

# DMI ANNUAL

OMFIF  Digital Monetary Institute

2023



## WHAT COMES AFTER THE CRYPTO WINTER

COMING BACK FROM COLLAPSE



## Official Monetary and Financial Institutions Forum

181 Queen Victoria Street, London, EC4V 4EG

T: +44 (0)20 700 27898

[enquiries@omfif.org](mailto:enquiries@omfif.org)

[omfif.org](http://omfif.org)

### 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.

### AUTHORS

#### Philip Middleton

Deputy Chairman at OMFIF

#### Lewis McLellan

Editor, Digital Monetary Institute

#### Julian Jacobs

Economist

#### Edward Maling

Research Analyst

#### Sinan Yilmaz

Account and Content Manager

### EDITORIAL

#### William Coningsby-Brown

Production Manager

#### Fergus McKeown

Subeditor

#### Clive Horwood

Managing Editor and Deputy CEO

#### Simon Hadley

Head of Production

#### Sarah Moloney

Subeditor

## CONTENTS

### 3 'Something must be done!' The crypto regulatory challenge for 2023

Philip Middleton

### 5 Technological readiness and understanding of global asset owners

James Redgrave

### 6 Regulators poised to strengthen oversight of digital assets

Edward Maling

### 8 Crypto and blockchain Industries desperately Need a win in 2023

Lewis McLellan

### 10 Distributed ledger technology set for renewed growth in 2023

Olivier Truquet

### 12 Quantum computing Revolution approaches

Gary Seybold

### 13 Digital currency within 10 years

Sinan Yilmaz and Katerina Liu

### 16 A year in crypto: expertise and tools required for the new frontier

Suzanne Morsfield

### 17 Digitalisation redraws the lines for the public and private sectors

Sinan Yilmaz

### 19 Central banks must push forward exploration of cbdc use cases

Chris Ostrowski

### 21 Adoption of central bank digital currencies will boom in 2023

Mary Hall

### 22 Interoperability at core of work on nepal's cbdc

Koji Fusa

### 23 Financial institutions are cautiously wading into digital assets

Julian Jacobs

### 24 What emerging markets teach us about CBDC innovation

Wolfram Seidemann

### 26 Technology can solve split between CBDC privacy and compliance

David Dab

### 28 Smart regulation needed to rebuild trust in crypto

Rana Kortam

### 30 Exploring institutional decentralised finance

Larissa de Lima

### 31 Central bank digital currencies can help central banks tame inflation

David Bahamon



# 'SOMETHING MUST BE DONE!' THE CRYPTO REGULATORY CHALLENGE FOR 2023

**The crypto winter has caused many to worry about the consequences of the crypto industry continuing to operate unfettered, but are the threats dire enough to warrant drastic regulatory action? By Philip Middleton, chair, Digital Monetary Institute.**

IN VIEW of their commitment to stakeholder capitalism and globalisation, it was unsurprising that delegates at the World Economic Forum gathering in Davos were not enamoured of the threat to international harmony allegedly posed by the anarchic crypto ecosystem. It is also hardly shocking that the preferred solution was a universal, comprehensive, standardised regulatory system based on the existing financial regulatory architecture, applying to all market participants, governments and customers.

The underlying regulatory principle ought to be 'same activity, same risk, same regulation', echoing the Financial Stability Board's calls for regulatory equivalence between conventional and crypto financial instruments. This also has the no doubt unintended consequence of cementing the existing advantages of industry incumbents. It all has interesting echoes of Britain's attempts as the owner of the world's largest navy in the mid-1800s to prevent the development and introduction of the submarine.

Clearly this would require some new regulatory agencies, more supervisors and a raft of new laws and regulations. At best, it would be a global, technocratic system that trumps the inconvenient rough edges of national borders and political preferences – something not dissimilar to the European Union's Markets in Crypto-Assets regulation due in spring, which aims to

set the global standard for crypto regulation. The Bank for International Settlements' Committee on Banking Supervision goes a step further in making crypto activity unattractive for existing regulated financial institutions. It suggests that in extreme cases the reserve asset requirements for holding cryptoassets should amount to an eye-watering 1,250%. The EU may also seek to introduce this.

At Davos, much was made of the risks posed to good order by the scale of money laundering, scams and assorted financial crime perpetrated through cryptocurrencies. Also on the charge sheet were losses incurred by investors, the risks posed to gullible retail customers, potential threats to the stability of the global financial system and a general inability to trace and bring malefactors to justice.

“

**THE 'CRYPTO WINTER' OF 2022, DURING WHICH CRYPTO MARKETS SLUMPED FROM AN ESTIMATED VALUE OF \$3.1TN TO \$1TN AND SEVERAL LEADING INDUSTRY PLAYERS SUCH AS FTX, TERRA LUNA AND GENESIS LOST THEIR SHIRTS, HAS PROVIDED AMMUNITION FOR BOTH CAMPS IN THE REGULATORY DEBATE.**

Estimates of the amount of money laundered globally through the use of crypto in 2022 amounted to between \$8bn and \$20bn. In January 2023, four offenders were sentenced in the UK for fraudulently obtaining and laundering around \$27m in crypto obtained from an Australian cryptocurrency exchange. This seems egregious but is a rounding error compared with the United Nations Office on Drugs and Crime's estimate that \$1.7tn, or up to 5% of global gross domestic product, was laundered in 2022. The overwhelming bulk of this, despite far reaching international regulatory accords on anti-money laundering and countering terrorist financing regulation and enforcement, will have been perpetrated through the conventional financial system.

The 'crypto winter' of 2022, during which crypto markets slumped from an estimated value of \$3.1tn to \$1tn and several leading industry players such as FTX, Terra Luna and Genesis lost their shirts, has provided ammunition for both camps in the regulatory debate. For those demanding regulation, it is evidence that crypto poses a significant threat not only to investors' wealth, but also to the health of the financial system itself. But then in 2022 most investment was unhelpful to wealth: according to Bloomberg, \$18tn was wiped off the value of global stocks. Previously stellar companies such as Meta and Tesla saw their stock prices reduced by almost two-thirds, the MSCI World Stock Index was down 20% and bond markets saw their worst returns for a century.

All of this seems to demonstrate that crypto, far from being an alternative investment as many of its proponents like to claim, is closely correlated to the conventional financial system. Furthermore, despite the huge destruction of value, the industry limps on within its own walls and the collapse transmitted no dangerous shockwaves into the global financial system. Losses both corporate and retail have been painful for some but manageable for the system as a whole.

This may be because the sector was not big enough and insufficiently integrated into the global system to present much transmission danger. It may be that its links to conventional finance were sufficiently well-policed by both public and private actors for much harm to be done. Or it may be that, since the 2008 financial crisis, the belts and braces of the world's financial system have been considerably tightened and the whole system is now far more resilient to shocks.

The most notorious victim of the crypto winter has been the crypto exchange FTX, once valued at \$32bn, which filed for bankruptcy in November 2022. Its founder, Sam Bankman-Fried, has been charged by several US agencies with orchestrating massive financial fraud, misusing customers' funds and defrauding equity investors. The former billionaire has pleaded not guilty. Interestingly, these alleged crimes are being prosecuted by existing public agencies, in existing courts, under existing laws. While the possible inattention of some of FTX's regulators might come under the spotlight, from a broader regulatory perspective, and irrespective of the outcome of the case, there is little in the FTX



“**SOME COMMENTATORS HAVE SUGGESTED THAT, SINCE REGULATING CRYPTO INSTRUMENTS WOULD IN EFFECT 'LEGITIMISE' THEM, EFFORTS IN THAT DIRECTION MIGHT DO MORE HARM THAN GOOD.**”

story to date that suggests a massive new regulatory infrastructure is needed to police the world of cryptocurrency and assets.

Some commentators have gone further and suggested that, since crypto instruments are neither currencies, commodities, securities nor units of account, they should be left to their own devices with a large 'caveat emptor/no widows and orphans' sticker prominently placed on them. It has even been suggested that, since regulating crypto instruments would in effect 'legitimise' them, efforts in that direction might do more harm than good.

Nevertheless, there are some undeniable gaps in the coverage of existing laws, regulations and institutions. One, recently addressed by the UK Law Commission (and covered in an OMFIF panel session), is the amorphous definition of property rights particularly with regard to digital assets and non-fungible tokens. In the US, the spot market in cryptos that have not been officially determined to be securities is unpoliced. The Financial Stability Oversight Council has strongly recommended that Congress legislate to close this loophole. Though bills have been proposed in Congress, we still await developments.

These gaps might be closed by the establishment of a self-regulatory agency for crypto markets. However, there is debate over whether this would be a real regulatory agency, and it would involve making crypto firms responsible for regulating themselves.

From a whole spectrum of perspectives, 2023 looks set to be a defining year for cryptocurrencies, cryptoassets and central bank digital currencies. The regulatory debate surrounding this will be far-reaching and vibrant with passionate advocates for each of the main options. These include: strangling crypto through regulation; creating a discrete regulatory regime for crypto; bringing crypto within the existing financial system; and identifying and plugging existing gaps in laws but otherwise relying on caveat emptor. Needless to say, OMFIF and its members look forward to being at the centre of that debate. •

## OPINION

# TECHNOLOGICAL READINESS AND UNDERSTANDING OF GLOBAL ASSET OWNERS

**State Street survey shows that respondents are confident of finance's digital future, though unsure when it will arrive. By James Redgrave, vice president, thought leadership and editorial, State Street Digital.**

INSTITUTIONAL INVESTORS are beginning to look at digital finance and investment from the perspective of how its technology can benefit their operations and less as a means of holding cryptocurrencies.

Data from State Street's latest digital assets survey show growing education and awareness among asset owners about the applications of smart contracts and distributed ledger-based asset issuance, trading, ownership and administration.

However, this understanding remains nascent and its extent varies widely between institutions, as does their confidence in digital technology to transform investment operations and expectations of the timescale over which this could happen.

The study polled 100 asset owners worldwide (alongside the same number of asset managers and insurance companies) on their attitudes to and holdings of digital assets, such as cryptocurrencies. It also asked questions about their level of sophistication – in terms of internal systems and platforms, workforce expertise and third-party relationships – regarding blockchain and distributed ledger technology.

Respondents seem to be cooling on their interest in crypto as an institutional asset classes.

One-third of respondents (35%) said they had reduced their allocations to the asset class in the past 12 months (whether through direct holdings, funds containing crypto or funds holding crypto industry-related securities), compared to 26% who either increased their holdings or began holding the asset class for the first time.

Three-quarters (74%) planned to decrease or maintain allocations this year (including those with no existing allocations), while only 26% planned to increase their holdings or invest for the first time. However, over the longer term 73% do still aim to grow their crypto exposure.

Meanwhile, interest in other types of digital asset is growing. When asked what assets were of most interest, specifically as direct holdings, 44% of asset owners selected decentralised finance tokens, while only 26% cited cryptocurrencies.

