

STATE STREET DIGITALSM

Spring 2022 Digital Digest

Separating Fact from Fiction

STATE STREET[®]

Preface

You are at a cocktail party in full swing, surrounded by a dozen vibrant, engaging, accomplished professionals. Groups of twos and threes immerse themselves in dialogue, and you do your best to join one of those conversations. But you cannot. There are too many bits of information floating around, too little connectivity to cling onto. Despite your best effort and eagerness—regardless of the application of your sharpest focus—there is no point of entry.

This is a classic example of the phenomenon known as “source separation,” handed down to us in popular parlance through the expressions, “*separate the signal from the noise*” or “*separate fact from fiction*.” In a season that saw celebrity-filled Super Bowl spots that were less about serious presentations of cryptocurrency than attempts to entice the largest audience possible to chase after next-big-thing-ism, the value of clear and plainspoken information is at the heart of today’s conversation around digital finance. It is to help make sense of that conversation—to provide you with an entry point—that we created our Digital Digest.

If our inaugural issue was about the strategic thinking behind last summer’s launch of State Street DigitalSM and sharing proprietary survey data that demonstrated the lack of education and understanding that currently exists in the space (even among sophisticated investors), our spring Digest drills down a level deeper. Our goal with this publication is to invite you to that party sketched out above and to enter into an ongoing dialogue with you. To continue to share everything we are learning in direct and discerning ways during this time of exceptional financial market volatility. To serve as the reasonable voice in the room that helps you sift through the hype. To separate the signal from the noise.

Part of that work comes in the form of addressing in forthright fashion the controversies and questions we see arising in the digital finance space. Which is why in this Digest edition you will find a range of pieces that do not shy away from some of the most challenging issues of the day.

These articles include an analysis of crypto's energy consumption problem, why digital currency might prove to be a boon for the world's billions of un- and under-banked, and whether crypto can ever truly be compatible with ESG values. . . A thoughtful investigation—with some help from Chicken Little, circa January 1, 2020—about whether cryptocurrencies might ever achieve the safe-haven asset status enjoyed by gold, the US dollar, and the Japanese yen. . . An article that describes the overlooked importance of blockchain technology as essential infrastructure to support the adoption and use of digital assets. . . A survey of the global regulatory landscape during what promises to be a watershed year of tectonic shifts and emerging clarity. . . And an examination of wholesale and retail central bank digital currencies (CBDCs), what CBDCs have in

common with state lottery systems and alcohol sales, and whether their adoption might foretell obsolescence for crypto and the current banking system.

As the digital finance space continues to move quickly, we expect to shift publication of these Digests to a quarterly cadence in order to provide you with our keenest and most up-to-date thinking. As always, thank you for partnering with us, thank you for embracing the transformational change that is occurring in our industry, and thank you for being fellow signal-seekers.



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How Safe an Asset Is Crypto? A look at early evidence

— BY MICHAEL METCALFE

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Safe haven assets have a near mythical property in financial markets. While there are plenty of fundamental narratives that explain their performance, it is sometimes unclear whether this comes before, after or even during the simple numerology of the said asset performing well during the most turbulent times. In the case of gold, this empiricism has been established over centuries. For others such as Treasuries and the Japanese yen, it has been decades.

In the space of three years the current decade has brought a global pandemic, the deepest recession in the post-war period, the biggest inflation shock in 40 years—and now war. With the benefit of hindsight we go back to the beginning of 2020 and compare how bitcoin has fared relative to more traditional safe havens. The early evidence suggests it has held up reasonably well. Then we explore what may be bitcoin's greatest challenge yet, the withdrawal of global liquidity that has sent global financial markets reeling.

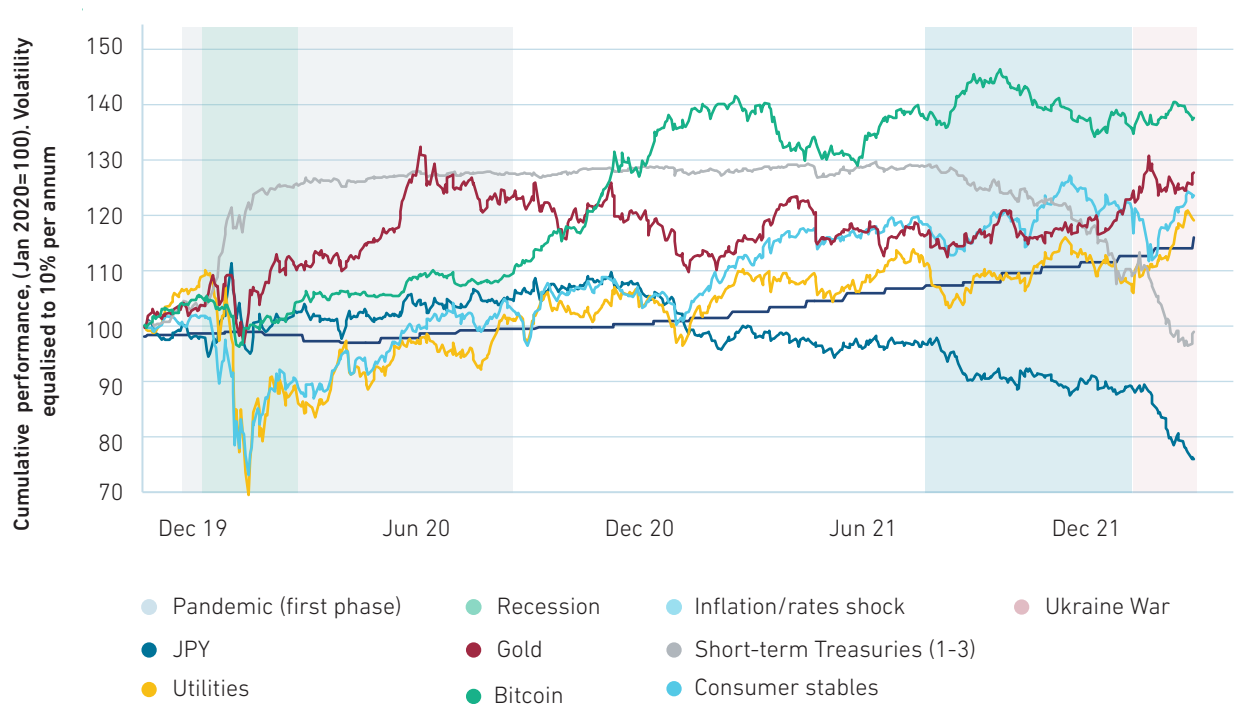
Safety guidelines

The fundamentals of what makes assets “safe” are varied and complex. In equity markets, the utility and consumer staples sectors are assumed safe because consumer demand for their products is typically inelastic to price moves (although that will be tested this year with inflation at its highest level in decades in the United States, United Kingdom, Europe and elsewhere) or changes in income.

During the recent pandemic, this took another twist with consumer mobility drastically reduced.

Companies and sectors that transacted primarily online were safe. United States Treasuries are considered safe because it is assumed the US will never default on its sovereign obligations. The Japanese yen, meanwhile, is considered safe as it is assumed during times of crisis, local investors will repatriate their holdings of foreign stocks and bonds. Gold is considered safe because it has proven to be a store of value during turbulent periods, because of its scarcity and its role in facilitating means of exchange. It is some of these later properties that can be applied to bitcoin to determine how it has acted as a store of value during turbulent times.

