STATE STREET®

Digital Digest

Understanding Our Role in a
New Technology Environment

August 2023

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State Street Digital Digest, Fall 2022

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Contents

Preface

Artificial Intelligence (AI) has created polar views about technology. Man and machine? (Think, modern connectivity and automation, health care and medicine, entertainment and leisure.) Or, man versus machine? (Think, Hal from the film 2001: A Space Odyssey, or, closer to home, fear of worker displacement.)

In our April *Digital Digest*, we examined the role that industry, technology and regulators play in meeting the challenges of our digital future. This edition dives into the "man versus machine" debates that have recently roared through the cultural discourse around AI and ChatGPT, and what it means for the future of digital finance. (And, no, an app didn't write this.)

In these pages we consider how trends in digital financial services align with the march of next–generation technology such as AI and quantum computing. Our Digest features articles about the intersection of blockchain and distributed ledger technology (DLT) with other emerging technologies, as well as – on the human side – personal insights from our experts sharing their experiences transitioning from careers in traditional banking and finance to a digital environment. They talk about how they engaged in reskilling and how high–touch human insight,

intelligence and emotional intelligence (EQ) remains an indispensable ingredient in a digital finance environment. Additionally, this edition includes our regular crypto markets column, global regulatory updates focused on central bank digital currencies (CBDCs) and stablecoins, and our popular and ever–expanding glossary of essential digital finance terms and definitions.

It likely will not surprise regular readers of this publication that we are firmly in the "and" camp – rather than "versus" – embracing new digital technologies that hold so much potential for clients, investors and other stakeholders. We are a company with a rich history of financial industry firsts (from the creation of the first-ever ETF 30 years ago and the industry's only comprehensive front-to-back platform in State Street Alpha®, to our proxy stand related to broader diversity representation on corporate boards (including our successful Fearless Girl campaign).

The spirit of innovation that is braided through our DNA and this, matched with our size, scale and history of sound financial stewardship makes us uniquely well–positioned to help clients transition from the analog world to an increasingly digital, decentralized one.

We are doing this through what I call a "dual–track" approach. As financial services continue to evolve, shifting from a traditional to digital world, our industry will need increasingly strong interoperability to handle the fragmentation that arises from dual–track worlds. Each time a new technology is introduced, we only create greater fragmentation. Clients will need the ability to shift gears between legacy and digital and the kind of partners that enable them to do so seamlessly, with superior security and the most rigorous regulatory standards.

Digital assets are soon going to part of mainsteam financial services. Their pending availability will change financial services, market infrastructure and how we do business. But the shift won't look or feel like flipping a light switch. The change will occur over time and is likely to occur in fits and starts, with varying degrees of acceptance. In other words, we can expect to live in a dual–track world for years (potentially decades) and institutions will need to embrace dual–track thinking.

Our job is to figure out what's next and prepare our clients for those changes in ways that include and accept – rather than exclude or deny – the reality of other technologies and ways of thinking.

Change is inevitable, takes time and can sometimes be overwhelming – but progress is usually spelled "and" rather than "versus."

Sincerely,

Donna Milrod
Chief Product Officer, State Street and Head of State Street Digital®

The Intersection of Blockchain and Digital Tokenization with Other Emerging Technologies

By Nitin Gaur

Global Head of Technology and Asset Design,
State Street Digital®

Part one

Blockchain at the nexus of artificial intelligence

Blockchain stands to accelerate the adoption of emerging technologies including artificial intelligence (AI), cloud and Internet of Things (IoT) by bringing in the missing element of trust, which is required by businesses to fully embrace these technologies at scale. On the other hand, blockchain business networks stand to benefit from the integration of these technologies into modern blockchain platforms and applications.

In recent years, AI and blockchain have made significant strides in revolutionizing the financial services industry. While AI has demonstrated its prowess in data analysis, pattern recognition and decision–making, blockchain has emerged as a transparent, secure and decentralized ledger system. When these two powerful, ground–breaking technologies converge, they create a potent combination that holds immense potential for transforming the financial services sector. In this article, we explore the use of AI in conjunction with blockchain technology and its impact on financial services.