In terms of technological preparedness, a surprising number of asset owners (12%) already claimed to have 'traded tokenised versions of traditional assets on distributed ledger/blockchain' and 16% said their internal systems and processes were up to it, if the wider market infrastructure was in place.

However, the significant majority (69%) was not prepared for this and only a little over half of those had a clear strategy for becoming so.

Readiness notwithstanding, asset owners clearly feel this is the future of asset management. More than three-quarters (76%) said they expect digital tokenisation and trading to become a 'commonplace form of transferring mainstream assets,' although 41% thought this would take a decade or more and only 15% thought it would happen in under five years.

Equally clear from the data was the fact they anticipate real benefits from tokenisation and are keen to start developing in-house expertise and building crucial relationships with essential partner organisations.

In particular, the potential to fractionalise illiquid assets, like private equity and real assets, was seen as a big advantage. Most respondents (56%) thought private equity would be tokenised first, with 46% expecting that real assets would be first.

More than half (60%) said transparency, lower compliance costs (51%) and faster trading (50%) were the top three benefits of tokenisation, with 52% citing reduced failed trades as the biggest area of cost saving.

And while most respondents are building teams with digital finance expertise (70% have already started or are formally planning to do so), 58% said they would look to fully or partially outsource a range of vital services, such as digital custody and wallets, smart contract generation and maintenance and digital fund administration.

Overall, the picture painted by this research is of an industry confident in the digital future of finance, but one which is not consistently clear on how or when it will arrive.

To see more of this research, and for information about how to request a presentation of the full results, see State Street's January Digital Digest newsletter. •



## REGULATORS POISED TO STRENGTHEN OVERSIGHT OF DIGITAL ASSETS

**Bills and consultations are nearing completion in several jurisdictions in response to the tumult of last year. By Edward Maling, Research Analyst, OMFIF.**

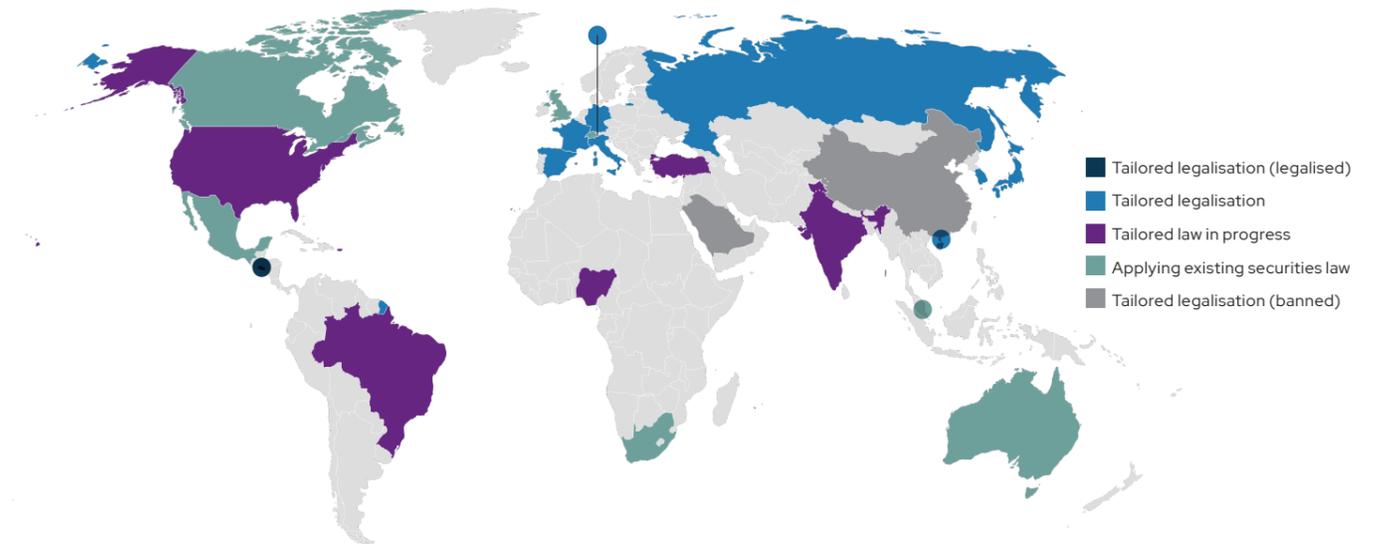
CALLS FOR CLOSER scrutiny of digital asset markets have intensified following the tumult of last year. Though the risks posed by their widespread adoption have long been on the radar for regulators, successive crises – namely the collapse of algorithmic stablecoins and failure of major exchanges – have contributed to the loss of trillions in market value. Growing concerns for consumer protection, and of the possibility of contagion for traditional financial institutions, have heaped pressure on regulators to enhance their supervision of an asset class, which is decentralised by design.

Against this backdrop, OMFIF has produced the

digital assets regulatory policy tracker. Launched in October alongside the ‘Digital assets’ report, this resource tracks the regulatory treatment of digital assets across 24 jurisdictions. At the country level, it includes information from relevant regulators and granular breakdowns on the legal status of various digital products and services, including those pertaining to virtual asset service providers and exchanges, stablecoin designs and derivatives products. The information is reviewed and updated on a quarterly basis, most recently in January 2023.

The tracker categorises regulatory treatment more broadly by highlighting progress made towards the design of tailored legislative

### DIGITAL ASSET REGULATORY TRACKER



frameworks. Despite the progress made by international bodies to coordinate the design of regulatory frameworks, the categorisations represented in the interactive map paint a more fragmented picture.

Attempts to rein in the more dangerous excesses of the digital assets market have led several countries to broaden the remits of market regulators by extending existing regulatory frameworks. This includes the extension of securities laws, as well as scrutiny of service providers’ compliance with reporting and registration requirements, particularly under anti-money laundering/combating the financing of terrorism legislation.

In jurisdictions with clear definitions – both in terms of regulatory mandates and categorisations of different tokens – and robust structures already in place, the extension of traditional securities laws has helped to provide sufficient coverage without impeding innovations in this space.

Concurrently, innovation has encouraged some lawmakers to pursue more comprehensive, tailored regulatory regimes. Developments in the composition of cryptoassets markets in recent years – in particular, the proliferation of new product offerings among a widening pool of retail investors – have created additional channels that potentially threaten financial stability. These have simultaneously blurred the lines around regulators’ jurisdictions. Questions continue to hang over how to accurately categorise, and best treat, different assets based on their use and characteristics.

Movement towards the implementation of tailored legislation has only been accelerated by

last year’s events. Renewed urgency hastened the development of tailored laws in a number of jurisdictions, including both the European Union and Japan where legislation on stablecoin issuer requirements has resulted in an effective ban of fiat-pegged products without collateralisation.

We will continue to monitor the progress of countries working on tailored legislation, with several bills nearing ratification already. For some jurisdictions, there are hints that new frameworks will be accompanied with more favourable conditions. In Hong Kong, for instance, a new licensing framework is expected to be accompanied by increasing access to retail investors as jurisdictions attempt to lure companies to their markets.

In others, the primary concern is curtailing investors’ access to risky products. Assessments which saw the banning of derivatives offerings in the UK and Spain explicitly referenced consumer protection. Similar justifications lie behind the extension of advertising restrictions, present in both of these countries as well as India, Japan and Singapore. For financial institutions with exposures to cryptoassets, prudential regulators in jurisdictions such as Canada have issued guidance clarifying their relationship to capital and liquidity requirements.

In more extreme cases, financial stability risks have been used to justify outright bans on all crypto-related activities, as observed in China where growing ownership and mining operations were perceived as threats to national strategies for central bank digital currency development and net zero targets. •



## CRYPTO AND BLOCKCHAIN INDUSTRIES DESPERATELY NEED A WIN IN 2023

**Much work is needed to overcome the fiascos of last year. By Lewis McLellan, editor, Digital Monetary Institute, OMFIF.**

REELING FROM high-profile failures in 2022, those seeking to promote blockchain as a major solution for financial industries need to demonstrate some success if they are to regain their momentum.

The crypto industry suffered some savage blows in 2022. A virulent combination of incompetence and malignity brought down first the Terra Luna stablecoin ecosystem and then FTX, until recently the second largest cryptocurrency exchange in the world. The consequences for the cryptocurrency market cap have been devastating.

Optimists say that these events will serve to blow away the speculative froth, shake out the bad actors and let the rest of the industry get on with building some truly valuable applications for blockchain under the renewed scrutiny of regulators.

Perhaps they're right, but even those outside of the crypto speculation game that are seeking

to make blockchain work for the finance world will have a great deal of work to do in 2023 to overcome the fiascos that occurred towards the end of last year.

While the crypto collapse grabbed the headlines, Sopnendu Mohanty, chief fintech officer at the Monetary Authority of Singapore, said that the Australian Securities Exchange's decision to abandon its blockchain securities exchange project after six years and A\$245m-A\$255m (\$164m-\$171m) invested would have a bigger impact on the adoption of blockchain.

Speaking at the OMFIF Asia forum in December, Mohanty called the development 'a fiasco', saying ASX's blockchain project 'was supposed to be the leading light showing how distributed ledger technology can change everything and make the processes super efficient, and that collapsed.'

Shortly after the failure of ASX's blockchain replacement project, TradeLens, a blockchain-



## OPINION

# DISTRIBUTED LEDGER TECHNOLOGY SET FOR RENEWED GROWTH IN 2023

**Regulated digital currencies, resilient distributed applications and emerging technologies will spur DLT expansion. By Olivier Truquet, Asia Pacific distributed ledger technology lead at GFT.**

DESPITE significant challenges in 2022, distributed ledger technologies have demonstrated resilience and reliability over the past year. Following the FTX collapse and as the trial of its 30-year-old founder, Sam Bankman-Fried, starts in the Bahamas, blockchain technologies did not fail FTX clients and stakeholders. Still, the lack of sound operational, accounting and decision-making processes certainly did. Public ledger technologies solve specific problems: centralisation and a lack of transparency. On-chain public records have allowed the community to raise concerns over FTX's solvency. They are very likely to become a crucial source of evidence for law enforcement authorities to uncover the mistakes and wrongdoings of the FTX management team leading to its bankruptcy.

In 2023, the blockchain industry will continue its journey to maturity with additional regulations and the broader adoption of regulated digital currencies (stablecoins, central bank digital currencies and tokenised deposits), further decentralised finance experimentation and critical technical developments such as zero-knowledge proofs applications.

In 2022, most central banks and financial regulators started developing digital legal tender. The People's Bank of China is currently running the largest CBDC pilot project in the world; Chinese digital natives have embraced this new means of payment with great enthusiasm. Convenience, attractive coupons and seamless integration between banks and mobile applications have allowed the e-yuan to achieve rapid adoption. With a transaction volume worth \$13.9bn, China is set to become one of the first countries to launch a CBDC at scale.

