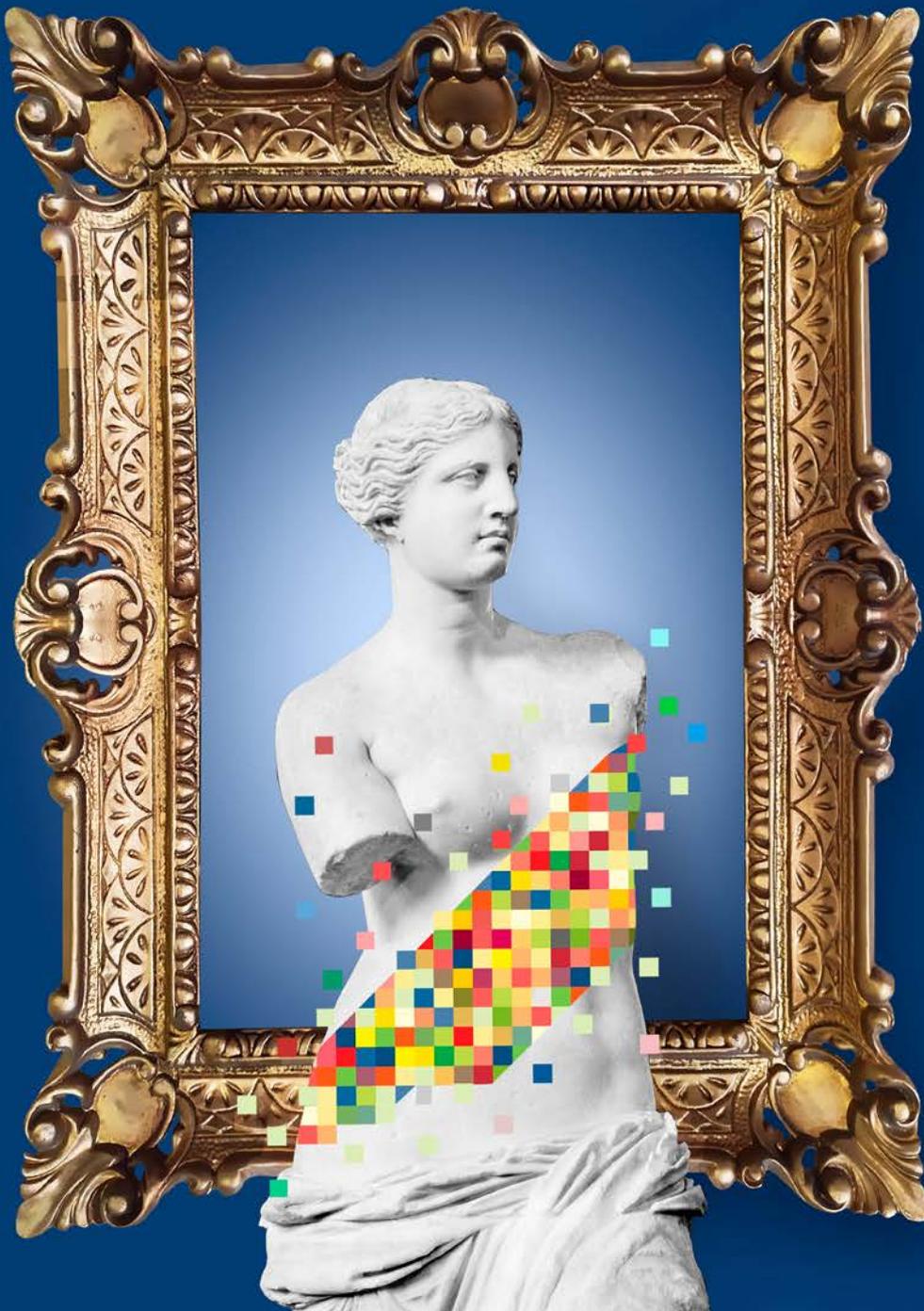


# Digital assets

Regulation and infrastructure  
for an evolving economy





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### ABOUT OMFIF

With a presence in London, Washington and New York, OMFIF is an independent forum for central banking, economic policy and public investment – a neutral platform for best practice in worldwide public-private sector exchanges.



Where the public and private sectors meet to shape the digital future of finance

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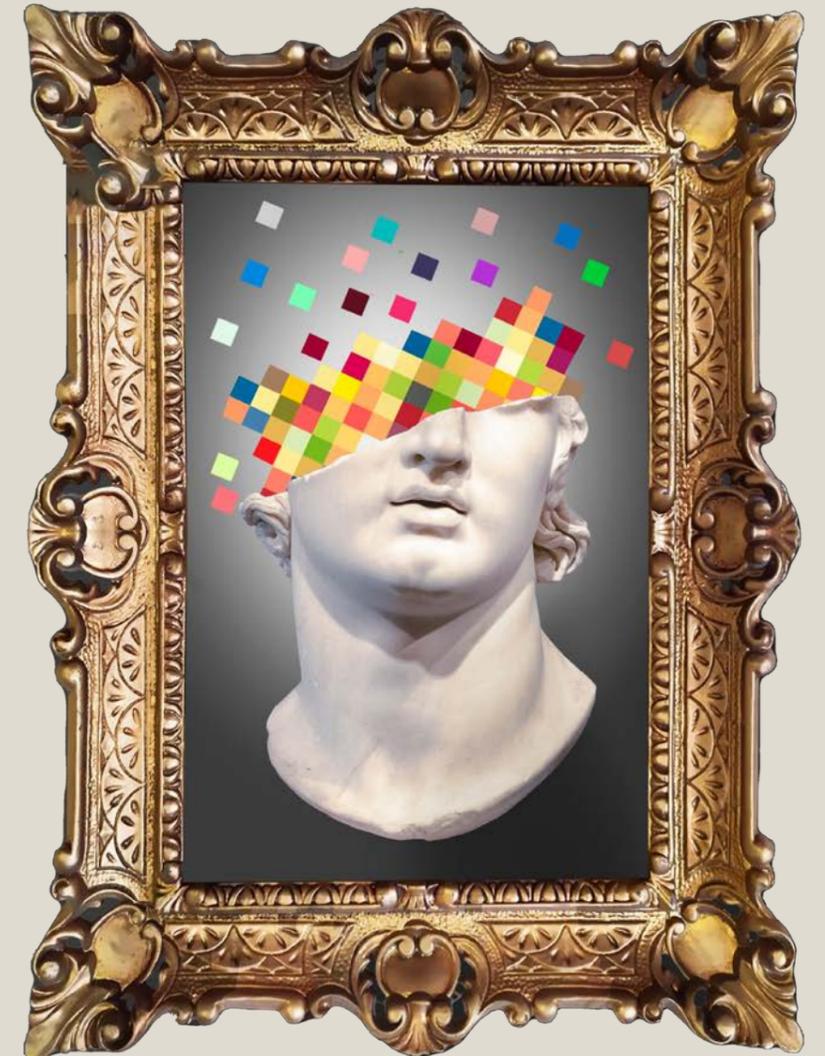
Founded in 2018, Copper provides a gateway into the crypto asset space for institutional investors by offering custody, prime brokerage, and settlements across 500 digital assets and more than 45 exchanges. It is committed to providing flexible solutions for institutional investors that can adapt to the changing cryptoasset space, while enabling far greater transparency and control for asset managers.



Binance is the world's leading blockchain ecosystem and cryptocurrency infrastructure provider with a financial product suite that includes the largest digital asset exchange by volume. Trusted by millions worldwide, the Binance platform is dedicated to increasing the freedom of money for users, and features an unmatched portfolio of crypto products and offerings.



Bittrex Global, the most secure digital asset exchange in the world, serves both retail and institutional clients, globally. Committed to helping users build wealth, Bittrex Global facilitates the purchase and trade of over 500 tokens.



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## INTRODUCTION

# CHARTING THE TURBULENT PROGRESS TOWARDS A DIGITAL ASSETS ECOSYSTEM

The world of digital assets is still reeling from the 'crypto winter' – a huge collapse in asset valuations in early 2022 triggered by the failure of a major stablecoin, resulting in the insolvency of some institutions.

The episode shared many of the characteristics of the global financial crisis – hubris around high-yielding, purportedly low-risk strategies, excessive leverage and systemic risk because of institutions' mutual exposure. Mercifully, it was on a smaller scale and, since the digital assets industry is fairly siloed and self-contained, it had far less impact on the broader economy.

But the crypto winter has done little to dampen the dynamism of the sector and, while valuations are still down, innovation and development continue apace. The possibilities for new models of economic activity enabled by a digital asset ecosystem are still as exciting to businesses and creators, even though the speculative froth of a \$2.8tn market capitalisation has been blown away.

A digital asset ecosystem, built on decentralised infrastructure, promises a means of monetising digital products independently of traditional intermediary institutions. While in regulated industries many of these intermediaries will have roles that cannot easily be removed by new technology, there

is still a compelling opportunity to improve efficiency and add new functions.

This report examines the economic opportunities digital assets present, looking at different kinds of digital assets and the possibilities they offer for businesses and individuals to deliver value and generate revenue.

One of the most exciting areas where the digital asset ecosystem can incite change is the infrastructure of financial markets. Over the course of researching this report, we have observed a convergence between the architecture of the crypto investing and decentralised finance worlds and that of traditional finance.

As the crypto world learns prudential risk management policy and regulation, traditional finance is using the technology underpinning cryptocurrency to tokenise and fractionalise financial instruments, broadening its investor base, improving liquidity and adding functionality.

A functioning digital asset ecosystem cannot develop overnight. For it to work effectively, there are a variety of technical services that must become commonplace. Some, like cloud services, are already in place. Others, like digital identity, still require a great deal of work before they are fit to underpin a digital assets ecosystem of systemic importance.

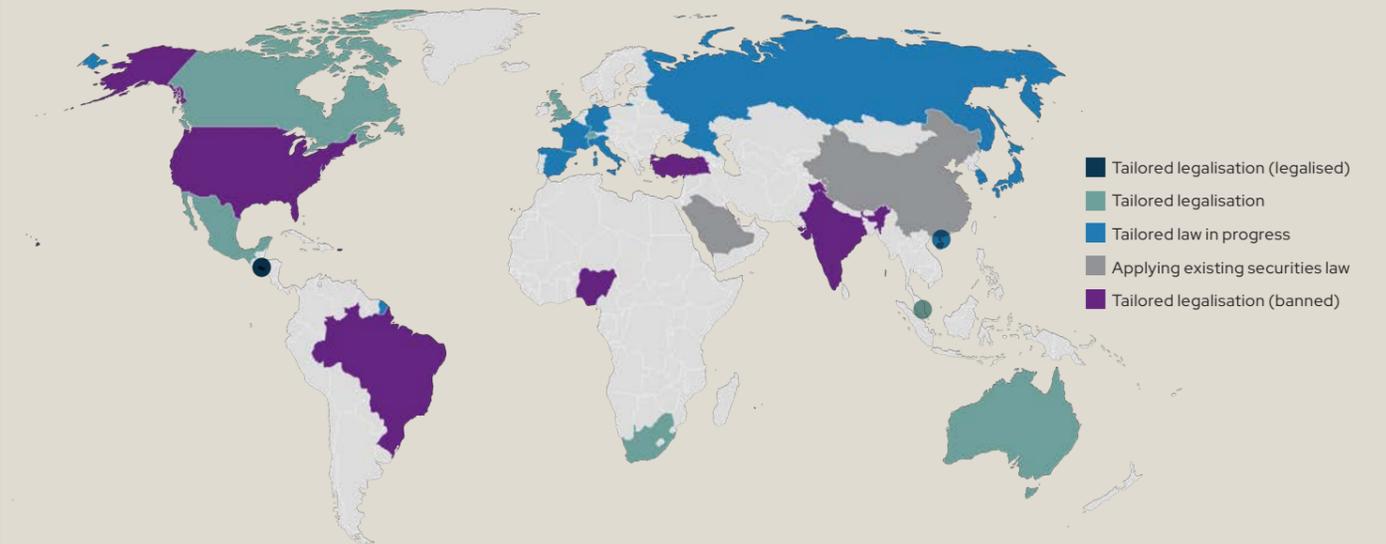
This report also examines the developing legal framework for digital assets. As digital assets grow in importance, the consequences of a repeat of the crypto winter grow more severe. Accordingly, regulators are doing their utmost to develop the regulatory architecture required to make the digital assets class into a healthy, safe marketplace. Achieving financial stability, investor protection and preventing financial crime without degrading the efficiencies and privacy features that digital assets can offer is an immense challenge for regulators.

