Digital Asset Exchanges Guide

Future of Finance

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Editor's Letter

Traditional exchanges are in danger of missing the point about tokenisation

A quarter of a century ago exchanges were threatened by a technological revolution. The combination of increased computer storage and processing power, plus the Internet, threatened brokers with disintermediation and traditional exchanges with extinction.

The highly intermediated open outcry futures markets, unable to compete on cost with electronic trading, were early victims.

Exchanges are facing their second revolution in a quarter of a century

Electronic trading came to the telephone-based bond markets from 1998, with the launch of Tradeweb. Equity markets were slower, and dependent on regulatory initiatives. The introduction of Reg NMS in the United States in 2005 and the Markets in Financial Instruments Directive (MiFID) in Europe in 2007 spawned dozens of alternative trading venues.

The rapid success of Chi-X Europe, created in anticipation of MiFID, still symbolises the immensity of the changes. Within just three years of launch, it had garnered a fifth of all European equities' trades by the simple device of competing on price.

With electronic trading, and especially with the growing availability of information (including price information) in digital form, the idea of an "exchange" came to seem infinitely extensible.

In the first decade of the 21st century, platforms emerged to enable investors to trade in energy, carbon emissions and the weather, to bet on sports results and to engage in spread-betting (in other words, to gamble on whether the price of an asset will rise or fall). Whether these were "exchanges" or not mattered only to pedants.

But technology did more than question definitions. It did more even than extend activity and divert it from trading floors and telephone networks to computer screens. It exposed exchanges, most of which were originally mutually owned non-profits, for what they then were: high volume, low margin utility businesses.

By lowering the cost of entry, technology made it easier for new entrants to compete with exchanges in some or all of the services that exchanges once monopolised. Chi-X Europe proved that was the case, and the traditional stock exchanges absorbed the lesson.

Traditional exchanges are still living with the consequences of that first revolution

As the content of this inaugural edition of the Future of Finance Digital Asset Exchange Guide (DAEG) confirms, traditional exchanges are still engaged in a long retreat from their beginnings in volume-dependent, low margin trading activities.

As part of that process, exchanges have taken a growing interest in post-trade activities. This was predictable, given that a clear winner from the turmoil at the turn of the century was central counterparty clearing houses (CCPs).

These offered market participants measurable benefits in the netting of trades and the more efficient mobilisation and management of collateral to support them. CCPs have since extended their reach into equities, bonds, foreign exchange and (with a push from the regulators) OTC derivatives such as interest rate and currency swaps.

Naturally, questions of integration arose. Should every exchange have its own CCP or should trades on some or all exchanges pass through a common clearing house? This prompted other integration conundrums. Should cash markets merge with derivatives markets? Should exchanges also own the central securities depositories (CSDs) that settle trades? Should integration be vertical (trading, clearing and settlement in a single entity) or horizontal (trading, clearing and settlement provided by separate entities)?

Market developments have delivered more than one answer to these questions over the last 25 years. Exchanges, CCPs and CSDs have merged, sometimes vertically and sometimes horizontally.

Technology-induced change tends to be like that: untidy, though never chaotic. Which is why the events of the turn of the century remain relevant today. Exchanges are once again facing the threats and the opportunities created by another technological change – namely, the third iteration of the Internet, or Web 3.0.

What Web 3.0 means for traditional exchanges

Web 3.0 is a catch-all term for moving the Internet from its Babylonian captivity by large, closed and centralised technology companies to open, decentralised, peer-to-peer networks.

What Web 3.0 means for exchanges is adapting to capital markets characterised by the issuance, trading and servicing of tokens on blockchain networks between digital wallets controlled by individual investors identified by digital identities.

Importantly, the tokens must be "native." If tokenisation is restricted to "asset-backed" tokens or "digital twins" – in other words, the underlying equity or bond or other assets continues to exist in its original form – its potential to disrupt incumbent exchanges will be limited.

But if issuance and trading of financial assets take place on blockchain networks in "native" form only, traditional exchanges will find their occupation is going and then gone.

Despite the existential nature of this threat, a consensus has developed at exchanges in favour of an incremental approach, of which the chief component is a blockchain-based infrastructure for privately managed assets.

As the cover story in this Guide explains, it is an understandable reaction to the tokenisation challenge, since it staunches a source of lost business and fits with what exchanges are doing already in other ways. But it ignores an important aspect of the promise of Web 3.0 – the restoration of the retail investor.

Some neo-exchanges are alive to this issue. They have focused on hosting tokenised private equity funds and reducing the minimum subscription amount to levels - the lowest Future of Finance has identified is US$1,000 – that retail investors can afford.

It makes use of a feature of token technology (fractionalisation) and appeals to asset managers (who widen their distribution) but it still leaves a great deal of intermediation in place between the assets and the investors, which is a contradiction of the promise of Web 3.0.

The future of stock exchanges might be retail, not institutional

But the greatest risk for exchanges of a limited approach is not a lack of technical purity. It is ignoring a generational change.

There is a reason Millennials and Gen Z are big buyers of cryptocurrencies rather than equities, bonds and mutual funds. The current infrastructure for traditional financial assets does not appeal to or work for younger investors.

Those younger investors have also noticed the half-hearted efforts of traditional exchanges to embrace blockchain, tokenisation and Web 3.0. They use other organisations, which are more committed.

The most respectable cryptocurrency exchange, Coinbase, did not exist 12 years ago. But in 2023 it had 105 million registered users, of which eight million transact at least once a month.

The company is worth US$50 billion, which is the same as the 223-year-old London Stock Exchange Group and greater than Deutsche Börse AG. Coinbase has infrastructure, value and above all scale, and among retail consumers too.

So the question posed by Ruben Lee in a seminal study of what was happening to exchanges at the turn of the 20th century - namely, "What is an exchange?"[1] – is being posed once again, and in an acute and urgent form, by the blockchain-based networks that host cryptocurrencies and security and fund tokens.

Of the five coin and token platforms interviewed in this Guide, only two are certain that they can even be properly described as "exchanges."

Yet all of them are engaged in one or more of the activities that any informed observer would regard as intrinsic to an exchange: raising capital in a primary market or setting a price for capital in a secondary market.

This is true of every neo-exchange in the cryptocurrency or security token or fund token market. Yet these exchanges have also extended the idea of what an exchange can be and do.

Coinbase has enabled retail investors to buy and sell cryptocurrencies and utility tokens (it lists 392) but it also offers its users custody, yield-enhancing staking and lending services, and even banking services such as cash management and the provision of credit.

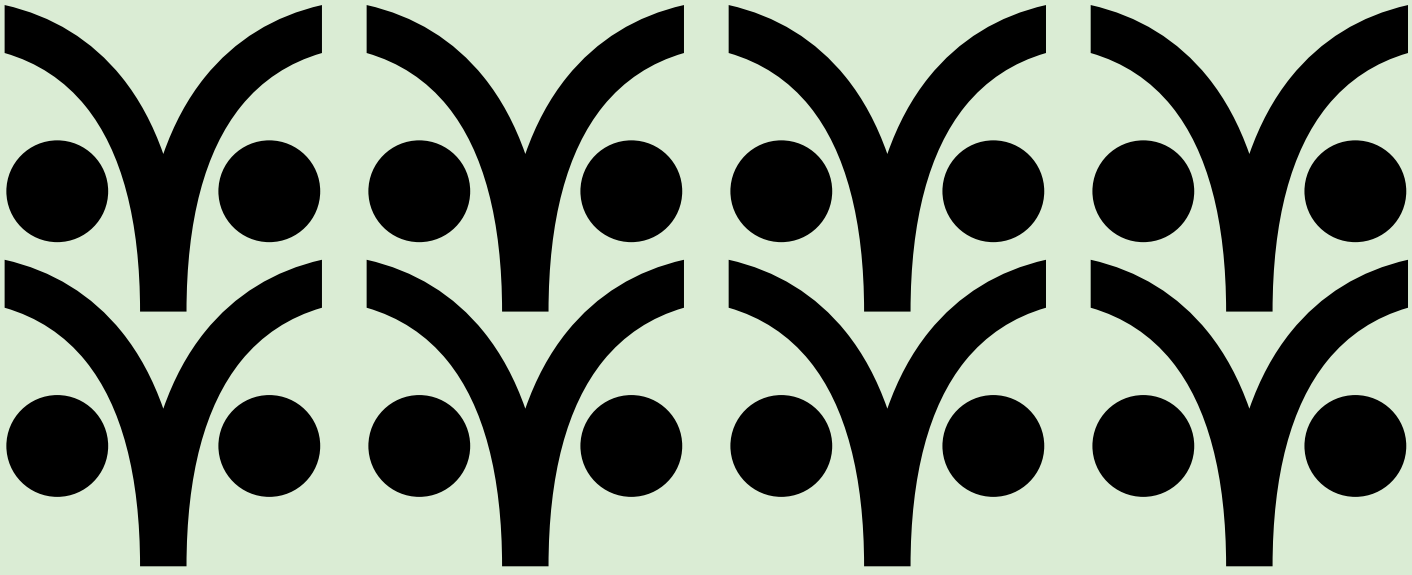
1. Ruben Lee, What is an Exchange? The Automation, Management, and Regulation of Financial Markets, Oxford University Press, 1998.

Decentralised exchanges (DEXes) such as Uniswap may be more ascetic, but they too offer peer-to-peer marketplaces for retail holders of cryptocurrencies.

It is always hard to make sense of what is going on when events are still unfolding. In this case, it is made doubly hard by the need to believe that the future of finance is being scripted in the troubled cryptocurrency and Decentralised Finance (DeFi) markets, rather than by the adaptation to technological change of the traditional financial services industry.

The subject of our book review in this issue makes a spirited case for "crypto" as still the true source of innovation. If she is right, that will reinforce the fear of some traditional exchanges, but also the complacency of others. Either way, I hope our efforts in this Guide illuminate at least a part of the world that is struggling to be born.

BX Digital believes that open ecosystems are the key to token market growth



No traditional stock exchange group in Europe has done more to embrace cryptocurrencies and digital assets than the Börse Stuttgart Group (BSG). Investors can trade the leading cryptocurrencies not just on the regulated Börse Stuttgart Digital Exchange but via its app-based retail broker BISON. The entrepreneurial approach of BSG is now being extended to Switzerland, where the company first expanded via the acquisition of the BX Swiss stock exchange in Zurich in 2017. BSG sees in Switzerland an opportunity to develop secondary market trading, not just of cryptocurrencies but of tokenised securities. In 2022 BX Swiss took part in a proof-of-concept organised by the Swiss Capital Markets Technology Association (CMTA), in which tokenised securities were traded on BX Swiss and trades settled in Swiss francs via a blockchain[1] but it has since moved into full delivery mode. In May 2023, BX Digital was set up to offer institutional and retail investors a regulated blockchain trading system. Dominic Hobson spoke to Andreas Ruflin, Chief Digital Officer, BX Digital, about the strategy to convert cryptocurrency investors into token investors.

Hobson: **Who owns your organisation, what are their expectations and how do they support your strategy?**

Ruflin: BX Digital is owned by Börse Stuttgart Group (BSG), the sixth largest exchange group in Europe. BSG has a strong franchise in traditional capital markets. BSG is strategically extending its comprehensive cryptocurrency trading, brokerage and custody offering towards digital assets (what it calls Distributed Ledger Technology (DLT) securities), launching in Switzerland and expanding towards Europe. There is very close collaboration and strong synergy between BX Digital and BSG.

Hobson: **Is it accurate to describe your organisation as an "exchange" where buyers meet sellers on your platform, as opposed to, say, investors meeting issuers as principal?**

Ruflin: From a business point of view, that is correct. You can speak of an exchange in the meaning of running an order book where supply meets demand in investment products and market makers

1. See Capital Markets Technology Association, Proof of concept for the issuance, trading and settlement of tokenised investment products, December 2022.

provide continuous liquidity between investors trading amongst each other in the secondary market. From a regulatory point of view BX Digital is called a "DLT trading facility," as the term "exchange" is a word reserved for traditional centralised exchanges.

Hobson: You have explained that your focus is on secondary market trading and not primary market capital-raising. What are the reasons for this?

Ruflin: Secondary markets, trading and liquidity, are our DNA. Capital-raising has been traditionally the job of banks. In the future this role may be more and more driven also by the issuers themselves.

Hobson: You have described your operating licence as a "financial market infrastructure" licence. Exactly what does this licence entitle you to do in terms of both instruments and activities and accredited investors?

Ruflin: We will focus on tokenised equity, bonds, exchange traded products and derivatives without leverage. Trading participants will be regulated entities such as banks and securities dealers. The instrument universe will be expanded towards instruments which are not comparable to traditional securities.

Hobson: Are you seeking additional operating licences?

Ruflin: We have filed for a DLT trading facility license from the Swiss Financial Market Supervisory Authority (FINMA). It is pending approval now.

Hobson: Your blockchain network is "public" rather than "private" or "public permissioned." What explains your choice?

Ruflin: A larger ecosystem, more interoperability, more liquidity, more services. In an "open (source) world," people can build services on top of each other and exponentially magnify the value of the overall system.

Hobson: Which blockchain protocol do you use?

Ruflin: Ethereum and we are assessing alternative, additional blockchains.

Andreas Ruflin

Chief Digital Officer at BX Digital

Hobson: **Do you work with a particular technology vendor?**

Ruflin: Our trading system is based on what we already have in BSG. Custody is provided by our trading members. The on-chain settlement infrastructure is custom-built.

Hobson: **In terms of the services you provide, issuance and settlement are on the public blockchain but registration and trading are not. Could you explain this division of labour between systems?**

Ruflin: The order matching is taking place on our central order book. Settlement is done via DVP on public blockchain directly peer-to-peer between our trading members' wallets.

Hobson: **How do transactions settle? Is it "atomically"? And how do you deal with the cash leg of settlement? Is it off-chain via the conventional banking system, cash on-chain in tokenised form, or by direct or indirect connections to central bank Real Time Gross Settlement systems (RTGSs)?**

Ruflin: The cash leg is cleared and settled via the Swiss Interbank Clearing (SIC) payments system which our system can instruct directly because we are a member of the Swiss National Bank SIC system.

Hobson: **Do your issuance services include offering or writing smart contracts?**

Ruflin: No. Tokenisation is done by other providers in the ecosystem. This increases the overall value of the ecosystem, as tokenisation partners can come from various asset classes, regions and origins to provide services.

Hobson: **Do you provide financial advisory services to issuers?**

Ruflin: No.

Hobson: **You have described the type of issuers you seek as "regional." Does that mean Europe or German-speaking Europe?**

Ruflin: Given the fact that we start with settling in Swiss Francs (CHF) via SIC, and tokens have to be issued as ledger-based securities as defined by Swiss law, issuers will be more Swiss-centric. However, our regulations allow issuers to come from abroad. We have the ambition to scale our offering into Europe supported by our mother company, BSG.

Hobson: The types of issuers you seek includes companies and issuers of investment products and funds. What explains your choice of targets?

Ruflin: Our choice is driven by what we know we can create a liquid market for. However, we are also looking at fully new types of securitisation, such as direct ownership of fungible assets.

Hobson: You have described liquidity as "very important" rather than "crucial," which is counter-intuitive for a secondary market. Can you explain your reasoning?

Ruflin: Liquidity is crucial. However, as a marketplace, our primary task is to provide a technology platform upon which trading members and market makers can provide their liquidity pools.

Hobson: Which type of market makers are you targeting as partners of your exchange – do you also look for automated market-makers (AMMs)?

Ruflin: At the start, we will add traditional market makers who understand the specific characteristics of the asset classes. AMMs are not foreseen at the moment.

Hobson: What types of investors do you think will be most interested in trading tokens on your exchange? Will this encompass mainly retail or also professional and institutional investors such as family offices, asset managers and even pension funds?

Ruflin: We get interest from both the retail and the institutional side. But our business model consists of going via the banks which then go to the investors, so we do not speak to the investors ourselves directly. We reach investors our trading members, which we attract by leveraging existing connectivity and our trusted position within Europe. Ultimately, what is most important to us now is the type of issuers and banks that connect to our exchange, since they bring the investors to us.

Hobson: Your choice of target asset classes (equity, bonds, exchange traded products and derivatives) without leverage derivatives is fairly comprehensive. But which of these asset classes are you focused on in the short term?

Ruflin: Equity is the primary focus in the short term.

Hobson: You have chosen not to provide custody services directly or work with a particular third-party custodian but to allow customers to use their own wallets. Why is that?

Ruflin: Custody is provided by our trading members and is not our traditional capacity. We believe in a decentralised, open ecosystem set-up, where custody should be as close as possible to the investor who can choose the right solution for them. We are not positioning ourselves as a central securities depository (CSD).

Secondary markets, trading and liquidity, are our DNA. Capital-raising has been traditionally the job of banks. In the future this role may be more and more driven also by the issuers themselves. The instrument universe will be expanded towards instruments which are not comparable to traditional securities.

Hobson: How is client cash handled by your organisation? Is it commingled with proprietary funds or held by an independent third-party bank?

Ruflin: As we do not offer custody, we do not need to handle cash. There is no need for pre-funding of accounts.

Hobson: What industry accreditations - such as International Standard on Assurance Engagements (ISAE) certificates- has your organisation secured?

Ruflin: We are promoting some tokenisation standards, such as the Capital Markets and Technology Association Token (CMTAT) framework in Switzerland.

Hobson: Your timetable to success (3-5 years) is not long but not short either. Are you fully funded for that timescale?

Ruflin: Börse Stuttgart is funding BX Digital with a long-term strategic plan. We are growing step by step, delivering and expanding our services, along our strategic roadmap.

What traditional stock exchanges need to do now

Massimo Butti

Over the near 20 years that have elapsed since Reg NMS and MiFID 1 overturned the traditional model of securities listing and trading, stock exchanges have had to cope not only with the fragmentation of liquidity but with the increasing power of digital technology and the digitised data it can consume, process and distribute. With the emergence of tokenised assets issued on to blockchain networks, the forces of technology and data have combined to present exchanges with the greatest threat-cum-opportunity they have ever faced. Looking at the European landscape, Massimo Butti, former Head of Equities at SDX, points to where the real opportunity lies.

The stock exchange business model, which was traditionally geared to transactional activity, has undergone significant transformation since the days of the first demutualisations in the 1990s and early 2000s. Major exchange groups in Europe have diversified vertically. Their revenue streams are now less dependent on Initial Public Offerings (IPOs), listings, and transactional activities on "lit" markets that advertise their best bid and offer prices.