Project Orchid, led by the Monetary Authority of Singapore, was also in full display at the Singapore Fintech Festival, where visitors had the opportunity to experiment with various forms of programmable money in the form of a fiat-backed Singapore dollar stablecoin and CBDC. The Bank for International Settlements has released a series of reports exploring CBDC bridge applications developed with various central banks. This trend will accelerate in 2023. The BIS will continue steering central banks' efforts in developing interoperable CBDCs, while new central banks will join the race to launch production-ready digital legal tender.

With trustworthy money in place, decentralised finance builders will continue to innovate and develop compliant financial applications in line with the Web3 ethos of transparency and openness. DeFi has an opportunity to move itself away from crypto farming schemes and excessive annual percentage yields to achieve widespread adoption. Businesses solving actual issues such as expensive foreign exchange transactions, crypto-to-fiat on-/off-ramps, and access to reliable stores of value will thrive in 2023. DeFi builders must implement proper risk management and conduct regular, independent smart contract audits in addition to being cognisant of traditional finance best practices to ensure sound business operations, profitability and the security of funds.

In 2023, blockchain technology will continue advancing towards maturity, with new zero-knowledge-proof applications and the development of battle-tested protocols such as Ethereum. Zero-knowledge proofs may further contribute to developing scalability solutions through verifiable computation, authentication and identity management and anonymous payments.

For instance, Matter Labs is spearheading the build of a Layer 2 protocol based on zero-knowledge proofs, zkSync 2.0. It is expecting to launch the alpha version of its mainnet in the next year after a complete architecture upgrade and a closed alpha launch for testing in 2022. The Ethereum core developers working on the Shanghai Upgrade (the next milestone on the Ethereum development roadmap) have estimated that it may occur in March 2023. This upgrade is significant because it would enable Ethereum staking withdrawals by validators and stakers. Further upgrades are expected later this year to improve Layer 2 scalability and the Ethereum Virtual Machine. There is cautious optimism about these new timelines, as the Ethereum core developers have notoriously preferred ensuring code security over meeting self-imposed deadlines.

In 2023, DLT will continue its journey towards mass adoption. Tier 1 financial institutions may lead the way thanks to their strong brands, custodial know-how and sound business practices. Innovators will continue developing and launching new technologies that benefit businesses and their clients.

As they say in the digital assets space: onwards and upwards. •

powered supply chain ecosystem, announced that it would also be discontinuing operations early in 2023. The project was a joint venture from AP Moller Maersk and IBM and its demise signals the end of one of the more promising avenues of enterprise blockchain deployment.

These two events have seriously dented hopes that the promises made about blockchain's ability to revolutionise processes in financial markets will be realised. That, combined with the collapse of cryptocurrency value, has robbed the industry of much of what momentum was left after central banks around the world began to tighten monetary conditions and the tide of cheap credit began to ebb.

But, despite the loss of momentum, Mohanty is far from ready to throw in the towel on blockchain. He affirmed that Singapore remains invested in DLT as a technology that can add value by changing business processes.

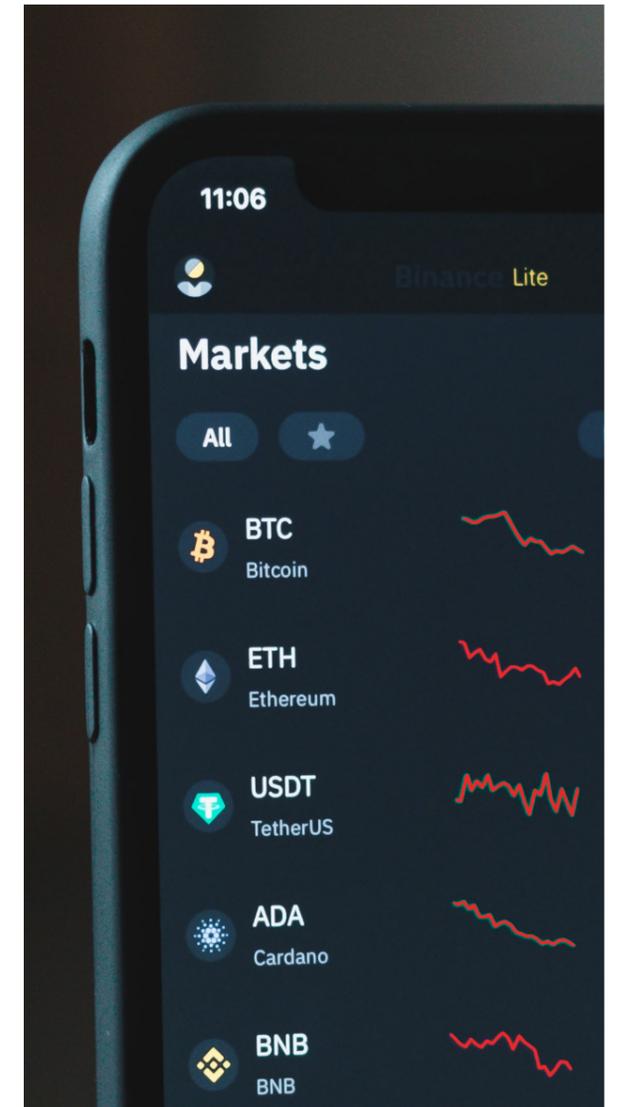
That may take a more radical approach to governance. Mohanty suggested that some of the problems that emerged in 2022, particularly in the case of FTX, stem at least in part from an excessive centralisation of control. Mohanty pointed out that this was possible because of the creation of private, permissioned blockchains designed to fit in with existing players' preferences. He suggested returning to the original public blockchain model.

The cryptocurrency industry must also make changes. Speaking on the same panel, Rana Kortam, director of global public policy at Binance, said: 'It's on us at Binance and every player to hold ourselves to a higher standard. The companies that differentiate themselves will be those that adopt proper risk management measures.'

The panellists also agreed that DLT has a great deal to offer in terms of modernising cross-border payments. That could involve the use of effectively collateralised stablecoins, as suggested by Binance's Kortam, or deposit coins issued by banks

as suggested by fellow panellist Naveen Mallela, managing director of JP Morgan's Onyx Coin Systems project.

Andrew McCormack, centre head for the Bank for International Settlements' Innovation Hub in Singapore, warned that, though blockchain-based solutions like these may seem attractive, the proliferation of these kinds of systems may well lead to fragmented liquidity unless there is an effective solution for interoperability. •



“

**THE COLLAPSE OF CRYPTOCURRENCY VALUE HAS ROBBED THE INDUSTRY OF MUCH OF WHAT MOMENTUM WAS LEFT AFTER CENTRAL BANKS AROUND THE WORLD BEGAN TO TIGHTEN MONETARY CONDITIONS AND THE TIDE OF CHEAP CREDIT BEGAN TO EBB.**

## OPINION

# QUANTUM COMPUTING REVOLUTION APPROACHES

**Classical computing won't disappear, but new approaches bring challenges as well as opportunities. By Gary Seybold, associate partner, offering management (business process operations), IBM.**

THE ERA of quantum computing is coming more quickly than many realise. Both public and private sectors, particularly financial services, must ensure they are ready for the huge changes that the new technology will bring.

For decades, quantum computing has been viewed as a futuristic technology: it would change everything, if it ever moved from the fantastical to the practical. Even in recent years, despite billions of dollars in research investment and extensive media coverage, the field is sometimes dismissed by real-life decision-makers as a far-out pursuit for academics and theorists.

However, new challenges, like climate change, novel diseases and the world's ever-growing population, have driven an increased need for agility, resiliency and accelerated digital maturity. With this acceleration, there will be soon a new era of computation. Quantum computing, as the heart of quantum-centric supercomputing, will dramatically impact how science and business evolve. By accelerating the discovery of solutions to big global challenges, quantum computing could unleash positive disruptions significantly more unexpected than technology waves of the past decades.

Classical computer bits can store information as either a 0 or a 1. That the physical world maintains a fixed structure with defined states is in keeping with classical mechanics. But scientists have pushed into the quantum realm of subatomic particles and realised that matter takes on probabilistic states – different possible features in different conditions. The field of quantum physics emerged to explore and understand that phenomena. Quantum computing uses quantum physics to solve problems beyond the capabilities of classical computers.

The power of quantum computing rests on two cornerstones of quantum mechanics: interference and entanglement. The principle of interference allows a quantum computer to cancel unwanted solutions and enhance correct solutions. Entanglement means the combined state of the qubits contains more information than the qubits do independently. These two principles have no classical analogy and modeling them on a classical computer would require massive resources. For

example, representing the full complexity of a 100-qubit quantum computer would require more classical bits than there are atoms on earth.

The building blocks of quantum computing are already emerging. IBM is running quantum computing systems on the cloud at an unprecedented scale, compilers and algorithms are rapidly advancing and communities of quantum-proficient talent are growing. The technology's applicability is no longer a theory, but a reality to be understood, strategised about and planned for.

The implications of quantum computing for businesses and governments are colossal. Much of our information is stored and protected by encryptions that, though highly resilient to conventional cyber-attack, will offer little protection against an attack by a quantum computer. There are opportunities as well as threats, however. The immense processing power quantum computing offers could yield remarkable results, offering new tools for analysis of data, which could revolutionise how portfolio management and risk analysis operations are performed.

Quantum computing will not replace classical computing; it will extend and complement it. But even for the problems that quantum computers can solve better, we will still need classical computers. Because data input and output will continue to be classical, quantum computers and quantum programmes will require a combination of classical and quantum processing.

IBM Quantum is continuing to push forward its technology roadmap to realise quantum computing and quantum-centric supercomputing. These advances will bring useful quantum computing to the world – and help solve some of the most pressing challenges humanity faces. •



**BY ACCELERATING THE DISCOVERY OF SOLUTIONS TO BIG GLOBAL CHALLENGES, QUANTUM COMPUTING COULD UNLEASH POSITIVE DISRUPTIONS SIGNIFICANTLY MORE UNEXPECTED THAN TECHNOLOGY WAVES OF THE PAST DECADES.**



## DIGITAL CURRENCY WITHIN 10 YEARS

**CBDCs sooner rather than later, say central banks. By Sinan Yilmaz and Katerina Liu.**

OMFIF'S 'Future of payments' survey found that two-thirds of central bank respondents expect to issue a CBDC in the next 10 years.

Research into CBDCs has been accelerating in the past few years and several countries have already deployed their CBDC solutions, either as pilots or full-scale rollouts. These projects, though not necessarily perfect in their execution or adoption, have given watching central banks real-world projects to learn from.

Many questions remain about the form and structure CBDC designs will take but having live projects to analyse has given other central banks more confidence about their own plans. The survey also revealed that around 38% of respondents had become more inclined to issue a CBDC over the course of 2022.

### CENTRAL BANKS ARE PURSUING CBDCs FOR VARIOUS REASONS, BUT NONE CITED IMPROVING CROSS-BORDER PAYMENTS AS THE MAIN MOTIVATION

Central banks' motivations for pursuing a CBDC vary according to their environment and the challenges they face.