Finally, we are proud to present OMFIF's digital assets regulatory policy tracker, produced in partnership with Bittrex Global. The tracker provides a breakdown of the most important pieces of digital assets regulation in 23 key jurisdictions around the world. It allows users to see if a jurisdiction has enacted bespoke regulation for cryptoassets or if they are using pre-existing securities regulation. The tracker also lets users see where various jurisdictions stand on issues like cryptocurrency mining, exchanges, derivatives trading and more.

Developments in digital assets are rapid and the possibilities are only just beginning to become clear. We have not seen the last crypto winter, but robust and well-crafted regulation will mitigate any damage. The benefits that a digital assets ecosystem offers will prove worthwhile.

**'The possibilities for new models of economic activity enabled by a digital asset ecosystem are still as exciting to businesses and creators.'**

## DIGITAL ASSET REGULATORY TRACKER



## TRACKING NEW DEVELOPMENTS

The financial stability risks of widespread digital assets use have long been on the radar of regulators. However, concerns around consumer protection and growing interconnectedness with traditional financial institutions have only been accelerated following the market turmoil over the last 12 months. This has heaped pressure on authorities to enhance their supervision of an asset class which is, by its design, less centralised and transparent.

At this time of heightened scrutiny, OMFIF is pleased to introduce its digital assets regulatory tracker. Launching alongside the 'Digital assets' report, the tracker features descriptive evidence and access to external information on developments to the regulatory treatment of cryptoassets and stablecoins across 23 key jurisdictions. At the national level, the tracker includes granular breakdowns on the legal status of various activities concerning cryptoassets, including those pertaining to exchanges operations, stablecoin design and mining.

The tracker also seeks to categorise regulatory treatment more broadly by highlighting progress made in the design of tailored legislative frameworks. Despite the efforts of international bodies to co-operate on the design of regulatory frameworks, categorisations featured in the map paint a fragmented picture of the existing landscape.

Attempts to bring digital assets under supervision in a timely manner have seen several countries broaden the remit of market regulators by extending existing regulatory frameworks. More often, this has included the extension of securities frameworks, as well as compliance for service providers with registration and reporting requirements, particularly anti-money laundering and combating the financing of terrorism legislation.

In jurisdictions with clearly defined regulatory mandates and structures already in place, such as Switzerland, this extension has provided sufficient regulatory coverage while not impeding

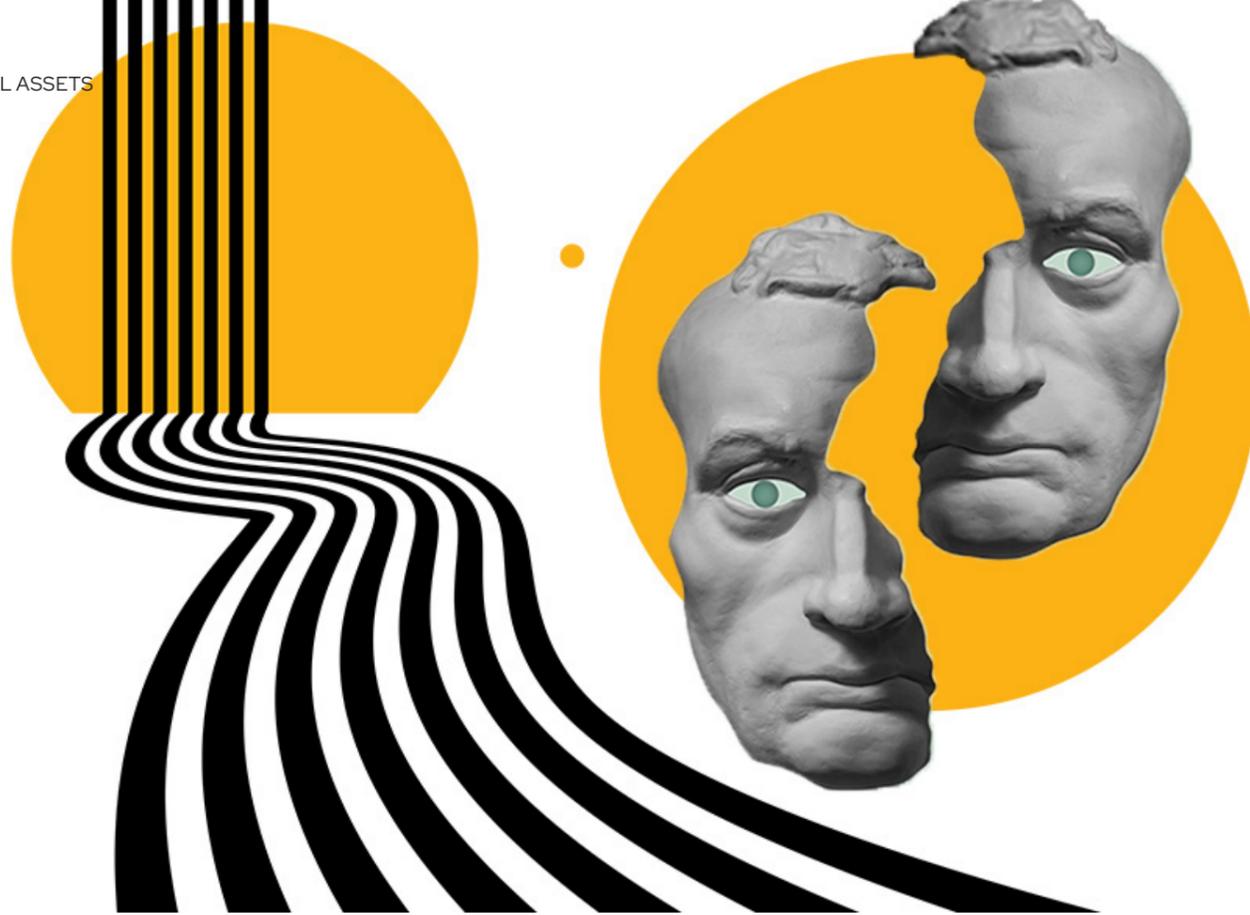
innovations in the digital assets space.

However, such innovation has contributed to a rising interest amongst law-makers for more comprehensive, specialised regulatory regimes. Significant developments across cryptoasset markets in recent years – in particular, the proliferation of new product offerings among a widening pool of retail investors – have created additional channels that threaten financial stability and which have simultaneously blurred the lines around regulatory jurisdictions. Questions continue to hang over how to categorise most accurately, and thus best treat, different assets based on how they are used and their characteristics.

Movement towards the implementation of tailored legislation for digital assets has been accelerated by the recent rout across digital assets markets. This renewed urgency has seen the recent implementation of tailored legislation across Europe and Asia. Both the European Union and Japan have introduced legislation with a stablecoin focus, resulting in an effective ban of non-asset-backed pegs. The progress of a further six featured countries, classified in the tracker as having tailored legislation in progress, will continue to be monitored.

Despite the move towards tailored frameworks, the potential for digital assets to create wider financial instability has seen regulators attempt to curtail some activities. Assessments such as the banning of derivatives offerings in the UK and Spain explicitly referenced consumer protection. In more extreme cases, financial stability risks have been used to justify outright bans on all crypto-related activities. This includes China, where growing ownership and mining operations were perceived as threats to national strategies for central bank digital currency development and net zero targets.

**THE DIGITAL ASSETS REGULATORY TRACKER IS AVAILABLE TO VIEW NOW**



## Digital assets: the road ahead

**The world of digital assets is expanding at breakneck pace. New opportunities and new types of economic activity may soon become commonplace.**

The global economy is going through a period of rapid development – a digital revolution perhaps rivalling the industrial revolution for the profundity of its consequences.

The amount of value we store and transact in entirely digital forms has never been higher. The steepness of the trajectory is likely to grow as the tools and skills on which the digital assets ecosystem rest are honed and become more widely available.

It will not be a smooth journey. Not everything produced on the way to a digital assets ecosystem will be of lasting value. That became clear during a crash in the cryptocurrency market in the first quarter of 2022. The accompanying evaporation of around \$2tn in asset value showed that a great deal of the expansion of the sector has been fuelled by excitement and cheap money.

But as the froth is blown away, the economic opportunities that the nascent industry offers are starting to emerge. Citi estimates that the total addressable market will be between \$8tn-\$13tn by 2030, with around five billion users.

Already, some of the biggest players in technology are staking out their territory in the digital asset ecosystem. Meta intends to pivot its business model from social media ad revenue to digital assets infrastructure in what it calls the metaverse.

Metaverse, a term from the pages of Neal Stephenson's 1992 sci-fi classic *Snow Crash*, where it referred to a virtual

reality world, has hazily entered the public consciousness as some kind of VR environment for business and leisure. Yet, the concept is ill-defined and poorly understood.

So far, the adoption of VR is limited. Its eventual ceiling may climb as the technology improves and its applications grow, but it would be a mistake to limit the digital asset ecosystem only to VR. Instead, consider the thinking of Phil Chen, founding partner of Race Capital and chief decentralisation officer at HTC. Chen described the metaverse as: 'Not a destination, but rather a point-in-time. Just as the singularity is the point in time where artificial intelligence surpasses human intelligence, the metaverse is a point in time where people value digital assets more than physical assets.'

The value of digital assets and the proportion of the economy that they make up is climbing independently of the still somewhat lukewarm response to VR.

As a technological foundation for the digital asset ecosystem, far more important than VR is decentralisation – removing the need for a central ledger maintained by an authoritative and trusted third party. The seed planted by the original cryptocurrency, bitcoin, took root and has borne fruit with an astonishing variety of flavours and qualities.

A large portion of this new generation of assets exists on blockchains – a shared database distributed and updated by its users via one of a variety of mechanisms that build consensus without the need for trust. These frameworks allow

secure peer-to-peer token exchange, which can encompass a remarkably broad range of qualities.

These qualities can change the ways we interact with art, music, gaming, identity and intellectual property, as well as offering a new foundation for financial market infrastructure.

Part of the value of a digital asset ecosystem built using this kind of technology is that assets need not only exist within the framework of a particular institution and ownership of a particular asset is not contingent on the issuing institution. Because the ledger can be distributed among many providers, the same tokens can be traded with any actor in the network.

Digital assets come in a variety of types and each will have a different role to play in the digital asset ecosystem.

### **NFTs: a revolution for digital art**

One of the most important benefits of a digital asset ecosystem is that it offers a way for creators to monetise and control their work.

Say a retailer sold the right to stream a song. If that retailer were to go bankrupt, that right would be meaningless. A CD or an MP3 file can be stored locally, so that ownership is not affected by the fate of the institution that sold it. However, copies that are indistinguishable from the original can be created and sold, undermining the creator's ability to profit from their work. The digital asset ecosystem, properly delivered, should offer a means of certifying the authenticity of the original without tying the asset to a particular company's infrastructure.