Figure 1: Cumulative performance of safe haven assets this decade and bitcoin



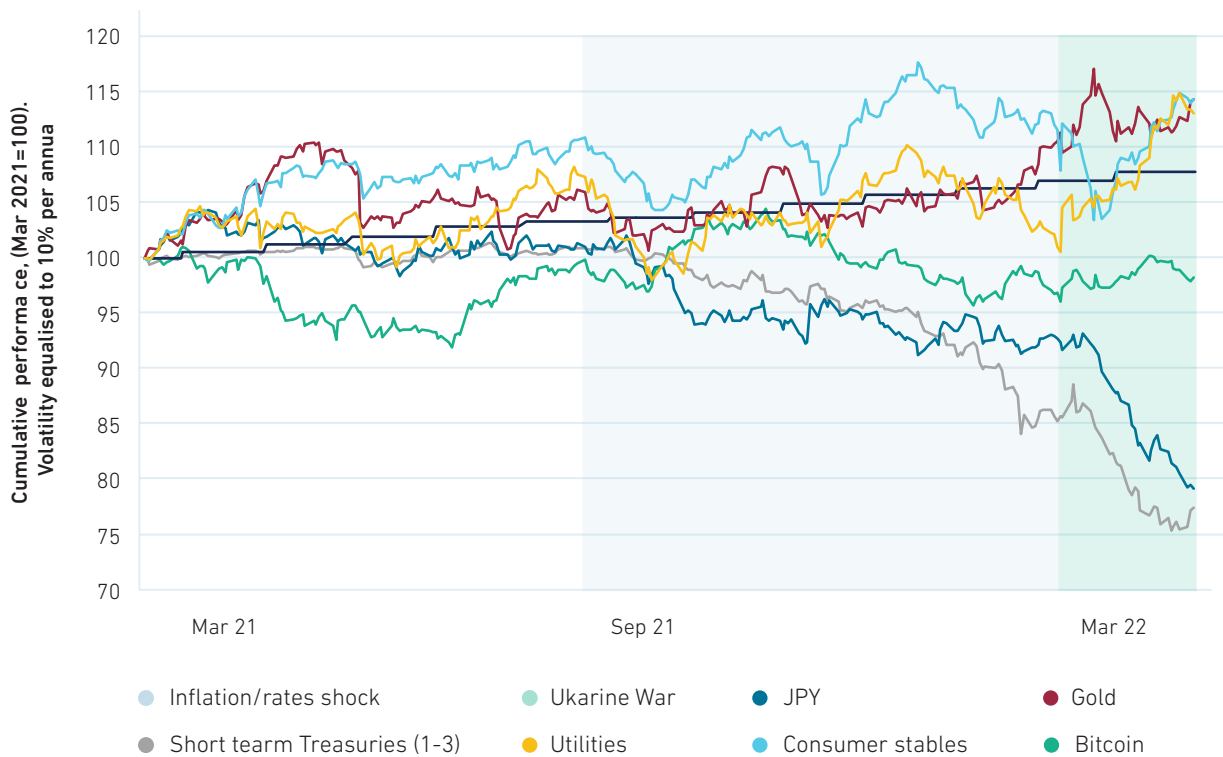
Source: Bloomberg

A look back with Chicken Little

To investigate the question of how bitcoin has performed compared to typical safe haven assets, we construct an experiment. A portfolio manager (we are calling them Chicken Little) comes into work on January 4, 2020 and decides this will be the decade where the sky really is going to fall and allocates funds to one of the potential safe havens we outlined above. To compare the assets together we scale the returns such that volatility is normalized to 10 percent per annum. So looking back at the beginning of second quarter 2022, which asset would have delivered Chicken Little the best returns?

Figure 1 shows what is initially, a surprising result. Some of the traditional safe havens have not just underperformed the 11 percent inflation seen over the period, but in absolute terms, holdings of both the Japanese yen and short-term US Treasuries are worth less today than they would have been at the beginning of 2020. Other utilities, consumer staples and gold did well as advertised, delivering cumulated nominal returns over 20 percent or an annualized real return of 2.9 percent. However, bitcoin's nominal and real return was almost double this. This is still true even after its poor performance so far in Q2, a quarter during

Figure 2: Cumulative performance of safe haven assets in the past year and bitcoin



Source: State Street Global Markets, Bloomberg

which a few of the traditional safe havens have also suffered uncharacteristic (for them!) collapses. So with perfect foresight Chicken Little should have picked bitcoin on January 1, 2020, assuming it was a simple buy and hold volatility adjusted strategy. A fact that no doubt other Chicken Littles worried about turbulent periods may well take note of in the future.

At face value this looks like a terrific result for bitcoin in spite of its current troubles. In the first three years in the most risk-prone decade in a long time, it has outperformed traditional safe haven assets on a risk adjusted basis. A healthy dose of caution, however, is required. Short-term bitcoin returns are positively correlated with equity returns, especially and unfortunately when equities fall. The end result of this experiment is also sensitive to the choice of starting point. If instead of the start of the decade Chicken Little was looking for their safe haven at the start of second quarter of 2021, the results are less impressive. As Figure 2 highlights generating returns above inflation has been a challenge; none of the traditional safe havens have beaten inflation, and some have even posted outsized losses in nominal terms. Bitcoin is, of course, included in this set, but on the all-important volatility adjusted basis, it has still done better than either the Japanese yen or short-term Treasuries.

The underperformance of these traditional safe havens, as well as the new contender, also serves to highlight an important point; crises are often different to what has gone before or at least recently. The inflation impulse created by the war in Ukraine on top of an already robust inflation trend has necessitated a dramatic response from central banks. So instead of the usual monetary

accommodation to prevent a crisis getting worse, in 2022 the crisis itself necessitated the rapid removal of accommodation; hence the underperformance of Treasuries and yield sensitive Japanese yen. The result that Figures 1 and 2 demonstrate is that not every safe haven performs well necessarily in every crisis.

So there is some consolation in this for those hoping that bitcoin could yet be a safe haven vehicle. However, it also introduces an important caveat that is often cited when considering asset market performance in the past three years; it has been dependent on abundant liquidity. Massive fiscal and monetary stimulus to save the real economy channeled excess savings into asset markets, traditional and crypto alike. Now that monetary policy is being tightened to combat inflation, what will happen to all that liquidity?

The liquidity challenge

Arguably, this liquidity removal could pose an even bigger test for bitcoin, than the crises it has weathered in the past three years. On the one hand the fact that this is a risk for crypto assets in the first place is encouraging. When a rising tide of excess savings lifts the boat of many asset markets simultaneously, the fact that crypto is included in this pool shows its emerging acceptance. However, in a world of excess savings, crypto can attract inflows without the need to sell traditional assets. That will not be the case once excess savings have been unwound. In the US, we have only seen three months where the stock of excess household savings accumulated over the pandemic has been drawn down. At the same time, we are only two interest rate moves into the Fed's

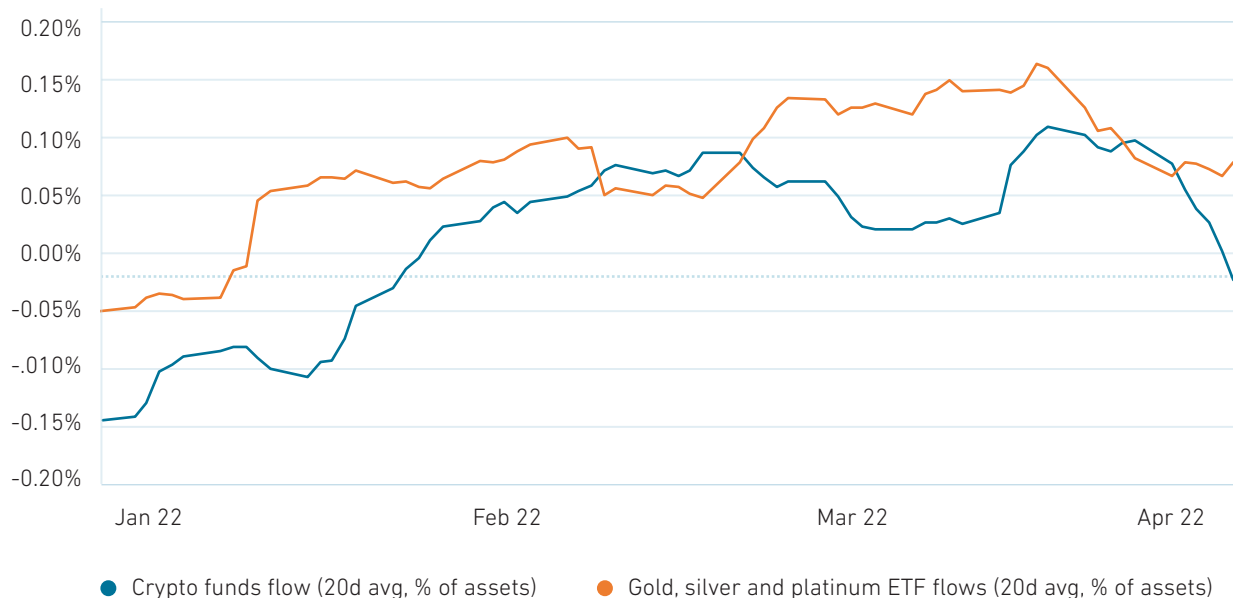
tightening cycle and quantitative tightening is about to begin. While financial markets, of course, look ahead in an attempt to discount these moves, how markets react to the reality of tightening liquidity is still highly uncertain.

Fixed income markets have dug out their old playbooks from the last surprisingly robust Fed tightening cycle in 1994/95 and have been in full panic mode for much of the year. There was no such precedent for the crypto eco-system to follow, so volatility has come more recently.

As turbulent as recent Bitcoin price action has been, what we would note so far is a relatively modest reaction from some crypto's newer investors. Although inflows into bitcoin ETFs are small compared to other avenues for gaining

exposure into crypto assets, their newness and traditional asset form has piqued the interest of new, less certain crypto investors. In February and March crypto ETFs attracted inflows of a similar scale (relative to assets under management at least) to the traditional safe havens in precious metals ETFs, up until the end of March (Figure 3). And while there have been significant outflows since then, they have (so far) only reversed the robust inflows seen the immediate aftermath of Russia's invasion of Ukraine. This is not a good outcome, but nor are the cumulative level of outflows so far this year too troubling either. Not yet at least. Whether this will still be true as US interest rates head toward 2% and beyond over the summer is a key uncertainty though and reason for continued caution.