Most central banks selected 'other' and indicated that their aim was to increase the efficiency of their domestic payments network. Some felt that, with the widespread decline of cash, a CBDC would allow central banks to retain a role in payments networks that are increasingly dominated by private actors.

Some jurisdictions, particularly those with lower levels of financial inclusion, want to use a CBDC as a means of broadening access to financial services. Not one central bank claimed their main objective with a CBDC was to aid cross-border payments, even though these are generally slower and more costly than domestic systems.

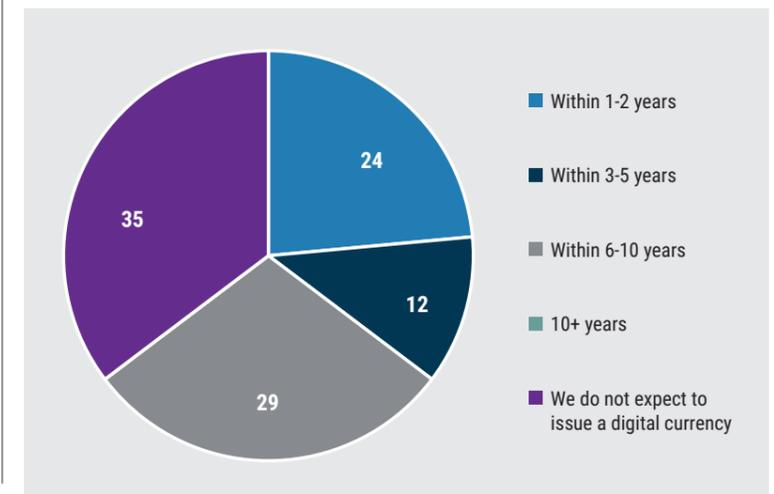
While innovation can help make tedious manual



### 1: Two-thirds of central banks expect to issue a CBDC within 10 years

When do you expect to issue a CBDC? Share of respondents, %

Source: OMFIF Future of payments survey 2022



processes more efficient, CBDCs are not necessarily the best way to address the problem. Regulatory frameworks differ between regions, as well as the requirements to gather information for anti-money laundering, know your customer and combatting terrorist financing.

**NEVERTHELESS, MANY THOUGHT THAT INTERLINKING CBDCs OFFER A PROMISING AVENUE FOR IMPROVING CROSS-BORDER PAYMENTS**

Although no central bank stated it was their main objective, many respondents said that interlinking CBDC systems is the most promising option for improving cross-border payments.

Improvements in cross-border payments have lagged behind the progress domestic markets have made. Some central banks hope that CBDCs will represent a clean slate, allowing them to build a more naturally interoperable system.

Through its innovation hubs, the Bank for International Settlements is already running several

**“ IMPROVEMENTS IN CROSS-BORDER PAYMENTS HAVE LAGGED BEHIND THE PROGRESS DOMESTIC MARKETS HAVE MADE. SOME CENTRAL BANKS HOPE THAT CBDCs WILL REPRESENT A CLEAN SLATE, ALLOWING THEM TO BUILD A MORE NATURALLY INTEROPERABLE SYSTEM.**

projects to test different methods of cross-border transfers with CBDCs. Project Jura and Project Helvetia explore settlement in wholesale CBDCs when transferring tokenised assets on distributed ledger technology. Project Dunbar and Project mBridge explore a common DLT platform for multiple CBDCs to transact on. Project Icebreaker is studying how CBDCs could be used for international retail and remittance payments.

**A RANGE OF PRIVATE SECTOR PLAYERS WILL PARTICIPATE IN CBDC**

A whole suite of new players is involved in the introduction of a CBDC. Technology providers are helping build the framework that digital cash will run on, advisory services are assisting with strategy and other third parties like marketing companies are involved in the process too, aiming to encourage public adoption.

Commercial banks are engaging with central banks on the topic of CBDCs, but the rise of fintechs and non-bank payment services providers are likely to play an important role in the distribution of a CBDC.

**ENCOURAGING ADOPTION OF CBDCs IS A PRIMARY CONCERN FOR CENTRAL BANKS, WHILE BANK DISINTERMEDIATION IS A SECONDARY CONCERN**

Central banks are expressing concerns around the adoption of CBDCs, given that some active

projects are experiencing lower levels of uptake than expected. Addressing these concerns requires central banks to educate the public about the benefits of a CBDC and to design it to be as interoperable with existing payments systems as possible.

Some are taking more dramatic steps. The Central Bank of Nigeria has imposed a limit on the value of cash withdrawals to push the adoption of its CBDC.

Commercial bank disintermediation is another main concern for central banks. The design of the CBDC is important too, since central banks must ensure that they do not deprive commercial banks of their deposits.

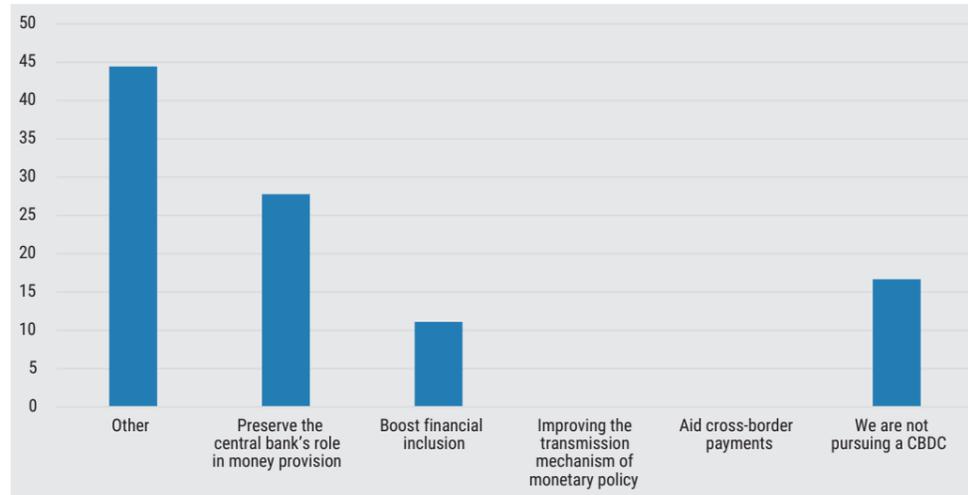
Another major concern faced by central banks is cybersecurity.

A CBDC will require many central banks to supervise or operate a complex digital system, which they will need to ensure is secure and trustworthy enough for people to use for their payments. •

**2: No strong consensus of central banks' objectives for pursuing a CBDC**

What is your main objective by pursuing a CBDC? Share of respondents, %

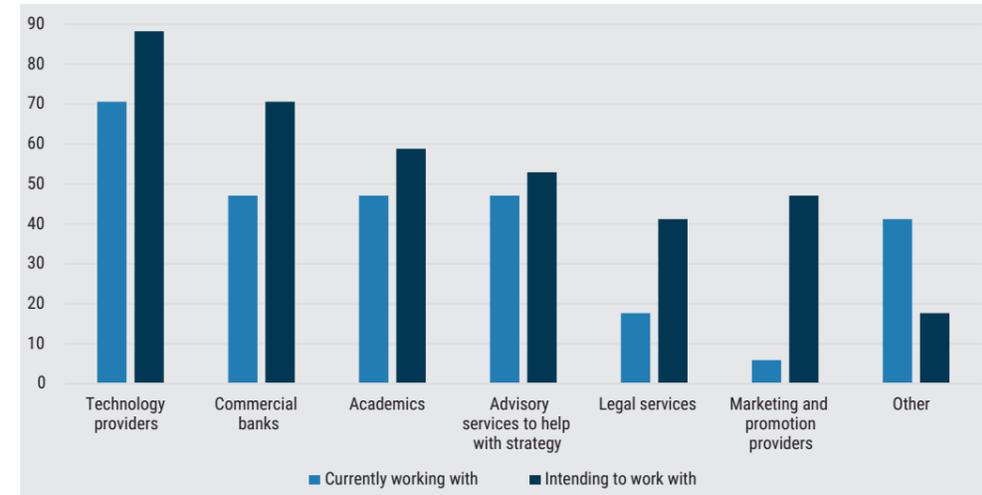
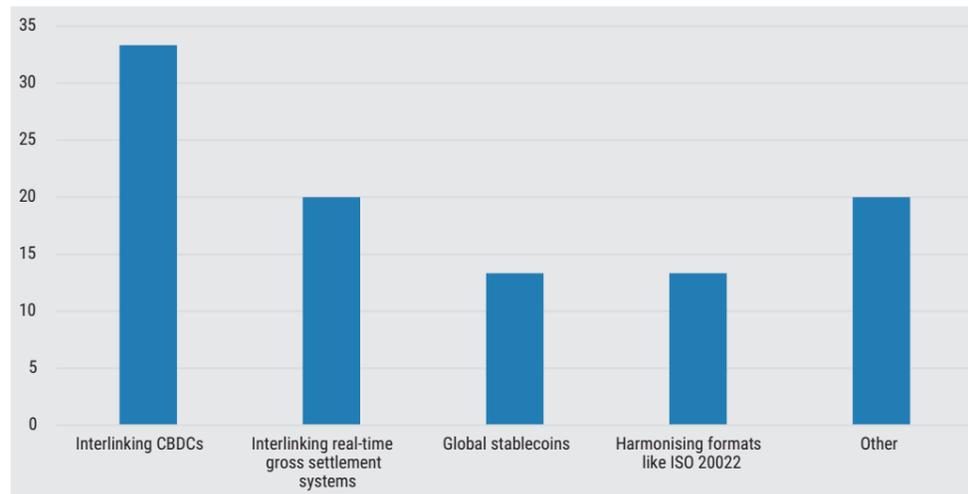
Source: OMFIF Future of payments survey 2022



**3: Interlinking CBDCs shows most promise for cross-border payments**

What do you think is the most promising avenue to improve cross-border payments? Share of respondents, %

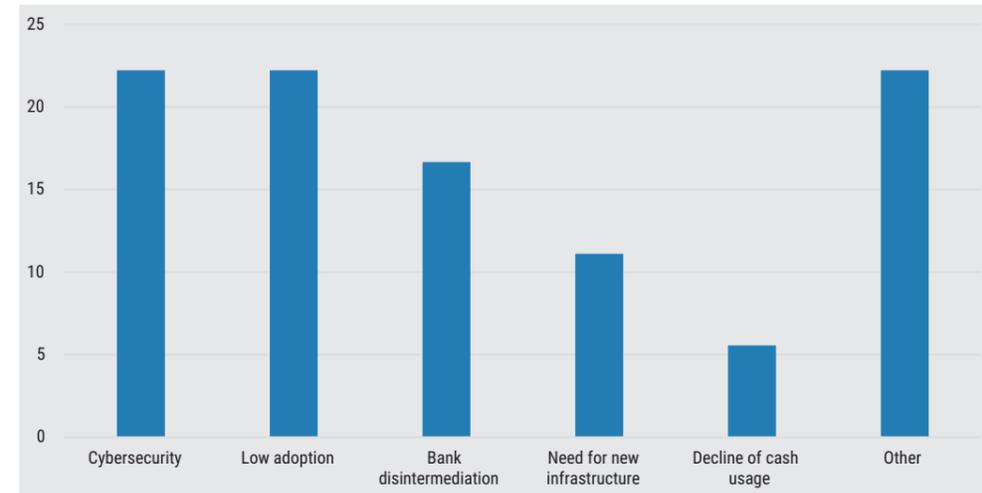
Source: OMFIF Future of Payments survey 2022