The technology underpinning this is the non-fungible token. All of the other types of digital assets discussed below are fungible, one unit of ether is interchangeable for another, just as one dollar is equivalent to another. There are degrees here. Bitcoins, though generally thought of as fungible, carry a unique transaction history.

Fungibility is a desirable quality in payment instruments, but to represent the ownership of unique assets, unique tokens are needed. Non-fungible tokens are, in essence, cryptocurrencies with a fixed supply of one, which represents ownership of an asset.

With headlines touting sales of NFTs for huge sums, these instruments have been right at the forefront of the excitement around digital assets. The \$69.3m sale of the artwork *Everydays: The First 5000 Days* by US digital artist Beeple in March 2021 was an early example, capturing the imagination of the public. However, as the excitement faded, stories of huge losses began to emerge. Among the most famous was the NFT of an image of Twitter co-founder Jack Dorsey's first tweet. It was being sold for \$280 a little over a year after its first sale for \$2.9m.

Few asset classes have polarised opinion in such a dramatic way. NFTs could be 'a grotesque invention of the Covid era... invented by the devil to lure fools into the art world and persuade them to spend their money on nothing,' in the words of art critic Waldemar Januszczak, or digital art 'is a massively underappreciated asset class poised to dominate the art



**'The ability of digital media to deploy varying combinations of still and moving images, audio and text has given birth to an explosion of new works and experiments of questionable artistic merit with still less solid investment value.'**

market,' in the view of Matt Fortnow and QuHarrison Terry, authors of *The NFT Handbook*.

For some, the collapse in the cryptoasset market signalled the return of a fantasy market to reality. Others view the events as part and parcel of the growth pains of a new economy. Major auction houses and art dealerships are already establishing specialist digital art departments to serve the perceived market opportunity. Once the dust has settled, both views may turn out to be right, with speculative and volatile froth being replaced by a novel infrastructure which improves the efficiency of existing markets and develops entirely new ones.

The ability of digital media to deploy varying combinations of still and moving images, audio and text has given birth to an explosion of new works and experiments of questionable artistic merit with still less solid investment value. But the underlying blockchain technology upon which it is based, on the face of it, addresses and solves problems associated with such attributes, as incontrovertible provenance, reliable

documentation and trust, which have long bedevilled the traditional art market.

Advocates also point to the ability of NFTs to reduce transaction costs significantly and to enhance liquidity. They also highlight, by virtue of smart contract capabilities, the opportunity to introduce such novelties as recurring royalty payments or sale conditionality, theoretically in perpetuity. It is not difficult to see how these attributes might be applied both retrospectively and in the future, not only to physical and digital representations of works of art, but also to fields of intellectual property such as copyrights, patents, trademarks and music.

The combination of tokenisation and smart contracts could be particularly valuable in markets where forgery and misrepresentation are common. For these markets, indisputable and immutable authentication could be a game changer. This could apply to digital products such as event tickets or physical objects such as stamps, collectibles and memorabilia. A new market is emerging in so-called fan tokens, where supporters of sports teams can purchase and trade bespoke NFTs, often with attached rights to other fan benefits.

Another potentially revolutionary feature of NFTs is their ability to engineer theoretically unlimited and transferable fractional ownership of so-called non-bankable assets, such as classic cars, fine wines and memorabilia. Such assets tend to be difficult to value, relatively illiquid and with high transaction costs. They are thus difficult to include reliably in a portfolio or present to a bank as collateral. Tokenisation, fractionalisation and digitalisation of such valuables via NFTs could create whole new asset classes, aimed at both institutional and retail investors. This capability could also be applied to significant financial assets such as property, ships, oil rigs or spacecraft. They would also create serious questions for regulators as many of non-financial asset classes are unregulated, although many true believers claim that the nature of decentralised blockchain technology removes the need for a central regulator or the regulation of trades since no exchange need be involved.

**'The combination of tokenisation and smart contracts could be particularly valuable in markets where forgery and misrepresentation are common.'**

## Cryptocurrencies: a revolution in digital money

Cryptocurrencies, like bitcoin, were the original use case for blockchain, designed to enable peer-to-peer value transfer. Bitcoin was envisaged as a means of payment for goods and services but problems with its scalability and the length of time transactions take to process have limited its usefulness for this purpose. In effect, it has become a speculative asset.

Despite this, cryptocurrencies still offer many possibilities. First, they can be used as bitcoin was originally intended: as a means of payment. In a blockchain-based digital asset ecosystem, they could prove particularly useful for payments since, as blockchain-native instruments, they can be settled atomically – that is, without counter-party risk – when used to pay for other blockchain instruments. However, absent an ability to maintain a stable value, they are unlikely to be widely adopted.

Many of the cryptocurrencies launched since bitcoin have ended up in similar speculative niches. However, many of them offer more functionality – typically via smart contracts.

Whether these constitute a security, like a bond or a stock, a commodity, like gold or oil, or even a currency, like the dollar, is a question with which regulators around the world are still grappling.

Accordingly, the regulatory obligations of those issuing cryptocurrencies remain unclear in some jurisdictions.

### Security tokens

Security tokens are designed to be purchased as an investment in the hope that they will grow in value. These tokens might entitle their holders to a particular cashflow, not unlike an equity dividend or bond coupon.

The issuance of security tokens is a regulated activity, requiring similar disclosures to those of companies issuing traditional securities.

Some use the term 'security token' to mean a cryptocurrency token representing ownership of a stock, bond or other financial instrument. In this report, tokenised security refers to this, keeping the term security token to refer to natively digital tokens that have the characteristics of securities.

### Utility tokens

Utility tokens typically can be spent to obtain services within a platform. An example would be Filecoin, a token



that allows users to rent unused hard drive space. They can still function as investments. Investors may choose to stockpile tokens in anticipation of an increase in the demand for the service that token holders are entitled to.

These typically have far lower regulatory obligations than other types of cryptocurrency.

The distinction between security and utility tokens, though conceptually fairly simple, is legally thorny and regulators around the world take different approaches to their classification.

### Stablecoins and digital asset payment tools

Cryptocurrencies have values that fluctuate in accordance with supply and demand. Stablecoins, by contrast, are designed to have a fixed value relative to another asset, usually a fiat currency, frequently the dollar.

The overwhelming majority of trading in stablecoins is in and out of cryptocurrency. Stablecoins are transacted on blockchain, so can be efficiently settled versus cryptoassets, providing a means of quickly entering or exiting a position while remaining within a blockchain ecosystem. Like cryptocurrencies, stablecoins offer a means of settling payments on the blockchain and should be able to do so without the instability that characterises the broader cryptocurrency market.

There are a number of methods of achieving this stability, with varying degrees of promise.

### Asset-backed stablecoins

The largest stablecoins tend to be backed by user deposits. A user might deposit \$100 and receive \$100 in a stablecoin. The issuer will keep the deposited \$100, typically either in cash or cash-like assets, ready to be returned to the user when they redeem their holding.

While theoretically secure, the range of assets in which user deposits are invested can create risk if they are insufficiently safe or liquid. The safest option would simply be to require stablecoins to be collateralised one-to-one, with deposits held at the central bank. These are sometimes referred to as deposit coins. A slightly riskier option, but one that allows issuers to profit, or at least meet operating expenses, would be to allow them to operate as a narrow bank, holding high quality assets like Treasury bills.

Rigorous and transparent audit procedures are required to ensure stability.

### Basket-backed stablecoins

It is possible to have a stablecoin backed by multiple currencies with a value determined by the values and proportions of the currencies that make up its basket – a little like the International Monetary Fund's special drawing right. This would keep a steady value, like other stablecoins, but have the added benefit of providing a cross-border payments platform, since a user could onboard in one currency and withdraw in another.

Though attractive, the monetary and regulatory implications of such an instrument are profound. Meta (under the name of Facebook) attempted to launch such a project, first under the name Libra, then later as Diem. Regulatory bodies in the US, the EU and others, as well as central banks around the world, pushed back on the project strongly and it was eventually abandoned.

### Algorithmic stablecoins

Other stablecoins seek to maintain their peg via algorithmically determined manipulation of supply. The collapse of the Terra stablecoin, together with its associated cryptocurrency Luna (which was convertible for Terra at a fixed rate) demonstrated the limitations of these instruments.

### Tokenised deposits

It is possible for banks to represent ownership of their deposits on a blockchain. This is akin to a stablecoin backed by reserves but rather than relying on a separate audit of the reserves for surety, one could transact in tokenised deposits with the same level of confidence as in any money issued by institutions with federal deposit protection insurance.

### State-backed

A central bank can issue a tokenised version of its currency, tradeable on the blockchain or via a centralised digital infrastructure. Central bank digital currencies are distinct from stablecoins in that stablecoins are issued by private companies and therefore represent a credit risk to them. A CBDC is a liability of the central bank, just like cash.



## Opportunities, limits and the new market infrastructure

**Digital assets can provide greater opportunities to investors, issuers and regulators. But a number of limitations and risks have already surfaced.**

The last few years have been a whirlwind for investors in digital assets. There was an explosion of retail and institutional interest in cryptocurrencies, non-fungible tokens and other blockchain-based securities during the initial stages of the pandemic, followed by a mass sell-off in early 2022 – dubbed the ‘crypto winter’. These dramatic booms and busts can often distract from the underlying opportunities presented by digital assets. In particular, they have the potential to provide greater access, capabilities and efficiency to users than traditional financial products.

Inclusivity is one benefit offered by digital assets. At its core, accessing securities on the blockchain simply requires a connection to the internet, rather than relying on traditional brick-and-mortar institutions. Accordingly, ‘digital assets allow access to financial services for those who are underbanked, particularly in developing economies. Indeed, countries in Africa and East Asia are at the forefront of adoption,’ stated Oliver Linch, chief executive officer of Bittrex Global. This corroborates a recent study by Chainalysis, a blockchain data platform, which finds that cryptocurrency adoption is particularly high in countries such as Vietnam, the Philippines and India.

For those who fall through the cracks of traditional banking and payments systems, distributed ledger

technology can provide a faster, cheaper and easier way of engaging in peer-to-peer transactions. Moreover, digital platforms can provide opportunities to save and borrow. For instance, decentralised finance lending platforms allow depositors to ‘stake’ their digital assets to earn interest, while borrowers can use cryptoassets (often disbursed as stablecoins) to finance other activities. These lending processes are automated with instantaneous disbursement, provided that pre-specified rules are met. This can be much quicker and more accessible than relying on loans from banks.

Digital assets can also improve investment opportunities. The pool of available assets is not limited to cryptocurrencies. Technology is available that can ‘tokenise’ traditional financial securities, whereby custodians can store traditional assets and create an equivalent cryptographic token which can be traded on the blockchain. There are possibilities to pool various financial assets into a single token – similar to an exchange traded fund. Assets can also be split up, a process known as fractionalisation, and traded as individual digital tokens.

There are numerous benefits derived from tokenisation. Tom Menner, chief technology officer at SBI Digital Markets, stated that ‘fractionalising assets via tokenisation can

improve retail access to products such as equities, debt, real estate and commodities.’ Indeed, small players who may not have the capital to buy certain financial products could invest in their tokenised counterparts. This should, in theory, provide greater liquidity in secondary markets. It should allow issuers to tap into a more diversified investor base too.