The importance of data to the changing business model of traditional stock exchanges

Revenues are now more dependent on data, data analytics, benchmark indices, and pre- and post-trade services. This has significantly broadened the scope of exchange operations. Exchanges, which once focused solely on raising capital and facilitating trades, now offer a plethora of products that include rapid price discovery and execution, risk management, regulatory reporting, investment services, custody and clearing. The benefits for customers include substantially enhanced capital efficiency and regulatory compliance.

But data has become the most significant revenue driver for exchanges. The London Stock Exchange Group (LSEG), for example, is capitalising on the demand for data analytics and benchmark indices. It has boosted its data revenues through the acquisition of FTSE International Limited in 2011, Yield Book in 2017 and Refinitiv in 2021. Likewise, Deutsche Börse bought out the SIX Group share in STOXX in August 2015, adding it to its existing DAX products and amalgamating both with the analytical capabilities of Axioma in 2019. In 2022 the German exchange added the Kneip fund data business in Luxembourg and in 2023 the Danish asset management software company SimCorp, with the aim of using its client base to distribute data and data analytics products.

Data sales are expected to continue to grow for exchanges for the foreseeable future, despite recurrent buy-side complaints about the high cost of purchasing data their transactional activities have helped to create. While exchanges face competition from independent data

vendors such as Bloomberg, FactSet, MSCI and S&P Global, revenues will remain healthy, driven by the demand from algo traders and artificial intelligence (AI) and machine learning (ML) trading models that consume vast amounts of data and by the index providers supporting passive investment products. Environmental, Social and Governance (ESG) investment strategies are also creating a new demand for high-quality, curated data. The appetite for fixed income data, which was previously patchy and hard to obtain, is also increasing.

The attractions of post-trade clearing and settlement services

Post-trade services are the other principal new source of growth for exchanges. Exchanges are responding to buy- and sell-side demand for tools to manage counterparty risk and optimise capital usage following the introduction of regulatory requirements aimed at moving Over the Counter (OTC) derivatives transactions to centralised clearing through Central Counterparty Clearing Houses (CCPs).

LSEG has gradually increased its majority stake in LCH, the London-based CCP for equities, fixed income, commodities, foreign exchange, repo and swaps, to 82.6 per cent. Deutsche Börse has controlled the Eurex derivatives exchange and its Eurex Clearing CCP since 2012. The 2020 purchase by pan-European share trading platform Cboe Global Markets of EuroCCP (now Cboe Clear Europe) from its four shareholders - Euronext, Nasdaq, ABN Amro and The Depository Trust & Clearing Corporation (DTCC) - was a further sign of the importance of clearing revenues to exchange groups.

The shortening of settlement cycles is also increasing awareness among market participants of the risks and costs (in terms of fines and buy-ins) of failing to settle transactions on time. Europe moved to settlement on trade date plus two days (T+2) in 2014 and, following the switch in the United States to settlement on trade date plus one day (T+1) in May 2024, is now on course for a T+1 or even T+0 timetable. This is creating opportunities for exchanges that own central securities depositories (CSDs) to reassure buy- and sell-side firms that the risks can be managed.

Though LSEG had to sell Monte Titoli, the Italian CSD, as part of the terms for acquiring Refinitiv, the exchange continues to settle FX trades. Deutsche Börse, which has owned Clearstream, which controls the German CSD as well as the Luxembourg-based Clearstream international CSD (ICSD), since 2002, now earns nearly a third of net revenues from securities services. These encompass not just settlement and custody of securities, but sophisticated services designed to increase the efficiency of cash and capital usage through collateral mobilisation and management.

The shifts away from listing and trading to data and post-trade services are reflected in the revenue mix of exchanges. At LSEG, the Data and Analytics segment revenues in 2023 accounted for 66 per cent of total revenues and the Post Trade segment for 15 per cent. Capital Markets, including the FXAll and TradeWeb platforms that came with the Refinitiv acquisition, accounted for only 19 per cent of total revenues. Likewise, Deutsche Börse reported a 32 per cent year-on-year increase in their data and analytics business in 2023 and a 35 per cent surge in securities services, while cash equity trading declined by 15 per cent. Even at Euronext, which still derives nearly half its revenues (48 per cent) from trading and listing, the combined revenues from data and post-trade are growing and reached 40 per cent of the total in 2023.

The dangers for exchanges that cling to the models of the past

The strategic direction of LSEG, Deutsche Börse and Euronext looks smart by comparison with those exchanges that have not managed to pivot into more lucrative services and continue to depend on transactional revenues for their survival. For them, the landscape promises to fragment further. Operators of "lit" markets face competition from "dark pools," Multilateral Trading Facilities (MTFs), Organised Trading Facilities (OTFs) and – following the passage of the second iteration of the Markets in Financial Instruments Directive (MiFID II) - the emergence of Systematic Internalisers (SIs) as well. Infinitely scalable algorithms, smart order routers, and the wide availability of hyper low-latency markets has made High-Frequency Trading (HFT) volume less sticky, increasing competition between exchanges for volume and compressing their margins across asset classes and products.

The spike in primary markets activity - the bread-and-butter business of traditional exchanges and the main pillar of their capital-raising franchises - witnessed in 2020-21 has not sustained itself. Instead, IPOs have settled back into a volatile pattern, with many companies opting to stay private for longer or, in certain cases, even de-listing to escape rising regulatory compliance and governance costs and to take advantage of a private equity industry flush with funds. Moreover, local and regional exchanges in Europe and other parts of the world have seen reduced revenue not just from IPOs and listings but in secondary market activity, due to aggressive marketing by American and Asian venues, which are luring companies outside their home markets and capturing a disproportionate share of listing activity.

Tokenisation: Is it an opportunity or a threat?

So, what is the way forward for exchanges that have not managed to adapt their business model to the changed environment, lack either a viable data business or post-trade capabilities, and continue to rely primarily on transaction revenues that not only fluctuate in line with trading volumes and competition from other regions but are experiencing increasingly compressed margins?

Tokenisation is one opportunity they can exploit. The future is still open to the establishment of a competitive edge in this new area of financial market infrastructure. The winner will be the organisation that can better adapt to evolving market demands, including the largely untapped potential for tokenisation of securities, funds and other assets, and the probable convergence of Decentralised Finance (DeFi) as a whole with Traditional Finance (TradFi).

The issuance of tokenised assets on to blockchain networks has already created several challengers to traditional stock exchanges, ranging from cryptocurrency exchanges to specialist security and fund token venues. Although they are still small and largely unregulated, these venues have the potential to compete with incumbents by offering easier access to both mainstream and alternative asset classes in innovative ways. They are already spawning entire ecosystems around specific types of tokens and developing new models of liquidity.

While it is true that a perceived lack of regulatory clarity is not conducive to the launch of large scale blockchain initiatives by financial market infrastructures (FMIs) of any kind in Europe – it is

no longer true to say that regulatory uncertainty is a barrier to entry. In the European Union (EU), the Markets in Crypto-Assets Regulation (MiCAR) is coming into force in the second half of 2024.

Although work is still necessary to decide if a particular token is governed by MiCAR or not, the Regulation provides a considerable degree of regulatory certainty over cryptocurrencies and Stablecoins. From December 2024 Crypto-Assets Service Providers (CASPs) can be authorised to provide services as regulated enterprises. The EU securities regulator, the European Securities and Markets Authority (ESMA), has also launched a Distributed Ledger Technology (DLT) Pilot Regime to provide a "sandbox" for FMIs to experiment in the provision of token trading, clearing, settlement and custody services. While it is true that no authorisation has been granted yet, ESMA has received applications from four FMIs that are likely to compete with incumbent FMIs for a share of the tokenised asset markets.

More progressive traditional exchanges in Europe such as SIX Group have long since recognised the disruptive potential of blockchain and have outpaced competitors by launching Swiss Digital Exchange (SDX), which offers fully regulated issuance, trading and settlement services to issuers and investors active in tokenised securities. SDX is collaborating closely with both regulators and members to modernise the Swiss marketplace, expanding into Asia with a local partner (AsiaNext) and helping clients invest in cryptocurrency derivatives as well as security tokens.

In addition, SDX provides a hedge for sell-side incumbents against the possibility of disintermediation because its digital asset offerings can be integrated easily into the current market infrastructure while offering the additional benefit of atomic settlement (in which one leg of a transaction settles only if the other leg settles simultaneously) in wholesale central bank digital currency (wCBDC). Project Helvetia, in which SIX works with the Swiss National Bank (SNB) and the Bank for International Settlements (BIS) Innovation Hub to explore how tokenised assets can be settled on a blockchain in central bank money, has already passed through three phases and was in June 2024 extended for a further two years. This could pave the way for a major upgrade of the Swiss bond issuance and repo market infrastructure and eventually precipitate a shift into a full blockchain architecture that supports atomic settlement of bonds and repo in wCBDC.

The SDX cryptocurrency staking service, on the other hand, offers institutional clients that hold cryptocurrencies easy access to a new source of revenue. While cryptocurrencies remain a small market (the total market capitalisation was just US$2.13 trillion in August 2024[1]) by comparison with the traditional global equity (US$115.02 trillion at end-2023[2]), debt capital (US$140.7 trillion) and mutual fund (US$74.56 trillion in Q1 2024[3]) markets, they do provide useful experience of DeFi and will help forward-looking exchanges manage the convergence with traditional capital markets.

This convergence play is clearly evident in another Swiss initiative: Rulematch, a spot cryptocurrency trading venue for financial institutions. It uses the same technology and matching engine as traditional exchanges, replicating the same market structure with a central order book and identical rules. Similarly, Deutsche Börse has launched a regulated spot platform for

1. https://coinmarketcap.com/
2. SIFMA, 2024 Capital Markets Fact Book, July 2024.
3. Investment Company Institute, Worldwide Regulated Open-End Fund Assets and Flows, First Quarter 2024.

cryptocurrencies, Deutsche Börse Digital Exchange (DBDX), on which they will develop a complete cryptocurrency ecosystem and value chain for institutional trading, settlement, and custody.

The settlement and custody services are provided to DBDX by another Deutsche Börse acquisition, Crypto Finance, which is a provider of trading, custody and investment services for cryptocurrencies. Based originally in Switzerland, where it is regulated by the Financial Market Supervisory Authority (FINMA), Deutsche Börse acquired the company in December 2021. The DBDX-Crypto Finance combination can be expected over time to develop into the provision of services to the security and fund token markets.

Ultimately, the potential of digital assets is as large as the existing securities and funds markets. However, the long-term impact of tokenisation, especially on traditional central limit order book (CLOB) revenues, remains uncertain.

In the United Kingdom, LSEG announced in September 2024 the intention to use blockchain to build an end-to-end digital market ecosystem to raise and transfer capital across asset classes. However, the service might be available to professional counterparts only. The truth is that, thanks to the increased efficiency of equity trading since the passage of Regulation National Market System (Reg NMS) in the United States in 2005 and the first iteration of the Markets in Financial Instruments Directive (MiFID 1) in Europe in 2007, tokenisation is highly unlikely to disrupt blue-chip equity activity on CLOBs.

However, tokenisation could have a more significant impact on the less liquid – even illiquid - corporate bond markets and the seemingly ever-expanding universe of Exchange Traded Funds (ETFs) and other Exchange Traded Products (ETPs). The news in May 2024 that Tradeweb Markets, the fixed income trading platform owned by LSEG, was working with a blockchain technology vendor founded by former PIMCO employees that has experience of using blockchain in the fixed income markets (Alphahedger) and had invested in the tokenisation engine provider Securitize, is a further indication that tokenisation may have effects in the bond markets earlier than in the equity markets.

In continental Europe, exchanges have identified post-trade services as the most promising area for the application of blockchain, notably in the funds industry. In 2023, the Luxembourg-based FundsDLT blockchain-based transfer agency service developed by the Luxembourg Stock Exchange was acquired by Deutsche Börse and folded into the Clearstream Funds Services order routing service while also offering full digitisation of security issuance through their D7 service. Clearstream rival Euroclear, which owns the FundSettle mutual fund order-routing platform, in July 2023 acquired Goji, which specialises in private market funds. Though these CSD services increase transparency and transferability of assets it is not yet clear how they can attract sufficient order flow and develop liquidity to support CLOB markets.

Are private assets the real tokenisation opportunity?

With a few notable exceptions, the opportunities in conventional equity, debt and fund markets all involve leveraging blockchain technology to enhance or re-platform existing exchange processes. Many of these are already in need of upgrades. But, while these improvements will doubtless yield

benefits through more streamlined interfaces and shorter settlement windows, they are likely to fall short of fully harnessing the transformational potential that blockchain offers to FMIs.

The challenges of managing the transition to blockchain-based markets will be complex but not insurmountable. In exploiting the opportunities, exchanges must ensure that the economic incentives of the various participants in the eco-system are aligned. Users of exchange services, especially on behalf of clients, will naturally be sensitive to any suggestion that exchanges threaten them with disintermediation. To maintain their support, exchanges will have to convince clients that their role remains infrastructural rather than client-facing.

Secondly, exchanges must ensure that the various systems deployed are interoperable and that integration is as seamless as possible, not just between legacy systems and blockchain systems, or between tokenised asset markets and traditional equity, fixed income and fund markets, but across the pre-trade, trade and post-trade functions as well.

Operating across tokenised as well as traditional markets will present exchanges with unfamiliar challenges. The centralised liquidity pools of a traditional stock exchange operate in a different way from the decentralised liquidity pools of the tokenised future. Mastering the differences is complicated by the fact that traditional markets are highly regulated, while the regulation of tokenised markets is still developing.

Which is why many believe that the best long-term opportunity - for exchanges lies in using blockchain to capture privately managed assets. Private markets could be viewed as a "green field" opportunity for exchanges to bring their expertise in managing highly standardised markets to the fragmented reality of private assets.

Though made up of multiple asset classes – real estate, private credit, private equity, infrastructure and alternative assets – private markets are large (McKinsey put private markets assets under management at end-June 2023 at US$13.1 trillion).[4] But they are also fragmented and, thanks to a lack of infrastructure, suffer from scalability and liquidity shortcomings.

According to BCG, the market for tokenised private assets could grow to US$16 trillion by 2030,[5] representing 10 per cent of global Gross Domestic Product (GDP). Yet they may not be a particularly attractive opportunity for exchanges. Privately managed assets are inherently illiquid and do not trade frequently. The lack of transparent valuations and efficient price discovery mechanisms, extended ownership chains and complex regulatory compliance obligations all contribute to this illiquidity. Superficially, exchanges ought to be sceptical about an asset class that generates few transactions, and which will struggle to develop economies of scale through trading frequency and volume.

However, the opportunity can be viewed from another perspective. The best chance in privately managed assets might lie not in generating revenue from a high volume of secondary market transactions and distribution to new classes of investor but in using blockchain to create a new ecosystem that solves some of the problems holding back their democratisation. Effective integration with existing financial infrastructure, creating complete interoperability and fungibility

4. McKinsey Global Private Markets Review 2024: Private markets in a slower era, 28 2024.

5. BCG, Relevance of on-chain asset tokenization in 'crypto winter', May 2022.

with traditional assets, would be the most profitable long-term objective. But, using tokenisation to provide clear ownership chains and help managers of the assets to meet increasingly onerous regulatory and governance demands, could be a useful bridgehead that can be expanded over time.

A prime example of what an exchange could do to seize this opportunity is the development of a service that orchestrates, standardises and simplifies the private equity fund value chain. Although tried and tested, the traditional Limited Partner (LP) structure for investors is highly intermediated and (as a result) expensive, creating a bias to selling large lots to small groups of large institutional investors.

Blockchain could transform the operational efficiency of interactions between fund managers and LPs (notably capital calls) and so reduce costs. This in turn would allow fund managers to lower fund ticket sizes and widen their distribution to include less wealthy and less institutional classes of investor. Programmable capital drawdowns using blockchain technology would make it economic for funds to sell lots for as little as US$1,000 without any increase in the costs of registration and records – indeed, it would facilitate a decrease in such costs. Token exchanges have in fact already succeeded in reducing fund ticket sizes to these levels.

Provisions that require the consent of partners for unit transfers could be coded into smart contracts and automated. In effect, shares in privately managed funds would enjoy the same benefits as investors in securities already enjoy when securities are issued into a CSD, which not only maintains the integrity of the issue but also records subsequent changes of ownership.

The General Partners (GPs) would have access to a continually updated cap[italisation] table, as well as access to a range of investors which might subscribe capital to the fund at a lower price. LP structures would benefit for the first time from operational standardisation, shorter settlement cycles, immutability of records and increased transparency. These benefits would widen distribution to qualified investors as well improving the possibility of creating secondary market liquidity on a regular basis.

Exchanges could in effect mutualise the cost of the development of such ecosystems for privately managed assets, supporting product-specific smart contracts such as the ERC3643 token standard. ERC 3643 is an Open-Source set of smart contracts that facilitate the issuance, management and trading of tokens, including through built-in digital identity capabilities that militate against mis-selling. Smart contracts of this kind which decentralise and automate investor due diligence checks, can overcome a major bottleneck in the on-boarding of investors to private equity funds.

One benefit of exchanges entering the private markets is that it would help to bridge the gap between private and public markets and between TradFi and DeFi. By making use of blockchain technology, it would also familiarise participants in traditional markets with its capabilities. Other opportunities to make use of blockchain will disclose themselves over time; indeed, some are evident already.

Exchanges could, for example, validate transactions across different venues on behalf of investors for a small fee, helping to mutualise costs and maintain margins by acting as outsourced service providers. Exchanges could also offer Know Your Customer (KYC) and Know Your Asset (KYA)

and Know Your Token (KYT) services, vetting investor participation in specific funds, markets or transactions, reducing mis-selling risk, and conducting due diligence on digital assets before their placement with investors.

Lastly, exchanges can treat blockchain as an extension of the technology-based services which many of them engage in already. They can provide token issuance services, asset immobilisation services between public and private blockchains, white-listing of exchanges and counterparts, and provision of programmable composite assets to enhance liquidity and achieve settlement finality.

All these services could be turned by exchanges into chargeable service packages. However, this would require exchanges to a switch from a model based on transaction fees to a service or subscription-based model. This remains unusual but is not unknown (the Aquis Exchange, for example, has a subscription-based trading model in which the marginal cost of trades falls in line with increased volume).

The role of regulation

This transition would be accelerated by confidence in the regulatory constraints. Regulation is of course a factor that exchanges cannot control, though it is one that they can influence in the direction of being clear, consistent and straightforward to comply with. Compliance will need to be built into the services that exchanges provide, in particular to ensure that, while novel products are developed for the mass market and access to high-yielding asset classes is democratised, investments always remain suitable for particular investors.

