP¥ 2.96 billion) puts it behind the long

established Nomura (JP¥ 27 billion at JP¥6.75 billion apiece) and SMBC Nikko Securities (JP¥ 24.5 billion at JP¥ 8.16 billion apiece).

Chart 3



Source: Future of Finance research

Daiwa Securities has a minority stake in ODX, as does its nearest rival, Nomura Securities. Indeed, the two firms, along with Kabu.com Securities (an arm of Mitsubishi UFJ Securities) and online securities broker Monex, were also founders of the JSTOA.

With 15 full members (all securities firms) and 53 supporting members (a mixture of tokenisation platforms, legal and accounting firms, issuers, security token exchanges and the JSTA), the JSTOA SRO represents the collaborative approach in institutional form.

It can of course be argued that long-established securities firms are bound to endorse a self-regulatory approach. It is harder to dismiss the openness of their approach to the ownership of the two platforms driving tokenisation in Japan.

How the tokenisation platform consortiums were created

Progmat (originally founded by MUFG) and BOOSTRY (founded by Nomura) are the organisations that structure, issue and support security tokens – and both have found it makes sense to open ownership to other market participants.

Progmat and BOOSTRY have adopted wider ownership structures because it became clear that competing firms would not use a platform owned by a major bank or a major securities house alone, since that risked creating a monopolistic or duopolistic market.

Progmat is now owned by eight firms and has independent management. Its Digital Asset Co-Creation Consortium (DCC) has an even wider embrace. The DCC aims to draw in a network of potential issuers in corporate Japan as well as professional advisers such as lawyers and accountants, which are likely to be fruitful sources of issuance activity (see the Sidebar "Progmat Inc.").

Both Progmat and BOOSTRY have found it makes good commercial sense to share ownership of their tokenisation platforms with other market participants because it encourages them to make use of their services.

Progmat, Inc.

Progmat, Inc was founded in 2021 as a wholly owned subsidiary of Mitsubishi UFJ Trust and Banking Corporation (MUFJ). It hosted both security tokens (a total of JP¥ 120.96 billion through March 2024) and utility tokens under that parentship until September 2023, when ownership was opened to a wider group.

Although MUFJ retains the biggest stake, Progmat is now owned by another seven institutions that include two other powerful banking groups (Mizuho and Sumitomo Mitsui) as well as telecommunications giant NTT and SBI Holdings.

So the platform has a broad and influential set of owners – and the board structure indicates a high degree of cooperation between them.

Shareholders	Percentage Share
Mitsubishi UFJ Trust and Banking Corporation	49.0
NTT DATA Japan Corporation	13.5
Mizuho Trust & Banking Co., Ltd.	7.5
Sumitomo Mitsui Trust Bank, Limited	7.5
Sumitomo Mitsui Financial Group, Inc.	7.5
SBI PTS Holdings, Co., Ltd.	5.0
JPX Market Innovation & Research, Inc.	5.0
Datachain, Inc	5.0

Progmat has done most of its business with securities tokens but is active also in the utility token market. Utility tokens are well-established in Japan and Progmat views them as a long-term growth area, mainly through links to customer loyalty or rewards programmes. In September 2022, for example, Japanese retailer Marui issued bonds to its card holders (see the Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020").

Initially, Progmat saw links between security and utility tokens. It expected security tokens to be issued with utility tokens attached. This actually happened in a number of early issues, where investors gained access to free coffees from hospitality companies and room upgrades from hoteliers, but this aspect has disappeared as security tokens have become better established.

Progmat is also looking at the potential to issue Stablecoins. The PSA Act amendment passed in June 2023 allows the introduction of these from June 2024. Though obviously none are issued yet, it is clear that Progmat is interested in acting as a platform for the issuance of Stablecoins that conform to Japanese regulatory requirements.

In the longer term, Progmat is pursuing an expansive and ambitious strategy ("Connecting society with programmable networks to digitise every possible form of value") that rests on a conviction that all forms of assets will one day be tokenised.

In pursuit of this, Progmat has created a broad coalition of interests via the Digital Asset Co-Creation Consortium (DCC), which currently has 254 members. That is enough to encompass a large swathe of corporate Japan, a lot of financial institutions and a list of technology companies, law and accountancy firms, and FinTechs, including cryptocurrency companies.

BOOSTRY has also admitted shareholders other than Nomura and is now independently managed in a fashion similar to Progmat (see the Sidebar "BOOSTRY") and has followed a similar path, but with a larger vision of what openness can deliver.

BOOSTRY has opened its blockchain platform iBet for Fin – which it founded in April 2021 - to other companies, in the expectation of attracting developers to create apps for issuers and investors, as well as attracting issuers and investors directly.

BOOSTRY

BOOSTRY was established in September 2019 as a joint venture between two affiliates of the Nomura securities house: Nomura Holdings (which owned 66 per cent) and Nomura Research Company (which owned 34 per cent).

The initial goal was a blockchain platform called iBet for Fin that would use the Daml smart contract language offered by Digital Asset[48] to lower the cost of issuing bonds. But the idea soon ran into resistance from other securities firms reluctant to support a platform controlled by a major securities house.

In July 2020 SBI Holdings took a 10 per cent stake in BOOSTRY, and in March 2023 the Japan Exchange Group (JPX) acquired 5 per of the capital, so although Nomura still controls the organisation it has both an establishment shareholder and an entrepreneurial shareholder.