That said, for institutional investors, fractionalisation may not be a sufficiently convincing reason to adopt digital assets. They already have large pools of capital, can access primary markets and are able to invest in illiquid products. For this group, Menner argues that ‘the draw of tokenisation comes from other new capabilities it offers. For example, it provides an opportunity to assemble fragments of assets to offer as collateral to raise additional capital. This means collateral can be bespoke to the preferences of each lender and borrower, rather than relying on Treasuries or other government bonds.’ Tokenising collateral can provide other advantages, such as reducing reliance on intermediaries and shortening settlement times in repurchase transactions.

More broadly, blockchain-based assets can improve efficiency and costs through smart contracts. This enables cashflow operations to be embedded into the digital asset itself to ensure the automatic payment of coupons or dividends. Off-chain data can also be incorporated on the blockchain through ‘oracles’ which can improve efficiency. For instance, a credit rating downgrade could trigger automatic asset sales among investors with an institutional mandate to hold higher-rated debt. From a regulatory perspective, smart contracts are also effective, as know-your-customer features or sanctions red lists could be coded into the asset itself, which would ensure legal provisions are fully enforced.

Finally, Steven McWhirter and Rana Kortam at Binance mentioned that ‘responsible defi innovation can foster greater competition and choice, which may ultimately boost financial inclusion and benefit consumers.’ At first, investors may want to dip their toe into these assets. ‘Crypto exposure via ETFs is a good starting point for investors to onboard with digital assets,’ suggested Seamus Donoghue from METACO. But as the industry develops, various possibilities will emerge which makes it difficult to outline the path ahead. Donoghue mentioned ‘there is likely to be a coexistence of blockchain-native assets as well as tokenised versions of existing financial securities, then investor interest and access will determine which assets will progress further from there.’

### Limits and risks

While digital assets can provide greater opportunities and capabilities to investors, issuers and regulators, it is not all a rosy picture. There are already a number of limitations and risks that have surfaced.

Safety and stability are among the biggest concerns. Digital assets are underpinned by DLT in which users are anonymous. This can encourage illicit activity. It also hinders the ability of lenders on defi platforms to perform

**‘For those who fall through the cracks of the traditional banking and payments systems, distributed ledger technology can provide a faster, cheaper and easier mode of engaging in peer-to-peer transactions.’**

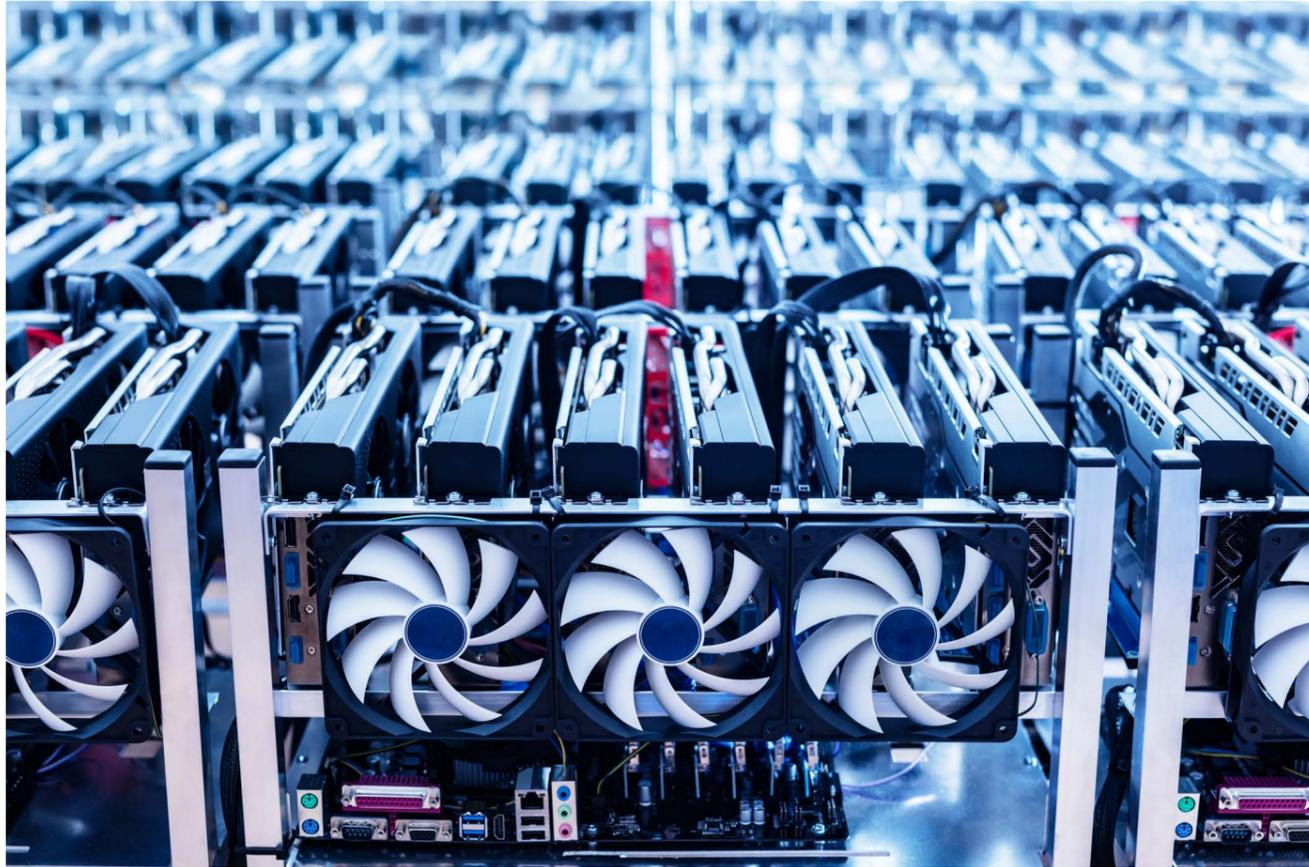
typical compliance checks for borrowers. As explained by the Bank for International Settlements, in its ‘DeFi lending: intermediation without information?’ report, ‘assessing the risk of borrowers through time-tested methods – from banks’ screening to reliance on reputation in informal networks – is not possible.’ In the absence of important information, such as credit scores or income records, there is a greater reliance on providing cryptoassets as collateral to access defi loans.

This brings its own limitations. The BIS report pours cold water on the ability of defi to enhance financial inclusion given this reliance on collateral. It means that defi lending ‘only serves those with sufficient assets, [therefore] excluding those with little wealth.’

Moreover, defi lending tends to be highly procyclical – when crypto assets appreciate in value, market participants can offer more collateral and borrow more on defi platforms. This can encourage borrowers to become highly leveraged, making them vulnerable to a deterioration in market conditions.

Earlier this year, the algorithmic stablecoin TerraUSD lost its one-to-one peg with the dollar and took down its sister coin, Luna. This caused a ‘platform run’, akin to a bank run, with depositors withdrawing funds, defi lending drying up and other cryptocurrencies selling off. Celsius, a centralised platform offering which used deposits as collateral to borrow other cryptocurrencies, was caught in the crossfire as it took on too much leverage and could not cover its loans. These sagas emphasise the fact that defi is still in its nascent stages and there is a lack of regulatory oversight to prevent excessive risk taking in a volatile and pro-cyclical environment.

Otherwise, the use of digital assets has raised environmental concerns. A report released by the White House Office of Science and Technology Policy stated that ‘as of August 2022, published estimates of the total global electricity usage for cryptoassets are between 120 and 240 billion kilowatt-hours per year, a range that exceeds the total annual electricity usage of many individual countries, such as Argentina or Australia. This is equivalent to 0.4% to



## 240bn kilowatt-hours

The upper estimate from the White House Office of Science and Technology Policy of how much electricity per year the cryptoasset sector uses

0.9% of annual global electricity usage.' Crypto mining for bitcoin, which uses a proof-of-work model, is particularly energy intensive. Specialised computers are run around the clock to verify transactions on chain in order to unlock new digital coins. Following the merge, the term for a recent update, Ethereum has moved to a proof-of-stake model which requires significantly less power. Further steps in this direction may be required to ensure that the digital asset industry is consistent with sustainability goals.

### Systemic hurdles to mass adoption

These drawbacks must be overcome to drive mass adoption. There are more systemic hurdles to clear too, separate to the assets themselves. Improving awareness and understanding among the investment community is one. Tom Menner of SBI Digital mentioned that 'widespread investor adoption is technically possible, but there is a

lack of education right now. For example, investors often conflate digital assets with cryptocurrencies.' That is perhaps unsurprising. Headlines have been dominated by the dramatic swings in market capitalisation and various failures or scandals surrounding the crypto industry. Meanwhile, the more mundane, but nonetheless important, progress on tokenisation seems to have flown under the radar. However, greater investor education alone is unlikely to be enough to drive mass adoption. There are still crucial parts of the new infrastructure that needs strengthening first.

A lack of clear regulation was mentioned by various individuals from crypto-native and traditional financial firms as a major hurdle. Legal frameworks are not yet standardised across jurisdictions which can impede progress and lead to inefficiencies, especially considering the inherently global reach of digital assets. Better regulation could also help to alleviate security concerns. 'Removing bad

actors is necessary to reduce the reputational risks around cryptocurrencies and increase investor confidence,' said Oliver Linch of Bittrex Global.

Aside from regulation, having a common payments system to settle transactions is also necessary to improve efficiency and confidence. Thomas Eichenberger, head of business units at Sygnum, suggested that this could derive from central bank digital currencies, which 'would help for standardisation and to build confidence with the introduction of official means of settlement.' Many central banks around the world are undertaking projects to develop CBDCs but this process is relatively slow. Private sector stablecoins are a viable alternative, such as digitalised commercial bank tokens, provided there is regulatory oversight.

### Fintechs vs traditional finance

Despite these challenges, the digital asset industry continues to develop. Innovations come from both fintechs as well as traditional financial institutions. Crypto-native firms tend to be more specialised and nimble and already have the internal structures to work in defi (such as using cloud-based technologies). In contrast, 'traditional financial institutions are still working to adapt legacy systems to digital assets. That's both in terms of the underlying technology as well as internal operations, such as legal, risk and compliance' stated Wayne Hughes, head of digital assets BNP Paribas Securities Services.

But traditional financial firms have their advantages. Hughes mentioned they 'already have a large investor base and work within the existing regulatory framework, which helps to build trust.' This message was echoed Donoghue, who added that traditional finance has the benefit of 'relatively strong balance sheets.'

Ultimately, while approaching it from different angles, both fintechs and traditional financial institutions are trying to achieve the same goals – improving the efficiency, security and accessibility of digital assets. Both traditional financial firms and fintechs have partnered with each other to reach these goals. In July, BNP Paribas Securities Services announced it was working with two fintechs, Fireblocks and METACO, to develop its digital custody offering. In the same month, BNY Mellon and Goldman Sachs settled the first securities lending transaction using a DLT platform provided by the fintech firm HQLA. There is a systemic benefit from pushing the boundaries and developing this new market infrastructure, as all parties can learn from each other and build from each innovation. As a result, it would not be a surprise to see further partnerships between fintechs and traditional banks.