Figure 3: ETF flows into crypto and precious metals



Source: Bloomberg

Stress tested

Safe haven assets are not created overnight. Even the most traditional assets that have built their reputations over centuries or decades can have bad crises. And, as we've seen recently, typically risky sectors like technology can perform well in times of crises. So far, as a buy and hold strategy crypto has done remarkably well in the turbulent markets of the 2020s. Time horizon, however, matters considerably to investors. Their appetite for both large gains and losses will determine what an optimal allocation to crypto should look like. Megan Czasonis, Mark Kritzman and Dave Turkington explore this in a recent [paper](#) published in the Journal of Alternative Investments. Even though bitcoin has not performed as well

as other safe haven assets in the past year, its resilience to unprecedented re-pricing of policy accommodation has been impressive.

While Bitcoin might have passed this first medium-term test, it faces an even sterner test in the short-term with the rapid withdrawal of liquidity. Bitcoin is far from alone in facing this challenge. It is simply part of the rigorous stress test the current macro environment is presenting. Thus far the modest reversal of flows into new products like Bitcoin ETFs suggests this is a test Bitcoin may yet pass. But it is still too soon to say this with much confidence. What we do know, though, is that with the passing of each test, confidence in and credibility of some crypto assets will only grow.

An ESG Assessment of Crypto

— BY RICK LACAILLE

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Cryptocurrencies get a bad reputation from environmentalists. And with good reason. According to the Cambridge Bitcoin Electricity Consumption Index, bitcoin consumes more electricity in a year than an entire country the size of Sweden, Norway or the United Arab Emirates.¹ So does that mean the environmental case against cryptocurrency is closed or are there ways to mitigate crypto's environmental impact? And what about other environmental, social and governance (ESG) priorities that investors might have. This article explores crypto's environmental impact as well as a broader range of ESG priorities.

Crypto's environmental impact remains negative for now but with potential for mitigation.

To understand crypto's environmental impact, first you have to understand the relationship between virtual currency and the physical infrastructure, and the operating inputs it requires. As a digital representation of value, cryptocurrencies use distributed systems to store and transfer ownership securely through a cryptographic process based on complex computations. Essential aspects include:

- The decentralized nature of cryptocurrency requires independent computers to agree on which transactions are legitimate to ensure accuracy. Depending on the currency's design, different algorithmic consensus mechanisms can have different levels of energy efficiency.
- Transparency about historic transactions and the wide use of omnibus accounts by crypto exchanges removes the need to record derivative ownership transfers on the blockchain (so-called on-chain activity versus off-chain). As a result, there is no full transparency available.
- Cryptocurrencies are designed to operate globally on a 24/7/365 basis, but the speed of transactions can vary, depending on the currency's design and other operational factors.

There are different methodologies to control how the network agrees to update to a blockchain ledger. These methodologies differ in terms of speed, scalability and so-called 'Byzantine fault tolerance,' in other words how resilient the network is to malicious actors and whether the interaction between participants is based on other trust mechanisms or not.

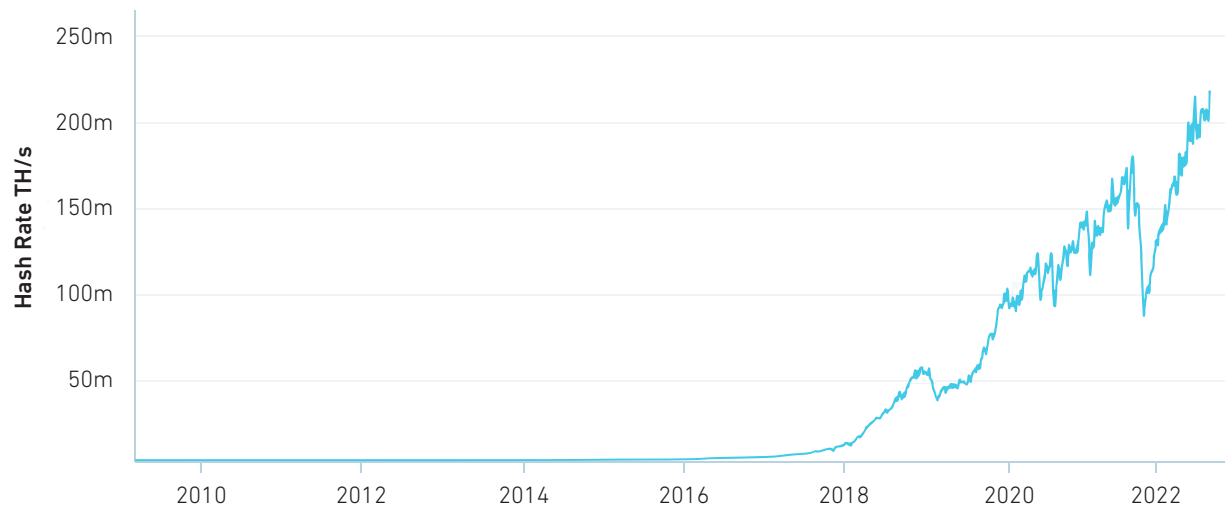
Cryptocurrencies which use so-called permissionless or trustless networks, such as bitcoin, adopted the so-called proof of work methodology (PoW) with anonymous miners. Miners, who could be anyone in any geography, compete to add a set of proposed transactions as a new block to the network by

solving a mathematical challenge whose complexity is adjusted with respect to the computer power available. This model consumes increasingly large amounts of energy especially if the cost of energy is lower than profit from this mining activity, which may be derived from the voluntary fees paid to miners and a specific network reward.

Various estimates have been made about the impact of bitcoin on the environment. For example, a group of researchers from the University of Hawaii calculated that with widespread adoption, bitcoin emissions alone could push global warming above 2°C within less than three decades.²

Figure 1: Total Hash Rate (TH/s)

The estimated number of terahashes per second the bitcoin network is performing in the last 24 hours.



Mining hashrate is a key security metric. The more hashing (computing) power in the network, the greater its security and its overall resistance to attack.

Source: www.blockchain.com

However, determining precisely how much energy is consumed by the bitcoin is difficult. Whilst many aspects of providing services related to crypto (e.g., crypto exchange and trading) have increasingly been brought into the regulatory perimeter, in most cases mining is not regulated. Miners can enter and leave this market, their identities are not clear, and neither is the efficiency of their computer hardware. Energy consumption for bitcoin is estimated based on further estimation of the computer power in the network (hashing power) and a set of assumptions about how miners operate (Figures 1 and 2).

Other cryptocurrencies have adopted a different consensus algorithm generally referred to as proof of stake (although some are hybrid models that combine proof of stake with other approaches e.g., proof of history). Proof of stake (PoS) implies that the network chooses a participant to make the next update based on the length of time and quantity a participant held the respective cryptocurrency and an element of randomness. While arguably less secure, this methodology is significantly more energy efficient and offers the higher transaction throughput and thereby operational efficiency.

Figure 2: Network Difficulty

A relative measure of how difficult it is to mine a new block for the blockchain.



A high difficulty means that it will take more computing power to mine the same number of blocks, making the network more secure against attacks. The difficulty adjustment is directly related to the total estimated mining power estimated in the Total Hash Rate (TH/s) chart.

Source: www.blockchain.com

The industry itself recognizes that cryptocurrencies like bitcoin and ethereum have an environmental problem. A campaign to switch bitcoin mining from PoW to PoS called “Change the Code Not the Climate,” estimates the move could reduce bitcoin’s carbon footprint by 99 percent. In the case of ethereum, efforts have been underway for six years to move from PoW to PoS. In theory, the move offers to cut ethereum’s greenhouse gas (GHG) emissions by almost 100 percent.³ But in practice, the switch is complex and has not been fully accomplished.

Efforts are underway in the crypto industry to make mining more sustainable by relying on renewable energy.⁴ However, current estimates of the share of renewable energy used to power bitcoin mining varies widely, making it hard to pin down. For example, CoinShares found that as of December 2021, renewables contributed under 30 percent of bitcoin mining while the Bitcoin Mining Council puts that figure closer to 60 percent. A recent [Science Direct research paper](#) found that the share of renewable energy powering Bitcoin decreased from 41.6 percent to 25.1 percent after China’s crack-down of crypto operations.⁵ Miners in China had access to renewable sources, but this was lost when mining was forced to move to countries such as the US and Kazakhstan.

The industry has also formed the Crypto Climate Accord (CCA) in 2021, to achieve net zero emissions from electricity consumption for CCA signatories by 2030 and to accelerate the adoption of and verify progress toward 100 percent renewably powered blockchains by 2025.

While it is uncertain whether bitcoin and ethereum will switch to PoS, it is clear that if cryptocurrencies are to be widely adopted, they will have to mitigate their environmental impact.

Crypto could have a significant positive social impact by promoting financial inclusion

When it comes to social impact, the case for crypto is far more positive. Cryptocurrencies can promote financial inclusion by driving innovation in financial services, like peer-to-peer micropayments, potentially providing accessibility to all (with an internet connection) and reducing costs by automating financial services at scale.