Shareholders	Percentage Share
Nomura Holdings	51.0
Nomura Research Company	34.0
SBI Holdings	10.0
Japan Exchange Group (JPX)	5.0

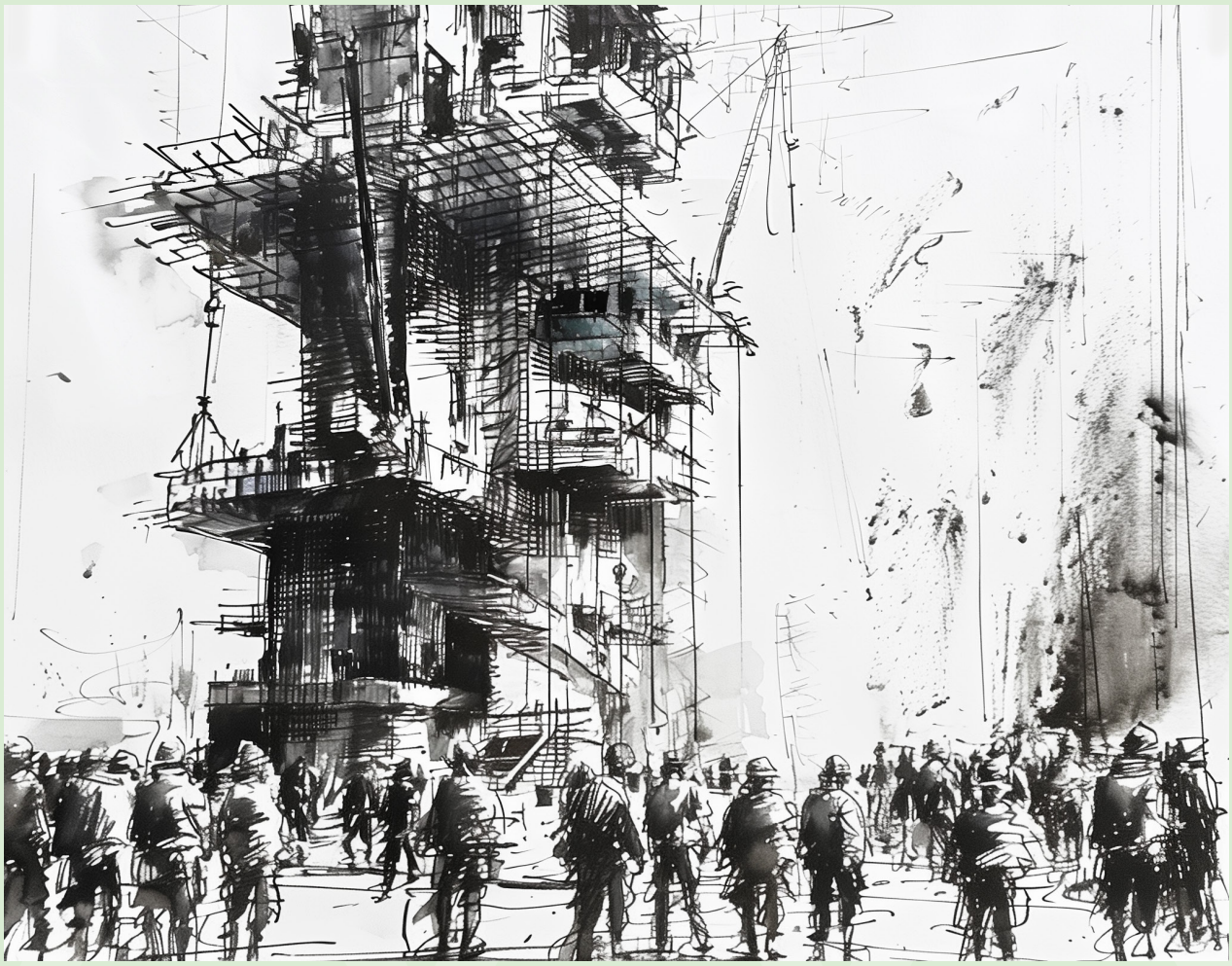
48. See Future of Finance, "Having built the tools for institutions to embrace tokenisation, Digital Asset is now building the network to make it happen," 9 April 2024, at https://futureoffinance.biz/having-built-the-tools-for-institutions-to-embrace-tokenisation-digital-asset-is-now-building-the-network-to-make-it-happen/

Secondly - and more consequentially - BOOSTRY now offers the iBet for Fin blockchain platform not as a proprietary network but as an independent and open technology whose goal is to simplify and standardise all the elements of the security token lifecycle.

It rests on Quorum, the open source but permissioned blockchain protocol developed initially by J.P. Morgan but acquired in August 2020 by Consensys, the Ethereum-based blockchain company founded by Joe Lubin.

BOOSTRY serves as the secretariat for iBet for Fin and continues to help develop and support the protocol, but other users are free to contribute applications. Other actors in the Japanese token eco-system certainly seem to be comfortable that iBet for Fin is autonomous.

Since it became open in April 2021 with just four member-users, iBet for Fin has added 18 more. They include six securities houses (SBI Securities, LINE Securities, Mizuho Securities, Daiwa Securities and Mitsui & Co., Ltd Digital Asset Management as well as Nomura Securities) and six banks and trust banks (Sumitomo Mitsui Trust Bank, Mizuho Trust Bank, SMBC Trust Bank, Mizuho Bank and Resona Bank as well as Nomura Trust Bank,) as well as exchanges and technology vendors. BOOSTRY expects the member-firms to help attract others to develop applications for use on the iBet for Fin network.