### New market infrastructure

The co-existence of fintechs and traditional financial institutions underscores the point that building a new capital market infrastructure for digital assets is a process of evolution rather than revolution. Some entities, such as brokerages, may lose their relevance in a world of

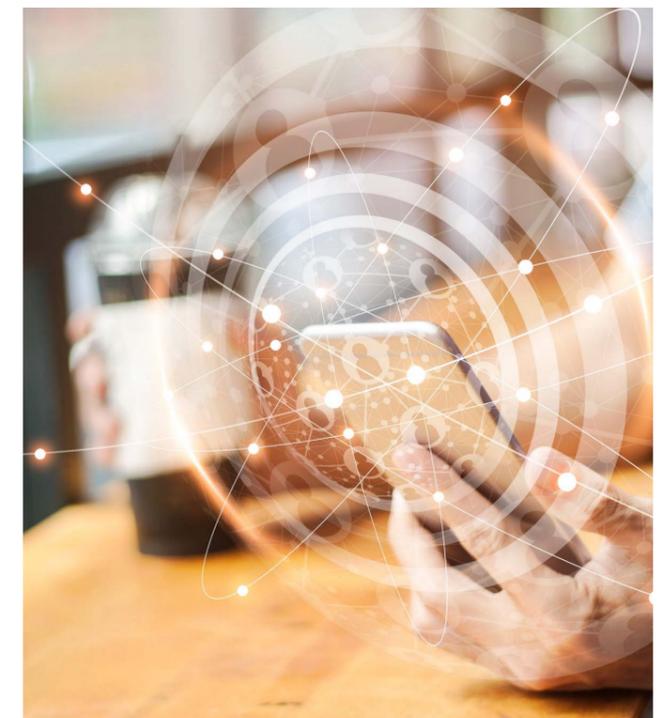
instantaneous peer-to-peer transactions using DLT. But much of the existing ecosystem will still be required.

Clear regulation has already been mentioned as a prerequisite to mass adoption. On the part of exchanges, they are still required as a marketplace to trade blockchain-based securities and to provide useful market data. There are similarities in their operations too. McWhirter and Kortam from Binance stated that 'as an exchange, much like in traditional financial infrastructure, we take cyber security and operational resilience incredibly seriously. We have similar concerns to those in traditional finance in terms of protecting against cyber attacks and staying online.'

Exchanges for digital assets have made some important adaptations though. Linch said that 'there is a second level of security on crypto exchanges to perform compliance checks on each token and its underlying technology, which is a key difference to traditional securities exchanges.' Bad actors could take advantage of the anonymity provided by decentralised platforms. The vast choice and competition among digital tokens can mask those which are underpinned

*Continued on p.15 >>*

**'Aside from regulation, having a common payments system to settle transactions is also necessary to improve efficiency and confidence.'**



# GLOBAL CO-OPERATION KEY TO DEVELOPING REGULATION

**Work of global standard setting bodies is crucial for consistency and adherence to best practices, writes Rana Kortam, director, global public policy at Binance**

BLOCKCHAIN is one of the most fascinating innovations of our generation, revolutionising numerous products and services. By 2030, the blockchain market could be worth \$1.4tn and boost global gross domestic product by \$1.76tn.

Today, 300m people own cryptocurrencies, the most widely used blockchain application, driven by crypto's remarkable ability to address certain challenges. However, regulation is projected to play a pivotal role in the industry's next chapter – the World Economic Forum predicts that adoption will be 'directly correlated with its level and quality'. At Binance, we believe that comprehensive, consistent and risk-based regulations are key to responsible innovation that unlocks the industry's potential.

Global inequality leaves 1.7bn people, especially women, people of colour and underprivileged communities, without bank accounts. Blockchain eliminates traditional barriers such as prohibitive fees and proximity to physical banks.

Reaching \$589bn, remittances are a major driver of economic growth for developing countries. The G20 roadmap recognises crypto's potential to bring down costs from the current average of 7% closer to the UN's sustainable development goal of 3%. Blockchain-based payments are faster and more efficient, processing international transactions in minutes rather than in days as in traditional banking.

Small- and medium-sized enterprises account for 90% of businesses and 50% of jobs globally. Decentralised finance solutions can bridge the \$8.9tn gap in SME finance.

Blockchain has boosted US GDP by \$407bn, Germany's by \$95bn, and the UK's and Japan's by \$72bn each. In developing markets, crypto drives economic growth in line with financial literacy. Globally, Web 3 startups have generated \$89bn in venture capital funding and can attract top notch talent.

Blockchain has had tremendous impact beyond financial services. It can address the identity gap for one billion people with no national ID, provide cutting-edge solutions in manufacturing and supply chains (now a \$86m industry), and empower local creator and gaming economies with global reach and more efficient monetisation tools.

## Sensible regulation is key

Regulatory certainty creates a safe space for innovation – driving consumer trust, market order, clarity and impact. The WEF has called for bespoke frameworks for crypto that address issues like financial stability and crime prevention, informed by macroeconomic impact studies.

Many jurisdictions have lingered over whether to adopt new or existing frameworks, regulators or both. However, we

“**REGULATORY CERTAINTY CREATES A SAFE SPACE FOR INNOVATION – DRIVING CONSUMER TRUST, MARKET ORDER, CLARITY AND IMPACT.**”

share the IMF's view that the ideal regulatory response should be coordinated, consistent and comprehensive to minimise regulatory arbitrage.

Global standard setting bodies play a critical role in driving consistency and adherence to best practices. The Financial Stability Board's recent proposals, the cryptoasset roadmap from the International Organization of Securities Commissions and the Basel Committee's framework for banks' crypto exposures are steps in the right direction. The FSB's proposals specifically underscore the importance of domestic and international co-operation. Additionally, the IMF highlights taxonomies as a valuable tool for visualising how emerging terminology fits within an existing ecosystem.

However, standards only work with consistent, timely implementation. Out of the 200 countries committed to implementing the Financial Action Task Force's travel rule on crypto, only 29 have done so. Global harmonisation will enable easier, less costly and more robust compliance.

Successful, comprehensive regulations address six elements: legal certainty, effective risk monitoring, financial stability, consumer protection, market integrity and cross border co-operation. Conversely, clarity on what's within scope must be ensured: tokens used as utilities should not be subject to the same regulations as cryptoassets used as financials instrument.

Regulation must be proportionate to the nature, scale and complexity of the risks. The FSB concurs: authorities should apply 'effective regulation, supervision and oversight proportionate to the financial stability risk the industry poses.'

The Organisation for Economic Co-operation and Development highlights education as a key user protection tool.

As an industry leader, protecting consumers and giving them choice remain Binance's top priorities. This balance is achieved through local regulations that align with international standards. Transparency through clear communications, risk disclosures and collaboration is also key to consumer protection.

By working together, private companies and public regulators can implement global standards in a harmonised, consistent and proportionate manner, which can unlock new opportunities and unprecedented growth.

by shaky foundations. This means digital asset exchanges have to do extra due diligence to ensure that listed securities are safe and secure.

Custodians will also be a useful feature of the new market infrastructure. Admittedly, technology providers have made it relatively easy and accessible for individuals to hold their own digital wallets which store assets directly. 'But asset managers will prefer the assurance of a third-party custodian to manage their holdings,' mentioned Donoghue, as is the case now.

Some of the challenges facing those safeguarding digital assets differ from their traditional finance peers. While in the existing financial sector, banks or intermediaries could potentially cancel or undo transactions, this is typically not possible for digital assets as transfers on chain are irreversible. Eichenberger stated that 'given the finality of

transactions, we have to focus even more on the prevention of internal fraud than traditional custodians.' For digital asset custodians, that includes robust internal compliance checks for staff, sound approval governance and multi-party verification of transactions, as well as strong cybersecurity defences, particularly for 'hot wallets' where assets are held online (unlike 'cold wallets' which are held offline). Provided that digital asset custodians build these robust internal defences, they could potentially foster greater trust among investors than traditional custodians given the nature of digital assets. Indeed, 'blockchain provides a transaction of records so it improves security' Eichenberger said, as there is full traceability and auditability of transactions.

Other intermediaries, such as central securities depositories, may be required. From a regulatory perspective, there are benefits to ensuring a third party can oversee settlements, even when achieved instantaneously on the blockchain. Banks will remain relevant in this new system too. They are already working to develop digital asset infrastructure. More broadly, they will be needed to generate deals, advise issuers and find investors. Banks may also have a useful role to provide stability to defi lending. They could perform credit scores and identity checks on borrowers before providing funds on the blockchain. The BIS suggested that 'these advances are likely to push the system towards more centralisation, blurring the distinction between defi and traditional finance.' This underscores the more overarching point that fintech and traditional financial entities will operate side-by-side (and, at times, together) to improve the provision, efficiency and security of digital assets.

**'The co-existence of fintechs and traditional financial institutions underscores the point that building a new capital market infrastructure for digital assets is a process of evolution rather than revolution.'**





## Decentralisation and the infrastructure for a digital asset ecosystem

**As more and more parts of our lives are conducted in digital spaces, a new layer of infrastructure is evolving to provide the plumbing that will enable digital economic activity.**

Commodity services for digital assets are taking shape. Some have been well-established for a few years such as cloud services and cybersecurity. But others – digital identity and digital wallets – are only just beginning to take shape.

On the one hand, this rapidly developing industry offers new business opportunities. On the other, these require regulation to ensure they can be managed safely and securely. Regulating decentralised infrastructure poses unique challenges for regulators.

A true digital asset ecosystem is yet to take shape, but there is room to speculate about the commodity services on which it will rely. First, it is important to define what is being discussed.

The term digital asset ecosystem encapsulates the systems used to hold, use and transact in digital assets. With the advent of Web3 and the metaverse, these systems are likely to be built on decentralised systems with distributed ledger technology. The principle of decentralisation is informing much of the development, with the prize being an ecosystem where assets can be held and traded independent of the infrastructure of a particular institution.

The likely outcome is that there will be a variety of blockchain protocols in simultaneous operation. Interoperability bridges will ensure that assets can be transferred between them. These different blockchain

protocols will have different methods of building consensus and verification and, accordingly, different strengths and weaknesses. This will give users the opportunity to select between blockchain settlement systems based on their priorities, including speed, privacy, programmability and sustainability.

This network will allow users to transact with each other and with businesses. While the types of assets have been detailed elsewhere, it is important to consider what the payments rails will look like.

### Payments in the metaverse

The exchange of digital assets is only half the story. How users pay for digital goods and services is at least as important.

The simplest option would be to employ the conventional digital payments architecture that we use already. People should be able to use their credit and debit cards to buy digital assets in the same way as they currently pay for goods and services online.

But since much of the infrastructure is likely to be based on blockchain, the range of blockchain payment solutions – including cryptocurrencies, stablecoins and central bank digital currencies – offers a built-in economic system.

Having a means of settling the cash payment leg of an

exchange on blockchain allows for instant atomic settlement, eliminating counterparty risk.

Microtransactions are likely to form an important part of the digital asset economy. One might imagine buying tokens that allow access to content on a magazine or streaming platform, rather than paying for a monthly subscription. While this is technically feasible with conventional payments rails, micropayments of this sort are not economically viable because of the cost of processing them.

Therefore, a token-based payment system is likely to be common and widely used. While cryptocurrencies may become more broadly adopted, it is more likely that, for day-to-day purchases, consumers will prefer to use the same unit of account in which their salaries and taxes are paid, rather than take on the risk of currency volatility. This means some form of stablecoins or central bank digital currency is the most likely payment solution.

Who manages the on and off ramps for these payments becomes the next question. If one purchases tokens for use in the digital asset ecosystem, and it is possible for these to be redeemed for regular fiat currency, there would have to be controls in place to ensure this is guaranteed in the event of stress.

### Cloud services for settlement

Perhaps the simplest and most fundamental of the systems required for a digital asset ecosystem, the plumbing underpinning it all, is data storage and computational power. Although cloud services are not inherently decentralised in the sense typically used to describe distributed ledger systems and public blockchains, they can be used to host both centralised and decentralised systems. However, one of the benefits they offer is similar to that offered by decentralisation: removing the single point of failure.