The World Bank estimates there are 1.7 billion people in the world today, or about a third of all adults, who are “unbanked,” and in some developing economies, that figure is as high as 61 percent.⁶ Without access to affordable financial services such as credit, savings, insurance and payment, those 1.7 billion are not fully able to participate in the economy and lack essential tools to grow household income and wealth.

The benefits of promoting financial inclusion are well known. The McKinsey Global Institute calculated that widespread use of digital finance could boost annual GDP of all emerging economies by US\$3.7 trillion by 2025, a 6 percent increase versus a business-as-usual scenario, and create an addition 95 million jobs across all sectors.⁷

In Nigeria, where one in three adults lack access to financial services, the government launched a CBDC pilot program in October 2021, called eNaira to promote financial inclusion. As of December 2021, 666,000 speed eNaira Wallets were created, more than 35,000 total transactions worth US\$500,000 were registered, and there are expectations that 90 percent of the population will be able to use eNaira. While a CBDC is not a cryptocurrency, it illustrates the potential of digital currencies to deliver significant economic and social benefits.

El Salvador approved a proposal to make bitcoin legal tender in June 2021. The statement from President Nayib Bukele at the time said that bitcoin was made legal tender to “bring financial inclusion, investment, tourism, innovation and economic development to El Salvador.” So far it has been difficult to assess the impact crypto is having there. In January, 2022 a government endorsed report calculated there were at least four million users (about the entire population of El Salvador) but a few months later, a report by the Chamber of Commerce and Industry of El Salvador reported that 86 percent of businesses contacted had never used bitcoin in a transaction.⁸

There are also potentially large benefits from cryptocurrencies facilitating cross-border transfers for small values at low cost as they do not require currency conversions. Companies like Bitpay are already multiplying in this space. A report by Oliver Wyman and J.P. Morgan found that digital currencies could save global

corporations over US\$100 billion a year in transaction costs when it comes to cross-border payments.⁹ And this does not take into account the benefits for small businesses or entrepreneurs to facilitate cross-border economic activity.

While there is a case for cryptocurrencies to promote greater global financial inclusion, it will take time and wider adoption before the evidence materializes. However, the developing use of digital currencies including crypto seems set to offer a naturally competitive way of reducing some of the negative aspects of the financial system for the poorest in society.

Without regulation, cryptocurrencies can introduce risk into the financial system

By design cryptocurrencies are decentralized, so there is no single body overseeing crypto strategy or direction. For many proponents, that is indeed the beauty of such systems, but this beauty might come at a wider cost. Cryptocurrencies can add risk to the financial system, including by facilitating criminality, lack of education, lack of transparency, and lack of regulation and oversight. As crypto becomes part of the investment landscape, proper risk governance will be key if it is to be widely adopted.

Cryptocurrencies can be used for nefarious purposes and ransomware. Chainalysis, a crypto analytics firm, found a massive spike in the amount of cryptocurrency ransomware attackers from over US\$412 million in 2020 compared to just US\$93 million in 2019.¹⁰

While crypto has a reputation for providing cover for illegal activity, so far those who have tried to measure the extent of illicit activity find that it may only make up a relatively small portion of total activity. According to another study by Chainalysis, the share of illicit activity to total crypto activity from 2017 to 2020 was less than one percent. In comparison, the estimates of illicit activity in the economy as a whole was on the order of two to four percent of global GDP.¹¹ However, a 2022 report by Chainalysis found that cryptocurrency-based crime was at its highest level in 2021, yet transactions involving illicit activity represented just 0.15 percent of cryptocurrency transaction volume in 2021.

Whether those figures are correct remains subject to debate. Even if they are, cryptocurrencies will retain their attractions for criminals and others wishing to hide their tracks. That implies introducing better KYC regulations, periodic reporting and potentially a framework, which includes penalties for violation of disclosure requirements. In the end, finding the right balance between the attractions of anonymity and increasing trust in cryptocurrencies through disclosures will be key and a delicate balancing act.

Key conclusions

As things stand today, an ESG investor would have a tough time making the case for investing in cryptocurrencies. Both the negative environmental and governance impacts go a long way to cancel out any potential positives for increasing financial inclusion. However, that may not always be the case. The industry recognizes it has an environmental problem and has options for reducing its carbon footprint. At the same time, governments are accelerating efforts to provide regulatory and oversight frameworks that foster trust and reduce risk in the financial system (see the next article in this digest on the evolving global regulatory landscape for cryptocurrencies). Over the longer term, widespread adoption of cryptocurrencies will very likely depend on how well ESG considerations are addressed.

The developing use of digital currencies including crypto seems set to offer a naturally competitive way of reducing some of the negative aspects of the financial system for the poorest in society.

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The Developing Global Regulatory Landscape for Digital Assets

— BY JUSTIN MCCORMACK

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Bitcoin began the crypto revolution in 2008 as a response to the global financial crisis and reliance on banks to execute financial transactions. As institutional investor interest swelled, questions about the regulatory treatment of such assets became more prominent. Until recently, there has been a lack of regulatory transparency. The war in Ukraine has added further urgency by highlighting the need to ensure economic sanctions are effectively implemented in crypto markets.

With signs that regulators may introduce more clarity around crypto, we examine the historical regulatory framework for digital assets and expectations for 2022.

The recent approach to crypto asset regulation

In most jurisdictions, regulators have approached crypto asset regulation by first trying to identify whether a crypto asset would be classified as a type of instrument that is already regulated. While nearly all regulators have determined that crypto assets are not currencies, there is not much consensus beyond that. Here we explore how jurisdictions across the globe are approaching these issues.

United States

Currently, a crypto asset can be classified into one of three categories depending on its characteristics:

- **Security:** falls neatly within the Securities and Exchange Commission framework, including registration of issuance and registration of relevant intermediaries.
- **Commodity:** subject to the jurisdiction of the Commodity Futures Trading Commission (CFTC); however, the CFTC regulatory framework does not require registration for issuance of commodities and, except for anti-fraud supervision, generally does not regulate spot transactions in commodities.
- **Virtual currency:** this designation often triggers state-level registration requirements as a money services business.

Whether a particular crypto asset is a security or a commodity depends in part on whether the instrument satisfies the Howey test.¹ However, the subjective nature of the test makes it open to interpretation.

As discussed in more detail below, there have been a number of recent developments evidencing the focus of US regulators to bring regulatory clarity to the treatment of crypto assets. These developments include the issuance of a report on stablecoins by President Biden's Working Group, a joint statement by US prudential regulators on their areas of focus for crypto asset policy in 2022, and an executive order by President Biden mobilizing the government to focus on crypto asset regulatory matters.

Europe

While current laws in most European Union (EU) jurisdictions do not clearly categorize crypto assets, where they can either be financial instruments under the Markets in Financial Instruments Directive (MiFID) or "other assets" depending on their characteristics, that is set to change, as a result of the Markets in Crypto Assets Regulation, commonly referred to as MiCA.

MiCA is expected to establish a regulatory framework for virtual asset issuers and service providers in the EU similar to the framework that applies to financial instruments under MiFID. As an EU regulation, MiCA would be a binding legislative act that will be applied in its entirety in the law of each jurisdiction once finalized and approved.

While many European jurisdictions are awaiting the passage of MiCA, Germany has taken a proactive approach:

- **Banking Act (Kreditwesengesetz (KWG)):** includes crypto assets/units of account as non-MiFID financial instruments under the German law² and add custody of crypto assets as a financial service requiring a license from the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin)).
- **Electronic Security Act (Gesetz zur Einführung elektronischer Wertpapiere (eWpG)):** to clarify the tokenization of traditional financial instruments, eWpG introduced the concept of a crypto securities registrar, an entity responsible for maintaining a decentralized register for instruments authorized to be issued on distributed ledger technology. The BaFin proposed regulations for the issuance of collective investment vehicle units (crypto fund units) on a distributed ledger in September 2021. To the extent similar models are adopted in other jurisdictions, this could transform how securities are issued and transferred.

Asia Pacific

In Singapore, a crypto asset could be a capital markets product, a digital payment token or e-money. Most cryptocurrencies qualify as digital payment tokens under the Payment Services Act 2019, which sets forth clear licensing and registration requirements for a range of crypto

asset services. This clarity, as well as the fact that Singapore took a welcoming approach to crypto assets in part through its creation of a FinTech regulatory sandbox in 2016, has led to Singapore being viewed as a crypto asset favorable jurisdiction.

With some of the most well developed legislation regarding crypto assets, Japan's Payment Services Act now includes "crypto assets" as a specific type of instrument, which is defined to include cryptocurrencies such as bitcoin and ether that are, "usable as a payment method to an unspecified person and not denominated in fiat currency."³ Entities that provide specified services for crypto assets are required to register as crypto asset exchange services providers (CAESP), which includes business entities involved in the sale, purchase or exchange of crypto assets and custodians of such assets.

Amendments to the Payment Services Act also established a new self-regulatory organization, the Japan Virtual and Crypto Assets Exchange Association, which is required to review any new crypto asset proposed to be supported by a CAESP.⁴ For crypto security tokens (e.g., tokens that represent equities or bonds), such instruments are regulated under the Financial Instruments and Exchange Act as electronic recorded transferable rights indicated on securities. Entities that offer, buy, sell or exchange such instruments must register as Type I Financial Instruments Business Operators.