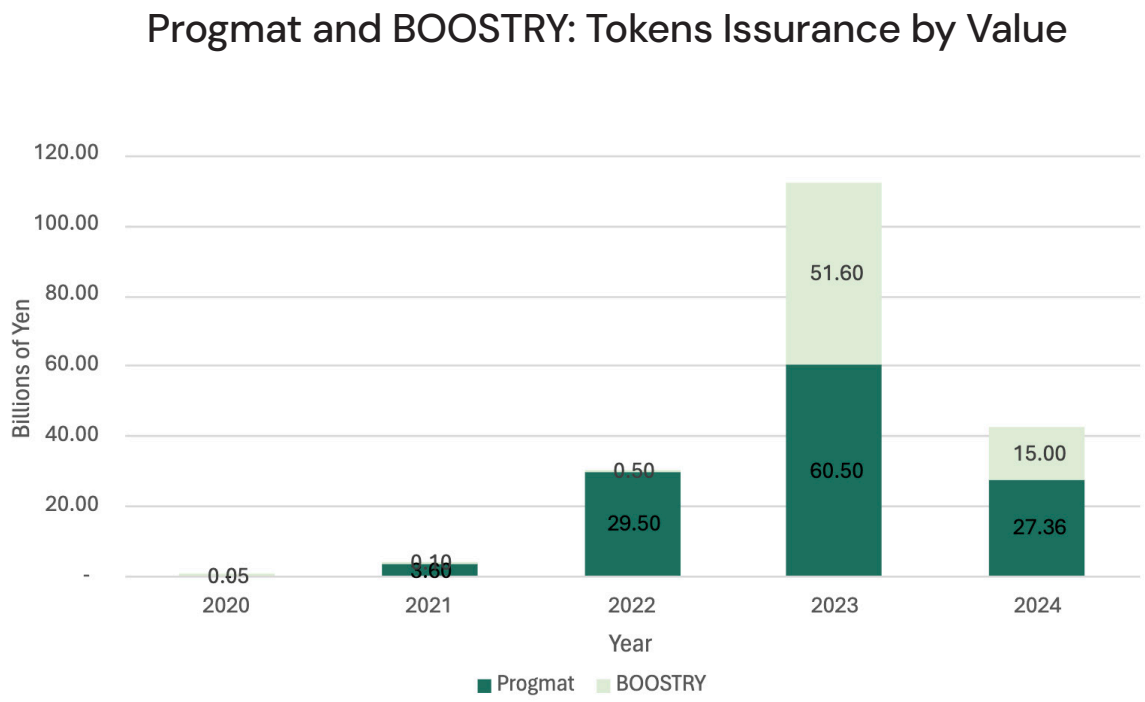
The ibet for Fin platform is currently accessed by 18 separate financial institutions in Japan. It provides the members – mainly securities houses, banks and trust banks - with the ability to issue and service security tokens without investing in proprietary systems, while also enabling developers to script new services for security tokens on the same platform.

The role of asset managers in tokenisation in Japan

However, information on issuance activity hosted by BOOSTRY is less complete than the information provided by Progmat. On its website, Progmat records a total of 23 issues over the four years between 2021 and 2024 (see Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020").[49]

Comparable data for these years for BOOSTRY is not available, so Chart 4 is based on publicly available information about four issues between 2020 and 2023 with a total value of JP¥ 10.65 billion, and other information published by BOOSTRY.[50] This data almost certainly under-estimates activity on BOOSTRY in years prior to 2023 and possibly in 2024 as well (see Chart 4).

Chart 4



*Data from BOOSTRY is incomplete except for 2023.