If they cannot control regulation, exchanges can control the governance of their trading, clearing and settlement platforms. Governance structures need to be robust, and this robustness must be especially of true of exchanges that operate both public blockchain networks and private permissioned blockchain networks, or which interact with blockchain networks owned and operated by others.

It can even be argued that exchanges will need to choose between the public and the private, and not attempt to straddle the divide as this might prove costly and land exchanges with sets of hard-to-sell services that do not address client pain points. The oft-cited "public permissioned" model - in which a service is open to anybody but ultimately accessible only by a sub-set of approved entities is simple to describe, especially by analogy with the Internet, but might easily descend into a regulatory compliance nightmare.

Conclusion

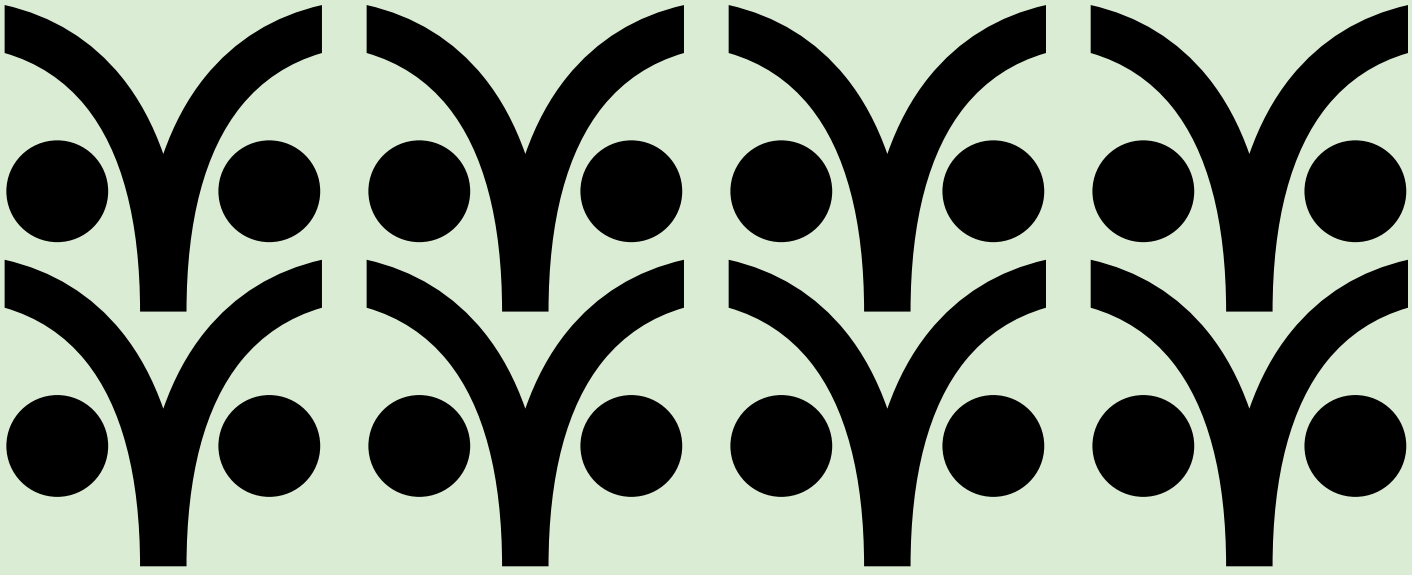
In developed capital markets, the traditional stock exchange model of hosting transactions between buyers and sellers has been challenged ever since Reg NMS was promulgated in the United States in 2005 and MiFID 1 was introduced in Europe in 2007. These twin measures fragmented centralised liquidity.

Major exchanges have responded by integrating vertically with post-trade services and increasing data revenues, which now significantly outweigh listing and transaction fees as a source of revenue. The remaining strategic question for them is tokenisation. The limited interest shown by traditional exchanges in tokenisation to date is likely prudent, since it is unlikely to disrupt the currently efficient model of equity issuance and trading.

This suggests that the greater impact of tokenisation will be felt in the bond and fund markets. Developments in these markets will not leave exchanges undisturbed, but they are not an existential threat. Instead, the threat-cum-opportunity where exchanges *must* respond lies in privately managed and alternative assets. Here, by applying blockchain, they can provide centralised support services that would help to solve longstanding issues of liquidity and scalability in private markets, while helping stakeholders to shift from a culture based on transaction fees towards a subscription-for-services revenue model.

This in turn represents a generational opportunity for exchanges that still rely heavily on the old transactionally intense paradigm (in which revenues depend on listing and trading fees) to use blockchain to innovate and close the gap with incumbents who have managed to diversify their services in post-trade services and data provision.

21X is keeping the faith in a tokenised future for finance



Just two years ago the founders of 21X were selling digital asset issuance and distribution on a Software as a Service (SaaS) basis. It was the decision by European regulators to launch a three-year Distributed Ledge Technology (DLT) Pilot Regime for financial market infrastructures to test whether blockchain technology is compatible with investor protection, financial stability and market integrity that persuaded the leadership of 21X that there is an opportunity in operating a digital asset exchange. Once applications opened in March 2023, they applied to the European Securities and Markets Authority (ESMA) for a licence to operate one within the framework set by the DLT Pilot Regime. The company is now embarked on a journey to build a public and permissionless but regulated token exchange that is protected by robust security measures and a full set of customer due diligence checks. 21X will serve initially institutional issuers and investors only, but its founders have the long-term ambition of democratising investment by making a wide range of asset classes available to retail investors faster and at lower cost. Future of Finance Co-founder Dominic Hobson spoke to Max Heinzle, CEO of 21X, about the types of business the company is seeking and the types of services it will provide.[1]

Hobson: Who owns your organisation, what are their expectations and how do they support your strategy?

Heinzle: 21X AG is owned 100 per cent by its parent company, 21.finance AG. The company has been supported through seed funding rounds – with investors that include family and friends, family offices, financial institutions and technology firms. The expectations of the owners are aligned with advancing the adoption of digital asset trading and leveraging blockchain technology to create a more efficient, transparent, and secure market infrastructure. They support 21X's strategy through capital investment, strategic partnerships, and providing industry expertise.

Hobson: Is it accurate to describe your organisation as an "exchange" where buyers meet sellers on your platform, as opposed to, say, investors meeting issuers as principal?

1. See also the earlier interview with Max Heinzle at https://futureoffinance.biz/21x-the-european-token-exchange-with-a-reassuringly-german-personality/

Heinzle: Yes, it is accurate to describe 21X as an "exchange." However, it's much more than that. It's a market infrastructure for tokenised financial instruments which, unlike a traditional exchange, offers additional services such as, in our case, settlement.

Hobson: You have explained that your focus is on both primary market capital-raising and secondary market trading. What synergies do you see between the primary and the secondary markets?

Heinzle: The synergies between primary and secondary markets at 21X include enhanced liquidity and price discovery. Primary market capital-raising benefits from the presence of a vibrant secondary market where assets can be traded post-issuance. This liquidity attracts more issuers to the platform, knowing that their assets will have a market post-issuance.

Hobson: You have described your operating licences as "capital markets" and "financial market infrastructure." Exactly what do these licences entitle you to do in terms of both instruments and activities and accredited investors?

Heinzle: Our "capital markets" and "financial market infrastructure" licences actually allow us to offer a wide range of financial instruments - specifically, equities, bonds, and funds. These will be tokenised versions, meaning they represent ownership of traditional assets on a blockchain. Structured products are currently not confirmed for 21X, nor are listing requirements for them, initially. We can serve any regulatorily compliant accredited investors – even retail investors.

Hobson: Are you seeking additional operating licences?

Heinzle: We believe our market infrastructure model for the trading of digital assets and other service offerings is not just applicable to our European Union (EU) platform. Therefore, we are looking to expanding our footprint by considering additional licences. This includes licences that would allow us to operate in new jurisdictions and offer additional financial products. However, we don't want to run before we can walk – and the go-live for our EU exchange remains our main focus for 2024.

Hobson: Your blockchain network is "public" rather than "private" or "public permissioned." What explains your choice?

Heinzle: We chose a public blockchain network as we feel it will enhance transparency, security, and accessibility. This choice reflects our commitment to open and verifiable transaction records,

fostering trust among participants – and is seen as the direction of travel by many major market players. The sense that the evolution of capital markets won't happen in private has been gaining momentum of late in the financial technology (FinTech) world – and is very much proving to be the case.

Hobson: Which blockchain protocol do you use?

Heinzle: From go-live, 21X will operate on the Polygon Proof-of-Stake (PoS) network, an interoperability and scaling framework for building Ethereum-compatible blockchains. We chose the Polygon network, running on the Ethereum blockchain protocol due to its robust smart contract capabilities and wide adoption within the digital asset community.

> Often when you're working at the coalface, you lose sight of the bigger picture. This can be the case as we transform our industry from traditional finance to a world of trading and settlement of tokenised assets on the blockchain. The changes will be immense, but on a day-to-day basis it's easy to forget how immense.

Hobson: Do you work with a particular technology vendor?

Heinzle: We actually work with several technology vendors – from development companies to smart contract auditors - to ensure our platform is secure, scalable, and efficient. These partnerships help us integrate best-in-class technology solutions.

Hobson: In terms of the services, 21X provides issuance, trading and settlement – but not custody - on the public blockchain. Registration is not on-chain. Could you explain this division of labour between systems?

Heinzle: Issuance, trading and settlement and custody will occur on the public blockchain to leverage its security and transparency. While 21X establishes itself as a reliable trading platform before expanding into custody - which requires a different set of expertise and infrastructure – it will work with existing, licensed custodians for safekeeping of user assets. Registration of the financial instrument remains off-chain to comply with regulatory requirements and ensure efficient record-keeping and data privacy, and centralised control over user identities. We will also be licensed under the eWpG (Gesetz zur Einführung elektronischer Wertpapiere – eWpG)[2] as a registrar. 21X will operate a registry for primary

2. For a full explanation of the German legal and regulatory environment, see Future of Finance, Digital Asset Custody Guide, Issue 2, Regulation Matters, pages 31-43.

market issuances as well as on a secondary market for trading existing tokenised securities. And our eWpG licence will allow us to operate a crypto[-asset] security registry for issuing new security tokens on a blockchain.

Hobson: How do transactions settle? Is it "atomically"? And how do you deal with the cash leg of settlement? Is it off-chain via the conventional banking system, cash on-chain in tokenised form, or by direct or indirect connections to central bank Real Time Gross Settlement systems (RTGSs)?

Heinzle: Yes, transactions settle atomically, ensuring that both legs of a transaction (asset and cash) occur simultaneously. The cash leg is handled on-chain with our E-Money Token partner - and in the future through Markets in Crypto-Assets Regulation (MiCAR)-regulated parties or even Central Bank Digital Currencies (CBDCs). The consideration of CBDCs can happen due to our participation in the European Central Bank (ECB) Trials Wave 2[3], allowing us to gather valuable data and insights on real-world use cases of these currencies.

Max Heinzle

CEO of 21X

Hobson: Do your issuance services include offering or writing smart contracts?

Heinzle: Yes, our issuance services include offering and writing smart contracts tailored to the specific needs of issuers, ensuring seamless integration with the blockchain. When it comes to tokenisation, we will work with others to fulfil the tokenisation transformation process. In the future we will be able to tokenise assets ourselves - but under our conditions, and not create assets for others, such as issuers.

Hobson: Do you provide financial advisory services to issuers?

Heinzle: 21X will be able to collaborate with existing financial advisors who are familiar with the regulatory landscape in order to offer expertise to issuers. While we are presently focused on rolling out our market infrastructure, if 21X considers offering financial advice in future, a separate

3. The European Central Bank (ECB) is running a series of trials to test blockchain as the foundation for settling wholesale transactions in central bank money. From July to November 2024, a "second wave" of 49 private firms will explore specific use-cases, joining a first "wave" of participants who have been testing since 13 May.

licence for financial advice might be required under regulations for investment or financial portfolio management as financial advisory services related to digital assets evolve.

Hobson: You have described the type of issuers you seek as "global." How are you reaching a global audience?

Heinzle: We reach a global audience through strategic partnerships, targeted marketing campaigns, and participation in international financial and technology conferences. There is significant interest in the EU DLT Pilot Regime run by the European Securities and Markets Authority (ESMA) and we are seeing increased awareness in 21X following our licence application and this, combined with the extensive network of contacts of our senior management, is helping develop issuing business opportunities.

Hobson: The types of issuers you seek includes public companies, private companies, mutual funds, private equity funds and exchange-traded funds (ETFs). What explains your choice of targets?

Heinzle: We are targeting public companies, private companies, mutual funds, private equity funds, and ETFs due to their diverse capital needs and the potential for significant secondary market activity. Significantly, these are the products currently permitted under the EU DLT Pilot Regime. This will change in future, which will, in turn, lead to changes in our product offerings and targets.

Hobson: You have described liquidity as "crucial." How will secondary market liquidity help your primary market activities?

Heinzle: Secondary market liquidity is crucial as it provides confidence to primary market participants that their assets will have a ready market, thereby attracting more issuers.

Hobson: Your target clients include market-makers and liquidity providers. Do you view these as the principal sources of liquidity or are automated market-makers (AMMs) part of your strategy?

Heinzle: We view both market-makers and liquidity providers as essential sources of liquidity. However, automated market-makers (AMMs) can also be part of our strategy as they ensure continuous liquidity and efficient price discovery. Nevertheless, we are talking about completely new financial instruments in a developing financial sector so we may need the experience of specialised market makers for this special product category.

Hobson: The types of investors you are seeking include asset owners such as pension funds and sovereign wealth funds, insurers, wealth managers and private banks, brokers, family offices, and accredited retail investors. Which type of investors are finding your services most attractive at the moment?

Heinzle: Currently, asset owners like pension funds, sovereign wealth funds, and accredited retail investors find our services most attractive due to the security and transparency offered by our platform and due to the fact that we will likely be the first and only exchange fully regulated by ESMA. Additionally, the exchange we hope to operate specifically allows retail investors to directly access markets without the need for intermediaries. This will be an important target market for us.

Hobson: Your choice of target asset classes (equities, bonds, funds, structured products such as ETPs) is relatively narrow. What explains your focus on these asset classes?

Heinzle: Our focus will be on equities, bonds, funds, and structured products. Our choice of these target asset classes has been driven by two imperatives – regulation and demand. Most importantly, we have to work within rules stipulated under the EU DLT Pilot Regime for what can and cannot be made available for trade on our exchange. And, secondly, it is driven by market demand and suitability for tokenisation and trading on a digital platform.

Hobson: You mentioned custody earlier that you are providing custody services via third party custodians. Will you choose these or will the customers choose them?

Heinzle: We intend to provide custody services via third-party custodians, giving our clients flexibility and ensuring the highest standards of asset security. We do not hold a custody licence ourselves.

Hobson: You have explained that customer cash will be held by third-party banks. Do you choose the banks or can customers choose the bank they prefer?

Heinzle: Customer cash is converted into e-money tokens – and therefore held and exchanged from cash into e-money with a regulated e-money institution, to ensure security and compliance.

Hobson: Are the additional services you provide – such as fractionalisation of assets, peer-to-peer trading, and direct market access (DMA) - designed to appeal to a particular type of investor, such as accredited retail investors?

Heinzle: Services like fractionalisation of assets, peer-to-peer trading, and direct market access (DMA) are designed to appeal to all accredited investors, including retail investors, offering them greater flexibility and investment opportunities. However, our focus at present is directed towards institutional investors – retail investors will be targeted in future.

Hobson: What industry accreditations - such as International Standard on Assurance Engagements (ISAE) certificates- has your organisation secured?

Heinzle: We have secured several industry accreditations, including ISAE 3402 and Service Organization Control (SOC) Type 2 certifications, ensuring our operations meet the highest standards of security and compliance.

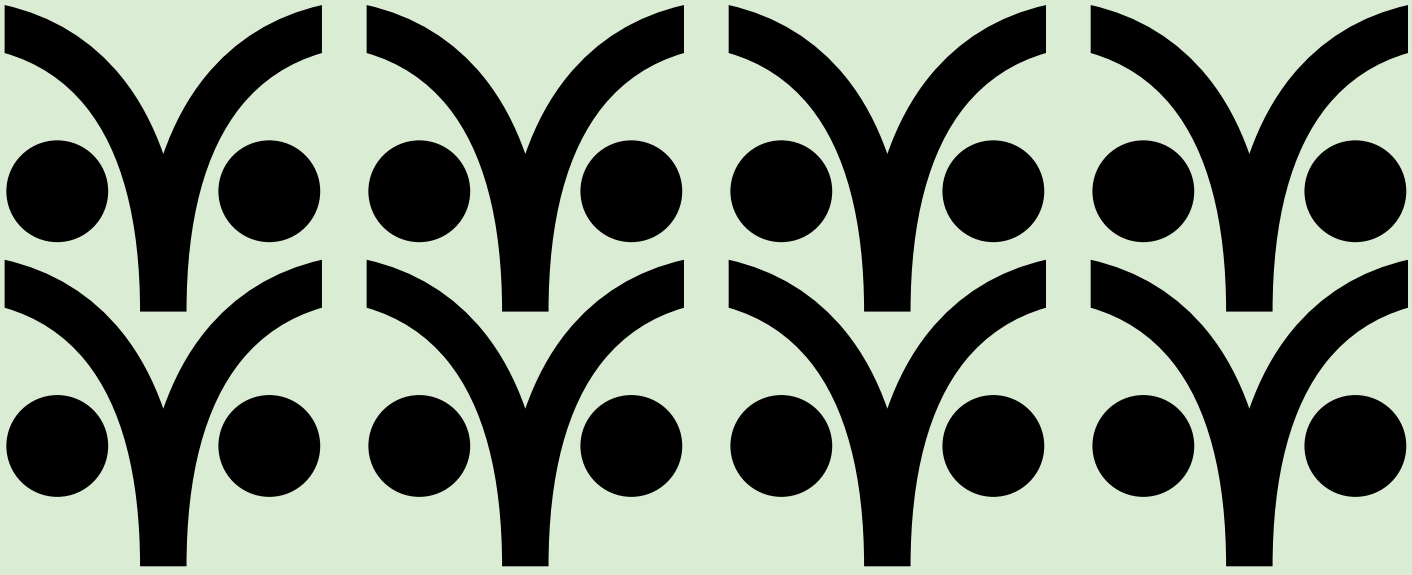
Hobson: Your timetable to success (3-5 years) is not long but not short either. Are you fully funded for that timescale?