Progress toward a global framework to address anti-money laundering and combatting the financing of terrorism considerations

While local regulators continue to debate the appropriate framework for issuing and licensing intermediaries for crypto assets, regulators have made progress on forming a global framework for addressing anti-money laundering (AML) and the financing of terrorism (AML/CFT) considerations.

In particular, the Financial Action Task Force (FATF), an intergovernmental organization that sets international standards to combat AML and terrorist financing, promulgated a standard, known as Recommendation 15, covering the registration of service providers with respect to “virtual assets.” Published in October 2018, it introduced the concept of a virtual asset service provider (VASP), and provides that to manage and mitigate the risks emerging from virtual assets, countries should ensure that virtual asset service providers are regulated for AML/CFT purposes, and licensed or registered and subject to effective systems for ensuring compliance with the relevant measures in the FATF Recommendations.”⁵

A VASP includes a natural or legal person that, as a business, conducts one or more of the following activities:

1. Exchange between virtual assets and fiat currencies
2. Exchange between one or more forms of virtual assets
3. Transfer of virtual assets

4. Safekeeping and/or administration of virtual assets or instruments enabling control over virtual assets
5. Participation in and provision of financial services related to an issuer’s offer and/or sale of a virtual asset⁶

With this recommendation as a baseline, a number of jurisdictions, including the EU,⁷ Hong Kong,⁸ Singapore,⁹ and Australia¹⁰ have implemented rules and regulations as part of their AML framework that require entities to register with local AML/CFT authorities before providing VASP services.

Greater regulatory clarity on the horizon in 2022?

Starting in late 2021 and continuing through 2022, there have been a number of global regulatory developments that point to coming clarity in global crypto asset regulation.

US prudential regulator “crypto sprint”¹¹ and US executive order on insuring responsible development of digital assets¹²

In November 2021, US prudential regulators, as part of a “crypto sprint,” issued a joint statement on crypto asset policy, identifying areas of prudential regulator focus for 2022, which included providing clarity on safety and soundness expectations for the provision of crypto asset custody services by banks as well as facilitation of customer purchases and sales, loans collateralized by crypto assets and issuance and distribution of stablecoins.

On March 9, 2022, President Joe Biden issued the executive order on Insuring Responsible Development of Digital Assets. The executive order takes a “whole of government approach” with a statement of general US policy for digital assets. It also includes a request for more than 24 federal agencies to produce reports that address the risks posed by digital assets, study how existing regulations and policies apply, and further evaluate whether there’s an appropriate role for CBDC within the US economy. A core theme of the executive order is collaboration among federal agencies as well as among global regulators, with the US taking a leading role.

The executive order establishes the following principal policy objectives:

1. Protect US consumers, investors and businesses
2. Protect US and global financial stability, and mitigate financial risks
 - a. Digital asset issuers, exchanges and platforms, and intermediary oversight entities should be subject to compliance with regulatory and supervisory standards like traditional firms using the “same business, same risks, same rules” model.
3. Mitigate illicit finance and national security risks posed by misuse of digital assets
4. Reinforce US leadership in the global financial system and in technological and economic competitiveness

5. Promote access to safe and affordable financial services
6. Support technological advances that promote responsible development and use of digital assets

A positive step for the US, the executive order represents important momentum toward developing a coordinated regulatory framework for digital assets, further illustrating the strategic importance of the industry. The focus on identifying and mitigating risks while also supporting innovation is welcome.

It will be important for the industry to participate fully in the process as reports and analysis are published and discussed.

European Union Markets in Crypto Assets Regulation (MiCA)¹³

Since the European Commission introduced MiCA on September 24, 2020, the proposal has progressed through the EU legislative process, and, on March 31, 2022, entered into the final phase known as the trilogues, which are tripartite negotiations among the European Commission, European Parliament and European Council. Once approved by all three institutions, which is expected later this year, the regulation would automatically become legally binding for each EU member state, following a transition period.

While final text is subject to negotiations, the framework proposed under MiCA is as follows:

Objectives: to facilitate legal certainty for instruments not covered by existing financial services legislation, to support innovation, to instill appropriate levels of consumer and investor protection and market integrity, and to ensure financial stability, particularly as it relates to stablecoins.

Instruments covered: MiCA was designed to cover a gap in the regulatory framework for crypto assets not covered under other financial services regulation, such as financial instruments regulated under MiFID. More specifically, MiCA covers: asset-referenced tokens, e-money tokens, and other crypto assets. Asset-referenced tokens and e-money tokens are variations of stablecoins, with asset-referenced tokens having multiple fiat currencies, commodities or other crypto assets as reference assets and e-money tokens having only a single fiat currency as reference assets (e.g., USD Coin).

Issuer Obligations: MiCA imposes a series of obligations on issuers of all crypto assets, with more stringent requirements applying to each stablecoin category. Core requirements are that crypto assets must be issued by a legal entity. The issuer is also required to publish a white paper containing core information and disclosures about the crypto asset prior to its issuance. Similar to a prospectus for a financial instrument, an issuer cannot disclaim liability for misstatements or omissions in the white paper. In addition, the issuer is required to provide initial purchasers with a 14-day right of withdrawal.

Limited exceptions to the white paper requirement apply if the crypto asset is offered for free, is automatically created through mining as a reward for the maintenance of distributed ledger technology or validation of transactions (e.g., Bitcoin), or is non-fungible.

Crypto Asset Service Providers (CASP):

In addition to the crypto assets and their issuers, MiCA also establishes authorization requirements and standards for providers of crypto asset services. The CASP services covered under MiCA are broader than those of a VASP under FATF Recommendation 15, and include:

- a. The custody and administration of crypto assets on behalf of third parties
- b. The operation of a trading platform for crypto assets
- c. The exchange of crypto assets for fiat currency that is legal tender
- d. The exchange of crypto assets for other crypto assets
- e. The execution of orders for crypto assets on behalf of third parties
- f. Placing of crypto assets
- g. The reception and transmission of orders for crypto assets on behalf of third parties
- h. Providing advice on crypto assets

With the exception of custody, the services are largely the same as services regulated under MiFID with respect to traditional assets. Entities authorized to provide services under MiFID are not required to obtain a separate authorization, although they are required to comply with the other relevant obligations under MiCA.

United Kingdom

Her Majesty's Treasury released a report¹⁴ on April 4, 2022 detailing responses to their 2021 consultation regarding the UK regulatory approach to crypto assets, stablecoins and distributed ledger technology. The report stated an intention to extend the existing UK payments regime to cover issuers of stablecoins and entities providing related services, including introducing a new regulated activity for custody of stablecoins. The report also noted that HM Treasury would work closely with the Bank of England, the UK Financial Conduct Authority and the industry to consider possible guidance or changes to existing legislation (e.g., MiFID, UK Central Securities Depositories, Settlement Finality Regulations) that may be necessary to enable tokenization of securities.

The report identified that the Financial Conduct Authority, Prudential Regulation Authority and HM Treasury would establish the Financial Market Infrastructure (FMI) Sandbox. With this approach, participants could request exemptions from or modifications to existing legislation, to facilitate testing of distributed ledger technology in FMIs and enable UK authorities to better understand the legislative changes necessary to accommodate distributed ledger technology. The report anticipates that the sandbox would be up and running in 2023. Finally, the report noted that HM Treasury is continuing to assess the appropriate regulatory response to crypto assets used as a means of payment other than stablecoins and stated its intention to consult later in 2022 on its proposed approach.

Hong Kong January 2022 consultation, joint circular and guidance

Unlike China, which has banned cryptocurrencies, Hong Kong is focusing on regulating their use. In January 2022, the Hong Kong Monetary Authority (HKMA) issued a discussion paper¹⁵ seeking comment on how to bring crypto assets and stablecoins within the regulatory perimeter. The majority of the paper focuses on stablecoins and raises the question of whether the existing Payment Systems and Stored Value Facilities Ordinance can be expanded to cover stablecoins or whether a new legislative framework is required. The paper further asks market participants to opine on the appropriate scope of legislation. With respect to other crypto assets, the paper noted that the HKMA will soon provide financial institutions with detailed regulatory guidance on their interaction with and provision of intermediary services to customers related to crypto assets. Comments to the paper were due on March 31, 2022.

On January 28, 2022, the Hong Kong Securities and Futures Commission (SFC) and the HKMA issued a joint circular on intermediaries' virtual asset-related activities¹⁶, and the HKMA published guidance to authorized institutions regarding their interface with virtual assets and VASP.¹⁷ The joint circular applies to existing SFC-licensed corporations and authorized institutions that want to distribute virtual asset-related products and provide virtual asset dealing and advisory services. The circular imposes specific requirements on how SFC-licensed entities should conduct this business alongside their existing securities-related businesses. This includes only providing products

and services to professional investors; assessing suitability of virtual asset products and services for their clients; and, when engaging in dealing services, using only SFC-licensed platforms and otherwise complying with the regulatory requirements for dealing in securities even where the virtual asset in question is not a security.