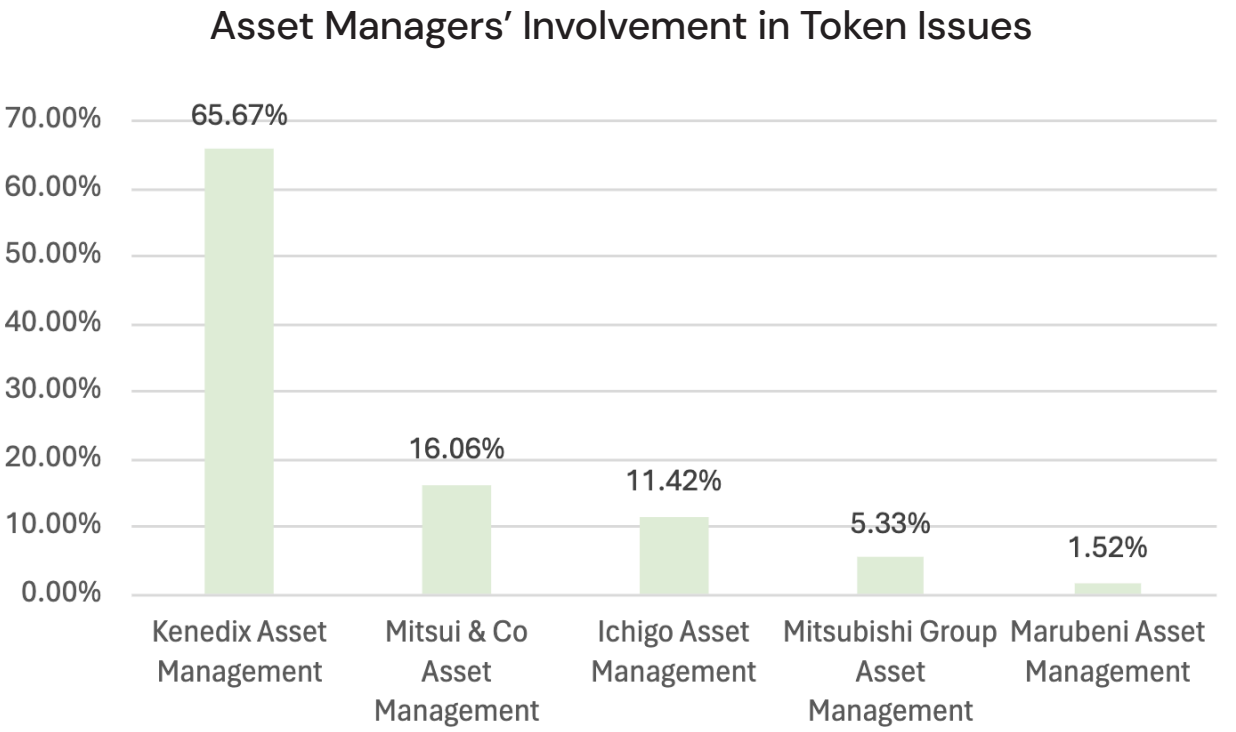
Source: Future of Finance research

49. See Future of Finance, "Having built the tools for institutions to embrace tokenisation, Digital Asset is now building the network to make it happen," 9 April 2024, at https://futureoffinance.biz/having-built-the-tools-for-institutions-to-embrace-tokenisation-digital-asset-is-now-building-the-network-to-make-it-happen/

50. BOOSTRY Co., Ltd., BOOSTRY Releases Japan Security Token Market Report (FY2023), 2 April 2024.

Despite not being a shareholder, Daiwa is the leading distributor on Progmat, helping to distribute eight issues worth a total of JP¥ 80.1 billion. But securities houses need issuers, and asset managers have proved more fruitful than corporates (see Chart 5). Six of the eight issues led by Daiwa Securities, for example, were issued on behalf of Kenedix Asset Management (KDX).

Chart 5



Source: Future of Finance research

In fact, KDX is the most active asset manager, with nine issues to its credit so far, valued at JP¥ 86.26 billion (see Chart 5). Kenedix is one of the largest real estate asset management companies in Japan, managing over JP¥ 3 trillion in assets. The company has described security tokens as "the third pillar of our business" after Real Estate Investment Trusts (REITs) and privately managed funds.

Kenedix predicts substantial growth in Japan's real estate security token market over the next five years. It expects issuance to reach JP¥ 500 billion by 2025 and the real estate tokenisation market to be worth JP¥ 2.5 trillion by 2030.[51]

A fund management arm of Sumitomo Mitsui is also a regular issuer on Progmat, with eight issues worth a total of JP¥ 21.1 billion. The tokens are sold through the Sumitomo Mitsui banking network.

51. https://www.patiencerealty.com/post/kenedix-predicts-real-estate-security-token-market-to-be-jpy-25-trillion-by-2030

Coupled with issues reported elsewhere, the Sumitomo Mitsui asset management subsidiary is responsible for ten issues worth a total of JP¥ 36 billion – all of them asset-backed by real estate.

The other asset managers involved in security token issuance in Japan are Ichigo Asset Management, Mitsubishi Group Asset Management and Marubeni Asset Management (see Chart 5 and the Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020").

The role of the securities houses

If asset managers are the main issuers, the securities houses are responsible for the distribution of the tokens to investors. Daiwa securities is the market leader on Progmat, thanks largely to KDX.

Nomura has no equivalent of KDX to provide a steady stream of new issues. Indeed, it is not that conspicuous even on the BOOSTRY platform it created and continues to dominate as the biggest shareholder (see Chart 3). Two of the four deals involving Nomura that are identified in the Future of Finance database actually used Progmat, not BOOSTRY.

SBI Securities, the brokerage arm of SB Holdings, is actually more active than Nomura in the Japanese token markets, being involved as a distributor in eight deals. Only Daiwa Securities can match that number, but the average size of the issues supported by SBI Securities (JP¥ 23.7 billion) is conspicuously lower than the equivalent figure for Daiwa Securities (JP¥10.01 billion).

Predictably, MUFG, the creator of Progmat, is the preferred custodian to Progmat issues. Likewise, the major banking groups that have issued tokens in their own name tend (unsurprisingly) to reserve for themselves custody of their own issues. And it is Mizuho Bank, not MUFG, that is more prominent in the role of administrator and fiscal agent, whose chief responsibilities are payment of income and ensuring tax compliance.

Nor do Progmat and BOOSTRY have the Japanese tokenisation market to themselves in terms of technology. The California-based tokenisation engine Securitize supported one of the first security token issues in Japan when Sumitomo Mitsui tokenised its credit card receivables.

Securitize technology was also used in the Marui bond issue to cardholders in September 2022 and another transaction in April 2023 when Sumitomo Mitsui led the tokenisation of real estate assets of Sony Bank (the financial arm of Sony Corporation) for sale to clients of Sony Bank (see Sidebar "Security Token Issues in Japan Since the FIEA Law Changed in May 2020"). So Securitize has supported three token issues in Japan.

A domestic technology vendor is also active in the market. HashDasH Holdings, a Japanese firm that sees an opportunity to use tokens to fund sustainable energy and agricultural projects, has joined forces with Tokai Tokyo Securities, the Japanese securities house. Tokai Tokyo has invested in HashDasH and is working with HashDasH and the ADDX digital asset exchange in Singapore to tokenise Japanese real estate for sale to Tokai Tokyo clients.