Heinzle: We are presently undergoing a Series A funding round, which should complete later this summer. Once this is closed, we will be fully funded to undertake the launch and scale-up of 21X before the end of 2024 and for our 18-24-month timetable to success, with strategic plans in place to achieve our growth and operational milestones within this period.

Hobson: Is there anything else we have not discussed that you would like to add?

Heinzle: Often when you're working at the coalface, you lose sight of the bigger picture. This can be the case as we transform our industry from traditional finance to a world of trading and settlement of tokenised assets on the blockchain. The changes will be immense, but on a day-to-day basis it is easy to forget how immense. We believe that the go-live of 21X's fully regulated Distributed Ledger Technology (DLT) exchange for digital assets – which should be before the close of 2024 – does truly represent a transformative leap in the financial sector, promising enhanced accessibility, efficiency, and transparency. And in a wider context, this move not only legitimises the digital asset trading market but will also catalyse wider innovation and growth in technology, products, markets and customers, marking a profound shift in the global financial landscape.

When it comes to tokenisation, traditional stock exchanges might be mistaking the future for the past



The lack of interest of traditional stock exchanges in tokenisation is counter-intuitive. After all, most people think stock exchanges exist to help issuers raise capital in the primary market and price capital in secondary market trading. Yet both the biggest global exchanges in major markets and emergent stock exchanges in developing markets have, for different reasons, passed up the token opportunity. For mature exchanges in particular, the omission appears to make sense. As businesses, they are increasingly uninterested in revenues from issuance and trading, making tokenisation look like a return to their past rather than their future. For similar reasons, selling operational support services to managers of privately managed assets looks the best token bet to place, but it might prove a catastrophic strategic mistake. Tokenisation, like any innovation, poses an awkward dilemma: doing the right thing in the short term might turn out to be the wrong thing in the long term. Traditional stock exchanges might just be impaling themselves on the horns of this dilemma.

Future of Finance recently researched 87 traditional stock exchanges around the world to find out what they were doing about tokenisation. The study found that about 20 per cent were active in cryptocurrency futures and funds, and another 20 per cent were investing in digital securities or the infrastructure needed to support digital securities. But 60 per cent were doing nothing at all.[1]

Meanwhile, specialist token exchanges are proliferating. Thetokenizer.io currently lists 64 token exchanges around the world, of which 19 offer a platform that issuers can use to tokenise securities and funds.[2] The list is certainly not comprehensive. STOMarket, another organisation that tracks the security token markets, monitors 612 tokens worth more than US$40 billion listed on 34 separate exchanges.[3]

Most traditional stock exchanges are doing nothing about tokenisation

Some jurisdictions have proved more prolific than others in generating token exchanges. Singapore is the global market leader, having spawned a dozen (1x Exchange, ADDX, Altax, AsiaNext, BondBlox, DBS Digital Exchange, DigiFT, InvestAX, Kasa, AgoraX, SDAX and SGX Bond Trading), while second-placed Switzerland hosts half a dozen (Aktionariat, though they are now changing strategy, BKBE/BCBE, BX Digital, SDX, Sygnex and TDX).

1. https://futureoffinance.biz/what-do-stock-exchanges-need-to-survive-the-tokenisation-of-everything-insights/
2. https://thetokenizer.io/STO/explore-exchanges/
3. https://stomarket.com/charts

What is curious about all such lists is the absence of traditional stock exchanges. Deutsche Börse, the Singapore Exchange (SGX), the Swiss Stock Exchange (SIX), the Luxembourg Stock Exchange, Börse Stuttgart and the Canadian Securities Exchange (which is itself only 20 years old) are the only established exchanges to have invested enough in tokenised assets to be noticeable.

In Japan, it is the junior arm of the Japan Exchange Group, the Osaka Stock Exchange, that has taken the lead in establishing the Osaka Digital Exchange (ODX) with the go-ahead SBI Holdings Group.[4] The venerable Tokyo Stock Exchange (TSE), also owned by the Japan Exchange Group, has by contrast confined itself to a minority interest in a tokenisation platform (BOOSTRY) and has kept issuers and investors waiting for more than two years for its proposed security token market to open in April 2025.

It is mainly challengers, rather than incumbents, which have invested. This is partly because they have much to gain and little to lose from betting on the growth of tokenised markets. But entrepreneurial vision and energy is also a factor.

What has to be explained is why a majority of stock exchanges of all kinds have felt confident enough to ignore the potential of tokenisation.

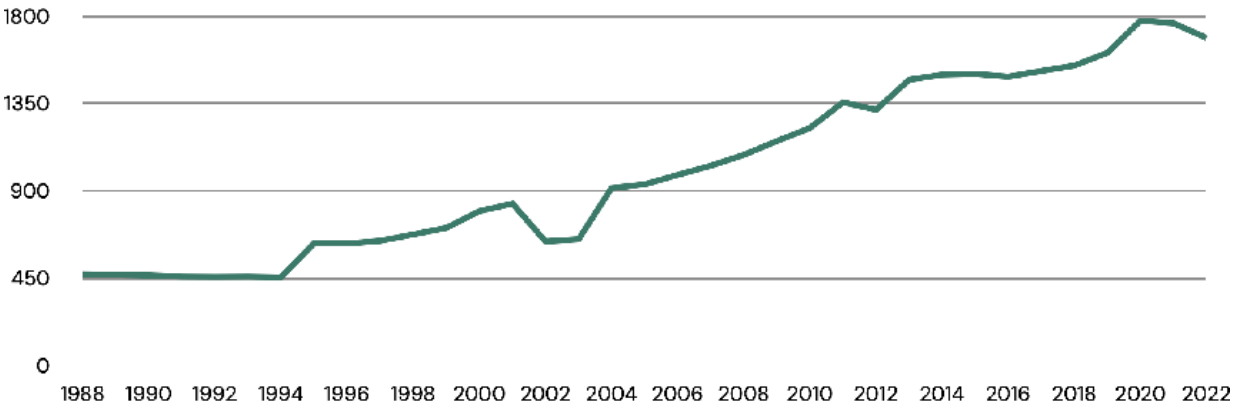
Stock exchanges face different incentives in emerging and mature markets

In the case of emerging markets, the answer is obvious: they do not need to do anything. Their core business, of introducing companies to capital through listings, is healthy. World Bank data shows that since the late 1980s the number of listings of domestic companies has increased by 258 per cent (see Chart 1). Their market capitalisations, and listing and trading revenues, reflect the foundational role of stock exchanges in developing economies – and the fact that corporate issuance and investor engagement still have ample room left for further growth.

4. See "The unexpected reason behind the unexpected rise of tokenisation in Japan" in Future of Finance Digital Asset Tokenisation Guide, pages 1-86.

Chart 1

Number of Domestic Companies Listed on Stock Exchanges in Upper and Lower Middle Income Countries 1988-2022

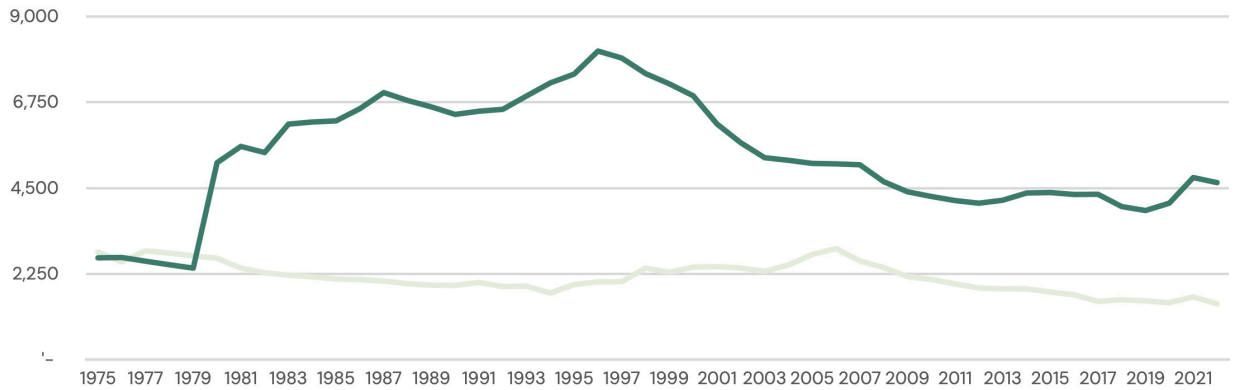


Source: World Bank

In mature, high-income economies, on the other hand, listings are in secular decline. This is especially true of two leading Anglo-Saxon economies: the United States and the United Kingdom. World Bank data shows that in the United States the number of domestic companies listed on stock exchanges had by 2022 fallen by 43 per cent since the peak in 1996. In the United Kingdom, the number of domestic companies listed on the London Stock Exchange had by 2022 fallen by 50 per cent since the peak in 2006 (see Chart 2).

Chart 2

Number of Domestic Companies Listed on Stock Exchanges in the United States and the United Kingdom, 1975-2022

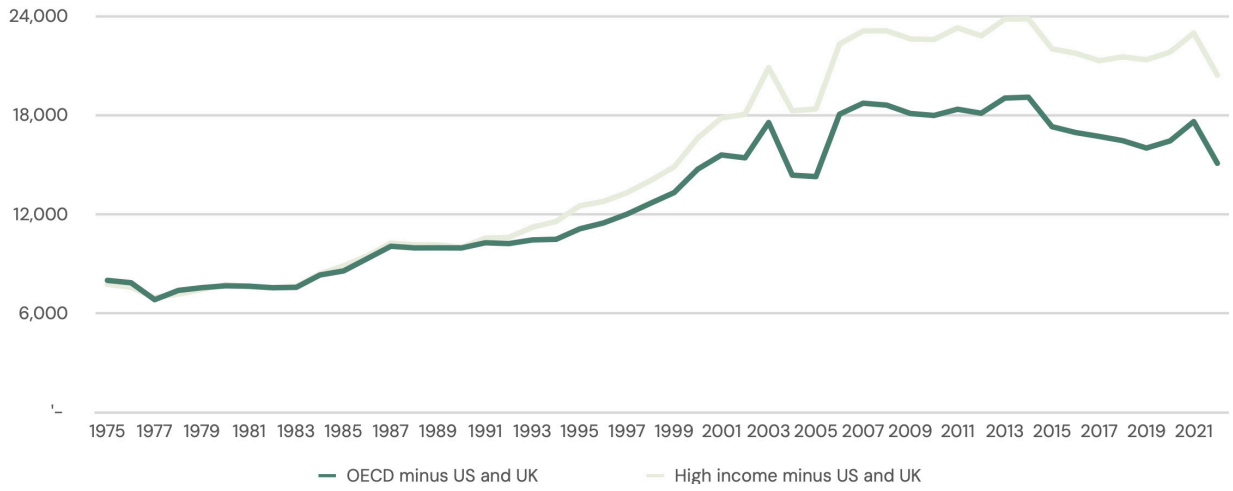


Source: World Bank

However, listings are diminishing in other advanced economies too. The World Bank data shows that domestic listings in high-income economies and member-states of the Organisation of Economic Cooperation and Development (OECD) other than the United States and the United Kingdom are down 14 per cent and 21 per cent since their peaks in 2014 (see Chart 3).

Chart 3

Number of Domestic Companies Listed on Stock Exchanges in Developed Countries Minus the US and UK



Source: World Bank

Why is this happening? One explanation is that developed economies have reached saturation point. In other words, the positive relationship between the stock market and economic growth that is observable in middle income countries has ceased to apply to developed economies. An International Monetary Fund paper of 2012 argued that finance actually starts to inhibit economic growth once the financial sector is equivalent in size to 80 per cent or more of GDP.[5]

The private equity industry has hurt stock exchanges in mature markets

Another factor is the growth of the private equity industry. At end-June 2023, assets under management by the global private equity industry were worth US$8.2 trillion.[6] True, this is a fraction of the US$115 trillion capitalisation of the global equity markets,[7] but such a straightforward comparison under-estimates the extent to which private funds co-invest alongside institutional investors and further enlarge their impact through leverage. In short, the private equity industry has more than enough equity and debt capital to compete with public markets to own public companies and to keep private companies private for longer.

5. Jean-Louis Arcand, Enrico Berkes and Ugo Panizza, "Too much finance?" IMF Working Paper 12/161, June 2012.
6. McKinsey & Company, Private markets: A slower era, McKinsey Global Private Markets Review 2024, page 23.
7. SIFMA Research Capital Markets Fact Book, July 2024, page 12.

Private ownership is also more congenial for management. They escape the quarterly pressure to enhance earnings, the cost of maintaining a public listing, the need to comply with public information disclosure rules and the constant threat of being taken over (indeed, mergers and acquisitions have played a large part in reducing the numbers of listed companies). Though they rarely use the time well, managers do get the space to plan, invest and build.

In addition, private equity owners tend increasingly to devour most of the shareholder value private ownership creates, leaving less for institutional investors in the public markets. That makes it harder for private companies to achieve higher valuations at an initial public offering (IPOs), so most privately owned companies get sold to another private equity fund or a trade buyer and never touch the stock exchange at all.

The private equity industry has more than enough equity and debt capital to compete with public markets to own public companies and to keep private companies private for longer.

Demography, passive investing and fragmentation of liquidity do not help

Other factors are at work. Maturing pension funds serving ageing populations that need income more than capital growth are shifting institutional money into the bond markets. But it is the rising popularity of passive investment funds – which, by definition, do not take part in new issues – which is the more formidable enemy of the old-fashioned IPO.

According to BCG, passive investment strategies accounted for 20 per cent of global assets under management (US$24 trillion) in 2023, double the share they took in 2005 (10 per cent) and six times the value (US$4 trillion). In 2023 passive products attracted 70 per cent of net flows into mutual funds and exchange-traded funds (ETFs).[8] (Ironically, ETFs have provide one of the few sources of additional listing fees for exchanges, and have encouraged them to manufacture bespoke market indices.)

Equity trading has also moved away from the traditional stock exchanges. Since the passage of measures designed to reduce fragmentation and achieve better prices for investors by increasing competition for their business – namely, Regulation National Market System (Reg NMS) in the United States in 2005 and the first iteration of the Markets in Financial Instruments Directive (MiFID 1) in 2007 – the reverse of the intended effects has occurred: equity trading has shifted to a variety of often less visible price formation venues.

The greater fragmentation of trading is the greatest (and most ironic) of the consequences of Reg NMS and MFID. But the measures also prompted an increase in short-term activity by professional traders (so-called High Frequency Trading), a shrinkage of average transaction sizes and reduced

8. BCG, Global Asset Management Report 2024, 22nd Edition, May 2024, AI and the Next Wave of Transformation, page 5 and Appendix 2, page 26.

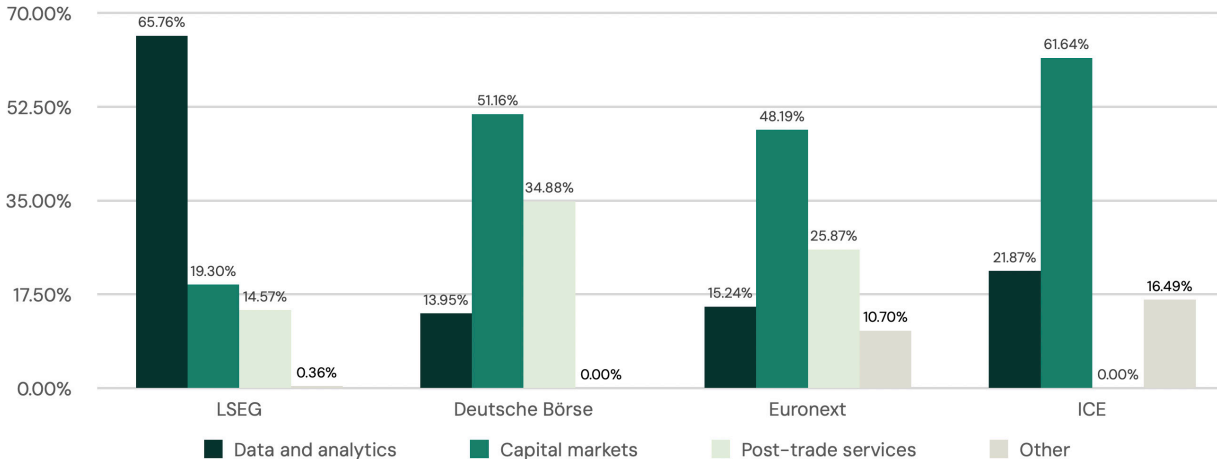
price transparency through the proliferation of "dark pools." But however unintended the consequences, the net result was that traditional stock exchanges lost trading revenues.

Traditional stock exchanges are diversifying away from their original mission

The loss of transactional and listing revenues has forced stock exchanges in developed markets to diversify their sources of income away from the fees they traditionally earned from operating capital markets. No established exchange illustrates this more vividly than the London Stock Exchange Group (LSEG). As Chart 4 shows, LSEG has transformed itself – notably by the acquisition of Refinitiv for US$27 billion in 2021 – into a company that earns two thirds of its revenues from selling data. Capital markets now account for less than one seventh of revenues at LSEG.

Chart 4

Sources of Revenue at LSEG, Deutsche Börse, Euronext and ICE in 2023



Source: Annual reports

The shift away from listing and transaction revenues is less noticeable at Deutsche Börse, but the German exchange group is nevertheless emphasising post-trade rather than trading services and building a data business for asset managers (it purchased asset management technology vendor SimCorp for €3.9 billion in September 2023 and in November 2023 launched an investment management division).

Euronext is following the same path, management boasting consistently in analyst presentations about their diversification away from "volume-related businesses." Likewise, at ICE the apparently high level of reliance on transactional activity is exaggerated by the inclusion of clearing in its

capital markets revenues. ICE is even developing a mortgage data business by buying home loan companies.

Nasdaq, the principal domestic rival to the ICE-owned New York Stock Exchange (NYSE), is also shifting its focus away from equity issuance and trading. In November 2023, Nasdaq purchased the financial software company Adenza for US$10.5 billion. For Nasdaq, Adenza adds risk and compliance management services as well as data.

To traditional stock exchanges, tokenisation looks like their past rather than their future

This tilt away from issuance and trading activity helps to explain the widespread lack of enthusiasm in the stock exchange industry for tokenisation. After all, considered superficially, tokenisation is all about cutting the costs of issuance and trading. In their estimation, equity trading in particular is already so efficient, thanks to Reg NMS and MiFID, than they want to reduce their exposure rather than increase it.