We rely on the following assumptions around blockchain technology and the applicability of AI technologies:

Blockchain is becoming the **transaction and data platform of choice for business networks** and a trusted among partners and competitors.

Using AI, network participants will be able to **gain insights and derive decisions they cannot achieve alone.** AI driven transactions will give rise to new business models and more significant automation opportunities.

The Synergy: Blockchain and AI

While both blockchain and AI offer unique benefits, they also present their own adoption challenges. Bringing these two technologies together may seem like mixing information technology (IT) pixie dust, especially given the unprecedented hype surrounding them individually. However, there is a logical and pragmatic way to approach their convergence.

Currently, AI is predominantly a centralized process, requiring users to have unwavering trust in a central authority to produce reliable business outcomes. By decentralizing the three essential elements of AI – data, models and analytics – blockchain can provide the trust and confidence necessary for end users to fully adopt and rely on AI–based business processes.

How blockchain can enrich AI by bringing trust to data, models and analytics:

Data Ownership

Many prominent AI technology services are centralized, and establishing trust among users has been a challenge. Blockchain can act as a digital rights management system, enabling users to license their data to AI providers under specific terms, conditions and durations. The blockchain ledger serves as an access management system, storing proof and permission for businesses to access and utilize user data.

Trusted AI Models

Blockchain technology can ensure the provenance and traceability of training data and models for machine learning. By tracking the origin of training data and maintaining an audit trail, businesses can provide transparent evidence of why a particular fruit, for example, is classified as an apple or an orange. This capability safeguards against manipulations and ensures trust in AI models.

Explaining AI Decisions

Blockchain can help bring transparency and understanding to AI outcomes and decisions. By recording decisions and associated data points on a blockchain auditing becomes simpler, and the inherent attributes of blockchain contribute to building trust within the network. The European Union has enforced a law requiring machines' decisions to be explainable, imposing fines for non–compliance.

Exploring use cases that unlock the potential of these disruptive technologies

By combining AI and blockchain, financial institutions can unlock even greater possibilities. We identify some key areas wherein their collaboration can create significant value:

1   **Fraud Detection and Prevention**

AI algorithms can analyze transaction data and patterns in realtime, flagging suspicious activities. These alerts can then be recorded on a blockchain, creating an immutable trail of potential fraud attempts. This synergy provides an enhanced layer of security, reducing financial risks for both customers and institutions.

3   **Smart Contracts and Automation**

Blockchain's smart contract capabilities can be combined with AI to automate complex financial agreements, reducing administrative costs and improving efficiency. AI algorithms can analyze contractual terms, identify risks and suggest modifications, ensuring contractual compliance and minimizing disputes.

2   **Know Your Customer (KYC) Compliance**

AI–powered facial recognition and natural language processing can facilitate efficient and accurate KYC processes. When combined with blockchain, customer identity verification can be stored securely and shared across institutions, simplifying compliance procedures while maintaining data privacy.

4   **Decentralized Credit Risk Analysis**

AI algorithms can leverage transactional data, social media activity and other non–traditional data sources to assess creditworthiness. Storing credit scores and transaction histories on a blockchain enables decentralized access to credit information, empowering individuals and businesses with better financial opportunities.

Conclusion

The convergence of AI and blockchain holds tremendous potential for enhancing financial services and other industries. By combining the trust and security offered by blockchain with the analytical capabilities of AI, businesses can unlock new opportunities for innovation, efficiency and automation. It is crucial to address challenges such as data privacy, regulatory compliance and interoperability to fully realize the benefits of this synergy. Financial institutions that embrace the integration of AI and blockchain will be well–positioned to thrive in a rapidly evolving technological landscape.

Part two

The application of quantum technology in decentralized finance

The advent of digital asset–related technologies, such as blockchain, data analytics and AI, aims to create a foundational framework that supports the real–time movement of assets. This increased velocity of asset movement brings issues around the veracity of data that gets generated.