What are the lessons for other jurisdictions?

Which further confirms that the Japanese business establishment is not shy of committing money and time to tokenisation, and that collaboration comes easily to Japanese companies.

Indeed, it is the participation of traditional, regulated financial institutions – banks, securities houses and asset managers – in a variety of collaborative ventures, and not start-ups, that is driving progress in tokenisation in Japan.

While it is tempting to conclude that the authorities and business are approaching the token opportunity in the same way that the Ministry of International Trade and Industry (MITI) and the keiretsu approached the re-industrialisation opportunity after 1945, that would not do justice to the reactive, pragmatic and flexible nature of developments by both the public and the private sectors since the demise of Mt. Gox.

Besides, not everything that happens in Japan is sui generis. The bias to real estate and bonds in the Japanese token market is apparent elsewhere too. So is the lack of progress in creating secondary as opposed to primary markets, though the ODX START market (already live) and the JPX security token trading platform (scheduled to start in April 2025) show the opportunities and the benefits of secondary market trading are well-understood.

The principal lesson for other jurisdictions of the Japanese experience of tokenisation is not the intensity of the collaboration between domestic financial institutions, regulators and policymakers but openness.

In fact, the principal lesson for other jurisdictions of the Japanese experience of tokenisation is not the intensity of the collaboration between domestic financial institutions, regulators and policymakers but openness. The presence in the Japanese market of one leading foreign supplier of tokenisation technology (Securitize) is one instance of this. It proves that the country is not closed to outsiders.

But openness is especially true of the two leading tokenisation platforms, both of which have opened themselves to new shareholders and both of which are soliciting business from issuers and investors throughout Japan. One even encourages third party developers to contribute to the development of the platform in a way that echoes the pioneering years of the Internet of the early 1990s. That is the unexpected lesson of tokenisation in Japan: the market is working, not because it is collaborative, but because it is open.

Security Token Issues in Japan Since the FIEA Law Changed in May 2020

2020

October 2020: The first issue under the new law was an equity issue for SBI Holdings subsidiary SBI e-sport, a firm managing esports platforms, for JP¥ 50 million on the iBet for Fin blockchain built by BOOSTRY. SBI, a 10 per cent shareholder in BOOSTRY, underwrote and distributed the tokens to third party investors.

2021

February 2021: Daiwa subsidiary Fintertech issues one month tokenised bonds on behalf of Daiwa Securities (JP¥ 10 million) and Daiwa Food and Agriculture (JP¥ 1 million) to Daiwa Securities Group on Liquid Network as part of trials of the Bitcoin Lightning network sidechain to prove that digital money can be used to pay interest and redeem bonds.

April 2021: Sumitomo Mitsui Trust Bank issued a security token backed by credit card receivables using Securitize tokenisation technology. It was the first security token to receive an investment grade rating (A-1).

April 2021: SBI Securities, the brokerage arm of SBI Holdings, issued a JP¥ 100 million short-term bond on to the BOOSTRY iBet for Fin blockchain, acting as sole underwriter and distributor. An unusual feature was that any buyer of a JP¥ 100,000 denomination bond with an account at the SBI VC Trade cryptocurrency trading arm of SBI Holdings also received 10 XRP, the native token of the XRP Ledger and the cryptocurrency used by the Ripple payment network.

April 2021: Osaka Digital Exchange Co., Ltd was founded by a consortium of SBI Proprietary Trading System (PTS) Holdings (59 per cent), Sumitomo Mitsui Financial Group, Nomura Holdings, Daiwa Securities Group and CBOE Worldwide Holdings Limited. It started trading conventional securities through a PTS and on Christmas Day 2023 opened the START securities token secondary market for trading.

July 2021: A JP¥2.8 billion asset-backed real estate token issue is the first to be offered using the Progmat token issuance and servicing platform built and owned by Mitsubishi UFJ Trust and Banking Corporation (MUFG). The operator was Kenedix Asset Management, a major Japanese real estate fund manager; Nomura Securities acted as distributor and custodian of the physical assets;

SBI Securities also acted as a distributor; and MUFG was trustee and custodian of the private keys to the tokens.

November 2021: Progmat hosts the JP¥ 800 million tokenisation of a logistics facility on Rokko Island, operated by Mitsui & Co.'s asset management arm. SBI Securities acted as distributor.

2022

February 2021: Daiwa February 2022: JP¥ 2.1 billion of student accommodation is tokenised through Progmat, operated by Kenedix Asset Management, and distributed by Daiwa Securities and SMBC Nikko Securities.

February 2022: A hot spring facility in Kusatsu is tokenised through Progmat, raising JP¥ 4.2 billion. Mitsui & Co.'s asset management arm acted as operator and Nomura Securities as distributor.

April 2022: Japan Exchange Group (JPX) announces plans to launch a security token market in April 2025.

May 2022: Three residential real estate properties in Tokyo are tokenised through Progmat, raising JP¥ 3.0 billion. Mitsui & Co.'s asset management arm acted as operator and SBI Securities as distributor.

June 2022: JPX Research Institute (part of the JPX group) issues a JP¥ 500 million Green Tracking Bond though the BOOSTRY tokenisation issuance and servicing platform.

July 2022: A logistics facility in Atsugi is tokenised through Progmat with a valuation of JP¥ 15.0 billion. The operator was Kenedix Asset Management, and the distributor was Daiwa Securities.