The World Federation of Exchanges (WFE) boasted in a recent paper that not one of its members had yet launched a tokenised equity market "because these markets are already very efficient."[9] Indeed, equity trading is now so efficient that traditional exchanges no longer see it as something which will reward their shareholders with the profit margins they expect.

Chart 5

Stock Market Performance of LSEG, Deutsche Börse, Euronext and ICE 2002-2024

Source: Yahoo Finance

9. World Federation of Exchanges, Demystifying Tokenisation: Embracing the Future, 11 June 2024, page 8.

Nor, gauging by recent share price performance, is this judgment wrong. As Chart 5 shows, the strategic shift away from transactional revenues is generating value for shareholders of leading stock exchange groups. A rising share price limits the appetite for investing in innovative ideas.

Traditional exchanges are also observing the conspicuous lack of success of peers that have invested in tokenisation (a fate shared by the various start-up token exchanges). Accordingly, the senior management of traditional stock exchanges could be forgiven for thinking that tokenisation represents nothing but a threat to their current performance: hefty up-front investment costs plus no proven path to profitability.

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Blockchain technology furnishes exchanges with plenty of arguments for inertia

Traditional stock exchanges can also argue that the investment costs are not purely in-house. Transitioning an entire domestic securities industry to a tokenised model entails forcing sell-side market participants to build interfaces and systems to support tokens as well, and to insulate their buy-side clients from the impact. If the users of exchange services are unwilling to make the investment, stock exchanges cannot drag them along.

That lack of incentive to invest is exacerbated by the lack of interoperability between blockchain networks, let alone between blockchain networks and traditional markets of the kind stock exchanges operate. Until present work-arounds, and efforts to standardise exchanges of data between blockchains, achieve greater success, the cost of building separate connections to each platform erects another barrier to adopting tokenisation.

Lack of inter-operability obviously inhibits activity, since it makes it harder to move liquidity between markets and asset classes. But nor have concerns about the speed, scalability and storage capacity of blockchain technology itself disappeared. Between 2021 and 2023 the daily trading volume in US equities alone averaged more than 11.4 billion trades a day worth an average of US$550 billion.[10] Bitcoin, the most heavily traded asset on blockchain technology, has cleared 4 million trades a day once in the last five years.[11]

Though Bitcoin trades generally settle within 5 to 20 minutes[12] - rather faster than the trade date plus one day (T+1) timetable North American markets adopted in May 2024 - congestion can precipitate delays that continue for days. Traditional stock exchanges have reasonable grounds for

10. SIFMA Research Capital Markets Fact Book, July 2024, pages 59-60.
11. https://data.bitcoinity.org/markets/volume/5y?c=e&t=b
12. https://www.blockchain.com/explorer/charts/median-confirmation-time

believing that blockchain technology is not fast enough to execute and settle all the trades they currently host.

This further undermines the case for investing in tokenisation. Indeed, exchanges also argue that unpredictable settlement timetables damage activity (and so liquidity) because there is no trusted intermediary, such as a CSD or custodian bank, to make investors whole when a trade fails. Indeed, in blockchain transactions, trades do not merely fail until they are repaired, but actually die.

This is a consequence of "atomic" settlement: the instant exchange of two assets that are linked, so that the transfer of one occurs only upon transfer of the other, with transactions that fail to match ceasing to exist rather than being treated as exceptions for later repair.

Although "atomic" settlement is hard to achieve as long as fiat currency is not available in digital form on blockchain networks, the mere idea of it is sufficiently different from the way securities markets work today for exchanges to insist without much fear of contradiction that their users do not want it.

Whatever the merits and demerits of securities markets based on credit, sell-side firms have always traded without having all the funds and securities available up-front. They have long since built the cost of posting collateral to cover the risk of trade failure into their calculations, and anyway economise on these costs through multi-lateral netting, usually via a counterparty clearing house (CCP).

Lack of clearing, inadequate custody and "regulatory uncertainty" further militate against tokenisation

Clearing is not incompatible with blockchain – ClearToken is building a CCP which will provide cross-token netting for the tokenised asset markets – but its continuing absence does increase the cost of cash (and the capital that cash demands) that has to be committed to tokenised trading by sell-side firms. This gives exchanges yet another reason to be sceptical that tokenised markets are about to scale.

Similarly, exchanges note that buy-side institutions want independent custody services provided by banks that will make them whole in the event of loss, rather than running their own wallets (self-custody) or relying on a service provided by a cryptocurrency exchange or working with a digital asset custody start-up.

Some global custodian banks are prepared to provide these services but find themselves in a chicken-and-egg predicament, where they need scale – which cryptocurrency holdings alone cannot provide - to invest. In the United States, moves by the Securities and Exchange Commission (SEC) to put assets in custody on bank balance sheets and extend the range of assets for which they are responsible have provided a further disincentive. The proposed changes were sufficient to prompt State Street to abandon its plans to provide a digital asset custody service altogether. [13]

13. See Future of Finance Digital Asset Custody Guide, Regulation Matters, pages 44-61.

This is an instance where the stock exchange claim that neither law nor regulation is sufficiently clear about tokenisation for issuers and investors - let alone exchanges - to embrace it, has some force.

But this excuse is increasingly threadbare in the major markets of western Europe, North America and Asia.[14] Germany, for example, has even defined token custody in law. Across many ambitious but less developed markets, legislators and regulators are busy re-writing laws and rules to help the local securities industry attract token business. "Regulatory uncertainty" is an excuse rather than a fact.

Stock exchange investment in cryptocurrency services is a stop-gap

But on balance traditional exchanges are probably right to be confident that, until global custodians provide a service and reassure them that the regulatory framework is sound, institutional investors will not engage with tokens. Though some exchanges are themselves providing post-trade services, including custody as well as clearing, their efforts are also constrained by the lack of scale in token markets and limited largely to cryptocurrencies.

This of course reflects the failure of security and fund and asset-backed tokens to take off. Cryptocurrencies can provide exchanges with revenues and profits while they continue to invest in security and fund tokens. The cryptocurrency pitch by exchanges that offer services is, understandably, a conservative one. After all, they compete for cryptocurrency business in a fragmented marketplace that is scarcely regulated at all.

Though the top ten exchanges account for probably half the trading volume on the average day, Coinmarketcap records 250 cryptocurrency exchanges (of which 95 also trade cryptocurrency derivatives) and 454 decentralised exchanges (DEXEs) (of which 13 trade cryptocurrency derivatives).[15] In this environment, institutional money, insofar as it is interested in cryptocurrencies at all, is bound to welcome the assistance of familiar and long-established traditional stock exchanges.

14. See Future of Finance Digital Asset Tokenisation Guide, "Securities Token Laws and Regulations in Seven Jurisdictions," pages 31-34.
15. https://coinmarketcap.com/

The stock exchange bias to institutional money might be a strategic mistake

However, this bias to institutional participants in the cryptocurrency markets might turn out to be a strategic error. All the reasons traditional stock exchanges have identified for abjuring investment in tokenisation – the existing efficiency of equity markets, heavy investment costs, lack of interoperability, limited speed and scalability, the absence of clearing and independent custody and regulatory uncertainty - rest on the belief that tokenisation cannot scale without institutional money. The few exchanges that have committed to tokenisation believe this more ardently than most.

Yet the only blockchain-based markets to have attained any scale at all – namely, cryptocurrencies - have relied largely on retail money. True, retail investors in cryptocurrencies are having an even worse experience than retail investors in the conventional financial markets. If retail traders lose 75-80 per cent of the time in traditional markets, they lose 95-100 per cent of the time in cryptocurrency markets. In both traditional and cryptocurrency markets trading, the retail side supplies the money and the professional side takes the profits.

This is ironic. One reason why retail investors have abandoned direct participation in conventional financial markets is that they sense the game is rigged against them. They have invested in cryptocurrencies partly because it is much easier to do so but mainly because the chance of making significant gains – even life-changing amounts of money – is greater in a zero-sum investment such as cryptocurrencies than in a positive-sum investment such as equities.

Traditional stock exchanges, like asset managers, abandoned retail investors a long time ago. According to the Office for National Statistics, retail investors in the United Kingdom owned just 10.8 per cent of shares in domestic listed companies at the end of 2022.[16] In the United States, the most recent survey by the Federal Reserve estimates that 21 per cent of Americans own shares directly.[17] In 1950, retail investors owned 90 per cent of the common stock of American public corporations directly. Today, most American retail investors own shares, if they own them at all, through mutual funds invested via retirement plans.

Tokenisation take-off probably depends on retail rather than institutional money

Which prompts a question: could blockchain do for equities what blockchain has done for cryptocurrencies? Cryptocurrency exchanges have certainly thought so, on grounds their customers would welcome the opportunity to trade tokenised stocks alongside cryptocurrency assets on a single market infrastructure.

Both Binance and FTX (before it failed in November 2022) have offered tokenised versions of popular common stocks such as Amazon, Apple, BioNTech, Facebook, Google, Netflix, Nvidia and Tesla, in which the tokens represent holdings of the underlying shares in a fashion akin to

16. Office for National Statistics, Ownership of UK quoted shares: 2022, 4 December 2023.

17. The Federal Reserve, Changes in U.S. Family Finances from 2019 to 2022: Evidence from the Survey of Consumer Finances, October 2023, page 16.

a depositary receipt. Bittrex Global – unlike Binance and FTX, a cryptocurrency exchange that actively sought regulatory approvals - also offered tokenised versions of high-profile stocks before it closed in 2023.[18]

Regulators have discouraged the trading of tokenised shares on cryptocurrency exchanges, but a retail appetite for trading them clearly exists. The difficulty even specialist, regulatorily compliant token exchanges have faced is that issuers of the sort of high profile, highly liquid technology stocks retail investors want to trade lack the incentive to issue shares in tokenised form.

That said, there are benefits for issuers in tokenising equity. Blockchain ensures the register of shareholders is always up to date. Automation of dividend payments and other corporate actions through smart contracts can reduce paying agency costs. But most of the benefits, such as the elimination of brokerage fees, the ability to own fractions of shares and collect fractions of dividends and the option to trade the tokens around-the-clock, accrue to investors rather than issuers.

Even so, the benefits of tokenisation for investors are not completely immaterial for issuers. If tokenisation enables issuers to tap a wider range of potential shareholders, it could reduce their cost of equity capital. And in the long run the principal way in which tokenisation can achieve that is not ease of access, though that matters to retail investors, but through personalisation of investment portfolios.

Stock exchanges can help asset managers realise the potential of tokenisation

This is the point at which the choices that asset managers make ought to govern what traditional stock exchanges (and indeed specialist token exchanges) do in terms of making tokenisation happen.

Tokens are not just efficient substitutes for securities. They are something completely different. As executable objects in computers, they can simulate literally any object or idea. In other words, in financial services tokens can express and make investable any source of value or stream of income, including those that have yet to be conceived.

The opportunity this presents to asset managers is to stop selling crude bundles of cash and securities - ultimately, risk-adjusted market returns - and start selling flows of value calibrated precisely to the needs of individual investors as combinations of flows of tokens between issuers and investors on blockchain networks. [19]

The opportunity for traditional stock exchanges is to provide the open market infrastructure that enables issuers, asset managers and entrepreneurial intermediaries to manufacture the products and provide the services to deliver discrete, individualised portfolios to retail investors.

18. Bittrex ran cryptocurrency exchanges in Liechtenstein and Bermuda. It announced in November 2023 that it was winding down its operations after reaching a US$24 million settlement with the Securities and Exchange Commission (SEC), which had alleged Bittrex operated a national securities exchange without the right approvals.

19. See Future of Finance Digital Asset Tokenisation Guide, pages 22-24.

Providing such an infrastructure would represent a return by stock exchanges to their true personality: the provision of a neutral infrastructure which does not compete with their customers but on which existing and new customers can pursue an infinite variety of ends.

This idea is not completely alien to traditional stock exchanges. For example, at the R3 Cordacon conference in London in 2021, Dr Robert Barnes, then CEO of the Turquoise international securities trading platform at LSEG, outlined a vision of a future in which a traditional stock exchange becomes a "business service operator" that "orchestrates" a "regulated digital ecosystem."[20]

He meant that LSEG would operate a secure, regulated and above all neutral market infrastructure on which its customers – issuers and investors - could meet, co-operate, partner with and transact with a variety of existing and innovative service providers across tokenised securities and funds markets. It was a network vision, from which network effects could be expected to flow, and it is a valid one.

Unfortunately, traditional stock exchanges are dependent on what asset managers decide to do

Yet the opportunity will be hard for traditional stock exchanges to seize. One reason is that they work not with the individual investors that are most likely to drive tokenisation but with institutionalised asset managers and brokers. Exchanges have lost touch with retail investors and will find rebuilding those relationships akin – as Wittgenstein said of another task – to repairing "a torn spider's web with our fingers."[21]

Worse, the asset managers with which exchanges do transact have also abandoned retail business to another class of intermediary - wealth managers, serviced by fund platforms - they treat as distributors of their products. So Exchanges are not one step removed from retail investors but two, and arguably even three. Their ability to profit from tokenisation of securities and funds is dependent on what asset managers decide to do.

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Another obstacle is the strategic shift of the traditional exchanges away from what Euronext calls "volume-related businesses," or hosting the transactional activities of others, as opposed to clearing and settling transactions and aggregating and selling data about transactions.

Enthusiasm for tokenising privately managed assets might be a distraction

Interestingly, these strategic constraints help to explain the one tokenisation opportunity where (some) traditional stock

20. https://r3.com/cordacon/orchestrating-the-regulated-digital-ecosystem/

21. Ludwig Wittgenstein, Philosophical Investigations, Paragraph 106, page 46.

exchanges demonstrably share the enthusiasm of almost all the new token exchanges: privately managed assets. These assets – private equity, private debt, real estate and infrastructure – offer traditional stock exchanges a number of temptations.

The first is to embrace their nemesis. Private capital is denying stock exchanges income from IPOs, listings and trading. It is also a growth industry with a notoriously backward infrastructure. Exchanges see opportunities to help private equity firms communicate more efficiently with investors, automate investor servicing, enhance the management of capitalisation tables and, by tokenising funds and securities, increase the range of investors the private equity industry is able to reach.

SDX in Switzerland has worked with Daura (a blockchain-based equity platform for financing and running shareholder registers for small and medium-sized Swiss companies) and Aequitec (a shareholder register and corporate actions automation platform for privately owned companies).

Technology vendor GlobaCap, which is using blockchain to help companies cut the cost of issuing and administering private market securities and settling private market transactions, is working with the Johannesburg Stock Exchange (JSE), Nomura-owned global trading platform Instinet and DXA Invest, the Brazil-based platform for funding privately owned companies.

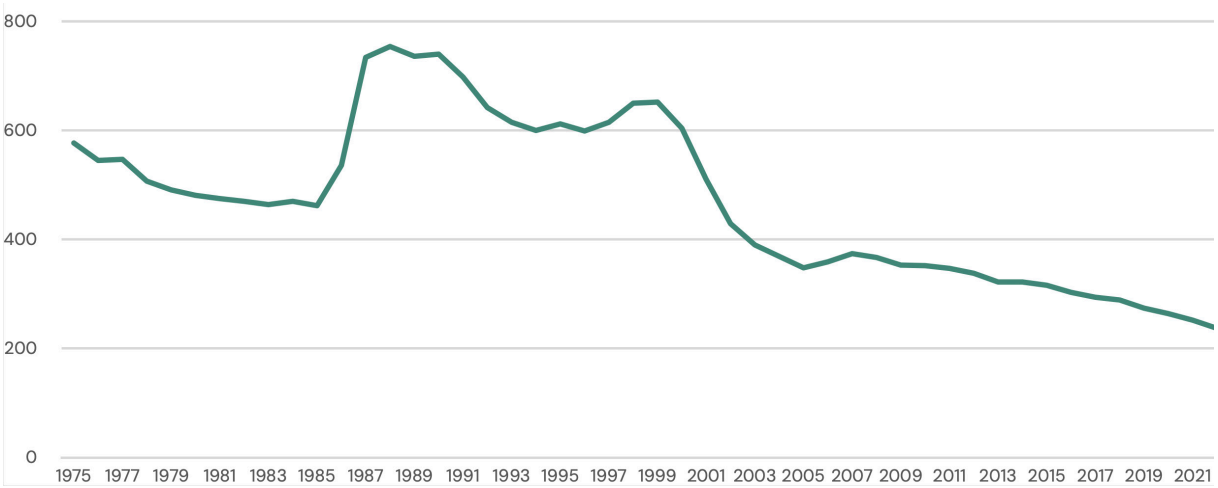
Importantly, these services are operational rather than transactional. Unlike public markets, where assets trade on centralised exchanges between digitally connected buyers and sellers, transactions in private markets still rely heavily on manual processes, substantially increasing the investment of time and money needed to settle trades.

Stock exchanges aim not to increase the ease and volume of trades and settlements, but to automate them. This disdain for transactional activity as a source of revenue in its own right fits with the strategic shift of stock exchanges towards post-trade activities, data management and the support of asset managers. If the role of exchanges in the tokenisation of privately managed assets was largely transactional, there would be a lot less interest in the sector.

Providing operational support for privately managed assets also fits with moves traditional exchanges are making already. For example, the Johannesburg Stock Exchange – still a top 20 global stock exchange – has introduced a private placements platform called JSE Private Placements. The aim is to compete with banks to fund private companies.

Chart 6

Number of Domestic Companies Listed on Stock Exchanges in South Africa 1975-2022



Source: World Bank

The advantage the exchange has is its network of investors, which are finding less and less to buy on the main market. The number of domestic listings on the JSE has fallen by 70 per cent since the peak in 1988 (see Chart 6). If JSE Private Placements can re-direct capital to privately managed companies sufficiently well to lower the transaction and servicing costs of raising equity or debt capital relative to bank loans, it will attract more issuers.

The Nasdaq Private Market – which was founded as long ago as 2013 in response to the Obama-era Jumpstart Our Business Startups Act (JOBS Act), a law intended to encourage funding of small businesses in the United States by easing national securities regulations – aims to achieve similar effects to JSE Private Placements, by providing a trading venue for private companies, banks, brokers, employees, shareholders, and investors to buy and sell private company shares.