It challenges every facet of the discipline that feeds into various liquidity optimization models, a risk model framework, portfolio optimization models, liquidity and treasury management structures impacted due to real–time payment systems, and the ability to detect and prevent financial crimes for a secure and resilient financial system. It is uncertain whether the current technology stack and infrastructure can support this newly envisioned financial infrastructure driven by digital assets.

They may need both vision and significant investment of capital and acumen. In this part, we focus on how quantum computing solves computationally challenging problems such as portfolio optimization, asset pricing and financial markets analysis. We also focus on

how it acts as a core foundational technology for security and cryptography that has the potential to both secure and threaten the infrastructure that facilitates the mobility of financial instruments.

For instance, quantum algorithms can potentially break widely used cryptographic protocols and algorithms that rely on the computational difficulty of factoring large numbers (e.g., Bitcoin mining), motivating the need for quantum–resistant cryptography that ensures financial security and sensitive data. This can be a systemic problem for blockchain and distributed ledger technology (DLT), which have embedded cryptography into the verification and validation system of transactions and provenance link ability.

Exponential Finance

The term "exponential finance" refers to leveraging exponential technologies and innovation to transform the financial industry. We explore the introduction of tokenized assets and new asset classes that are instilled due to the evolutionary emergence of Web 3.0 (or Web3, the third generation of the World Wide Web) and the ownership economic constructs it proposes. These include identity, data, healthcare records and giving every individual an opportunity to control their data, talent and identity, and subsequently monetize them.

As these new asset classes enter the financial infrastructure, driven by digital assets, and engage as crypto market infrastructure participants, they will hit the limitations of existing technologies and result in an asset movement velocity mismatch.

Our identity is represented by an avatar (or other Augmented Reality/Virtual Reality representation) and the things that we value are represented in the form of tokenized assets with valuation vehicles that prevent double spend and leverage blockchain as a transaction system. This brings the fundamental tenets of blockchain (trade, trust and ownership) to the Web3–induced markets and financial system. Our avatars that represent us may interact with various universes, and we preserve the right and ability to monetize our data, effort, talent and all the value they generate.

We must consider the commercial aspects of the metaverse and how it is monetized today, as well as the opportunity it presents to conduct business tomorrow. Additionally, we need a robust, secure and resilient infrastructure that allows us to transact, and that also supports the business avenues that come with hyper–financialization, resulting in velocity and veracity of data. We further explore the application of quantum technology in decentralized finance (DeFi).

Quantum Computing Key Terms and Concepts:

- A qubit, or quantum bit, is a minimum amount of processable information, analogous to a bit in classical computing.

- Two crucial properties that make quantum computing powerful and unique are **superposition** and **entanglement**. These two properties could have the ability to perform parallel computation at scale and state representation.

- There are various types of quantum computing models – most notably **digital (quantum) annealing** and **universal quantum computing**. Massive parallel processing (MPP) and application–specific integrated circuit (ASIC) development provide an alternative, but fall short in both capability and economics.

- Classical computing is based on **binary operations** (such as NOT and AND). These are non–reversible, whereas quantum evolution is reversible. While this is an important distinction to achieve parallel computation at scale with various state representations, most applications will need both classical computing and quantum computing.

In the context of exponential finance and cryptography, the preceding properties are important considerations. Most of the financial disciplines that are employed in models include a pattern (deterministic, randomness and distribution mapping) and risk (random and predictable). These computational frameworks fall under three broad categories – optimization, risk and opportunity.

At its core, finance deals with the uncertainty of the future behavior of assets and the tug of war between price (what you pay) and value (what you get). Risk quantifies the probability of actual return, which depends on a distribution of return expressed in volatility. With every increasing variable – and even more with digital assets due to a velocity exponential – quantum computing models can be employed to refine the financial disciplines discussed previously.

Another important framework issue is deploying quantum–resistant cryptography to protect financial infrastructure security and sensitive data, and to deploy cryptographic algorithms that are designed to remain secure with the newfound computational power of quantum computing. This is especially critical and urgent in the context of Web 3.0–induced markets, and financial systems with wallets and private keys as avenues to claim asset and process transactions.