September 2022: Japanese retailer Marui issued tokenised one-year bonds worth JP¥ 120 million to card holders, using Securitize technology.

November 2022: Three residential real estate properties in Tokyo are tokenised through Progmat, raising JP¥ 5.2 billion. Ichigo Asset Management acted as operator and SBI Securities as distributor.

2023

April 2023: A hot spring facility in Sapporo is tokenised through Progmat, raising JP¥ 7.7 billion. The operator was Kenedix Asset Management, and the distributor was Daiwa Securities.

April 2023: Sony Bank agreed with Sumitomo Mitsui Trust Bank to offer tokenised real estate from the Sony Bank portfolio to Sony Bank clients, using tokenisation technology from Securitize.

May 2023: Accommodation in Maihama worth JP¥ 12.9 billion is tokenised through Progmat. The operator was Kenedix Asset Management, and the distributor was Daiwa Securities.

May 2023: Residential real estate in Nihonbashi worth JP¥ 3.1 billion is tokenised through Progmat. Mitsui & Co.'s asset management arm acted as operator and distributor.

May 2023: Residential real estate in Komagome worth JP¥ 2.0 billion is tokenised through Progmat. Marubeni's asset management arm acted as operator and SBI Securities as distributor.

June 2023: A logistics facility in Tokorozawa worth JP¥ 13.0 billion is tokenised through Progmat. The operator was Kenedix Asset Management, and the distributor was Daiwa Securities.

July 2023: Residential real estate in Tokyo worth JP¥ 6.9 billion is tokenised through Progmat. The operator was the asset management arm of Ichigo and the distributor was SBI Securities.

July 2023: Accommodation in Kyoto/Sanjo worth JP¥ 1.1 billion is tokenised through Progmat. Mitsui & Co.'s asset management arm acted as operator and distributor.

July 2023: Tokai Tokyo tokenises real estate income from properties owned by real estate developer Tosei.

August 2023: Accommodation in Riverside 21 East Towers in Chuo ward in Tokyo valued at JP¥ 30 billion is tokenised by Kenedix Asset Management, raising JP¥ 13.4 billion.

September 2023: Accommodation in Atami worth JP¥ 1.4 billion is tokenised through Progmat. Mitsui & Co.'s asset management arm acted as operator and distributor.

November 2023: Residential real estate in Yokohama worth JP¥ 2.5 billion is tokenised through Progmat. Mitsui & Co.'s asset management arm acted as operator and distributor.

November 2023: Residential real estate in Tokyo worth JP¥ 2.9 billion is tokenised through Progmat. The operator was the asset management arm of Ichigo and the distributor was SBI Securities.

December 2023: Okasan Securities issues a JP¥ 2.0 billion tokenised bond through Progmat. Mizuho Securities co-underwrote the bond with Okasan Securities, while Mizuho Bank acted as bond manager and MUFG as custodian bank.

December 2023: Residential real estate in Nihonbashi Ningyocho worth JP¥ 5.0 billion is tokenised through Progmat. Mitsui & Co.'s asset management arm acted as operator and distributor.

December 2023: Hitachi issues JP¥ 10.0 billion of "digitally tracked green bonds" using the ibet for Fin blockchain network developed by BOOSTRY as registry. Nomura Securities Co., was the sole underwriter and distributor, Mizuho Bank the administrator and fiscal agent and MUFG the custodian.

2024

January 2024: Student accommodation valued at JP¥ 7.0 billion is tokenised through Progmat. The asset management arm of Mitsubishi Corporation was the operator and Daiwa Securities the distributor.

January 2024: Accommodation at Maihama valued at JP¥ 12.4 billion is tokenised through Progmat. The operator was Kenedix Asset Management, and the distributors were Daiwa Securities and SMBC Nikko Securities.

February 2024: Office space at Nagoya valued at JP¥ 6.96 billion is tokenised through Progmat. The operator was Kenedix Asset Management, and the distributor was Tokai Tokyo Securities.

February 2024: Daiwa Securities issued a JP¥ 1.0 billion one-year bond through Progmat, paying interest in e-money to Rakuten Edy, a digital wallet popular with investors in Japan.