In 2024 Nasdaq Private Market raised US$62.4 million in a series B Financing led by Nasdaq, with fresh investment coming from BNP Paribas, DRW Venture Capital, UBS, and Wells Fargo. It claims to have identified 170,000 private companies, of which it has analysed more than 25,500 and is now tracking more than 15,000. So it is easy to see why Nasdaq Private Market fits into classic modern exchange narratives about data and asset management rather than transactional activity.

Other exchanges that are developing similar ideas include LSEG (which is pondering PISCES, an "Intermittent Trading Venue" for less liquid shares to be bought and sold occasionally) and the International Stock Exchange in Guernsey, whose TISE Private Markets section enables private companies to auction shares without the initial and running costs of a formal listing and (importantly) without intermediaries.

Privately managed assets are not the critical path but a case of path dependency

In other words, for traditional stock exchanges, the tokenisation of privately managed assets is the path of least resistance: they are working with privately owned and managed companies anyway.

But it is also a case of path dependence. The shift by traditional exchanges from transactional activity to earning fees from data, operational and asset management means the critical path - getting from securities markets to token markets as expeditiously as possible – is closed to them.

It will be interesting to see if the dependent path leads to success, but the signs are not encouraging. Three years have elapsed since the American CSD, the Depository Trust and Clearing Corporation (DTCC), announced it was building a Digital Securities Management service as a post-trade infrastructure to reduce manual processing in private securities markets of all kinds. The service has yet to go live. [22]

In July 2024, Aktionariat, probably the most successful blockchain-based platform on the planet for funding small companies – it has tokenised more than 50 companies on public blockchains – and looking after token portfolios for investors, announced a major strategic shift to selling its token infrastructure technology to blockchain-friendly companies rather than tokenisation services to any type of company.

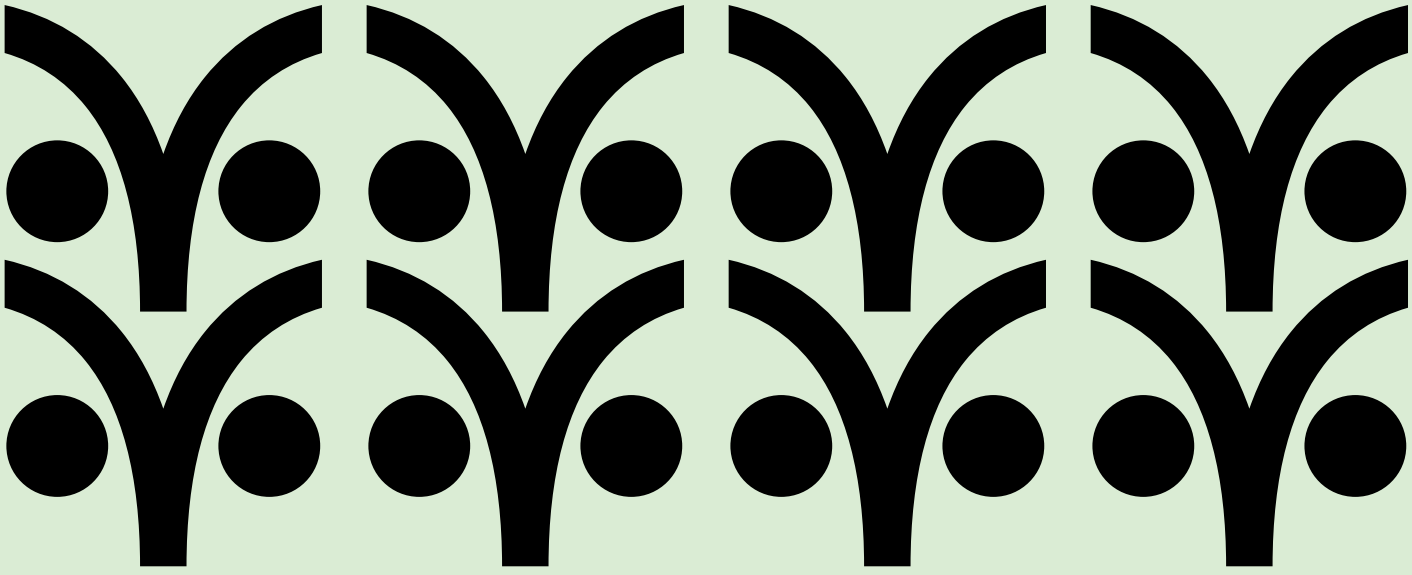
"The current business model would require hundreds if not thousands of issuers to catapult Aktionariat towards the ambitious goal of one day becoming a unicorn," explained the CEO. "This demand has not materialised despite our strong marketing and sales efforts ... many of our clients primarily used our tools to raise funds after other fundraising attempts failed. This is not a solid foundation for delivering value to investors and shareholders."[23]

Traditional stock exchanges will be tempted to read this as confirmation of the wisdom of their decision to avoid a serious commitment to tokenised markets. After all, it fits with news of similar economies at other token platforms, including SDX. But what it actually shows is that the opportunity – and the threat - of tokenisation lie somewhere other than where both incumbent stock exchanges and token market challengers are looking for it.

22. DTCC, Digital Securities Management: Bringing Private Markets Infrastructure Into The 21st Century, November 2021. supporting pre-IPO equity, DSM is designed to expand to a broad range of private-market instruments, including funds, real estate, debt, and others.

23. Aktionariat, Inflection Point, 12 July 2024.

After nearly a decade in business InvestaX still exudes energy and a passion for change



The blockchain-based investment and trading platform, InvestaX, can trace its origins to the Initial Coin Offerings (ICOs) boom of 2017-18, and its founders have shed none of the zeal for revolutionary reform of financial markets that characterised that period. They quickly recognized the transformative potential of the underlying technology—smart contracts and blockchains, which led them to overhaul their Web2 platform, replacing it with a cutting-edge blockchain-enabled system, fully equipped for the tokenisation of real-world assets (RWAs). However, a passion for making tokenisation happen does not mean InvestaX is an outsider. It has secured Capital Markets Services (CMS) and Recognised Market Operator (RMO) licences from the Monetary Authority of Singapore (MAS), and also collaborates with other regulated and licensed token exchanges, broker-dealers, investment firms and custodians, globally. Now, InvestaX has identified privately managed assets as where centralised traditional financial institutions (TradFi), with their preference for closed networks and high levels of intermediation, are most at risk of being bypassed and outpaced by start-ups that embrace blockchain technology, digitally native assets, open networks and direct access by investors. The company has launched a tokenisation Software as a Service (SaaS) platform to facilitate the issuance, trading and custody of RWAs. Future of Finance Co-founder Dominic Hobson spoke to Julian Kwan and Alice Chen, co-founders of InvestaX.[1]

Hobson: **Who owns your organisation, what are their expectations and how do they support your strategy?**

Kwan: We are backed by a good mix of traditional finance (Tradfi) and decentralised finance (DeFi) investors, including several publicly listed companies, Coinbase Global, UOB Venture Management, Signum Capital Management, 500 Startups, and several prominent individual investors such as Balaji Srinivasan (ex-Chief Technology Officer (CTO) of Coinbase) and the co-founders of PropertyGuru, Stephen Melhuish and Jani Rautiainen.

1. See also the separate interview with Alice Chen at https://futureoffinance.biz/investax-founder-agrees-that-tokenisation-is-synonymous-with-institutional-defi/

Hobson: Is it accurate to describe your organisation as an "exchange" where buyers meet sellers on your platform, as opposed to, say, investors meeting issuers as principal?

Kwan: InvestaX operates an exchange but also acts as the platform from which primary issuances can be launched. Essentially, we have built this one-stop shop tokenisation solution that enables the issuance, trading, and custody of Real World Asset (RWA) tokens, also known as security tokens, for all types of private market assets in a SaaS model, but we also hold the requisite licences to be able to distribute and trade these tokens.

Hobson: You have explained that your focus is on both primary market capital-raising and secondary market trading. What synergies do you see between the primary and the secondary markets?

Chen: Every issuer of a RWA token would like to offer their investors some form of secondary trading, and that is one of the strongest value propositions of tokenised RWAs recorded on the blockchain over traditional RWAs recorded on paper. The synergy between primary and secondary markets is crucial because it creates a more liquid and dynamic ecosystem. In the primary market, capital is raised, and RWAs are tokenised, but substantial additional value is unlocked in the secondary market where these tokens can be traded freely. This liquidity provides investors with the flexibility to enter and exit positions more easily, which, in turn, attracts more capital to the primary market.

Hobson: Exactly what do InvestaX's licences entitle it to do in terms of instruments, activities and accredited investors?

Chen: InvestaX's licences allow it to facilitate the primary offering and issuance of RWA tokens, as a broker-dealer. InvestaX is also licensed to operate a secondary exchange for RWA tokens, and it does so via a matching engine and order book model. While InvestaX caters to accredited and institutional investors, its sister company, IX Swap, focuses on retail investors. IX Swap operates the world's first licensed decentralised exchange for RWA tokens, powered by liquidity pools and automated market makers (AMM), and holds a Digital Assets and Registered Exchanges Act licence from the Securities Commission of The Bahamas, which allows it to launch primary issuances of digital assets, operate a digital asset exchange, digital assets, and more. Both platforms are

Julian Kwan

Co-founder, Chief Executive Officer of InvestaX

generally available to investors worldwide, subject to sanctions restrictions and the applicable laws of any particular jurisdiction.

Hobson: **Are you seeking additional operating licences?**

Chen: Not currently. Under both platforms, we are proud to say that we have the full suite of licences needed to issue, trade and custody any tokenised RWA, for all types of investors. These licences, which have collectively taken us five long years to secure, are the biggest value-add we can bring to any and all clients in the RWA tokenisation space, because of how regulatory compliance lies at the heart of every RWA token project.

Hobson: **Your blockchain network is "public" rather than "private" or "public permissioned." What explains your choice?**

Kwan: We are blockchain-agnostic but we see the value of public blockchains to be able to introduce interoperability, which is required to provide shared liquidity pools and the larger benefits of public protocol upgrades and improvements. Private networks fail to provide the connectivity to the Web3 ecosystem and all of the innovations and value there. Every digital asset that matters - Bitcoin, Ethereum, Stablecoins, altcoins (those other than Bitcoin (BTC) and Ether (ETH)), most RWA tokens, governance tokens for decentralised autonomous organisations (DAOs) are all on public blockchains and there would be no way to interact with them or any DeFi applications if you built your own universe on a private chain.

Hobson: **Which blockchain protocol do you use?**

Kwan: BASE (Coinbase), Ethereum, Polygon, Klaytn (Kakao), Tezos, Algorand and Hedera Hashgraph are some of the protocols we work with. However, we are blockchain-agnostic and are always willing to add other suitable public protocols to our platforms.

Alice Chen

Co-founder, Chief Operating Officer and General Counsel of InvestaX

Hobson: **Do you work with a particular technology vendor?**

Kwan: We build and own all our own technology. We have an experienced and highly knowledgeable in-house technology team that specialises in Web3 development. This internal

expertise allows us to maintain complete control over our platforms, ensuring they are secure, scalable, and tailored to the needs of our users. By developing everything in-house, we are able to stay at the forefront of blockchain innovation, quickly adapting to new trends and technologies while implementing features that align with our vision.

Hobson: In terms of the additional services you provide, issuance, trading, settlement, registration and custody are all provided on the public blockchain, which is unusual. What are the risks and advantages of providing all services on a public blockchain?

Chen: The primary advantage of using public blockchains for these services is the ability to leverage global infrastructure that seamlessly connects to the broader digital asset ecosystem, including the powerful tools and innovations within the DeFi space. By operating on public blockchains, we also benefit from enhanced security features and protocol upgrades inherent in decentralised networks, such as immutability and consensus mechanisms, which help to reduce the risk of fraud and ensure the integrity of transactions. Further, the use of public chains allows for greater interoperability with other digital assets and platforms, which can foster innovation and open up new opportunities for our clients. As for risks, we do not see any major concerns that outweigh these benefits. Public blockchains have proven to be resilient and secure over time, and their open nature encourages continuous improvement and audit by a global community.

Hobson: How do transactions settle? Is it "atomically"? And how do you deal with the cash leg of settlement? Is it off-chain via the conventional banking system, cash on-chain in tokenised form, or by direct or indirect connections to central bank Real Time Griss Settlement systems (RTGSs)?

Chen: With InvestaX, investors can use fiat currency or Stablecoins to purchase RWA tokens, which typically involves having pre-funded accounts. On the IX Swap front, investors invest using Stablecoins from their self-custody digital wallets, and everything happens on chain. Our AMM is built on Ethereum, Polygon and BASE (all public protocols), and the swaps settle onchain using digital currencies and digital securities. Both setups are optimised for seamless and efficient transactions and settlement.

Hobson: Do your issuance services include offering or writing smart contracts?

Kwan: Yes, we write our own smart contracts in-house, which allows us to provide highly customised and secure solutions tailored to our platforms and clients' needs. Our experienced Web3 development team creates smart contracts that manage everything from token issuance to managing the flow of funds, ensuring transparency and automation throughout the process.

Hobson: **Do you provide financial advisory services to issuers?**

Chen: Yes, we do offer advisory services to issuers. Our advisory services are designed to guide clients through the entire investment lifecycle of their tokenised RWA. This includes strategic planning, structuring, documentation, regulatory compliance and marketing. We leverage our deep expertise in blockchain technology and financial markets to help issuers structure their RWA token offerings effectively, ensuring that they meet both legal requirements and market expectations. Our team also provides insights into market trends and investor preferences, helping issuers to position their offerings attractively in the market. Our goal is to ensure that our clients can launch their tokenised RWAs successfully and achieve their strategic objectives, all while mitigating risks and enhancing their overall market impact.

Hobson: **You have described the type of issuers you seek as "global." How are you reaching a global audience?**

Kwan: We reach a global audience by leveraging our platforms' established international investor base and employing a diverse range of strategies, including public relations, marketing campaigns, speaking engagements at major conferences, interactive ask-me-anything (AMA) sessions on social media and webinars.

Hobson: **The types of issuers you seek includes public companies, private companies, mutual funds, private equity funds and exchange-traded funds (ETFs). What explains your choice of targets?**

Kwan: We are asset-agnostic and client-agnostic, meaning that we welcome issuers from diverse sectors and asset classes. We view tokenisation as simply a tool and back engine. You can tokenise almost anything that has value, whether it is financial instruments, public companies, private firms, mutual funds, private equity funds, ETFs, art, collectibles, real estate or luxury items. Our platforms are designed to accommodate a wide range of needs and asset types. Our focus is on providing a fast, cost-effective, and legally compliant environment for issuing RWA tokens, regardless of the type of asset or issuer.

Hobson: **You have described liquidity as both "crucial" and "very important." How does secondary market liquidity help primary market activity?**

Chen: Secondary market liquidity plays a vital role in enhancing primary market activity by providing a dynamic and accessible trading environment for RWA tokens. IX Swap pioneered the world's first automated market maker specifically designed for RWA tokens, which allows anyone holding RWA tokens to initiate a liquidity pool, which is game changing. Investors benefit from enhanced liquidity in the secondary market through the ability to exit their positions more easily and efficiently. IX Swap's automated market maker for RWA tokens facilitates trading 24/7, without the need for the counterparty buyer or seller to be present at the other side of the trade at any given time. The availability of a secondary market also reduces the illiquidity discount which is the tendency for assets to be priced lower due to difficulty in selling them quickly. As a result, investors are more confident in their ability to liquidate their positions without significant price concessions, making the RWA tokens more attractive and increasing overall market participation.

Hobson: **Are the additional services you provide – such as fractionalisation of assets, lowering minimum subscriptions to funds, trading, direct market access (DMA), custody and staking - designed to appeal to a particular type of investor, such as retail investors?**

Chen: All these services are integral to our overall value proposition and are designed to cater to a broad spectrum of investors, including retail investors on the IX Swap side. Fractionalisation of assets allows investors to purchase smaller, more affordable portions of high-value assets, making it easier for individuals with varying levels of capital to participate. Lowering minimum subscriptions to funds also opens up opportunities for investors who might otherwise be excluded from high-entry barrier investments. Custody of RWA tokens on both platforms are provided through licensed custodians, ensuring secure storage at all times. Additionally, IX Swap offers staking which gives investors opportunities for earning rewards and also encourages appreciation due to reduced circulating supply. Together, these features create a more inclusive and accessible investment environment, aligning with our goal to serve a diverse investor base and democratise access to investment opportunities.

> From day one, we chose to build on public blockchains, allowing us to leverage all the innovations being built on top of these protocols. Every digital asset that matters is on public blockchains and there would be no way to interact with them or any DeFi applications if you built your own universe on a private chain.

Hobson: Your choice of target asset classes (equities, funds, real estate, commodities), other real-world assets such as collectibles, structured products such as ETPs and structured derivatives for both retail and institutional investors is both global and comprehensive. But which of these asset classes are you focused on in the short term?

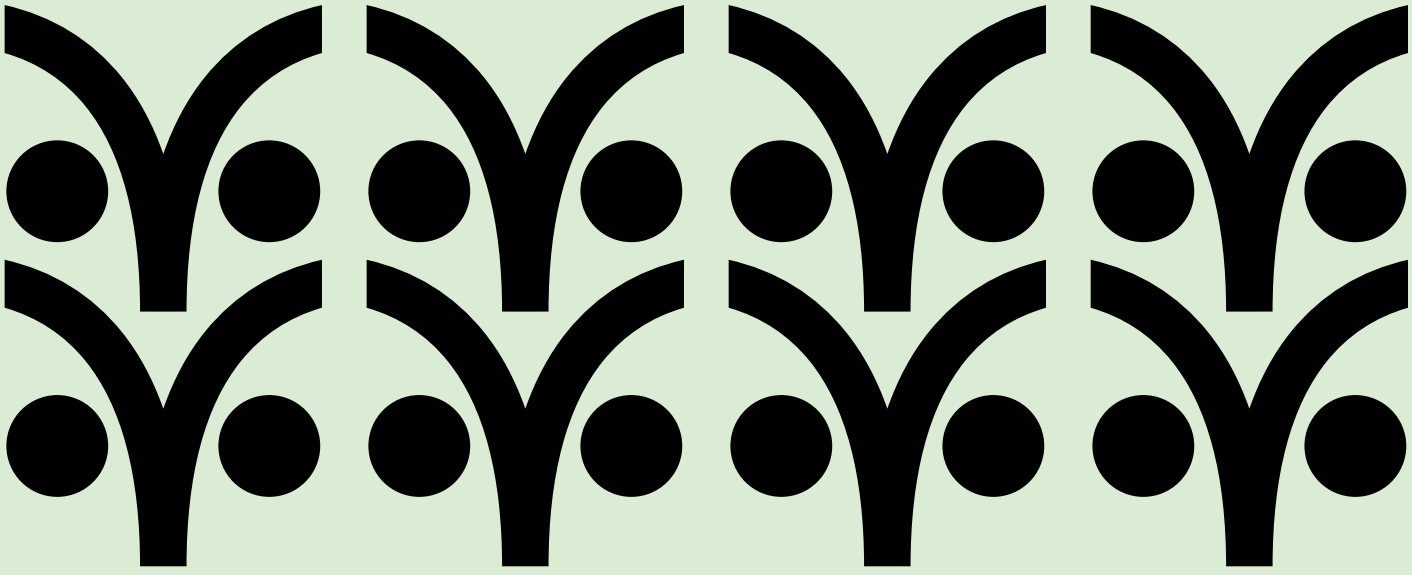
Kwan: In the short term, our focus is on start-ups, venture funds and other alternative investments. We see significant potential in these asset classes due to their dynamic and high-growth nature. Start-ups and venture funds, in particular, are crucial for driving innovation and scaling new technologies, which aligns perfectly with our mission to support cutting-edge financial products. These alternative investments often benefit from the flexibility and liquidity provided by tokenisation, making them ideal candidates for our platforms. By concentrating on these areas, we aim to capture the burgeoning opportunities within the alternative investment space, offering tailored solutions that address the specific needs of investors and issuers in these segments. This targeted approach allows us to build deeper expertise and create more impactful solutions, setting the stage for further expansion into other asset classes as we continue to grow. At the same time, we know that diversification is key to managing investment risk, so we also offer tokenised private credit and soon to offer tokenised treasuries as part of our suite of offerings.