A few years ago, many institutions preferred to meet these needs with servers located on premises in the belief that, by having direct access so that they could control it themselves, they would ensure security.

In fact, the reverse is true. In the event of a natural disaster, or even a fire in the building, let alone the possibility of civil disruption, having data stored on-site becomes a serious vulnerability.

Cloud storage solutions mitigate these risks. Data stored across networks of servers have much greater resilience to disruption than on-premises solutions. In its paper 'Central bank digital currencies: foundational principles and core features' the Bank for International Settlements points out that, to ensure resilience, CBDC infrastructure should either be distributed or make use of multiple data centres. An institution can use on-premises servers and remote back-up centres, but they will struggle to obtain the resilience that cloud services providers can offer.

Connectivity is another major concern. Even the most secure and resilient clouds are susceptible to outage. But using on-premises servers would not mitigate this risk since,

**'The principle of decentralisation is informing much of the development, with the prize being an ecosystem where assets can be held and traded independent of the infrastructure of a particular institution.'**

even if they were more reliable than high-quality cloud systems (extremely unlikely in itself), use of cloud servers is so ubiquitous that at some stage some crucial service underpinning the digital asset ecosystem will rely on cloud storage or computation. This means that even an ecosystem primarily reliant on on-premises servers will still be exposed to the consequences of cloud outages. Building entirely on cloud infrastructure, ideally within one system, minimises exposure to outages.

This kind of resilience is vital for a digital asset ecosystem. Service disruptions are not acceptable for systemically important infrastructure, particularly if it is to underpin networks where potentially digital assets worth hundreds of billions of dollars are transacted.

Load management is another key requirement for a digital asset ecosystem. If a digital asset ecosystem is to become as popular, widely-used and ubiquitous as is hoped, then the throughput – how many transactions that can be processed – will be enormous.

The computing power required to process transactions seamlessly at peak times is likely to be many times higher than during low traffic times. While it is possible to build the capacity to process peak traffic with on-premises servers, this capacity will be wasted at low-traffic times.

Cloud services providers have devoted vast resources to addressing this load management problem and are likely to deal with it more efficiently than an individual institution attempting to solve it themselves.

The BIS has published a report detailing the technical standards that CBDCs will have to meet. While a digital asset ecosystem may or may not involve CBDC, it can safely be assumed that these standards will be required of any transaction system of systemic importance.

### Cybersecurity

The cybersecurity protections offered by using cloud services rather than on-premises servers are substantial.

'The fact is that as technology becomes more complex, the surface area expands and the potential for exploits grows,' said Zack Korman, vice-president of engineering at CYBR, a

Norwegian cybersecurity company. ‘Only huge companies like Amazon and Google have the resources available to keep up with the pace of development.’

Large-scale cloud providers, benefitting from these economies of scale, can offer a whole panoply of tools, often powered by artificial intelligence and machine learning, to detect fraud and other potential criminal activity.

Having secure servers is only part of the cybersecurity problem. There are also potential vulnerabilities in code. Many of the hacks in the cryptocurrency world are due to vulnerabilities in smart contracts. It was this that allowed the hack of the DAO, a venture capital fund, in 2016.

But some cloud providers can offer assistance in this regard. Xiaochen Zhang, global head of innovation, international financials at Amazon Web Services said: ‘We can host nodes for blockchain operations and manage that process. Our resilience engineers can help to identify potential vulnerabilities at deployment.’

While intuitively the idea of data being shared on servers alongside data from others feels less secure than isolated data, cloud providers can achieve extremely high standards of security. Even military intelligence organisations employ cloud services technology, with the Pentagon expecting to commit to a cloud services contract worth \$9bn in December this year.

This dominance of cloud services means that there is a need for oversight. They are not invulnerable to cyberattacks and, as more systemically important institutions and service infrastructure begins to rely on it, concentration risk is the inevitable consequence. Accordingly, regulators must ensure that cloud systems underpinning systemically important infrastructure are as resilient as possible. One way to ensure this is to use multiple different service providers as back-up.

The above relates to the viability of cloud services as the hosting protocol for the computation and settlement of transactions in a digital asset ecosystem. However, content storage itself is a similarly important component.

A non-fungible token is stored and transacted on blockchain. However, the asset of which it denotes ownership is not itself stored on the blockchain. The reasons for this are simple. The token itself is small and easy to transact. Storing a large image or video file on the blockchain would be bulky and inconvenient.

**‘Large-scale institutional NFT providers are more likely to have resilient content storage architecture, but many NFTs are created by small, independent artists looking to monetise their work.’**

The NFT simply contains a link to the content, which is hosted elsewhere. So, while the blockchain on which an NFT is tradeable might use high-quality resilient cloud architecture, the content might be stored on a local server or a retail service like DropBox. If the creator neglects to pay the fees to keep their content online, the NFT holder could lose access to it even if the NFT architecture remains sound.

Large-scale institutional NFT providers are more likely to have resilient content storage architecture, but many NFTs are created by small, independent artists looking to monetise their work. If this is to become a major centre of economic activity, regulators should consider imposing quality and resilience standards on the infrastructure used to store digital assets.

As well as centralised cloud providers, there are also decentralised peer-to-peer networks like the InterPlanetary File System, which provides a decentralised network for content storage. These systems last as long as the network remains supported, so they are not dependent on any single user’s server or infrastructure.

#### **Regulatory challenge: governing decentralised organisations**

When discussing decentralisation, it is important to acknowledge the distinction between decentralised infrastructure and decentralised governance.

By now, the concept of decentralised infrastructure is widely understood – a network of many nodes working collaboratively to verify the information shared within it.

It is possible for an institution to provide a service on an infrastructure distributed on a network of many nodes, collaboratively verifying the information shared in the network, and for that institution to still have a centralised governance model with a board, a chief executive officer and the rest of the conventional decision-making architecture of businesses.

Decentralised governance is another matter. Decentralised autonomous organisations are (at least in theory) not governed by a central authority, but by the contributors to the network. One of the most famous, indeed, eponymous examples of these was the DAO – a crowd-sourced venture capital fund built on Ethereum in 2016. The principle was that users would deposit ether and receive governance tokens that entitled them to votes on the fund’s investment decisions. A vulnerability in one of the smart contracts allowed hackers to steal around a third of the funds deposited.

There are a variety of models that DAOs use, but the principle involves giving token holders votes on decisions about how the DAO operates, then using smart contracts to execute those decisions. In reality, changes may have to be implemented by developers, but the idea is that they do so at the behest of the voters. Some protocols might allow one vote per token (giving a bigger say to those with more invested in the network). Others give more votes to those who stake (lock up) their token in smart contract-controlled escrow for a given period. Others might allow one vote per address, giving everyone an equal say.



**‘Large-scale cloud providers, benefitting from these economies of scale, can offer a whole panoply of tools, often powered by artificial intelligence and machine learning, to detect fraud and other potential criminal activity.’**

The innovations DAOs deliver – distributed, democratic decision-making – can empower a valuable and exciting new form of governance.

However, for systemically important infrastructure, this form of governance has limits. Scott Hendry, Bank of Canada, pointed out that regulators have some concerns about a lack of accountability if systemically important transaction networks were to be governed in a decentralised manner. ‘The decentralised world does not yet have a good model for accountability, oversight and decision-making. One possible approach could be to investigate the establishment of at least something like the self-regulating, semi-public organisations that we have in certain traditional finance sectors to set some standards.’

He observed that in times of crisis, it is vital to be able to quickly make decisions for the good of the platform and the broader economy.

Clearly then, not every decision made about a systemically important transaction network can be made in a distributed fashion. But decentralisation of governance is not a binary choice but a sliding scale. Pietro Grassano, business solutions director for Europe at Algorand, points out that some choices

can be made in a decentralised fashion but not everything. ‘Decisions about cryptography and security matters like that are technocratic and best taken in a centralised fashion.’

So, it might be possible for regulators to accept a systemically important digital asset settlement system where some elements of the governance are decentralised, but those pertaining to key vulnerabilities have a more conventional decision-making architecture, ensuring quick responses by people who can be held accountable for their actions.

#### **Wallet provision**

The question of how users will interact with digital assets is another area where the shape of the ecosystem is still developing. There are two main systems: custodial wallets and self-custody.

To make transactions in a blockchain-based ecosystem requires a public key and a private key. A public key is shared with counterparties. It is the address to which they send funds. A private key is kept secret and used to initiate transfers.

Custodial wallets, often offered by exchanges, use an account-based system, holding users’ assets in their name, much as custodial services work in traditional finance. They control the private key for the sending of funds, most of which are stored offline in what is known as ‘cold storage’ for security reasons. A small portion is held online to meet small withdrawal and trading needs.

These providers control the funds of users – which some in the crypto community dislike. However, giving up that control means that users benefit from customer support as well as easy and convenient use of their funds on exchanges.

The digital asset ecosystem offers an alternative. One of

# The future of payments 2022

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the main advantages of cryptocurrency and blockchain based infrastructure is the possibility of self-custody – keeping control of your private key.

This gives holders of assets the opportunity to transfer their assets away from the protocol, holding them offline, independent of any intermediary.

In order to manage their private key, users can trust their memories or write it down and store it somewhere, which becomes a new vulnerability. Huge quantities of cryptocurrencies have been lost because owners forgot or lost their private keys. So, while there is a certain intellectual purity to the principle 'not your keys, not your crypto', which advocates that users hold their cryptocurrency directly, rather than relying on intermediaries, most people will want some assistance in holding their cryptoassets. Self-custody wallets provide a means of generating and securely storing a private key without exposing it to the wallet provider. Typically, these rely on the internal hardware in smartphones or computers to generate and store a key locally.

In order to initiate transactions, digital assets must be brought online to interact with blockchain networks via application programming interfaces, so wallets must be able to achieve this without compromising keys.

While self-custodied wallets offer privacy and security, the fact that wallet providers do not gather any information means that they frequently cannot be linked to a verifiable identity that controls the wallet. This has implications for anti-money laundering. Many institutions will find it difficult to transact with self-custodied wallets while still adhering to their compliance and know-your-customer standards.

As well as holding cryptocurrencies, wallets allow users to hold NFTs. Most NFTs are created on the Ethereum blockchain, but this is not the only option. Other NFTs are hosted on Flow, Cardano and Solana, among others. This creates a potential problem of liquidity isolation.

For a digital asset ecosystem to be truly efficient, it must be possible for NFTs to move from blockchain to blockchain, allowing users to trade freely, irrespective of the chain their asset was created on.

One solution is an NFT bridge, which locks up the digital asset on the original chain then creates an identical one on the target chain with smart contracts. A more ambitious solution, but one that might form a more powerful basis for a digital asset ecosystem, would be a 'blockchain of blockchains' – distributed services that allow asset exchanges between blockchains and that provides a language for smart contracts that can facilitate services like royalty payments between chains.

## Digital identity

Identity in the digital asset ecosystem is a vexed question. One of the early promises of bitcoin and blockchain was that it would allow peer-to-peer transactions without exposing your identity to your counterparty or to any third party.

While many are still working towards this goal, any digital

**'Perhaps the simplest and most fundamental of the systems required for a digital asset ecosystem, the plumbing underpinning it all, is data storage and computational power.'**

asset ecosystem will require regulatory approval and that this will not be delivered without the principal actors adhering to certain standards.

These standards – know-your-customer, anti-money laundering, countering terrorist financing and so forth – require service providers to verify users' identity and ensure they are not committing crimes.

Exactly how this should be done is debated. There are inefficiencies and inadequacies in the present system. In many jurisdictions, multiple systems – passports and driving licenses, for example – are designed to verify identity in person, but services must also be delivered remotely. The first step is to digitalise identity.