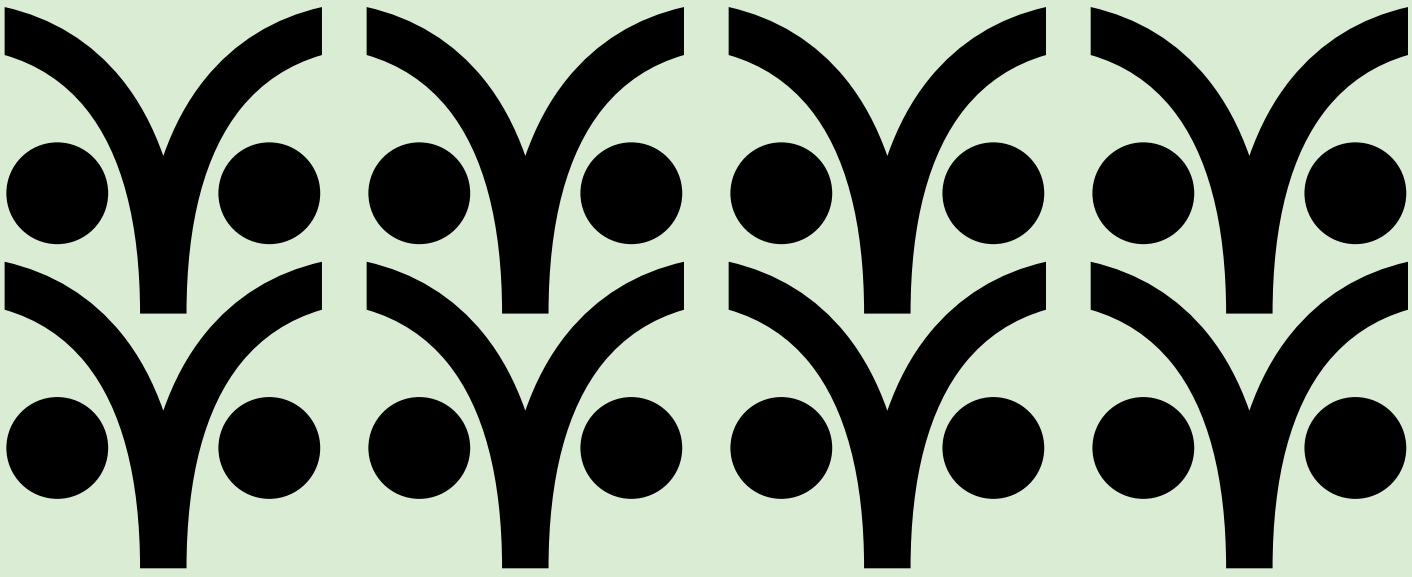
March 2024: Hitachi Construction Machinery Co., Ltd. issued JP¥ 10 billion of five-year Green bonds structured by Daiwa Securities and co-led by Daiwa Securities, Nomura Securities and SMBC Nikko Securities.

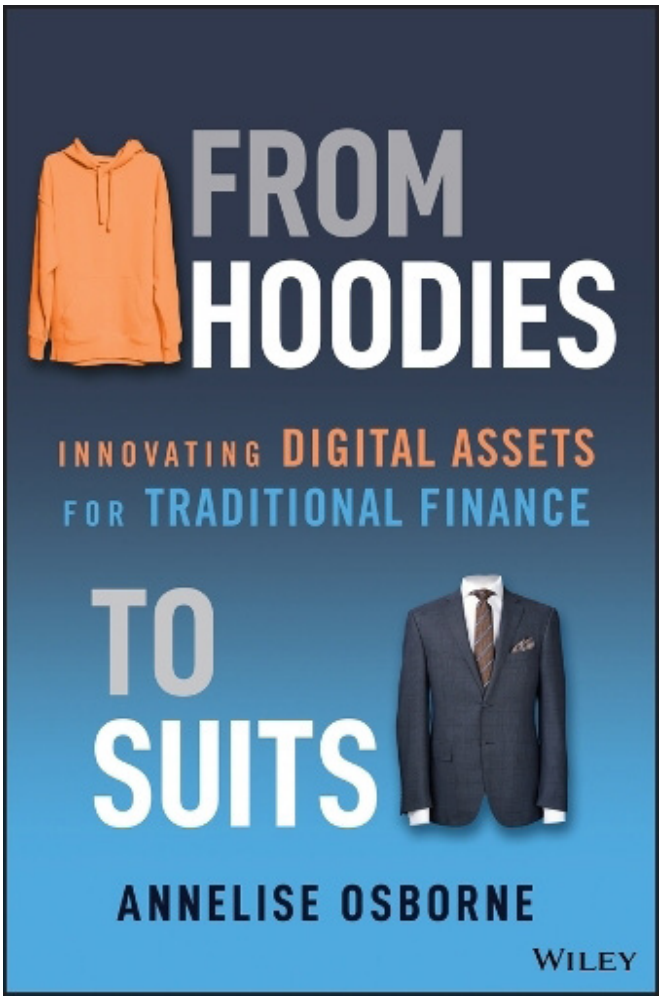
The unexpected lesson of the substantial progress of tokenisation initiatives in Japan is that the market is working, not because it is collaborative, but because it is open.

BOOK REVIEW

From Hoodies to Suits: Innovating digital assets for traditional finance

Annelise Osborne
John Wiley & Sons, June 2024, 272 pages.





There is a big idea at the heart of this book. It is to marry the fearless inventiveness of young developers and entrepreneurs (the constructors of DeFi, or "Hoodies") with the ingrained compliance mentality and long business experience of the old (the denizens of TradFi, or "Suits"). This is a better idea than the deracinated, peer-to-peer financial system that emerged from the Cypherpunk mind of the mysterious Satoshi Nakamoto, since it promises not to circumvent an untrustworthy establishment but to institutionalise innovation at scale.

Annelise Osborne argues that neither the Hoodies nor the Suits can achieve this unaided. "The Hoodies had the foresight, know-how, and community-thinking to build the next iteration of finance," she writes. "The Suits couldn't have pulled that off. Innovation is difficult to develop within a large institution with institutional and status quo thinking." But the Suits can now build on 15 years of experimentation by the Hoodies. "The Suits can take what the Hoodies built and make it more efficient and useable in the regulated financial markets," says Osborne. "Traditional finance is not disappearing. It's being upgraded."

On this view, even the disasters perpetrated by Hoodies, such as the implosion of the Terra/LUNA algorithmic Stablecoin pairing or the collapse of the FTX cryptocurrency exchange, can be seen as useful learnings. After all, neither SBF nor Kwon Do-Hyung had Suits in the room to restrain them. "The Suits could have mitigated so many of crypto's early mistakes," writes Osborne. By this she means better standards of corporate governance, regular audits, investment in cyber-security, risk management processes and (yes) regulation.