**4: Central banks are working with the full range of third-party services**

Which of the following third-parties are you currently working with/intend to work with on digital currencies? Share of respondents, %

Source: OMFIF Future of Payments survey 2022



**5: Low adoption and cybersecurity tie as primary concerns over deploying a CBDC**

What is your main concern over deploying a CBDC? Share of respondents, %

Source: OMFIF Future of payments survey 2022

## OPINION

# A YEAR IN CRYPTO: EXPERTISE AND TOOLS REQUIRED FOR THE NEW FRONTIER

**Themes surrounding restructuring, risk management and global regulations emerged in 2022. By Suzanne Morsfield, global head of accounting solutions, and Brian Whitehurst, head of regulatory affairs at Lukka.**

THE HIGHS and lows of the crypto world made 2022 seem like an eternity. Balancing the limitlessness of a new frontier that is redefining multiple industries with the accompanying turbulence similar to the wild west creates short life cycles that are not for the faint of heart. There is a renewed sense of urgency for responsible actors to have an increased impact on how the ecosystem develops, to make sure the balance does not tip too far in one direction. Lukka, having the advantage of being deeply embedded in the industry since 2014, understands not only this balance, but also the clear benefits of blockchain's innovative technology and the necessary democratisation provided through crypto, allowing it to stand at the forefront of responsible development in this new frontier.

Every global development in crypto would be difficult to cover in a year of extreme growth, changes, pull-backs and multiple scandals. However, three themes emerged that are important to the evolution of the industry.

As one regulator stated: 'It's not for governments to pick winners and losers... whether specific industries, new technologies or individual entities.' This means, even with the best corporate governance, reporting or regulations, there will always be entity failures. While restructuring is never ideal, when it does happen, effective restructuring that enables both rebuilding and creditor/investor compensation is of utmost importance. Unfortunately, crypto witnessed the restructuring process play out multiple times in 2022. But alongside these pitfalls is the opportunity for the industry to build back better. One necessity to do that is the understanding that high-quality data becomes critical not only for locating on-chain assets, but also for connecting them with off-chain transactions in order to also accurately identify and value all assets.

Difficult events highlight why the industry needs to mature its risk management perspective and shore up its approaches to middle and back office operations. These approaches include:

- Strong corporate governance with robust checks and balances.

- Audited financial statements and disclosures.
- American Institute of Certified Public Accountants SOC 2, Type II attestations for service providers.
- Clear, truthful terms and conditions.
- Segregation of customer assets from company assets.

Regulators have been eyeing crypto with a mix of support and caution for years. While many still err on the side of caution, 2022 was a progressive year for proposed legislation of the crypto industry globally. Most regions attempted to balance the necessity of strong guardrails with encouraging innovation. Others paid closer attention to taxonomy and classification.

However, a less talked about, but no less important, regulatory evolution is happening within financial reporting. US capital markets saw several key developments here, including the Financial Accounting Standards Board's new fair value measurement requirements and disclosures for crypto, and the Security and Exchange Commission's requirement for fair value estimation and disclosures about the type and amount of crypto-specific activities in certain cases. Other regions have not revised their reporting rules yet but are monitoring these developments.

A strong response to 2022's events is possible, but a full suite of relevant expertise and solutions is required, including:

- Robust reference data sets and data analysis capabilities, like Lukka Reference Data, to standardise the ecosystem.
- A digital asset classification system to improve transparency and efficiency in analysing digital assets, such as the Lukka Digital Asset Classification System.
- Asset identification and fair market valuation, like that Lukka Prime provides for actively-traded crypto assets.
- Data and information about crypto activities that support required disclosures to a very detailed level at any point in time.
- Responsibly addressing the industry's shortfalls head-on with robust data and thoughtful solutions will allow 2023 to not seem quite as long for crypto. •



## DIGITALISATION REDRAW THE LINES FOR THE PUBLIC AND PRIVATE SECTORS

**Public and private institutions are battling to defend their roles in the provision of money. By Sinan Yilmaz, account and content manager, Digital Monetary Institute, OMFIF.**

BOTH PUBLIC and private institutions are deeply involved in the provision of money, payments and capital markets infrastructure, as well as the auxiliary service of digital identity verification. But as technology changes what's possible, these roles are becoming redefined and both groups must innovate to protect their roles.

There is, of course, a collaborative element. Public organisations have a responsibility to ensure services are provided in a secure and efficient fashion. This requires them to foster a climate that allows the private sector to compete and innovate.

However, the arrival of new technologies is prompting such rapid innovation that the lines between private and public responsibilities are being blurred.

If the public sector fails to keep up with the pace of innovation, private companies will dominate and squeeze it out, reducing its ability to oversee and shape the economy to protect businesses and individuals.

Private sector companies are always under pressure to innovate faster than the competition or lose market share, but if the public sector overtakes



them as the source of innovation, they may find the services they wish to sell being provided as public goods.

Payments is a key battleground. Given the reduction in the use of cash, central banks have been looking into creating a digital representation of fiat currency to preserve their role in the payments industry. Central bank digital currency implementation, pilots and research projects are underway around the world. Close to 100 central banks have confirmed they are exploring the technology and 126 central banks attended the Digital Monetary Institute's annual central banks and digital currencies symposium in 2022. OMFIF's survey of central banks included in 2022's 'Future of payments' report also found that two-thirds of respondents expect to issue a CBDC within 10 years with many planning launches much sooner.

Given the ease with which most people in advanced economies can send money and make payments, it is tempting to ask why a CBDC is worth developing.

The motivations central banks described in the FoP survey varied broadly. Many cited a desire to ensure they retain a role in a world of increasingly digitalised payments, ensuring their sovereignty and giving them the opportunity to oversee financial activity. Others suggested that they would be able to improve efficiency in payments – something easier to achieve in countries with a less well-established mobile or digital payments infrastructure. Still others highlighted a CBDC as a means of improving financial inclusion, broadening access to digital payments.



Interestingly, no central bank suggested that improving cross-border payments was the primary objective, although some respondents to a separate question said that they thought it might prove to be a secondary benefit. The Bank for International Settlements is among several institutions working on realising this promise with its multi-CBDC pilot, mBridge, which aims to develop a platform for cross-border payments with CBDCs.

Fintechs and commercial banks aren't content to let the public sector dominate innovation in payments. Private institutions are finding cutting-edge methods of moving money to bring down costs, time and risks. Some are focusing on tokenising deposits or creating tokens to facilitate the efficient transfer of cash internally. The industry is doing all it can to stay one step ahead of central banks as they continue their efforts with CBDCs.

Outside of the traditional banking sector, some organisations are utilising the improvements in clarity on the regulation of stablecoins to

“

**MANY CENTRAL BANKS LACK THE TECHNICAL EXPERTISE TO DEVELOP AND MAINTAIN A CBDC, WHILE THE PRIVATE SECTOR PAYMENTS INDUSTRY KNOWS THAT WITHOUT THE APPROVAL OF REGULATORS, THEIR INNOVATIONS WILL COUNT FOR LITTLE.**

## OPINION

# CENTRAL BANKS MUST PUSH FORWARD EXPLORATION OF CBDC USE CASES

**Political considerations hamper monetary authorities from pushing digital currency research forward. By Chris Ostrowski, chief executive officer and co-founder, Sovereign Official Digital Association.**

THE MOST exhausting aspect of central bank digital currency discussions is the sheer range of policy issues at stake. When envisioning how multiple public money tokens (CBDCs or regulated stablecoins) will co-exist on distributed ledgers in the future, almost every key public policy area is impacted.

Privacy, anonymity, cybersecurity, monetary policy transmission, social policy, the role of the world's premier reserve currency, sanctions, national security, digital identity, banking regulation, cost of payments, big data and big tech monopolies are all impacted by the design choices and the implementation mechanism used to create a potential CBDC.

It is no wonder that many central banks seek refuge in setting up industry and research groups, issuing calls for evidence and publishing discussion papers, rather than actually running a full pilot. Even running a pilot, never mind launching a CBDC, comes with the types of political risks and exposure that central banks are hard-wired to avoid.

There is, however, no amount of research or industry analysis that can act as a substitute for the type of stress testing needed to identify how this new form of money will operate in a new digital habitat. This is not so much about choosing a particular type of technology. It is more about identifying and evaluating the new and specific use cases which may come with public digital money in token form.

Central banks are increasingly looking towards use case analysis when considering policy issues around CBDCs. They ask what practical benefits public digital money will bring to the lives of citizens. To answer this question, there needs to be a set of measurable, real-life use cases that central banks – and other CBDC actors – can roll out safely to their citizens in order to test hypotheses and drive adoption.

In emerging market and developing economy

countries, there is a clear role for token-based public money to drive financial inclusion and offer a route out of poverty for the unbanked and the underbanked. Low cost and immediate remittance payments, micro-insurance, secure savings, credit ratings and micro-credit products can all play a role in changing life outcomes for citizens in EMDE countries, in a way that cash and e-money will never be able to achieve.

In developed market countries with effective e-money and online payment systems already in place, the question is different. Here, authorities ask what a CBDC does that e-money, cash and commercial bank money can't. By deploying smart contract governance mechanisms and programmability features into the tokens themselves – or into the wallets which hold the tokens – new use cases, such as micro-payments, tokenised atomic supply chains and machine-to-machine payments, can offer a new digital experience to the end user and all economic actors, which is currently only seen with private cryptocurrencies.

Observing these use cases on safe, central bank-issued digital instruments offers a less exhausting – and more exciting – opportunity for central banks, commercial banks and other CBDC actors as they seek to make wise choices when launching or considering the launch of a CBDC. •

“

**IN EMERGING MARKET AND DEVELOPING ECONOMY COUNTRIES, THERE IS A CLEAR ROLE FOR TOKEN-BASED PUBLIC MONEY TO DRIVE FINANCIAL INCLUSION AND OFFER A ROUTE OUT OF POVERTY FOR THE UNBANKED AND THE UNDERBANKED.**



“

IF THE PUBLIC SECTOR FAILS TO KEEP UP WITH THE PACE OF INNOVATION, PRIVATE COMPANIES WILL DOMINATE AND SQUEEZE IT OUT.

offer these as payments solutions, particularly in jurisdictions with less reliable currencies and institutions. Regulatory developments on stablecoins and cryptocurrency can be viewed with the DMI's digital asset regulation tracker.