After that, there is the possibility of reducing the immense duplication of effort that goes on when every institution goes through the same process of gathering, processing and storing KYC information for the same customers.

One possibility is that a third party gathers this information, then gives users a token that they can use to verify their identity with banks and other counterparties. These counterparties can then be given cryptographic assurance that the appropriate KYC measures have been performed on this customer without having to receive, process and store the data themselves, which opens them up data protection regulatory liability.

This kind of solution is already in operation in some countries. Norway, for example, uses BankID.

Some believe, however, that this kind of architecture has too many vulnerabilities. 'It means trusting one single entity, which can be hacked,' said John Liu, head of product, Amazon, Web3 and blockchain, at AWS. Instead, Liu favours a self-sovereign identity system where users hold their own identity data locally and make use of decentralised identifiers. These are verification tokens that can be decoupled from centralised registries.

It would allow users to authenticate their identity cryptographically via zero-knowledge proofs without exposing personal information, which would then be stored in counterparties' databases, which might be vulnerable to hacking. However, building consensus – particularly internationally – that a system like this can be sufficiently robust and give institutions enough information to satisfy their KYC compliance standards and keep regulators happy will prove a difficult and time-consuming process.



## Race on between digital assets and regulators

**As regulators continue to try and make sense of digital assets, they are being faced with momentous questions about digital asset categorisation, taxation, and security.**

The world of digital asset regulation is one marked by a race between innovators and regulators. The rapid proliferation of tools such as cryptocurrencies and non-fungible tokens has been a swift-moving development, even considering the already-brisk pace of financial technology innovation. Among these broader developments in fintech, digital assets have emerged as perhaps the single tool most capturing the attention of the public and regulators alike. In 2022, advertisements for digital assets abound. Yet the proliferation of scams, money laundering and get-rich-quick ploys have also increased. In short, the digital asset space is marked by characteristics that attract regulators.

This preoccupation is demonstrated by the Biden administration's executive order to 'investigate' digital assets and develop a coherent policy response. Meanwhile, the Securities and Exchange Commission seems ready to regulate cryptocurrencies as a kind of security – an omen for an industry that often envisions itself as a replacement for fiat currency. Elsewhere, the European Union, through its 2020 Markets in Crypto-Assets regulation, has proposed regulations as part of its digital finance strategy. The UK is developing its regulatory framework, though it currently sorts digital assets into existing regulatory baskets.

Perhaps the most foundational regulatory question for

digital assets involves prudential deliberations about how to adopt appropriate financial categorisation. For instance, there is the question of whether digital assets should be regarded as securities, traditional equities or currencies. Such delineations have significant impacts on what disclosures are required and how assets should be taxed. The stakes are considerable.

The most notable example is the core question of whether cryptocurrencies should be considered a type of currency or else, as recently indicated by the SEC, a security. Under current US rules, cryptocurrency exchanges are legal and fall under the purview of the Bank Secrecy Act, which requires banks in the US to work with the government to combat money laundering. Yet future SEC regulations could force a fundamental change to how cryptocurrency markets function, seemingly eroding the potential for digital currencies to – at least as traditionally imagined – supplant fiat.

This extends beyond cryptocurrencies like bitcoin and ether. Indeed, just as the SEC has gone after initial coin offerings – for example, the lawsuit against Ripple Labs for selling XRP – and made it clear that it regards such tokens as investment securities, the world of digital assets has grown considerably since the start of the ICO boom in 2017. That includes the emergence of NFTs that, like ICOs, are guided by no central administrator and therefore sidestep traditional

security law. Yet they are still treated as investments by purchasers.

In deciding whether to categorise digital assets as a security or a commodity, many regulators have used something akin to the Howey test. This means that a security exists when the item in question involves the investment of money with an expectation of profit. Yet this has been criticised for being insufficiently nuanced to deal with tokens, which are used as a stake in a network that is ultimately the primary source of profit. Moreover, although individuals have been using digital assets as a tool for profit, is this an intrinsic quality of those assets? Or is it a condition of a highly volatile new market in which the value of these assets is still being determined and where profits arise between fissures between believers and nonbelievers?

Although this debate is of regulatory importance, answers from administrators are far from uniform or obvious. Indeed, there is significant variation in how regulators regard digital assets within existing frameworks. This offers a portrait of a global regulatory environment in which there is considerable confusion and disagreement over digital assets. At the core of it is the debate about whether to treat cryptocurrencies as they were initially intended – as a currency – or a security. This question must deal not only with the hard realities of how cryptocurrency has been used as it rapidly ascended into the public conscious, it must also look at the nature of technology and offer a framework that will set the agenda for what regulators and governments think cryptocurrencies should be.

### Diverse categories lead to diverse regulation

These fissures are readily apparent in a cross-country analysis of the frameworks nations are using.

In the US, although the SEC has come to believe that many digital assets – including cryptocurrencies and NFTs – are securities, this relative clarity is not reflective of a broader collective consensus among American regulators. For instance, the bipartisan Digital Commodities Consumer Protection Act would assign the Commodity Futures Trading Commission the task of overseeing bitcoin, among other cryptocurrencies, which would be classified as commodities. This would wrestle away some regulatory control from the SEC. Although the bill's details are opaque, it is an example of the disunity in the US regulatory system. This bill is also notable for introducing new financial registration categories, including 'digital commodity broker', 'digital commodity custodian', 'digital commodity dealer' and 'digital commodity trading facility'.

How the SEC categorises cryptocurrencies is significant. This is not only because of the sheer size of the US market, it is also because US laws allow the country to pursue anyone who transacts with a US counterpart, even if they do not live in the country. Coinbase lets Americans trade more than 150 tokens. If those products were deemed securities, the firm would need to register as an exchange with the SEC – a possibility that resulted in Coinbase shares falling from nearly \$53 to closer to \$14.



**'Portugal is regarded as particularly welcoming of cryptocurrencies. Other countries seeking to expand their digital economy have similarly encouraged cryptocurrency innovation.'**

The CFTC, by contrast, is adopting a friendlier 'do no harm' approach, by treating bitcoin as a commodity and allowing cryptocurrency derivatives to trade publicly. The Financial Crimes Enforcement Network makes the point that it expects crypto exchanges to comply with its travel rule by gathering share information about originators and beneficiaries of all transactions. However, more guidelines on the way.

The red tape emerging in the US is not necessarily seen elsewhere. The German government was one of the first countries to provide a legal framework around cryptocurrencies. The German federal central tax office considers cryptocurrencies private money for tax purpose and gains of below €600 on cryptocurrencies held for less than a year are tax free. The sale of cryptocurrencies held for over a year are tax exempt. Otherwise cryptocurrencies are subject to standard income tax rates.

Elsewhere in Europe, Portugal is regarded as particularly welcoming of cryptocurrencies. Like other European countries, it follows the guidelines delineated in the fifth money laundering directive (AMLD5), which defines cryptoassets as 'financial instruments' and sets out registration requirements around their issuance and selling. As part of a broader economic digitalisation effort, Portugal

does not consider digital assets currencies, making them non-legal tender and not subject to tax. This framework is part of a broader scheme offering tax advantages to individuals involved in digital innovation and which speaks to the political nature of answering how to categorise cryptocurrencies.

Other countries seeking to expand their digital economy have similarly encouraged cryptocurrency innovation. In Spain's case, it is common to see bitcoin kiosks in the streets and merchants willing to accept coins. Yet amid this, the European Union recently announced an essentially finalised agreement on the MiCA regulatory initiative, which could impose considerable compliance restrictions, including an effective ban of proof-of-work mining by 2025 and algorithmic stablecoins.

The UK has done considerable work to develop a regulatory framework around digital assets. In addition to regulations covering know-your-customer and anti-money laundering standards, the UK has put out calls for further research into digital assets and a ban on cryptocurrency derivatives trading. It has generally put digital assets into existing regulatory buckets for taxation purposes. This includes designating cryptocurrencies from an employer as taxable income based on the value of those assets at the point of transfer. Where cryptocurrencies are held as personal investments, capital gains taxes apply.

In Asia, Hong Kong has created stringent regulation of cryptocurrencies, including expanded restrictions on retail investors' access to digital assets and advertisement. China instituted an outright ban on cryptocurrencies. Despite its strict compliance rules, Hong Kong continues to position itself as a hub for financial technology and defines bitcoin as a virtual commodity, so capital gains taxes does not apply. Japan, by contrast, has relatively open regulations around cryptocurrencies, treating them as miscellaneous income as well as payment methods not denominated in fiat. In short, Japan's vision is far more in line with what many traditional digital asset voices initially imagined for cryptocurrencies. There are, however, additional designations and regulations around crypto derivatives, which are treated as financial instruments.

In Africa, approaches to cryptocurrencies vary considerably. In Nigeria, the central bank has barred private creation or dealing in crypto, saying it is not legal tender. The Nigerian SEC considers cryptocurrencies to be securities transactions. Generally in Nigeria, there is extremely limited (if any) room for digital asset innovation, although the country paradoxically experiences high cryptocurrency ownership and use. South Africa similarly considers cryptocurrencies an intangible asset; however, it is still in the process of deliberating on a regulatory framework. Kenya does not yet have robust regulations around cryptocurrencies.

In Latin America, Colombia has prohibited banks from offering financial services to cryptocurrency companies. This has choked off the industry. The designation that cryptocurrency is not legal tender nor subject to any regulatory framework has seriously discouraged the digital asset space from growing, even within a context of an

**'The rapid proliferation of tools such as cryptocurrencies and non-fungible tokens has been a swift-moving development within the already-brisk pace of financial technology innovation.'**

emerging Colombian tech sector. In contrast, El Salvador has fully embraced bitcoin as legal tender and promised no income tax on cryptocurrencies, as well as plans to encourage bitcoin mining. These moves have raised concerns from the International Monetary Fund and other monitors.

**Stablecoins and NFTs pose new questions to regulators**

There are emerging complexities presented by new kinds of digital assets, including tokenised assets and stablecoins. This goes beyond simply the question of whether digital assets should be considered a security or a currency.

In the case of stablecoins, where the value of the digital cryptocurrency is pegged to a traditional fiat currency, regulations are still being developed. The core issues extend beyond simply how to tax and categorise each type of digital asset. Given the assurance of stablecoins that they maintain their value, regulations ensuring this are both novel and not particularly rooted in existing prudential rules. One proposal, put forth by the Basel Committee on Banking Supervision, makes the case that regulators should ensure stabilisation mechanisms are designed to minimise fluctuations and have daily monitoring systems to ensure that these mechanisms are functioning as intended.

In addition, there could be stipulations the value of a stablecoin should not diverge by more than 10 basis points from the value of the originating asset more than three times over a year. A breach would call into question the strength of the stabilisation mechanism and force regulators to improve it. Moreover, banks must also verify that stablecoin organisations hold sufficient quantities of the underlying asset and are managed appropriately. Such proposals, however, remain outside the space of policy-making. There is limited infrastructure dedicated to developing a regulatory framework that would ensure the integrity of stablecoin products. Most stablecoins, unless remunerated, are exempt from SEC securities regulation.

A similar dearth can be found around token products. Tokenised traditional assets are digital representation of those assets using cryptography, rather than recording ownership through a central securities depository. Cryptoassets can be treated as a digital equivalent to a traditional asset when calculating capital requirements for credit and market risk. Individuals exposed to tokenised traditional assets are at

risk of changing value or a potential default from underlying assets as well as the risk of default of the redeemer.