An uncomfortable implication is that an US$8 billion fraud (FTX) and a US$50 billion loss (Terra/LUNA) can still provide useful (if expensive) experience. That is true but likely to prove too sanguine for some readers. It also risks underplaying the damage that cryptocurrency crime – which totalled US$113.5 billion between 2018 and end-2023, according to Chainalysis - does to the case for tokenisation of assets. But, as Osborne rightly counters, if the United Nations estimate that 2-5 per cent of global GDP is laundered, cryptocurrency might be just 0.002 per cent of a US$5 trillion problem.

She could go further. Anyone who argues that even legitimate cryptocurrency activity is a clear case of insiders ripping off outsiders will struggle to explain how this outcome differs from traditional finance. Such ironies are not lost on the author. The retail investors exploited by professional cryptocurrency traders buy cryptocurrencies because they do not trust traditional finance. With FTX, a technology that arose in opposition to the moral decay exposed by Bernie Madoff and the 2007-08 financial crisis, experienced its own Lehman Brothers Moment.

In fact, From Hoodies to Suits moves beyond mere ironies. It depicts an Hegelian dialectic in which the establishment is not only going to rescue an anti-establishment innovation from itself but imbibe the anti-establishment innovation so completely that it will reinvent establishment finance. "Bitcoin's root philosophy was to displace the banks, but its blockchain technology has provided banks with an efficient new rail for payment, trading, back office, and transactions, allowing lower costs, increased speed, and transparency," writes Osborne. "It was a framework designed to disrupt Wall Street, but it will actually become the basis of the next generation of Wall Street and capital markets."

> The House that Crypto Built is still standing, and the Suits can give it the upgrade investors deserve.
>
> – Annelise Osborne

But will it? To get to that synthesis, the text has to convince TradFi not DeFi, and Osborne endeavours to do that by pummelling the sceptical reader with overwhelming evidence of advance on every front – Stablecoins, blockchain protocols, dApps, digital wallets, cryptocurrency exchanges, real-world asset tokens, fund tokens, security tokens, smart contracts, interoperability, asset managers engaging, NFTs, the Metaverse and so on – despite reporting an equally wide array of setbacks, Proof of Concept and Pilot Test dead-ends, heists and scams and even the failure of three leading cryptocurrency banks.

"There's money to be made and new ways to make it," predicts Osborne. "Scoff at the Hoodies if that feels good, but they have unleashed technologies that have brought change to finance. Now's the time to decide if you're going to embrace change or fight it and miss out." The incentives to act are the reassuringly familiar pair of fear ("Technological advances are inevitable … and good ideas have a way of coming to fruition with or without you") and greed ("For those brave first movers, there could be trillions of dollars of value to unlock"). Multiple polls record that the leaders of regulated financial institutions agree they face both a mortal threat and a once-in-a-career opportunity. Yet few feel any compunction to act.

The data shows that only a handful of banks and asset managers are committed at all. In the end, even their decision will reduce to a conviction that tokenised assets offer increased sales revenue or lower costs from automation by smart contracts ("the real winner" says Osborne). For now, both gains and savings remain maddeningly theoretical for every established firm save J.P. Morgan, which claims to have saved itself US$20 million a year by using blockchain to automate aspects of securities financing and collateral management. As Osborne admits, financial

institutions running COBOL systems, and under pressure to deliver quarterly increases in earnings, are otherwise struggling to build what they call "the business case" for investing in blockchain.

What will unblock the current stasis, argues Osborne, is the generational transition. Blockchain disappears from the text as she explores the socioeconomic changes, shifting cultural attitudes and altered psychological propensities that will accompany the displacement of the Boomers by the Millennials and Zoomers. The coming generations will spurn 401(k)s backed by mutual funds in favour of tokenised asset portfolios selected by social media influencers using ESG criteria. The assets will be moved instantly into digital wallets using digital money, as in a computer game. Indeed, according to Osborne, the GameStop short squeeze of 2021 is a sign that technology is already altering the balance of market power.

In the long term, Osborne believes that "people will no longer talk about blockchain but will instead recognise and use the increased efficiency and opportunity found in systems, process, securities, investments, and money." It is hard to disagree. But in the short term, the technology actually matters. And what matters about blockchain is not that it is "technically a large, shared database," or that a token issued on to a blockchain is "a digital representation of ownership rights or asset value," or that a digital wallet "represents an account on the blockchain," but that it is none of these things. It is something entirely new.

Blockchain is not a database and nor are tokens digital representations or digital wallets accounts. Tokens issued on to blockchains are something entirely new.

Yielding to the temptation to understand and explain blockchain and its digital asset progeny by analogy with existing systems obscures this newness, by emphasising the continuities. Analogical reasoning reduces blockchain to yet another expression of capitalism as ever-more efficient solutions to the problem of efficiency. The novelties of a virtual computer, and of digital objects, and their ability to simulate anything that exists, are lost. If the revolutionary power of blockchain technology was better understood, the excitement about tokenisation would be commensurately greater. Perhaps Annelise Osborne can bring the enormous energy and enthusiasm that burn on every page of this book to bear on that challenge too.

There's money to be made and new ways to make it. Scoff at the Hoodies if that feels good, but they have unleashed technologies that have brought change to finance. Now's the time to decide if you're going to embrace change or fight it and miss out.

– Annelise Osborne

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