Hobson: You have explained that you are already enjoying profitable revenues, which is also unusual. What is the secret of your success?

Kwan: Our success can be attributed to several key factors. We began our journey in Asia, where we were among the earliest and biggest believers in RWA. I guess we are considered early pioneers in the RWA tokenisation space, with a number of world-first projects, including tokenising the Singapore Variable Capital Company fund structure in a blockchain native issuance (Project eVCC). We tokenised our own ESOP (DESOP) and pioneered onchain tokenised portfolios for VCs (OTPs).

Our dedication to this space is evident in the extensive efforts we undertook to obtain the necessary licences. From day one, we chose to build on public blockchains, allowing us to leverage all the innovations being built on top of these protocols. Additionally, our team's relentless work ethic and expertise have played a crucial role in our success. Despite having raised some of the least amount of venture funding compared to our peers, we have been able to attract and retain top talent, which I personally believe to be the best in the market. These factors combined—our early commitment, regulatory diligence, innovative approach, and exceptional team—have been instrumental in achieving profitable revenues and establishing our position as a leader in the industry.

Obligate has embarked on a quiet transformation of the capital markets



Obligate, the Zurich-based blockchain platform for the issuance of corporate bonds and structured products has a simple ambition. It is to enable issuers to recruit digital asset investors at a fraction of the cost and time it would take to complete the same transaction with a bank as counterparty or in the conventional capital markets – in part by replacing issuing and paying agency intermediaries with smart contracts. Already, Obligate has facilitated dozens of on-chain issuances, including several USD Coin (USDC)-denominated bond issuances by TradeFlow Capital management, a Singapore-based fund, a EUROe-denominated bond for Lamar Olive Oil, and USDC-denominated bonds for Bitcoin Suisse and Polytrade. Technically, the debt takes the form of eNotes ™, which are ERC-20 tokens issued on to the Polygon blockchain. But if blockchain is enabling Obligate to cut costs, nobody could accuse the platform of cutting corners. In legal and regulatory terms, the eNotes are governed explicitly by the Swiss law of contract. And, although eNotes rank as bearer instruments, distribution is limited to "qualified" institutional investors, who are subject to full Anti-Money Laundering (AML), Countering the Financing of Terrorism (CFT) and sanctions screening checks. Future of Finance Co-founder Dominic Hobson spoke to Benedikt Schuppli, co-founder and Chief Business Development Officer (CBDO) of Obligate, about how the platform works and how he plans to grow the business.

Hobson: **Who owns your organisation, what are their expectations and how do they support your strategy?**

Schuppli: Obligate is owned by a combination of its founding team (Benedikt Schuppli, Stephan D. Meyer) and investors (Circle, Earlybird, SIX, Blockchange). Their expectations include driving innovation in blockchain-based financial markets, supporting the strategy through funding and providing industry expertise.

Hobson: **Is it accurate to describe your organisation as an "exchange" where buyers meet sellers on your platform, as opposed to, say, investors meeting issuers as principal?**

Schuppli: No, Obligate is not an exchange. It's a capital markets platform facilitating capital-raising activities between investors and issuers.

Hobson: **You have explained that your focus is on primary market capital-raising. What are the reasons for this?**

Schuppli: The focus on primary market capital-raising is due to the opportunity to innovate and streamline the issuance process using blockchain technology. Due to the lack of standardisation in private markets, the potential for disruption and lowering transaction cost is massive.

Hobson: **You have described your operating licences as "brokerage," "capital markets" and "financial market infrastructure." Exactly what do these licences entitle you to do in terms of both instruments and activities and accredited investors?**

Schuppli: We are regulated as a financial intermediary subject to Anti Money Laundering (AML) regulation in Switzerland and have an umbrella set-up with a licensed investment broker in Germany.

Hobson: **Are you seeking additional operating licences?**

Schuppli: Currently nothing in particular.

Hobson: **Your blockchain network is "public" rather than "private" or "public permissioned." What explains your choice?**

Schuppli: In our vision, financial markets should be truly efficient, secure and accessible. We believe public blockchain is the best existing technology to achieve that. Any other option lacks at least one of the properties we are not ready to compromise on.

Hobson: **Which blockchain protocol do you use?**

Obligate is not an exchange. It's a capital markets platform facilitating capital-raising activities between investors and issuers. The focus on primary market capital-raising is due to the opportunity to innovate and streamline the issuance process using blockchain technology. Due to the lack of standardisation in private markets, the potential for disruption and lowering transaction cost is massive.

Schuppli: We use multiple blockchain protocols to meet our customers' demands. Polygon Proof-of-Stake (PoS), an Ethereum Virtual Machine (EVM)-compatible, Proof-of-Stake sidechain for

Ethereum and Base, a Coinbase-incubated Layer Two of the Ethereum network, are the most popular among our customers. Soon, we will deploy on Lisk (an Optimism Superchain Layer Two). We also experiment with Solana and other networks to ensure our customers have access to the most efficient technologies on the market.

Hobson: **Do you work with a particular technology vendor?**

Schuppli: While we work with external partners to increase scalability, we primarily incubate and develop the core expertise in-house.

Hobson: **In terms of the services Obligate provides, issuance, trading, settlement and registration are all provided on the public blockchain but custody is provided on another technology. Is this division simply because you do not provide custody? And what are the advantages and disadvantages of providing all the other services on a public blockchain?**

Schuppli: Obligate does not provide custody directly. The public blockchain enhances transparency and security, while third-party custody ensures specialised asset handling which is needed for institutional-grade customers.

Hobson: **How do transactions settle? Is it "atomically"? And how do you deal with the cash leg of settlement? Is it off-chain via the conventional banking system, cash on-chain in tokenised form, or by direct or indirect connections to central bank Real Time Gross Settlement systems (RTGSs)?**

Schuppli: eNotes are denominated in Stablecoins (i.e., USD Coin (USDC) and the EUROe Stablecoin issued by Membrane Finance) which allows immediate on-chain settlement both at the issuance and at repayment. Borrowers usually "off-ramp" the Stablecoins to their preferred operational fiat currency. Investors tend to keep Stablecoins after the repayment and deploy into the next opportunity.

Hobson: **Do your issuance services include offering or writing smart contracts?**

Schuppli: Yes, Obligate provides its smart contracts which are used in the issuance and settlement processes and to support corporate actions in the asset lifecycle.

Hobson: **Do you provide financial advisory services to issuers?**

Schuppli: No.

Hobson: You have described the type of issuers you seek as "global." How are you reaching a global audience?

Schuppli: Obligate reaches global issuers through strategic partnerships, industry networks, sales efforts and digital marketing.

Hobson: The types of issuers you seek includes public companies, private companies, mutual funds and private equity funds. What explains your choice of targets?

Schuppli: We want to enable every potential issuer to issue a financial instrument at low cost, fast time to market and maximum flexibility. Furthermore, targeting diverse issuer types ensures a broad market appeal and leverages the strengths of the blockchain for various financial instruments.

Hobson: You have described liquidity as "very important" but are focused on the primary markets. How will secondary market liquidity develop and how might it help your primary market activities?

Schuppli: While secondary market liquidity enhances the attractiveness of primary market offerings by ensuring investors can easily exit their positions, it is not directly offered by Obligate, as our focus is on the primary market.

Hobson: Your target clients include market-makers and liquidity providers. Do you view these as the principal sources of liquidity or are automated market-makers (AMMs) part of your strategy?

Schuppli: We are focused on qualified investors, which can access our platform also through brokers. AMMs are not part of our strategy yet.

Hobson: The types of investors you are seeking include asset owners such as pension funds and sovereign wealth funds, insurers, wealth managers and private banks, brokers, family offices, and accredited retail investors. Which type of investors are finding your services most attractive at the moment?

Schuppli: Our products are attracting significant interest from wealth and asset managers seeking new investment opportunities and diversification. We also observe strong demand from family offices and High Net Worth Investor (HNWIs) and Ultra High Net Worth Investor (UHNWIs) clients, who can access our platform directly or through brokers.

Benedikt Schuppli

Co-founder and CBDO of Obligate

Hobson: You have described the investors you seek as "global." How are you reaching them?

Schuppli: Strategic partnerships, distribution partners, sales efforts and public relations (PR), within the select jurisdictions we are active in.

Hobson: Are the additional services you provide – such as fractionalisation of assets, lowering minimum subscriptions to funds, peer-to-peer trading, and direct market access (DMA) - designed to appeal to a particular type of investor, such as accredited retail investors?

Schuppli: Although we're not targeting retail investors, services like asset fractionalisation and direct market access attract a broad range of investors.

Hobson: Your choice of target asset classes (equities, bonds, funds, real estate, commodities such as gold, other real-world assets such as collectibles, and structured products such as Exchange Traded Products (ETPs) and structured derivatives for both retail and institutional investors, is both global and comprehensive. What explains your focus on these asset classes?

Schuppli: Currently we are focused mainly on bonds and structured products which can be linked to a variety of assets (i.e. equities, funds, digital assets) due to high demand and blockchain compatibility.

Hobson: You have chosen not to provide custody services directly on the blockchain or to work with a particular third-party custodian. How are your customers custodying assets they acquire through you?

Schuppli: Clients have the choice to either self-custody their assets through their own wallet or work with one of our custody partners to ensure secure custody solutions for assets acquired through Obligate.

Hobson: **How is customer cash handled by your platform?**

Schuppli: Customer cash never touches our platform. For each issuance an escrow smart contract is automatically created to securely handle the flows of cash and tokens between issuers and investors. Wallets of our customers interact directly with that smart contract.

Hobson: **What industry accreditations – such as International Standard on Assurance Engagements (ISAE) certificates– has your organisation secured?**

Schuppli: Obligate is a member of the Financial Services Standards Association (VQF), an Anti-Money Laundering Self-Regulatory Organisation (SRO) supervised by the Swiss Financial Market Supervisory Authority (FINMA) that ensures compliance with Anti-Money Laundering (AML) regulations and ensures the provision of a secure, transparent platform for financial operations.

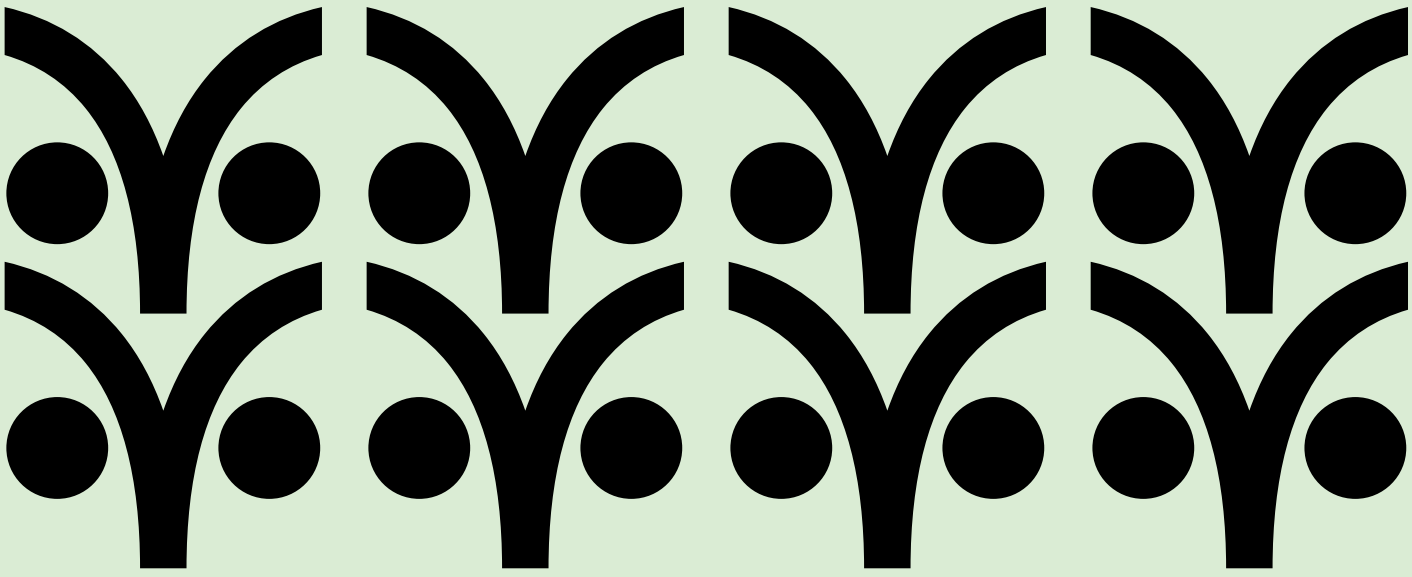
Hobson: **You have explained that you are already enjoying profitable revenues, which is also unusual. What is the secret of your success?**

BOOK REVIEW

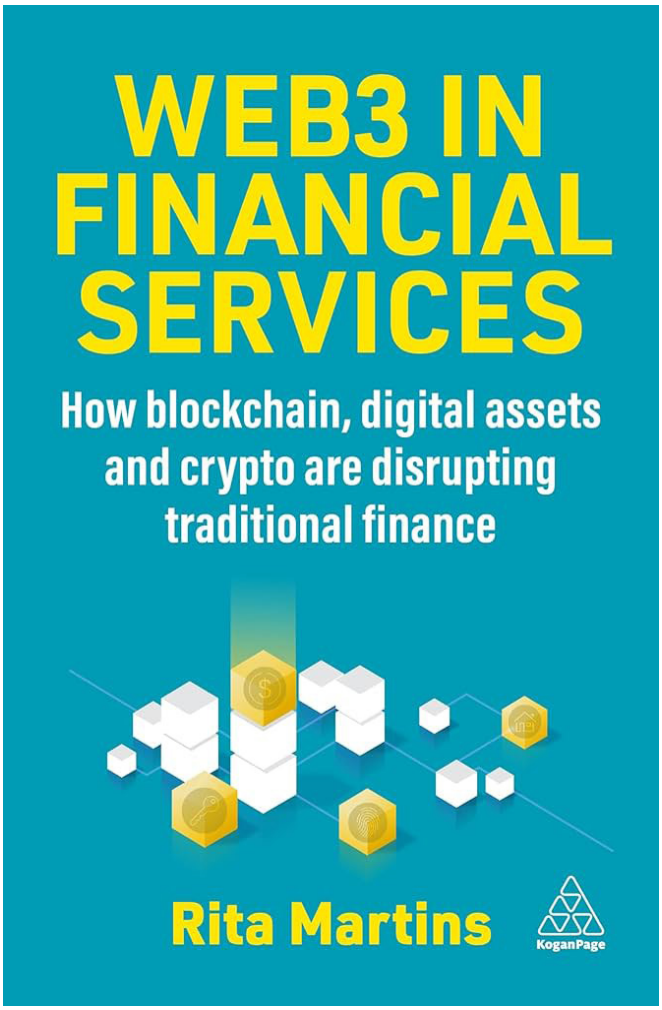
Web3 in Financial Services: How blockchain, digital assets and crypto are disrupting traditional finance

Rita Martins

Kogan Page, 2024, 288 pages



`We are done doing Proofs of Concept,' said a senior banker at a conference. `Now we need to scale up.'



It is hard to disagree with the anonymous banker quoted by Rita Martins towards the end of this compendium of everything that has happened in the cryptocurrency markets since Satoshi Nakamoto published Bitcoin: A Peer-to-Peer Electronic Cash System in October 2008.

As Martins points out, we know that blockchain technology works, that it yields operational efficiencies and that it makes possible new ways of lending, borrowing, issuing, trading and investing. The unresolved – though not unanswered - question for both start-ups and incumbent financial institutions is how to capture these gains at scale.

There are some familiar explanations for this, and Martins rehearses them. Blockchain technology itself struggles to scale. Visa processes 65,000 transactions a second (TPS) while Ethereum manages 12 and Bitcoin just seven. Even Solana, a blockchain protocol designed to achieve higher throughput, currently manages an average of only 400 TPS.

Interoperability between blockchain protocols is limited too. Every blockchain begins as a closed universe, designed like every business before it to share none of the value it creates with competitors. On the safe assumption that existing financial markets will not disappear overnight, there is also a secondary problem of interoperability with traditional asset platforms.

Then there is the lack of fiat currency on blockchains. When Martins writes that "Bitcoin disrupted money," she means that it spawned a host of imitators – in 2013 Coinmarketcap listed just seven cryptocurrencies, against more than 10,000 today – but neither these nor Stablecoins are a permanent solution to the need to settle the cash leg on rather than off blockchains. Solutions are in prospect, in the shape of tokenised deposits and central bank digital currencies (CBDCs) but have yet to become available in inter-bank form in a major reserve currency.

Lastly, there is regulatory uncertainty. Though increasingly implausible in the case of security and fund tokens issued on to blockchains, the fact that cryptocurrencies remain largely unregulated in almost every major jurisdiction save the European Union (EU) – much of whose Markets in Crypto-assets Regulation (MiCAR) came into force at end-June 2024 - the threat of inadvertent compliance problems is enough to persuade most regulated institutions to do nothing.