While the precise delineation of the roles of the public and private sectors remains an open question, both groups are united in a desire for innovation and improved services. Both also acknowledge that they will not achieve this without collaboration.

Many central banks lack the technical expertise to develop and maintain a CBDC, while the private sector payments industry knows that without the approval of regulators, their innovations will count for little.

Away from the payments world, efforts to innovate in capital markets intensified in 2022. The European Investment Bank developed Project Venus, issuing a fully digital native bond on a private blockchain in collaboration with two central banks and private companies. The Banque de France and Banque Centrale du Luxembourg provided a digital representation of euro-denominated central bank money, while Goldman Sachs, Santander and Société Générale acted as underwriters and provided the technology platform to create the instrument.

Though public institutions like EIB are leading the way in the creation of digital versions of traditional financial instruments, private institutions are also working on projects to make use of blockchain and tokenisation to remodel traditional finance, improve settlement speed and security and provide greater access to liquidity.

The structure of the capital markets business is inherently collaborative and, as such, efforts to

improve the market infrastructure tend to involve both the public and the private sector.

But digital innovation has not been confined to financial services. Digital identity has advanced to the point where it can function as a tool to support communities during times of crisis. Galvanised by the stresses of the pandemic and geopolitical instability, governments across the world have intensified their study of digital identity systems and services.

Ukraine introduced a digital ID that can be used anywhere in the country. The platform has given 21.7m Ukrainians access to 14 digital documents, including their ID card, driver's licence, tax number, birth certificate and a foreign biometric passport.

In the private sector, Microsoft has introduced its Entra Verified ID service through its Azure cloud platform. This decentralised system permits organisations and individuals to select the types of information they want to share, with whom and when they want it to take it back. Yoti, a digital identity verification company, has become the first government-approved digital ID in the UK for applying to jobs and renting property.

It isn't clear whether governments or the private sector have produced more innovation in 2022, but what is clear is that both groups realise that we are in a digital revolution. To preserve their roles in a changing world, they need to understand the impact that technological innovation will have on their stakeholders.

The stakes for both groups are high. However, perhaps the most valuable innovations – those that stand the best chance of providing radical improvements in their industry – stem not from competition between public and private but from collaboration. •

## OPINION

# ADOPTION OF CENTRAL BANK DIGITAL CURRENCIES WILL BOOM IN 2023

**Private technology platforms can help central banks accelerate their digital currency plans. By Mary Hall, global product marketing lead for CBDCs, Ripple.**

AS 2023 begins, the future of central bank digital currencies is accelerating. CBDCs offer reliable sources of digital currency for consumers, businesses and governments.

Although privacy and fear of government overreach continue to be debated, the regulation and adoption of CBDCs and stablecoins continue to pick up pace.

Since the Covid-19 pandemic, the world is becoming increasingly digital. The past 18 months have seen many citizens use mobile phones and digital wallets to carry out financial transactions. Blockchain-based CBDC solutions allow for integration with mobile apps, enabling greater financial inclusion for citizens, while simultaneously eliminating third-party banking fees. Current developments demonstrate that many of the world's largest central banks are moving forwards with plans to pilot and launch their own digital currencies to complement existing fiat currencies.

The Banco Central do Brasil is readying plans to launch a CBDC in 2024. The Reserve Bank of Australia has issued a whitepaper and lengthy request for proposals to explore the options for issuing digital currencies (stablecoins and CBDCs). The Bank of England recently sought applications to help develop a £200,000 CBDC wallet prototype. This work is the precursor to developing a CBDC pilot, or a digital pound. The Banque de France and the Banque Centrale du Luxembourg have announced they are working together on an experimental CBDC initiative.

These facts demonstrate that the time is now for the advent of digital currencies backed by central banks. Because CBDCs can be managed,

monitored, controlled and redeemed as needed by central banks, the implementation of these digital assets merits pilots and testing to establish trust and reliability.

Ripple's new CBDC private ledger and digital currency solutions offer a comprehensive platform for minting, managing, transacting and redeeming CBDCs that meets the high security standards of central banks. Ripple is currently engaged in CBDC and stablecoin pilots with the Republic of Palau and the Royal Monetary Authority of Bhutan.

With strong technology like Ripple's in place for central banks to launch their own CBDC, it's expected that in 2023 there will be greater adoption of digital currencies. The transformation from fiat to digital currencies offers the promise of lower costs for basic financial services, increased security, accelerated payments and reduced energy consumption. When you consider these factors, as well as the audit trail that blockchain provides for tracking and tracing transactions, it's easy to see why CBDCs are moving from vision to reality. •

“

BECAUSE CBDCS CAN BE MANAGED, MONITORED, CONTROLLED AND REDEEMED AS NEEDED BY CENTRAL BANKS, THE IMPLEMENTATION OF THESE DIGITAL ASSETS MERITS PILOTS AND TESTING TO ESTABLISH TRUST AND RELIABILITY.

## OPINION

# INTEROPERABILITY AT CORE OF WORK ON NEPAL'S CBDC

**ISO 20022 does not ensure consistent interoperability between different online systems. By Koji Fusa, chief executive officer of GVE.**

NEPAL and the Japan International Co-operation Agency executed the memorandum of understanding for the instant payment digital platform project in June 2022. By August, the Nepal Rastra Bank published 'Central bank digital currency: identifying appropriate policy goals and design for Nepal', its report looking into CBDCs. It outlined 10 policy goals the central bank wants to achieve via the introduction of a CBDC.

In October 2022, GVE was appointed to advise on the feasibility study of the instant payments digital platform, equivalent to a CBDC in the widest sense.

Visiting Nepal at the end of 2022, GVE met with key stakeholders, including the new prime minister, major government officials, the cybersecurity bureau of the police, department of money laundering investigation of the office of the prime minister and council of ministers, the telecommunication authority, the telco operator and commercial banks.

GVE's team was able to advise governmental officials on two key developments. First, the creation of ISO/IEC 24643, which complements the ISO 20022. Second, an April 2022 patent for an alternative to the public key infrastructure in Japan, filed under the patent co-operation treaty.

ISO 20022 is not enough to ensure the interoperability of different online systems, as pointed out by the G20. ISO/IEC 24643 was created to fix this and ensure the interoperability of 24/7 online systems to maintain high levels of security. By adopting ISO/IEC 24643, hacking and phishing of credit

card companies or Swift can be prevented, as all users and beneficiaries have to go through know-your-customer processes before they use the system. ISO/IEC 24643 also encourages users of the payments system to take modular-based approaches, so that the users can avoid the vendor lock-in.

The G20 also pointed out the existing cross-border payments systems are expensive, slow and opaque. GVE's CBDC architecture is designed not only to be used by central banks, but also by commercial banks and non-bank financial institutions, at minimal costs. In this way, the CBDC platform is able to replace certain cross-border services as it would reduce energy and server upkeep costs.

The National Institute of Standards and Technology pointed out in 2016 that the current PKI would become obsolete once quantum computing took off. GVE has applied for a patent for an alternative to the PKI. This very wide patent was established in Japan in April 2022. This is a testament to the continuing innovativeness of a team which created the world's first mobile payment service in 2004 and near field communication for contactless cards in 1997. •



**GVE'S CBDC ARCHITECTURE IS DESIGNED NOT ONLY TO BE USED BY CENTRAL BANKS, BUT ALSO BY COMMERCIAL BANKS AND NON-BANK FINANCIAL INSTITUTIONS, AT MINIMAL COSTS.**



# FINANCIAL INSTITUTIONS ARE CAUTIOUSLY WADING INTO DIGITAL ASSETS

**Economies increasingly welcoming digital strategies into their financial system. By Julian Jacobs, economist, OMFIF.**

LAST YEAR will be remembered as one of reckoning for digital assets. After years of slushy and speculative asset price growth and the spread of numerous junk cryptocurrencies, with at best dubious value, the rapid collapse of the crypto world is something many economists had expected for a long time. Yet, amid such dynamics is also an opportunity for the best innovations in cryptocurrencies and digital assets to distinguish themselves.

This was a key story in OMFIF's 2022 reports, which showed that financial institutions have been reconciling a general wariness of many products in the digital asset space alongside a clear recognition

of the benefits of digital assets for their goals, including stamping out illicit markets, improved financial inclusion and introducing more efficient payments systems. Such benefits appeared to be particularly pronounced among developing countries.

As revealed in OMFIF's Global Public Investor 2022 report, central bank reserve managers were averse to wading into digital asset classes in their portfolio investment. However, in our 'Digital assets', 'Future of payments' and 'Absa Africa Financial Markets Index' reports, survey respondents and interviewees expressed optimism about the potential for digital assets to improve the



## OPINION

# WHAT EMERGING MARKETS TEACH US ABOUT CBDC INNOVATION

**Adoption is being driven by countries with less developed financial ecosystems, highlighting the benefits of digital currency. By Wolfram Seidemann, chief executive officer, Giesecke+Devrient Currency Technology.**

DESPITE challenging global market conditions in 2022, the digital world has continued to evolve. Forecast to become a \$13tn business by 2030, the metaverse economy offers a growing range of revenue streams, while e-commerce and internet of things payment markets are also projected to thrive. Alongside these developments, central bank digital currencies enable banks and non-banks alike to build inclusive and pioneering digital schemes, products and services, bridging the gap between cash and the digital world.

Emerging markets like Ghana and Eswatini are ahead in unlocking this value of CBDCs, leading the way in digital payment innovation. Developed markets can benefit from the pioneers' learnings. This should give them the confidence to take their own bold steps towards digital public money, following the lead of emerging markets by developing a whole new infrastructure for economic growth.

CBDC adoption is being powered by countries with less developed financial infrastructures or less competitive consumer choice. However, another shared characteristic sets these emerging markets apart – a keen awareness of the need to innovate.

As a digital form of cash, CBDCs bring benefits including convenience, security and cost effectiveness. They also spur digital innovation by offering network effects. This is vital for creating effective competition and efficiency through interoperable payments platforms.

Emerging markets are seizing these opportunities to innovate and keep pace with the changes in digital finance. For example, Giesecke+Devrient carried out a successful CBDC pilot with the Bank of Ghana, where swift integration of financial intermediaries is enabling the frictionless flow of CBDC between mobile money and bank accounts. This project highlights the benefits of interoperability in supporting seamless user experiences and new business opportunities.

Ghana is now set to use the insights and feedback from the trial to support wider rollout plans.

In introducing a CBDC, strong public-private collaboration is key to the success. After all, central banks do not have to and do not want to compete with private financial entities. A CBDC ecosystem should be created by distributing roles between the public and private sector.

The public sector engages only if there is a gap to fill.