**Mitigating against financial risk**

Other areas of regulatory concern extend to financial risk. This includes the growing calls for banks to be responsible for assessing whether a cryptoasset complies with classification conditions and that banks have sufficient risk management policies to conduct such evaluations. This information should be made available to bank users interested in exploring that digital asset. JP Morgan offers one particular example of this sort of declaration. This is in line with SEC guidance stating that companies must disclose risks to investors from cryptocurrencies held by customers and account them as liabilities. Similar initiatives have been put in place by the Canadian Securities Administrators, which in 2021 put forward expectations for disclosure requirements. These were, however, aimed primarily at crypto issuers.

Given the recent implosion of certain cryptoassets, there are calls for regulations around leverage ratios to limit exposure to excessive levels of financial risk. As was made clear by Terra, there is often limited incentive for individuals to invest in stablecoins if the ratio is necessarily one-to-one with a fiat currency. Leverage, however, created an investment incentive, which provoked a competition to generate the highest yield. The challenges arising from this are clear. They bear a striking resemblance to the dynamics that can emerge generally in deregulated finance.

These issues around leverage unsurprisingly conjure up images of the 2008 financial crisis. According to optimists, however, a difference between digital assets and the financial practices prompting the 2008 crisis is that blockchain allows investors a much clearer picture of a company's exposure, risk and leverage as well as the ways it is distributed across the market. In a moment where digital assets are seeking access to the traditional financial sector – just as the financial sector, tepidly, seeks access to digital assets – the useful qualities of blockchain are worth noting. Indeed, blockchain may well help regulators perceive systemic risk in traditional finance.

**KYC and AML regulations remain an important challenge for digital assets**

KYC and AML regulations are of particular importance to the regulatory community. Members of the digital asset community are also keen to see more elaborate KYC and AML compliance.

Many digital assets and exchanges have sought to protect user anonymity. This has been criticised by regulators as providing opportunities for individuals seeking to launder money or engage in other illicit activity. Techniques include using tumblers (or mixers) to 'clean' dirty cryptocurrency by moving it through several addresses, cleaning the total transaction value before transferring it back to a single wallet. Then there is the dark web, where illicit activities and distribution of cryptocurrencies are consolidated and extremely difficult to track. Even when cryptocurrencies are exchanged through traditional means, the exchanges have

often failed to provide sufficient KYC and AML frameworks.

In contrast to the still-contested debates around cryptocurrency classification and tax regulation, the need for greater KYC and AML transparency is widely accepted, especially by regulators which want to improve the transparency of transactions. Digital asset innovators also often believe that greater KYC and AML standards will lift the reputation of the sector. Or as Sujit Raman, general counsel at TRM Labs, said, 'a major priority for the crypto community now is keeping illicit actors off of the digital asset space'.

Cryptocurrencies first came to public attention as a way to buy and sell illegal drugs on Silk Road, an online black market. Camille Pepos, deputy head of fintech supervision at the Malta Financial Services Authority, noted that the digital asset space has been marked by too many 'get rich quick scams' and that 'regulation should be a mitigation measure to offer consumer protection.' This includes, Pepos continued, ensuring market integrity and warding against market manipulation, which has largely been unaddressed by regulators. The enhancement of KYC and AML standards is generally viewed as a next step in the logical development of digital assets as a legitimate and institutional vehicle for transactions and wealth creation.

These efforts promise to improve the overall security of digital asset platforms. They include creating secure

**'In addition to introducing KYC and AML compliance rules, Singapore has also been focused on offering education to digital asset users about the technology, best practices and avoiding crime, money laundering and phishing.'**



frameworks that address attacks, such as one that saw hackers steal \$625m in cryptocurrency from the blockchain backing video game Axie Infinity. As criminals turn to cryptocurrencies as an arena for illicit purposes, greater regulation and more robust protocols can preserve the integrity and security of capital.

Regulators are enacting developments to improve KYC and AML standards. The US Treasury has called for new regulations, which would outline data collection requirements for cryptocurrency exchanges and wallets – this includes suspicious activity reports on transactions valued at over \$10,000 in addition to identification requirements. Treasury Secretary Janet Yellen argued that ‘more government regulation is needed to police the proliferation of cryptocurrency and other digital assets and to ward off fraudulent or illicit transactions.’

Meanwhile, the SEC, Financial Crimes Enforcement Network and CFTC announced that cryptocurrency exchanges should be classified as ‘money service businesses’, subjecting them to the KYC and AML provisions established in the 1970 Bank Secrecy Act. This means that any user on a cryptocurrency exchange must verify their identity. Efforts to expand these provisions are currently being developed.

In 2021, US President Joe Biden’s working group on financial markets released recommendations for new compliance requirements for cryptocurrency exchanges. In March 2022, the Biden administration released an executive order, which outlined plans to limit illicit finance facilitated through cryptocurrency, in addition to efforts to explore a US CBDC. It put forward a timeline to establish an extensive regulatory framework and set of reporting requirements, which would limit the use of digital assets ‘as a tool to circumvent US and foreign financial sanctions regimes.’

Work to develop frameworks for digital asset KYC and AML compliance is underway. Canada has required all cryptocurrency exchanges in the country to follow the same KYC compliance measures as mainstream financial institutions. South Korea and Thailand are both tightening their KYC and AML requirements, with the latter imposing in-person verification standards.

The EU, meanwhile, has created new rules aimed at preventing the illicit use of digital assets. This includes requiring providers, such as exchanges, to collect information about individuals involved in cryptocurrency transactions and to offer such information to law enforcement when required. These rules, however, do not require tracking private wallets as the EU initially planned. In addition to introducing KYC and AML compliance rules, Singapore has also been focused on offering education to digital asset users about the technology, best practices and avoiding crime, money laundering and phishing.

Major cryptocurrency exchanges have begun to implement more stringent KYC and AML requirements in response to the regulatory crackdown. Binance – a major crypto exchange – announced in 2021 the requirement for

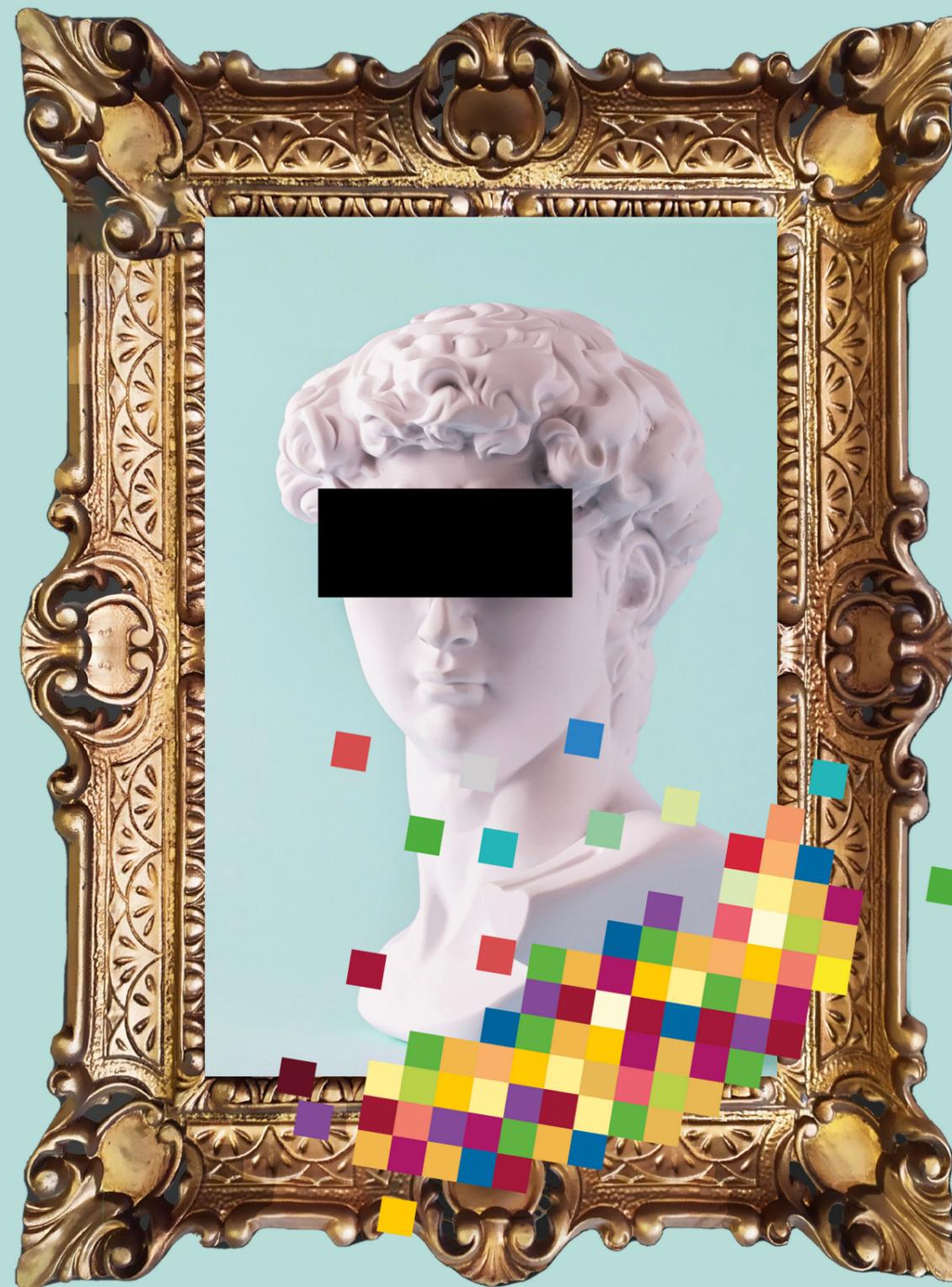
**‘In the case of stablecoins, where the value of the digital cryptocurrency is pegged to a traditional fiat currency, regulations are still being developed. The core issues extend beyond simply how to tax and categorise each type of digital asset.’**

new customers to present a government-issued identification and to proceed through a facial recognition test. Coinbase has implemented a similar multi-stage identity verification process. BitMEX – a large cryptocurrency derivatives exchange – implemented similar measures. It was fined, however, for ineffective KYC safeguards.

The scramble of many cryptocurrency exchanges underlies a central challenge facing KYC and AML regulation. Although the broad trend is moving towards greater identification requirements, the precise nature and extent of such compliance rules vary between jurisdictions. Many digital asset providers and exchanges lament a lack of global regulatory harmonisation, which would make compliance easier to follow and more robust. Binance has said it would welcome greater consistency globally when it comes to regulatory requirements. The difficulty lies in managing ‘inconsistent regulations across jurisdictions and the resulting need for more ‘clarification of regulation across geography’.

Greater harmonisation might also help address some of the shortcomings of current KYC and AML regulations. Among these is the lack of current oversight over decentralised exchanges (DEXs), which organise trades through smart contracts rather than the trading desks typical of other exchanges. Since DEXs are not financial intermediaries, they are able to dodge regulations. Consider, for instance, ShapeShift’s stated loss of 95% of its users after being forced to implement KYC measures. The exchange re-emerged in 2021 as a DEX.

Cryptocurrency exchanges have similarly avoided KYC requirements by declaring their home in countries with more relaxed regulatory environments. Estimates by CipherTracer show that half of the cryptocurrency exchanges registered in the Seychelles, for instance, have poor KYC measures in place. This is a country in which a BitMEX member claimed, according to the FBI, that it only cost ‘a coconut’ to bribe Seychelles law enforcement. This case, in addition, to others like it, has spurred collective calls to tighten up global cryptocurrency regulation. Efforts to spread regulation across borders are immensely challenging. The harmonisation effort has a long way to go.





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