Finally, the HKMA guidance, which was only directed at authorized institutions, emphasized that institutions would not be prohibited from engaging in virtual asset-related activities. However, it notes that authorized institutions are expected to have appropriate risk management measures in place, including appropriate capital reserves, and must notify the HKMA prior to conducting any such activities.

Australian crypto consultation paper

On March 21, 2022, the Australian Treasury proposed a new regulatory framework for crypto asset secondary service providers (CASSPrs)¹⁸ separate from the existing Australian Financial Services Licensing (AFSL) regime for financial products. The new regime would be administered by the Australian Securities and Investments Commission and would define the scope of crypto asset services covered similarly to the definition of VASP under FATF Recommendation 15. In addition, the consultation paper also seeks feedback on how to categorize crypto assets in advance of a token mapping exercise the Australian government is seeking to finalize by the end of this year. Comments to the consultation paper are due by May 27, 2022.

Regulating crypto assets' explosive growth

The surge in the crypto asset marketplace and concomitant growth in institutional investor interest has accelerated the discussion and development of regulatory clarity for these instruments and services.

Through the first quarter of 2022, we have seen jurisdictions across the globe take concrete steps to bring regulatory clarity to facilitate the continued responsible growth of the market, including with respect to the provision of custody services by financial institutions. As noted above, in the US, we are expecting prudential regulators, as part of their crypto sprint, to provide clarity regarding their expectations for banks providing such services. In Europe, we have the anticipated passage of MiCA, which includes a custody licensing framework. In Asia Pacific, there is an ongoing consultation regarding CASSPrs that includes proposals on crypto asset custody, and in Hong Kong, recent consultations and guidance indicate that authorized institutions will not be prohibited from conducting virtual asset-related activities, such as custody, provided that they have appropriate risk management measures in place and discuss them in advance with the HKMA.

There will no doubt be challenges along the way. But input by market participants in the ongoing legislative and regulatory consultations can help guide regulatory frameworks for this burgeoning industry.

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Why Crypto Is Just the Start of the Digital Transformation of Finance

— BY JAY BIANCAMANO

Head of North America, State Street Digital

It is hard to imagine financial services, let alone any industry, without the internet. Yet that was the case a few decades ago. The internet is the single underlying layer to everything we do today. It not only is how we “work” it is also how we spend our time off. Life became faster, scalable and “easier,” we learned more, communicated more and took advantage of it to transform finance.

Blockchain technology is primed to do the same thing. It will affect everything: WHAT we invest in, HOW we invest and even WHO we invest with.

The conversation around the adoption of blockchain technology in financial markets has, for the most part, been centered around cryptocurrency and its rise as an asset class. While crypto is an important development, it is just the start. Blockchain technology can support the digitization of any financial asset.

The reason blockchain is so attractive is at its heart blockchain verifies and confirms ownership as well as value in a way that is both immutable and seamless. It allows for value exchange that previously was unattainable for electronic transactions. Once the data is “validated” it cannot be changed, making it far more powerful than most technology in place today.

To understand why, start with what blockchain is. Blockchain is a distributed ledger and cryptocurrencies like bitcoin are just one use of the blockchain technology. Blockchain technology is over a decade old and what may be surprising is that blockchain already exists in many industries today. For example, both Walmart and the shipping company, Maersk use blockchain to monitor supply chains, solve logistic issues and improve performance. Other industries such as healthcare and public transportation also use blockchain technology.

We expect blockchain to cause a dramatic shift across all sectors of the financial industry including the buy side and sell side. For the buy side this not only means incorporating new asset classes into portfolio models for purposes of return, but more importantly it means taking advantage of blockchain technology to reduce the costs of IT, labor, compliance and overhead.

Since financial services is a dynamic and fluid industry, it has amassed a large amount of “technical debt.” Technical debt is the result of applying short-term solutions to improve or

implement processes rather than taking the time to implement a new technology or a longer term solution. In the past, technological innovation in finance often meant developing new layers on top of old ones. That will not be the case with blockchain though, as it requires an entirely new infrastructure. This is likely to occur as tokenization transforms traditional assets into digital assets.

The promise of tokenization

It is essential to understand what tokenization is, not only as a new form of asset investment, but also how it has evolved in the last five years.

Tokenization is best described as the process of taking a tangible “asset” and replicating it on a blockchain in the form of a “token.” That “token” represents the asset but in reality, it is a surrogate or proxy for the actual “asset.” It is important that the network on which it is represented recognizes it and treats it as the actual asset. These “tokens” can then be used to move that asset, settle and exchange it for another token representing another asset and so on.

While blockchain has been around since 2008, the idea of using it for tokenization is only a recent use case, however it has evolved rapidly in the past few years. A review of all blockchain based businesses that existed in 2017—well over 200 companies including custodians, trading firms, exchanges, developers and more—shows that none of the firms at that time specialized in

tokenization. Today there are at least two dozen firms whose business model is mostly, if not entirely, built on tokenization. For example: Securency, Tokeny, Texture, Paxos and Symbiont.

We have seen illiquid assets like real estate and art being digitized, but none of these early experiments gained much traction; they really were tokenization of assets that were for the most part not attractive to institutional investors. Today the digitization of private assets has accelerated, particularly equity and debt, along with traditional assets like public equity and fixed income. The future also holds the promise of true multi-asset trading. Our current trading universe involves almost every asset—bonds, gold, stocks, real estate—all trading on different platforms. There are multiple settlement cycles and multiple intermediaries and the movement from one asset class to the next or even between single assets (equity to equity) is not at all seamless.

But what if all assets were represented as tokens and could move between blockchains? The tokens themselves, instead of being represented by their conversion rate to a currency, would have a conversion rate to another asset. For example, we could move from a gold “token” into a bond “token” almost immediately; We would offset the tokens and net cash on the blockchain and do so with little risk of errors or settlement failure. The possibilities this creates are astounding and will lead to seismic shifts on the asset management business model.

The most interesting ideas take tokenization a step further. That is where tokenization is

starting to create entirely new asset classes, which will ultimately segue into the mainstream. For example, the tokenization of data is a particularly interesting area. Tokenization could allow companies to share their data securely with third parties, but more importantly allow them to value their data in a way that was previously unattainable.

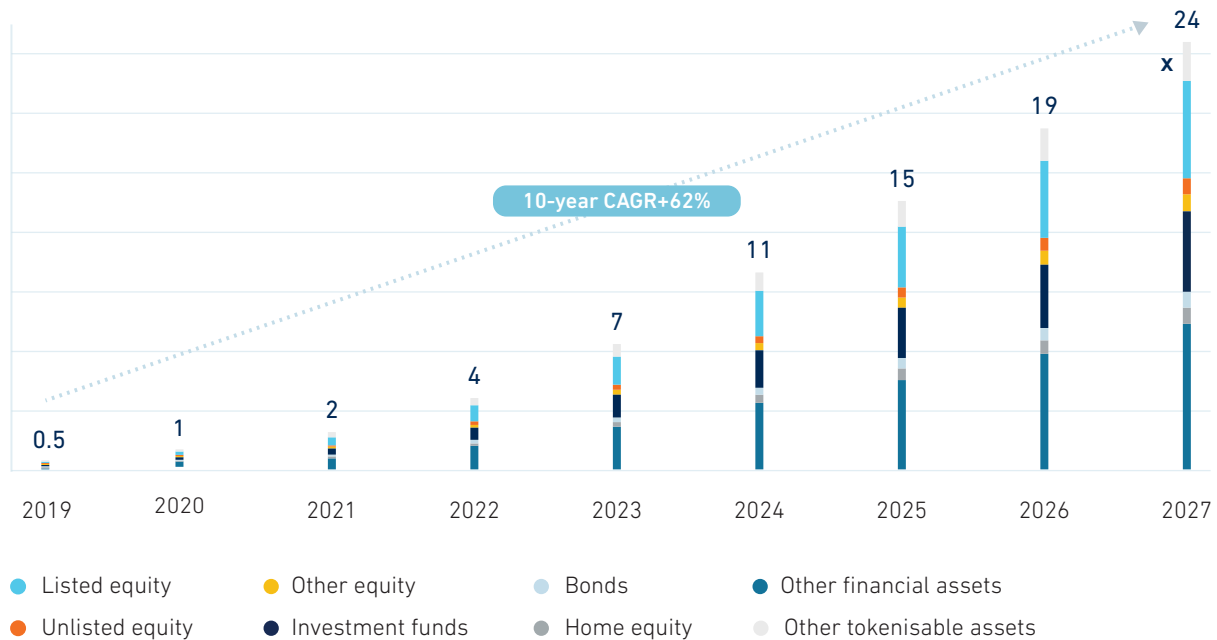
Finoa, a European digital assets management platform, researched tokenization markets and projected developments (Figure 1). Overall, it projected tokenized assets would grow from US\$500 billion to US\$24 trillion by 2027 not including intangible assets.¹

The advantages of tokenization are well beyond simply digitizing assets. The utilization of blockchain technology at some point in the lifecycle of the asset can create a better experience or even eliminate a process such as transfer Agency or T+0 settlement. Advantages of tokenization include:

- **Increased sources of capital** – Accredited investors will be able to access more private investments. Eventually the market for private assets will be democratized as they will be easily accessible to a wide and diverse set of investors.
- **Liquidity** – Tokens can easily and securely be exchanged on a secondary over-the-counter market using blockchain. As mentioned above, the bar of entry is lowered and the opportunity to create a retail secondary private market that does not yet exist.