While the central bank provides the open infrastructure, the private sector innovates on the platform and interacts with consumers and merchants. This is why early stakeholder engagement matters: financial intermediaries are crucial to on-boarding, distribution and wide-scale adoption.

Countries like Ghana and Eswatini aim to build diverse ecosystems, where the core infrastructure is provided by the central bank and customer-facing services and products are developed by private players. Such public-private partnerships create trust in the currency and convenience of innovative financial services.

Everyone should have access to convenient, secure digital payments and other financial services. CBDC has the potential to make this a reality. It is a digital version of physical cash – a ubiquitous and fully inclusive financial instrument that people can use independently from the issuer.

For the 1.4bn unbanked adults globally, as well as 'unbanked' children who form the next generation, CBDCs promote participation in the digital economy. This should also inspire developed nations to leverage offline functionality, where a bank account is not needed, and introduce a digital form of public currency that is simple, resilient and universally accepted. CBDCs could ease life for many people by offering a cheaper way for cross-border payments for migrant workers or enabling digital payments for small merchants like rural market vendors.

With the potential to shape tomorrow's digital economy, a collaborative CBDC ecosystem will deliver fast adoption and strong growth opportunities. It's hard to imagine all future use cases for a CBDC and the new business models it could bring, but by providing a trusted and solid infrastructure with public interest at heart, CBDCs could serve as a platform for innovation that's safe and accessible for everyone. It will provide added value to societies, serving as a driver for future innovation and inclusion across the globe.

A world with CBDCs is drawing near. Emerging market economies are forging the path towards a reimagined digital economy. To become participants, developed countries should not ask what problems CBDCs could solve, but see the opportunities they bring. •

## “

**AS REVEALED IN OMFIF'S GLOBAL PUBLIC INVESTOR 2022 REPORT, CENTRAL BANK RESERVES MANAGERS WERE AVERSE TO WADING INTO DIGITAL ASSET CLASSES IN THEIR PORTFOLIO INVESTMENT.**

mainstream financial system, including through a central bank digital currency.

The 'Digital assets' report focused on how countries and regulatory systems are reckoning with the broad issues around cryptocurrency regulation and implementation. This includes both the challenges of classifying digital assets for purposes of taxation as well as the know-your-customer and anti-money laundering regulations necessary to ensure the security and value of these products. OMFIF also produced a digital asset regulation tracker, which underscores the rules, guidelines and regulatory developments in major global economies. The results suggest a continued tentativeness in delivering a tailored digital asset regulatory system, though regulatory regimes are becoming more and more elaborate. It will be updated on a quarterly basis.

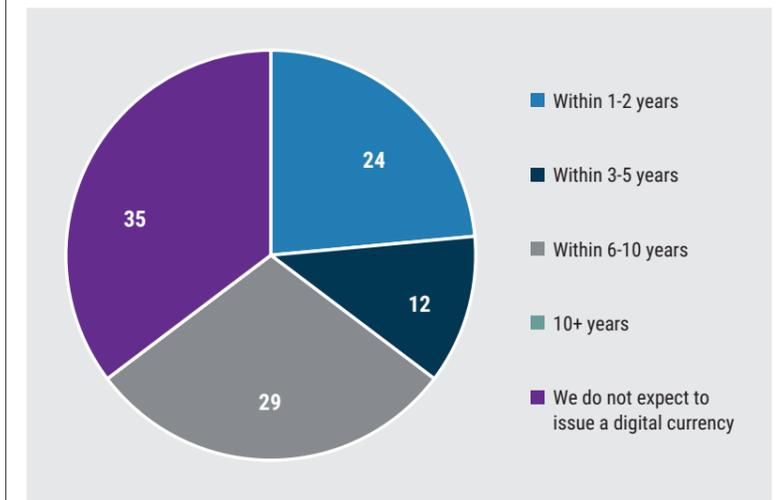
A key area of growing development, however, is in the space of CBDCs, particularly in developing countries – the Bahamas, Nigeria and eastern Caribbean states have already implemented a CBDC, and there is growing interest in implementing others. The 'Future of payments' report noted central banks were increasingly shifting towards exploring a CBDC. Most respondents indicated that they expected to issue a CBDC currency – either in a pilot or diffuse form – within the next 10 years. Last year we noted developments in digital assets and financial technology beyond cryptocurrency and CBDCs. Our work in the AFMI report underscores some of the other digital tools countries are deploying to

## “

**A KEY AREA OF GROWING DEVELOPMENT, HOWEVER, IS IN THE SPACE OF CBDCs, PARTICULARLY IN DEVELOPING COUNTRIES – THE BAHAMAS, NIGERIA AND EASTERN CARIBBEAN STATES HAVE ALREADY IMPLEMENTED A CBDC, AND THERE IS GROWING INTEREST IN IMPLEMENTING OTHERS.**

## 1: Two-thirds of central banks expect to issue a CBDC within 10 years

When do you expect to issue a CBDC? Share of respondents, %



Source: OMFIF Future of payments survey 2022

strengthen and digitalise their financial systems. This includes the Lusaka Securities Exchange's unveiling of a digital platform to provide financing to Zambian small- and medium-sized enterprises. Moreover, Cameroon's government implemented a National Digital Payment Switch in order to connect digital service providers.

Looking ahead to the rest of 2023, these trends are expected to continue. As a growing number of countries wrestle with regulations for digital assets, economies are increasingly welcoming digital strategies into their financial system. This includes CBDCs and extends to other digital financial tools and payments systems. In other words, our results suggest that the crypto crash may be precipitating a medium-term boom in other digital asset activity. We may see the start of this in 2023. •



## OPINION

# TECHNOLOGY CAN SOLVE SPLIT BETWEEN CBDC PRIVACY AND COMPLIANCE

**Consumers want digital cash to be private, while authorities require oversight. Pre-programmed governance can bridge this gap. By David Dab, national technology officer, public sector, Belgium, and Aadharsh Kannan, principal applied scientist, office of the chief economist, Microsoft.**

WITH AN INCREASING number of central banks looking to pilot central bank digital currencies (especially retail), tensions around financial privacy and legal compliance are re-emerging. Consumers and citizens want CBDCs to provide a high degree of privacy, if not full anonymity. Law enforcement and oversight authorities, however, want to prevent illicit actors from leveraging anonymous payments. This tension is not new. For traditional payments and stores of value, public authorities have devised consumer identity-based regulations and legal frameworks for addressing compliance issues. Over time, for those involved in illicit activities, this has tightened access to the digital financial system.

With the potential disappearance of physical cash, privacy-conscious consumers will want to retain the option to make legitimate anonymous transactions. Simultaneously, cash going digital could provide an opportunity for criminals if transactions and balances are anonymous, including lower costs, higher speed and potential programmability.

Naturally, law enforcement authorities wish to access CBDC transaction and balance histories, potentially delegating controls such as know your customer and anti-money laundering screening to financial intermediates. However, access to private information by public authorities must be restricted to legitimate uses and not be misappropriated for mass surveillance.

The two parties, consumers and law enforcement, agree that there are legitimate interests but do not trust that the other party will behave within the proper boundaries. The public realises that access to private information to combat serious crimes is acceptable if it is done with proportionality and minimal impact on privacy. Authorities have little interest in knowing specifics of transactions done within the bounds of law. Unlike traditional systems, it is hard to agree on a trusted third party for CBDC systems because some of the parties involved have supreme powers.

Modern cryptography provides an escape from this conundrum. Software can become the technological equivalent of a trusted third party, offering

cryptographically verifiable proofs to the two parties.

One way to implement this is to leverage confidential computing, where computers process data in a secure enclave. Data is always encrypted outside of the enclave and inaccessible when processed in it. Code running within the enclave is tamper proof and verifiable by both parties. In a CBDC system, the code will accept payment instructions with a verifiable identification, check availability of funds and transfer funds – without revealing the ID or transaction details.

In addition, the verifiable code would also perform AML and fraud detection checks. This maintains anonymity (stricter than pseudonymity) until a transaction is flagged as suspicious by the programmed rules. For audits of a single individual, the same system can enforce all necessary legal procedures before selectively revealing relevant CBDC transactions.

Even in the unlikely case of a breach leading to physical access to computers running such a system, cryptographic controls guarantee the integrity of data and code. This reduces the reliance on the integrity of the operator. Also, the governance of the suspicion rules can be distributed and dictated by multiple stakeholders, such as between central bank, law enforcement, advisory institutions and non-profits representing the public interest. Governance itself can be viewed as a rule enforced by code making it cryptographically impossible to tamper with its requirements (such as quorums). Confidential computing is a mature technology. All building blocks required to develop privacy preserving CBDC are available and prevalent.

A CBDC system that preserves privacy and ensures compliance, and mirrors, if not enhances, cash, is not constrained by technology. Programmed governance of privacy and compliance represents a shift in digital public infrastructure. CBDC systems are no exception. They may require a multi-stakeholder conversation among law enforcement, monetary authorities and defenders of data and privacy protection. After which technologies can be trusted to provide both CBDC financial privacy and compliance. •

## OMFIF Digital Monetary Institute FORTHCOMING MEETING

Virtual roundtable  
Tuesday, 14 February, 15:00-16:00 (UK)

REGISTER  
NOW



# PAYMENTS IN THE METAVERSE

The phenomenon of decentralised transaction networks that began with bitcoin is gradually developing into an architecture for the secure and efficient exchange of a whole range of digital assets, including cryptocurrencies, representations of fiat currencies and non-fungible tokens representing ownership of digital or real-world assets. Richard Clarkson, chief revenue officer at Payoneer, and Ronit Ghose, head of banking, fintech and digital assets at Citi, join OMFIF to discuss the possibilities the metaverse brings, what technical features must be developed to deliver these possibilities and the legal architecture required for transactions in the metaverse to be safe and legally supported. They examine the next steps for building the metaverse landscape, key innovation opportunities and challenges for stakeholders and the comparative utility of metaverse models.

Speakers:

**Robert Clarkson**, Chief Revenue Officer, Payoneer

**Ronit Ghose**, Global Head, Future of Finance, Citi Global Insights

**Register now**

## OPINION

# SMART REGULATION NEEDED TO REBUILD TRUST IN CRYPTO

**The rapid growth of cryptoassets makes a strong case for significant regulatory attention. By Rana Kortam, director, global public policy, Binance.**

THE CRYPTO industry had a historic 2022. Between macroeconomic headwinds, a bear market, insolvencies of major exchanges and providers (such as FTX and BlockFi), which were preceded by the staggering collapse of stablecoin TerraUSD, the global crypto market capitalisation fell to \$858bn in early December from highs of \$3tn.

It's easy to lose sight of the big picture on the back of a year punctuated by so many challenges. Around 10% of people around the world own digital assets. Crypto and blockchain technologies have proven their value in addressing real-world challenges for millions in financial services and beyond.