"The central question for each traditional institution is no longer whether to explore Web3 but how. Companies that do not take advantage of this new technology could be left behind and disrupted by new players."

Future of Finance research found a group of just six banks, three asset managers and three established stock exchanges regularly and actively engaged in tokenisation initiatives. Martins – who, as an adviser to financial institutions, is in a good position to know – argues that incumbents are doing more than we can detect. "Many institutional players have quietly been learning, testing and developing in the background and are now ready to deploy at scale," she says.

This implies not incremental change but a transformation. The transformation will be from the current Web 2.0 paradigm (which is characterised by closed platforms owned by centralised Big Tech firms that create value by monetising the data created by their customers) to Web 3.0 (which will be characterised by open platforms owned by users that create value by owning and controlling their own data and trading peer-to-peer).

According to Martins, in the financial services industry Web 3.0 will be synonymous with Decentralised Finance (DeFi). DeFi dispenses with intermediaries such as banks. Instead, consumers will use programmable money and digital identities to transfer value peer-to-peer between self-custodial digital wallets and save and invest via decentralised apps (dApps) hosted on blockchains, operated by self-executing smart contracts and owned by holders of tokens in Decentralised Autonomous Organisations (DAOs).

"If widely adopted, DeFi could disintermediate TradFi with significant impact to existing business models and strategies," warns Martins. She adds that "The central question for each traditional institution is no longer whether to explore Web3 but how. Companies that do not take advantage of this new technology could be left behind and disrupted by new players."

That makes Martins sound like a true believer, but she is not. The author is aware of how far DeFi falls short of fulfilling the vision of its inventors. For a start, the most successful cryptocurrency platforms are far from decentralised. Coinbase, for example, is as centralised as the New York Stock Exchange. Even where a blockchain network is based on a decentralised design, the nodes are almost always operated by the provider on behalf of the users.

Programmable money remains no more than a good idea. Digital identities are not just a good idea but an excellent one ("crucial for financial services' adoption of Web 3," says Martins). They

do exist in various bastardised forms, but the end-state of consumer-owned self-sovereign identities that incorporate enough of the personal data of their owners to make Zero Knowledge Proofs (ZKPs) a viable alternative to painful, paper-based and repetitive on-boarding processes, remain a pipedream.

As for DAOs, these also exist, but not in ways that align the incentives of owners, investors, employees, customers and suppliers described by DeFi evangelists. Most DAOs are controlled by small groups of large holders, often venture capitalists, which run the business in much the same fashion as managers of a limited liability company. There is, as Martins notes, "a gap between the ideal of universal participation and the realities of community engagement and efficiency."

There is a gap also in the way that dApps work in theory and in practice. Though Martins is right that "liquidity pools are an innovation of the DeFi industry with no equivalent in traditional finance" their operators have discovered that even a technology as innovative as smart contracts running on blockchains cannot erase the eternal truth that financial services transfer value through time, and that this creates risk.

All the problems of conventional lending – bank runs, fire sales, leveraged speculation, rehypothecation – have occurred in DeFi lending. Martins shows how automated lending and borrowing protocols have sought to overcome the necessarily hefty haircuts on collateralised lending and borrowing of such a volatile asset class as cryptocurrencies by broadening the range of eligible collateral and even (shock, horror) running credit checks (known here as the "white-listing" of borrowers).

"Web 3 is not as fully decentralised as originally envisaged," writes Martins. Indeed, it is not, which ought to be troubling when decentralisation is as fundamental to Web 3.0 as centralisation is to Web 2.0. But Martins is not a fundamentalist. For her, centralised versus decentralised is not a binary choice. "CeFi" is not synonymous with "TradFi" but a "hybrid between the traditional model and new Web3 concepts and technologies." A centralised platform can evolve into decentralised one (and vice versa).

This is a sensible and pragmatic way of looking at what is bound to be a long transition that ends in some form of convergence between institutions and markets. Richard Crook, in describing the eventual merging of the traditional markets with blockchain networks, is apt to quote a passage from George Orwell 's *Animal Farm*: "The creatures outside looked from pig to man, and from man to pig, and from pig to man again; but already it was impossible to say which was which."

As it happens, progress in that convergence is easier to trace in the security and fund token markets than in the cryptocurrency markets to which *Web3 in Financial Services* devotes most of its pages. Token markets are the places where traditional financial institutions are identifying the elusive blockchain use cases – one of them, the use by J.P. Morgan of blockchain in intra-day repo transactions, is famous as the only instance of a blockchain investment delivering a measurable return – and Martins does allude to these investments, but she finds most of the innovation is occurring in the cryptocurrency arena.

It is true that the cryptocurrency markets are a more fruitful source of innovation than the security and fund token markets, which tend to borrow what they find interesting from the cryptocurrency markets. But if the future of finance truly is being forged mainly in the

cryptocurrency markets, that makes it harder to be optimistic. As the text of Web3 in Financial Services demonstrates repeatedly, our species has a peculiar propensity to divert any new technology to rapacious ends, and cryptocurrencies issued on to blockchains have not escaped this curse.

Since the hack and collapse of the Mt Gox Bitcoin exchange in 2014 – the proceeds of the crime were laundered, predictably, by Russians – the cryptocurrency markets and the associated paraphernalia of digital wallets, electronic bridges and smart contracts have provided a constant stream of opportunity for morally disreputable activities, including theft, fraud and inside jobs. In the six years between the beginning of 2018 and the end of 2023, Chainalysis has recorded the loss of US$113.5 billion to illicit cryptocurrency addresses.

The cryptocurrency markets and the associated paraphernalia of digital wallets, electronic bridges and smart contracts have provided a constant stream of opportunity for morally disreputable activities

In November 2022, FTX, the third largest cryptocurrency exchange in the world, turned out to be a fraud. Its founder, Sam Bankman-Fried, was convicted on seven counts of fraud, conspiracy and money laundering and sentenced to 25 years in prison. In April 2024 Changpeng Zhao ("CZ"), the founder of Binance, the rival and at one stage potential rescuer of FTX, pleaded guilty to a money laundering charge in the United States and was sentenced to four months in prison.

In 2021 hearts warmed at the news that an unemployed or impoverished Filipino could earn US$300-400, more than the average monthly wage, in just a week by playing Axie Infinity. But many of the Filipinos that took part in the Axie Infinity boom borrowed money to play, and when the price of Smooth Love Potions collapsed, they lost everything. To make matters worse, some of the money they invested was stolen by North Korea in a successful hack of a cryptocurrency exchange.

The economics of Axie Infinity are the same as the economics of cryptocurrencies in general. There is no source of value in a play-to-earn game, just as there is no source of value in a cryptocurrency. There is only the continuous flow of new money from gullible, greedy or desperate investors to drive up the price of Bitcoin, just as new money drove up the price of Smooth Love Potions. In this context, the launch of Bitcoin spot exchange traded funds (ETFs) is not necessarily a cause for celebration, or an encouraging sign of convergence between the established and the novel.

However ingenious the innovations, cryptocurrencies often feel less like the future of money than the past of money, with echoes of Ponzi schemes and chain letters. So it is not surprising that regulators are getting tougher. The attempt to create a global Stablecoin was defeated by regulators. Customer due diligence requirements are being applied. Restrictions on the marketing

of cryptocurrencies are being tightened. Banks that want to service the cryptocurrency and Stablecoin industries are being denied full banking licences.

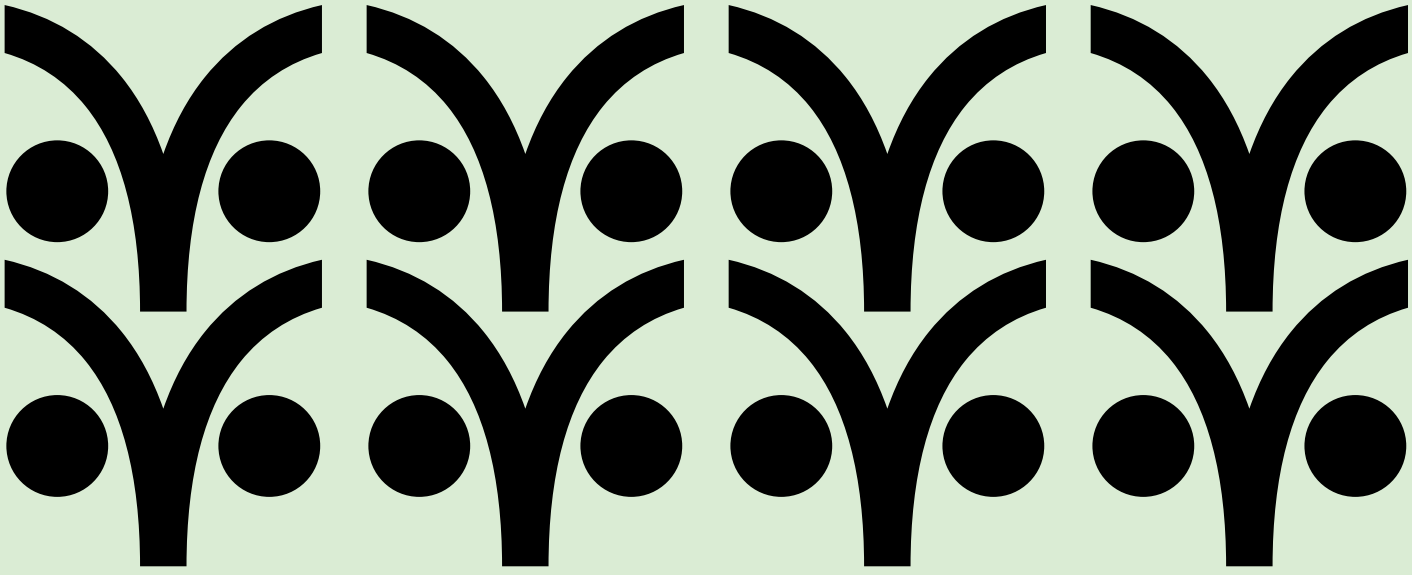
In the end, the passage to a Web 3.0 future for finance does not lie through the cryptocurrency markets. It lies through building infrastructure, as Rita Martins points out. DeFi, she says, is at the equivalent of the dial-up Internet stage, pre-broadband, with terrible user experience, coloured by unreliable connections, incomprehensible jargon, high and volatile transaction fees, uncertain settlement timetables, the difficulty of remembering seed phrases, lack of standards, minimal interoperability with TradFi and technical obstructions to integrating wallets with dApps.

This reflects a search for instant profit in a poorly prepared marketplace with low barriers to entry. Martins quotes Graham Cooke, author of *Web3: The end of business-as-usual*, to good effect on this issue. He has pointed out that Web 3.0 inverts the logic of Web 1.0, which was 80 per cent protocols and 20 per cent apps, by being 20 per cent protocols and 80 per cent apps. The key to the success of Web 1.0 was the open protocols that support the Internet, the World Wide Web and Email to this day, but their equivalents are not being built for Web 3.0.

So Martins is rightly dismissive of those who think that all Web 3.0 needs to take off is a "ChatGPT moment" – the fast-growing app all those DeFi entrepreneurs are desperately searching for already. What DeFi needs is an open public blockchain infrastructure on which fast-growing apps can be built.

"With tokenisation, all types of products can be created using one platform," writes Martins. "Rates, coupons, rules and all token components are added to the smart contract and can be changed individually, when needed, without having to change the platform's rules. Since there is only one stack, processes can be streamlined with lower costs and fewer resources." It sounds boring, but it will be more effective in creating Web 3.0 in financial services than anything else.

Deutsche Börse is building a vertically integrated market infrastructure for institutional investors in digital assets



In December 2021 Deutsche Börse completed the acquisition of a majority stake in Crypto Finance, a provider of trading, custody, and investment services for cryptocurrencies headquartered in Switzerland, where it is regulated by the Swiss Financial Market Supervisory Authority (FINMA). The strategy behind the acquisition was to enable Deutsche Börse to offer its institutional clients access to cryptocurrency services - including custody – and, obviously, give Crypto Finance access to the international client base, infrastructure and capital strength of the German securities trading, clearing and settlement group. Just over two years later, in March 2024, the Deutsche Börse Digital Exchange (DBDX) went live. DBDX is a trading venue for native cryptocurrencies and one of several initiatives of Deutsche Börse Group's holistic Digital Strategy. DBDX has now been successfully merged with the Group's FX entity – 360T - to achieve synergies on the organisational, regulatory as well as go-to-market dimensions. The digital business is headed by Carlo Koelzer, founder and CEO of 360T and Head of FX and Digital Assets of Deutsche Börse Group and will undergo a rebrand. In partnership with Crypto Finance, the vision is to offer a one-stop-shop solution for trading, settlement, institutional custody - all under the umbrella of Deutsche Börse Group. Future of Finance Co-founder Dominic Hobson asked Eric Viohl, Managing Director of Crypto Finance (Deutschland) GmbH and Miryusup Abdullaev, Head of Crypto Spot 360T, how Crypto Finance and DBDX work together.

Hobson: **DBDX, like Crypto Finance, provides a spot trading platform for institutional clients in Germany, using a Multilateral Trading Facility (MTF) licence. How important has the relatively advanced German domestic legal and regulatory framework been in driving the decision to establish DBDX, and how does it fit with the evolving European Union (EU) legal and regulatory framework?**

Viohl: The regulatory landscape for cryptocurrency in Europe is evolving rapidly, with Germany emerging as a key player. The Federal Financial Supervisory Authority (BaFin) has established a regulatory framework that allows financial institutions to offer cryptocurrency services in a controlled and secure environment. This achievement positions Germany alongside Switzerland.

The E-Securities Act (Gesetz zur Einführung elektronischer Wertpapiere – eWpG)[1], which enables the issuance of financial instruments on public blockchains, is also important. These regulations ensure that the country is well-prepared for the upcoming Markets in Crypto-Assets Regulation (MiCAR), with only minor adjustments needed. This readiness allows regulated entities such as 360T and Crypto Finance to transition swiftly to the MiCAR regime.

Abdullaev: German regulation is currently considered one of the highest standards in the European Union (EU). BaFin's stringent requirements for clear processes, Anti-Money Laundering (AML) measures, compliance, and information technology (IT) security set a high benchmark for other countries. Deutsche Börse Group, with its strong German foundation, is well-positioned to leverage this regulatory environment to expand its business across Europe under the MiCAR framework, spearheading this growth from Germany.

Hobson: Does DBDX operate like a conventional securities market, with users accessing the market via regulated firms such as brokers and banks during limited trading hours only or can the market be accessed directly 24/7?

Abdullaev: We act as a partner to the market, committed to supporting the ecosystem without directly targeting end-users. Unlike some competitors, we prioritise maintaining the existing relationships between end-users and their banks or brokers. This approach ensures that the client relationships remain intact, as we focus solely on B2B (Business to Business) and B2B2C (Business to Business to Consumer) services, mirroring our strategy in traditional asset classes. Being aware of the growing demand for 24/7 trading, we will not initially offer around-the-clock services. We understand that markets are moving in this direction, and we are prepared to adapt to this demand. However, this transition also depends on traditional market participants, such as banks and intermediaries, extending their trading and operating hours to support longer trading sessions. Not all participants are ready for this change yet.

Miryusup Abdullaev

Head of Crypto Spot 360T

Viohl: It is worth noting that we already offer 24/7 trading to our clients through Crypto Finance,

1. For a full explanation of the German legal and regulatory environment, see Future of Finance, Digital Asset Custody Guide, Issue 2, Regulation Matters, pages 31-43.

demonstrating our commitment to meeting the evolving needs of the market while maintaining our core B2B and B2B2C focus.

Hobson: What has convinced you that institutional investors are a better source of liquidity in cryptocurrencies than retail investors, which have tended to be the natural first movers in all types of digital assets?

Viohl: We see significant potential for large banks and traditional, non-crypto-native brokers to offer their clients access to cryptocurrency. There is a substantial group of users who are interested in investing in crypto but prefer to do so through their trusted house bank. By offering these banks a robust and regulated solution, we aim to unlock this new user group, providing them with the confidence to enter the market with a trustworthy partner like Deutsche Börse Group. Our long-standing reputation ensures that we take compliance seriously and provide a stable presence in the market.

Abdullaev: Although we primarily target institutions as our direct clients, we also aim to attract retail liquidity to our markets via intermediaries. The key to developing deep liquidity pools lies in combining both retail and institutional liquidity. This model allows us to create a vibrant and dynamic market environment that benefits all participants and reinforces our role as a reliable and innovative market partner.

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Hobson: Which cryptocurrencies will be traded on DBDX and why?

Abdullaev: We started our cryptocurrency offering with Bitcoin and Ether and are committed to further expanding our portfolio in response to client demand, always ensuring full compliance with MiCAR regulations.

Hobson: Trading on the DBDX will take place initially on a Request for Quote (RFQ) basis, to be followed by multilateral trading. How long do you expect the transition to be?

Abdullaev: We initially started with a bilateral RFQ model. However, this model can also accommodate multilateral trading, where liquidity takers interact with multiple liquidity providers. We have observed

that market participants are still undecided about which trading mechanisms are best suited for crypto trading. To address this, we have integrated DBDX into our 360T TEX multi-dealer trading platform to offer a wide range of market models and technical inroads. We are now working closely with selected partners to leverage our combined market-building expertise and professionalise crypto trading.

Eric Viohl

Managing Director of Crypto Finance (Deutschland) GmbH

Hobson: How does settlement take place? By delivery versus payment (DvP) with the cash leg delivered via the conventional banking system in fiat currency?

Viohl: Initially, settlements will take place in fiat currency, as many traditional players still prefer this method. However, our technology stack also supports settlement in Stablecoins. At the Deutsche Börse Group level, we are actively engaged in discussions around cash-on-chain and Central Bank Digital Currency (CBDC) initiatives across Europe.

Hobson: Will the DBDX/Crypto Finance combination handle cryptocurrencies only or will the service include payment tokens or Stablecoins?

Viohl: Through Crypto Finance, we already facilitate transactions using Stablecoins and offer trading pairs with Stablecoins as the settlement currency. On the MTF side, we are prepared to support Stablecoin settlements as soon as there is client demand.

Hobson: The 2023 annual report indicates Crypto Finance has under-performed. What explains that and how is it expected to change?

Unlike some competitors, we prioritise maintaining the existing relationships between end-users and their banks or brokers. This approach ensures that the client relationships remain intact.

– Miryusup Abdullaev


Future of
Finance