- **Fractionalization** – Assets can be split into far greater amounts than traditional methods, lowering barriers to investments. Also, through fractionalization tokens can offer greater investor diversification and targeted portfolio construction.
- **Data transparency** – Data is stored and accessed securely on the blockchain, providing credible insights to investors.
- **Shorter settlement time** – Tokens are traded 24/7 with a record that can be updated in minutes, compared to T+3 day settlement times. We have proven this in equity markets and our thesis is that it will hold for all markets.
- **Operational efficiency** – Mostly manual processes such as compliance and corporate action, can be “automated” via smart contracts.
- **Flexibility** – Tokens can be customized with unlimited share and debt classes with lower operational cost.

Figure 1: Projected Tokenized Market Volume Until 2027 (in US\$trn by Asset Class)



The challenges of digitizing assets

Of course, as with any new technology, there are challenges to overcome. First, cryptocurrency's environmental problem raises concern about the sustainability of blockchain technology more generally (Please see "An ESG Assessment of Crypto" in this Digital Digest). However, the industry has already introduced multiple blockchain protocols that rely on proof of stake for a more "greener" way to validate transactions on the blockchain and recognizes the need to continue to address environmental impact. Second, regulatory frameworks are largely lacking and need attention by major economies such as the US, Europe and Asia (Please see "The Developing Global Regulatory Landscape for Crypto Assets" in this Digital Digest). Third, security concerns surrounding the blockchain technology need to be addressed especially around public vs. private and permissioned vs. permissionless. Fourth, legacy technology issues need to be tackled. For example, can older systems be refined in a way that allows them to interact with blockchain technology?

Towards a new financial architecture

So what does all this mean? Today's global financial infrastructure is not built to support a world where all assets are bought, sold, held and serviced on a blockchain. While an argument can be made that transforming that architecture is years away, in some ways it has already arrived. For example, we founded, State Street Digital in 2021 not only to support our clients' investment in cryptocurrencies but to accelerate the digital transformation of our firm.

Industry leaders are now exploring business use cases for digitizing assets. This is especially true when it comes to regulators. The Fed is exploring creating a digital currency (Please see "The Digitization of Money" in this Digital Digest). The SEC in its FinHub initiative has carved out a space to explore using blockchain in securities markets.

We are exploring numerous proofs of concepts to advance the use of blockchain to improve our clients' experience. Our approach is not to create a product or service that is just available to State Street, but we are looking at ways to improve how we interact with third parties. These include:

- Using tokenization to allow for settlement of any asset atomically (i.e., T+0)
- Facilitating the movement of cash geographically between wholesale banks
- Using fractionalized assets to increase distribution or even to represent a portion of an underlying asset
- Providing digital representation of underlying collateral

Traditional buy-side firms are beginning to understand that the need for specialized assistance is imperative. Some are acutely aware that they will need to re-think their approach to both investing and managing digital asset. However, others are just beginning, asking about what blockchain is and what they need to know. While some firms are innovators,

looking to expand their business and transform their business model, others are comfortable with a business-as-usual approach that protects their long-term business models.

It may no longer be possible for the industry to ignore blockchain technology. Many financial firms are realizing that exploring blockchain solutions cannot be done in a vacuum using a traditional ROI model that yields finite returns. Instead, they must be evaluated bilaterally to understand how a new ecosystem can benefit the industry as a whole—an ecosystem that holds the promise of being more productive, more democratized and ultimately more valuable.

The advantages of tokenization are well beyond simply digitizing assets. The utilization of blockchain technology at some point in the lifecycle of the asset can create a better experience or even eliminate a process

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The Digitization of Money

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We live in a digitized world. As the use of physical cash has declined over the years,¹ fast and convenient digital payments have grown in volume and diversity. This trend occurred in tandem with the increasing interest of central banks in providing a resilient and robust platform for offering a digital currency that preserves the fundamental purposes of central banks — namely, ensuring monetary and financial stability and promoting wide access to secure and efficient payments.

One of the most pressing projects on the agenda of central banks is a study of the feasibility of a Central Bank Digital Currencies (CBDC). A 2020 survey found that 80 percent of central banks are engaged in investigating CBDCs² with several having progressed beyond research to conducting pilots. Those collectively representing 20 percent of the world's population deem it likely that they would offer a general-purpose CBDC within three years.

The Fed recently published a research study examining the feasibility of issuing a digital dollar.³ The Bank of England (BoE) is also exploring the issuance of digital currency for use in households and businesses for everyday payments.⁴ Next to the role of monetary policy in maintaining financial stability, CBDC is the most important topic in central banks' agendas. While the first CBDC was launched in 2020 in the Bahamas, there is no major currency area with a live solution.

What are CBDCs?

CBDCs are a digital form of money, denominated in the national unit of account, issued by a central bank as a direct liability. CBDC is the virtual or digital asset equivalent of a country's fiat currency, such as the US dollar. While the term is relatively new, central bank digital money has existed for years in the form of bank deposits at a central bank available exclusively to qualifying financial institutions.⁵

What is potentially transformative about many recent CBDC initiatives is their retail focus allowing households and businesses to directly access central bank holdings. Though regulated financial institutions can currently access digital central bank money through reserve accounts held by commercial banks, the only central bank money available to the public is cash. Retail CBDCs would dramatically change this by making central bank digital money available to the general public, which they can use to make digital payments. Further, given that CBDCs are a direct liability of the central bank, neither deposit insurance (to maintain public confidence) nor backing by a pool of assets (to maintain value) would be required under a CBDC system. As a result, retail CBDCs would be the safest digital asset available to the public, free from both credit risk and liquidity risk.

Why the urgency?

Concurrent with the decline in the use of cash, there has been a proliferation in the issuance of cryptocurrencies and stablecoins, which

are backed by fiat currencies or other assets.⁶ According to a 2020 survey conducted by the San Francisco Fed, use of cash fell from 40 percent in 2012 to 19 percent in 2020.⁷ Other countries have seen similar declines. Against this backdrop wherein the use of cash has declined, there has been a meteoric rise in cryptocurrencies, some of which, like bitcoin, ethereum and the stablecoin tether, continue to garner wider adoption. For central banks, the rise in cryptocurrencies, which have been subject to light-touch regulation, or none at all, has triggered mounting concerns about both the security of digital assets and, importantly, the lack of global standards governing the crypto ecosystem. For these reasons, central banks see a need to explore offering digital currency to ensure that the proliferation of private forms of money does not impede their ability to support monetary and financial stability.

How are CBDCs different from other forms of electronic cash?

Currently, central bank-issued currencies take physical (notes and coins, for the public) as well as digital forms (reserves, for commercial banks). The idea is to replace central bank-issued physical notes with their digital counterparts. Unlike existing electronic payment instruments used by individuals and corporates, which serve as direct claims on commercial banks, CBDCs are direct claims on the balance sheets of central banks. In effect, CBDCs are fiat currencies issued in digital form either in place of or as a complement to bank notes and coins. The goal of introducing CBDC is to provide a universal means of secure payments for the digital era, while preserving the monetary

sovereignty of central banks. Other important factors often cited with respect to CBDC include the near-instant final settlement of funds to end users on a 24/7 basis. Currently, this is available to the consumer via instant payment systems in more than 60 markets, however, it is based on credit intermediation. The differentiating factor is the removal of credit from the payment activity by moving from a commercial bank liability to a pre-funded central bank liability arrangement.

How would retail CBDCs be structured?⁸

A crucial consideration for central banks is how CBDCs will be structured and what roles the central bank and private sector intermediaries should play. The Bank for International Settlements (BIS) has identified three alternative models by which CBDCs⁹ could be structured:

- **Direct CBDC** — Under this model, the central bank issues CBDCs to end consumers directly, handles all retail payments in real time and maintains a record of all retail holdings.
- **Hybrid Model** — This model runs on two engines, the private sector handles customer on-boarding, oversees AML/CFT enforcement and conducts all retail payments in real time.
- **Intermediated Model** — This is also a two-tier structure like the hybrid model, but rather than recording retail transactions, the central bank maintains a wholesale ledger only.

Not all central bank charters permit issuance of a direct CBDC in the first place. For example, in the US, the Federal Reserve Act does not authorize direct accounts for individuals, so a hybrid or intermediated model are the only viable options in such situations and appear to be the models most central banks are rallying around in any event.

How would retail CBDCs be distributed?