Growth in blockchain technology is also set to become a core differentiator for economies and a key measure of international competitiveness in the next decade for attracting foreign direct investment, cultivating innovation and creating jobs. Investor appetite and sentiment around the technology's potential clearly substantiate that vision. The top 10 global crypto and blockchain venture capital funds raised over \$12.5bn in 2022, making it a record-breaking year for fundraising activity in the industry despite a noticeable dip in the second half of the year. The dip follows a resilient first half and mirrors the more significant and persistent year-long retreats in other sectors that were instigated by the broader macroeconomic and geopolitical environment.

Crypto appears to be at a regulatory tipping point in many places around the world. Governance, consumer protection and security remain the top concerns, understandably accentuated by recent events and/or lingering misconceptions around the technology.

Financial stability and integrity are also top of mind for regulators. Although cryptoassets account for only a small portion of global financial system assets, with a total market capitalisation of under \$1tn in June 2022, their rapid growth makes a strong case for significant regulatory attention.

At this important juncture, the right balance is crucial to allow for responsible innovation and growth. A digital assets regulatory framework should:

- Maximise user protection and successfully eliminate bad actors
- Favour simpler technologies that deliver tangible

solutions to the most pressing needs

- Provide clarity and avoid duplication or conflict with other regulations
- Adopt a proportionate and risk-based approach as the industry and technology continue to mature
- Create a level playing field to enable world-changing innovation.

The backdrop of challenges and rapid growth arguably made 2022 the busiest year to date for crypto policy-making, accelerating the need for regulatory clarity to protect consumers. The industry saw a flurry of global regulatory and legislative developments as well as standard-setting activity and industry action.

In terms of regulations, the European Union published its Markets in Crypto-Assets regulation, the first and most comprehensive digital assets regulatory framework to date - although it doesn't enter into force for another year. In the US, the work put in motion by the March White House executive order resulted in the US's first ever comprehensive framework. The UAE, Saudi Arabia, Bahrain and, most recently, Brazil have also introduced crypto regulations.

Moreover, a lot of guidance has been put forth by global standard-setting bodies on different areas, such as the Financial Stability Board's framework, International Organization of Securities Commissions' roadmap, Financial Action Task Force's guidelines for virtual assets and the Basel Committee's recommendations. In 2023, there will be a lot of swift movement by countries to implement these proposals. There will also be a lot of focus on areas that were left out of scope in MiCA and other frameworks, such as decentralised finance, non-fungible tokens and others.

Exchanges around the world have also been proactive and quick to launch their own voluntary initiatives to reassure consumers, increase transparency and (re)build trust in the ecosystem. Examples include publishing wallet addresses, proof of reserves and launching recovery funds.

With proper guardrails in place, Web3 can improve the lives of millions of people by transforming financial services and beyond - but only smart regulations and serious industry efforts can (re)build the trust needed to make it happen. •

# CENTRAL BANKS & DIGITAL CURRENCIES

GLOBAL ANNUAL DMI SYMPOSIUM  
LONDON 10-11 MAY 2023

On 10-11 May 2023, the DMI symposium returns to examine the distribution and use cases of both retail and wholesale central bank digital currencies, tokenised assets, deposits and capital markets, cross-border payments and domestic interoperability. Speakers will explore regulatory framework harmonisation, cybersecurity considerations and the future of money in the metaverse.

Register now

Visit [here](#) for an overview of the 2022 DMI symposium

## OPINION

# EXPLORING INSTITUTIONAL DECENTRALISED FINANCE

**Combining the power of decentralised finance with appropriate safeguards can unlock value. By Larissa de Lima, senior fellow, Jason Ekberg, partner and head of corporate and institutional banking, Michael Ho, partner, and Teddy Hung, engagement manager at Oliver Wyman.**

FROM THE carrier pigeon to the telegraph, the transistor to the mainframe, technological change has always shaped the finance industry. Decentralised finance, which uses blockchain-based smart contracts to automatically execute a variety of financial transactions without human intervention, has the potential to be the next great transformation.

DeFi already enables peer-to-peer markets in the cryptoasset industry for borrowing and lending, as well as decentralised exchanges for trading cryptocurrencies and non-fungible tokens. Those largely unregulated markets have attracted billions of dollars in investor money, but they've also experienced high volatility, sudden business failures and frequent thefts by hackers.

To break into the mainstream, DeFi needs to incorporate the same, or higher, levels of security standards and safeguards that have been developed over decades in the finance industry. The collapse of FTX vividly underscores the point, even if it was a centralised exchange.

The time is ripe for institutional DeFi, a system that combines the power and efficiency of DeFi software protocols with a level of protections and controls that regulators demand and customers expect. These include identity solutions to enable financial institutions to comply with anti-money laundering and know-your-customer regulations, strong cybersecurity to minimise the threat of hacking incidents and recourse mechanisms to make investors whole if something goes wrong.

This new model and the steps financial institutions can take to prepare themselves are explored in our new paper, 'Institutional DeFi: The Next Generation of Finance?', prepared with DBS of Singapore, Onyx by JP Morgan and Japan's SBI Digital Assets Holding.

The cost savings and new business opportunities of using institutional DeFi to streamline the world's trillion-dollar markets in foreign exchange, equities, bonds and other assets could be significant for issuers and investors, as well as for financial institutions that can adapt their technology and business models.

Many firms are already creating digital

representations, or tokens, of such real-world assets to bring them onto the blockchain. The next step – showing how such tokens can be transacted using DeFi protocols on a public blockchain – has been successfully demonstrated by our partner institutions in a pilot under the Monetary Authority of Singapore's Project Guardian. It carried out foreign exchange and government bond transactions, both real and simulated, against liquidity pools of tokenised deposits and government bonds on a public blockchain network, using digital identity solutions and logic adapted from existing DeFi protocols.

More work is needed to make the leap from proof of concept to real business and to scale that business to make an impact on global markets. The industry needs to collaborate to achieve greater legal clarity around the use and holding of cryptoassets, meeting KYC and AML requirements, and recourse mechanisms in case of disputes. The industry also needs to develop incentives to encourage adoption by institutions and liquidity providers, promote common standards to verify the credentials of market participants and facilitate interoperability, and refine business and operating models to capture the efficiency benefits of DeFi protocols.

Individual firms should develop their own playbooks, starting by forming a house view on the impact of DeFi. That could range from a modest evolution of existing market structures to a complete revolution that leaves DeFi structures triumphant.

Then institutions need to decide what their ambition is, where they want to play and how much they're willing to invest – taking into account their clients' needs and capabilities. Firms also need to get themselves ready by determining the best organisational structure to fit their ambitions, choosing the right mix of in-house development and partnerships with peers and vendors, and creating a talent environment that attracts the necessary skills and fosters innovation.

There is no single right answer on any of these issues, but answers are needed. The institutional DeFi opportunity is here. The time to build the future is now. •

## OPINION

# CBDCs CAN HELP CENTRAL BANKS TAME INFLATION

**Lack of correct, timely data hinders monetary authorities in their fight against rising prices. By James Shinn, executive director, Simon Chantry, co-founder and chief information officer, and David Bahamon, digital currency strategy manager at Bitt.**

AS CENTRAL BANKS implement policy rate hikes around the globe, the risk of synchronous and mutually-reinforcing recessions is growing. The International Monetary Fund predicts that a third of world economies will enter recession in 2023. 'Soft versus hard landing' debates all stem from one issue that has plagued central banks since the beginning of this bout of inflation: data, or rather the lack of it, for central banks to analyse their respective economies, particularly the rate of inflation and the effect of policy rate hikes on the real economy. The data and policy tools enabled by central bank digital currencies provide a way to significantly reduce this risk.

When modeling the impact of policy rate hikes, the US Federal Reserve staff and its board of governors keep a close eye on indices measuring the prices of goods and services. Healthcare is increasingly prominent in the basket of important services. As explained by Omair Sharif, founder and president of Inflation Insights, in Bloomberg's Odd Lots series, the process by which healthcare prices are measured is very different from the way prices of a monthly consumer price index report are measured. Healthcare price changes are not measured the same way food or durable goods are measured via monthly surveys or store

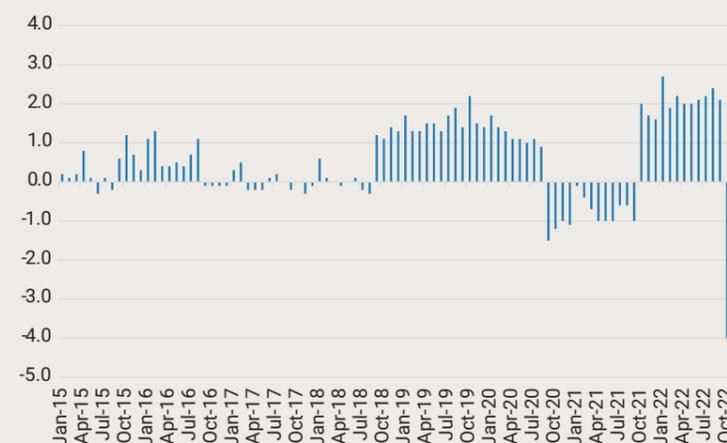
visits. Rather, the Bureau of Labor Statistics, in charge of measuring CPI in the US, measures the cost of a business to offer health insurance: if the cost of health services to businesses rises then inflation rises and premiums go up. The current way of capturing this information is via the reported annual profit margins of insurance companies, released once a year by the US National Association of Insurance Commissioners, typically in autumn. As demonstrated by Sharif, the impact this survey has on the monthly CPI reports for healthcare is extremely strong.

Many other CPI reports across the world are currently measured in this manner: asset and liability information submitted by market participants to central bank regulators is dated (multiple quarters behind), frequently incomplete and sometimes simply incorrect. Translating this torrent of information into a meaningful index of price inflation or financial risk for individual banks, and the financial system overall, involves a lot of sophisticated guesswork for central banks. Moreover, economists' attempts to statistically model the propagation of inflation effects or financial stress through the banking system are constrained by the relative infrequency of business cycle contractions and the opacity surrounding much of this information.

This flawed methodology does not need to be used: current CBDC architecture provides central bank economists and regulators with a wealth of near-real-time information on the CBDC balances of financial institutions, along with metadata which could tag which industry each CBDC is spent in, allowing real-time CPI measuring and even triangulated inflation fighting all the while maintaining robust privacy of all transactions for all users. A central bank doesn't need to wait for institutions to report its CBDC assets and liabilities; instead, central bank staff can query the CBDC balances directly.

As we fight inflation in 2023, lessons learned can be used to give central banks the tools they need to manage their economies in a better manner, rather than possibly engineering unnecessary recessions. •

**Figure 1: Irregular healthcare price measurement causes major October CPI swings**  
CPI change month to month, %



Source: Omair Sharif, Inflation Insights



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

**Official Monetary and  
Financial Institutions Forum**

181 Queen Victoria Street, London,  
EC4V 4EG

T: +44 (0)20 700 27898

[enquiries@omfif.org](mailto:enquiries@omfif.org)

**[omfif.org](http://omfif.org)**