Another design issue concerns how CBDCs should be distributed. There are two models under consideration. Under a single-tier model, the central bank issues CBDCs directly to financial institutions, consumers and businesses. Though a single-tier structure can reduce transaction frictions, it could also trigger a digital deposit run from commercial banks to central banks. As a result, CBDC plans for most central banks seem to be gravitating toward a two-tier architecture with central banks being the base layer issuing digital currencies to commercial banks. Existing financial institutions are managing the second, user-interfacing and CBDC-distributing layer.

In what form would retail CBDCs be held?

The third design question focuses on whether retail CBDCs should be implemented using a token- or account-based approach. Similar to the anonymity cash affords, a token-based approach would allow individuals, who hold the password-like digital signature or token, to perform actions such as moving funds without requiring disclosure of their personal identification. Account-based systems, predicated on verifying a user's

identity, are what we have today. While likely less complex to implement, they may carry higher privacy costs, depending on the nature of the authentication process involved. Who verifies the identity of a person seeking to join an account-based CBDC platform remains an open question.

How can CBDC help improve the function of central banks and the financial system?

Many advocates of CBDCs argue they would be cheaper and faster than traditional payment systems, enhance financial inclusion, facilitate efficient cross-border transfers, improve the effectiveness of monetary policy, particularly during a crisis or periods of financial stress, and help strengthen the stability and resilience of the digital payment ecosystem.¹⁰

A quick caveat: these advantages, though logical outcomes of a well-designed system, are not empirically observed in any large economy as CBDCs are not yet operational other than in a few small or emerging market economy jurisdictions.

Real-world challenges

While CBDCs have many potential benefits, significant challenges need to be addressed before they can be effectively designed and implemented. In fact, there is a **growing debate** whether any of the expected benefits of CBDC are real or can be achieved through other means. In our view, CBDC are a disruptive technology and thus, the user experience gained will be different (and thereby shift user expectations) and this is what should drive its appeal.

Design challenges

As noted earlier, design questions regarding who should issue CBDC (direct, indirect or hybrid), how they should be distributed (one-tier or two-tier) and in what form they should be held (account versus token) remain. There are a number of additional design questions, which will need to be addressed, including how a user's identity is to be verified (for both domestic and cross-jurisdictional purposes); whether accounts should be interest-bearing or not; whether there should be limits on the amount of CBDC an individual or business can hold or accumulate over a specified time frame; and what privacy rules and data governance frameworks are most indicated (including what data is to be protected, by whom and from whom).

Disintermediation of banking system

One of the biggest concerns posed by retail CBDCs is whether their introduction would lead to disintermediation of the commercial banking system. This is because retail depositors, who can directly hold funds in central banks under the direct CBDC model, would be incentivized to transfer their commercial bank deposits to a central bank, where their holdings could potentially earn interest, while having zero insolvency and illiquidity risks. As a result, bank deposits, a significant funding source and credit creator for commercial banks, would likely decline, or dry up altogether. Further, the "digital run" to CBDCs would likely be most severe during times of financial crises, where consumer confidence in traditional safeguards like government deposit insurance may be insufficient.

CBDCs could also lead to an increase in funding costs for banks, while reducing the availability of credit or raising the cost of credit for the private sector. In the case of interest-bearing CBDCs, there could be a shift away from low-risk assets, such as shares in money market mutual funds or sovereign bonds, to central bank holdings, which would reduce the credit supply in the economy. The design of CBDC should therefore be carefully calibrated to help avoid these unintended consequences and to enable commercial banks to continue their intermediation role to help ensure monetary and financial stability.

Security issues

Will the proposed CBDC be secure from cybercrime and satisfy KYC, AML and CFT requirements? In particular, should efforts to counter money laundering, prevent fraud or other illicit activities be implemented via a centralized platform or a decentralized digital ledger using blockchain technology? And how would such rules be enforced during so-called off-line transactions whereby CBDCs are moved between holders without screening at the time of payment? Some central banks seem to favor a centralized platform while the Bahamian Central Bank is using a permissioned distributed ledger technology (DLT). The ability to ensure security while fostering technological innovation is critical in the design of an effective CBDC platform.

Impact on reserve currency

It is argued that CBDCs and stablecoins could alter the international monetary system by limiting the hegemonic role of the US dollar as the world's

dominant currency. This would be accomplished by introducing effective competition for the dollar through a widely adopted CBDC that transcends national boundaries. Hence, a successful CBDC may be viewed as a beneficial outcome particularly by emerging markets. The pernicious effects of the hegemonic role of the dollar are explored [in our companion paper](#).

Additional design considerations

We have invested considerable energy in dialogue around digital currency with central banks and private sector industry leaders. We believe that any design of CBDC should also consider the following:

- Wholesale CBDCs that can readily function as a payment solution
- Support for private sector involvement
- Multicurrency capabilities
- A solution that is technology-agnostic

What's next?

Central banks face an important conundrum as the world's digital ecosystem continues to evolve rapidly and shows no sign of abating. Even with the introduction of a CBDC, private sector stablecoins are likely to continue in the digital economy. Both the International Monetary Fund (IMF)¹¹ and the Swiss National Bank¹² have indicated caution given concerns about the impact on monetary policy and macro-financial stability from the introduction of CBDCs. Geographic boundaries melt away in monetary policy when a phenomenon like bitcoin becomes legal tender.

Despite these challenges, the advantages of general purpose CBDCs in unlocking the potential for cheaper, faster, higher-quality and more inclusive financial services should not be overlooked. The key consideration is the ability to preserve macroeconomic stability. It is advisable to proceed with caution and consider viable private partnerships to harness the potential benefits of digital currency while preserving the monetary sovereignty of central banks.

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Many advocates of CBDCs argue they would be cheaper and faster than traditional payment systems, enhance financial inclusion, facilitate efficient cross-border transfers, improve the effectiveness of monetary policy, particularly during a crisis or periods of financial stress, and help strengthen the stability and resilience of the digital payment ecosystem.

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Glossary of Terms

Altcoins: Any digital currency that can be used as a substitute for bitcoin

Bitcoin: A decentralized digital cryptocurrency, with the token issues on the bitcoin protocol, that can be sent from user to user on a peer to peer network without an administrator or central bank involvement

Bitcoin mining: The process of completing computational puzzles in order to find new bitcoin

Blockchain: A distributed ledger technology that groups data into blocks when verified by members of the network are linked together to form the blockchain

Byzantine fault tolerance (BFT): A system in which the various components must agree on the same approach to avoid failure; in cryptocurrency, this refers to the use of proof of work and proof of stake as methods of maintaining validation in the system

Central Bank Digital Currency (CBDC): A digital token representing sovereign fiat currency

Central securities depositories (CSDs):
A financial organization that stores securities in order to easily exchange ownership through book entry instead of the transfer of physical certificates

Cryptocurrency: A digital token used as a medium of exchange or store of value, with transactions recorded using distributed ledger technology

Data stewardship: A set of practices to promote trust in an organization's data management

Decentralized finance: Distributed ledger technology-based financial services without traditional intermediaries and central authorities

Decentralized Autonomous Organization (DAO):
An organization represented by rules encoded as a computer program that is transparent, controlled by the organization members and not influenced by central government

Digital assets: Any asset in a digital form on a blockchain

Digital custody: The holding and administration of crypto assets and/or cryptographic keys used to safekeep or transfer crypto assets

Digital wallet: A place to store digital assets with a degree of security

Distributed ledger technology: A system of record that is shared and stored across a network of participants such as a blockchain

Ethereum: A blockchain platform that has smart contract capabilities

Fiat currency: A government-issued currency that is not backed by a physical commodity but by the trust in the issuer

Hashing power: A measure of computational power used by those validating transactions in proof-of-work on the blockchain

Howey test: The US Supreme Court's standard for determining if a transaction can be categorized as an investment contract, therefore determining its classification as a security

Instant settlement (AKA, "T+0," "same day," and "atomic settlement"): The transfer of funds from one account to another in seconds

Initial Coin Offering (ICO): An initial public offering in cryptocurrency

Nonfungible tokens: A unique and non-interchangeable unit of data stored on a digital ledger

Programmable money: A cryptocurrency that can be programmed for a specific outcome using smart contracts

Proof of stake (PoS): A decentralized method of validating a cryptocurrency transaction by algorithmically selecting validators based on the quantity of cryptocurrency they hold

Proof of work (PoW): A decentralized method of validating a cryptocurrency transaction by requiring members of the blockchain network to compute a mathematical puzzle in order to prevent anyone from tampering with the public ledger

Smart contract: A dynamic, open-ended mechanism that provides for coded sets of rules for a specific use case on a distributed ledger technology network

Stablecoin: A cryptocurrency pegged to the value of a fiat currency such as the dollar, backed by traditional assets or algorithmically attached to digital assets that are automatically bought and sold in order to maintain a stable value

Tokenization: The process of creating a digital token on a distributed ledger technology network

Web 3: An extension of the World Wide Web through standards set by the World Wide Web Consortium (W3C) with the goal to make Internet data machine-readable

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