Perspectives

We have taken financial disciplines approach to deconstruct the expansive financial system, better understand the technology limitations of today, and express a perspective on the technology innovations and advancements we need to support the new age requirements of exponential finance. This is in the context of hyper–financialization, with the introduction of tokenized assets and new asset classes that are introduced due to the evolutionary emergence of Web3, as well as the ownership–related economic and financial constructs it potentially creates.

We focus on quantum computing not only to solve computationally challenging problems such as portfolio optimization, asset pricing and financial markets analysis (in this context of exponentially greater asset volumes and velocity). But also as a core foundational technology for security and cryptography for the emerging digital asset infrastructure with embedded cryptography, in terms of the verification and validation systems of transactions and provenance.

Adapting the Workforce from TradFi to DeFi

By Eugene Meintjes
Digital Change, Collateral and Custody Specialist,
State Street Digital®

Industry 4.0—also called the Fourth Industrial Revolution or 4IR – refers to the current era of connectivity, advanced analytics, automation and advanced–manufacturing technology that has been transforming global business for years. As with the steam and electricity industrial phases, in addition to the preliminary automation and machine-engineered industrial revolutions, human curiosity and creativity was—and will remain—the driving force.

According to the World Economic Forum, more than half of the jobs in 2030 will require an understanding of digital technology (i.e., digital literacy). The fastest–growing roles relative to their size today are driven by technology, digitalization and sustainability.

While this sounds overwhelming, using high–tech devices smartly in financial services can lead to higher productivity and improved quality. Same as in your daily life, your perspective of business is unique to you. When you are working in a global demographic workforce, in diverse teams and with various technology providers and clients, it is important that you can encourage cognitive diversity, brainstorm ideas, communicate clearly and collaborate effectively in the digital

age. Perhaps you can even learn to adapt and modify your perspective from time to time depending on the crowd, scenario or challenge. It is true that the interconnectedness in banks internally—and with partners externally—becomes complicated. However, the reward of operational simplification, disintermediation of friction and layers of complexity, "platformification," multi–sided network effects, seamless integration, workflow automation and a truly digital client experience become too important to ignore.

The technology is only half of the 4IR story, and companies need to ensure their workforce is actively upskilling, reskilling and cross–skilling, in addition to hiring new people where necessary.

> **It's not just about our company being better and us being prepared for the future; it's about all of our employees being ready for that future – keeping them at the center, having them highly engaged, all of the reskilling—getting them excited about what the future holds.**

David Goeckeler
Western Digital CEO

Many colleagues working in securities services remember the "analog information age" and huge effort it took to dematerialize securities certificates in the 1990s. This included manually processing coupons and dividends via various intermediary banks then reconciling back to the clients' accounts, managing urgent failing trade settlements at market infrastructure level, cross–border asset safekeeping complexities and the famous fax or telex machines.

During this period of change that spread rapidly across the Web 1.0 to Web 2.0 phases of innovation, people had to learn, adapt and understand how to organize and move this client/financial/transaction data safely, securely and at scale. Back then in the United Kingdom, for example, the quickest way to learn was to put yourself through the Custody, Risk and Regulatory exams run by the UK Banking Regulator. Now, we deal with legacy transition phases—plus Web 3.0 and 4IR phases—and the pace of innovation is rapid. We all have an onus to ensure we

continually learn, relearn, understand and effectively control existing, as well as emerging, known and unknown risks.

It is important to engage your peers or senior leaders when you feel you are at a crossroad with your career, motivation, ambitions, learnings, etc,. I remember consulting my boss in the early 2000s and he asked me: "Do you want to be a number cruncher–focused financial analyst or do you want to be a project– and product–focused business analyst? Or, do you like working in the industry with clients, etc.?" I knew my interests lied broadly across the latter two themes so I went back to school for two years. This was a massive challenge considering it involved part–time classes and a huge time commitment, since I had to manage large banking clients during the credit crunch and "the collapse of Lehman Brothers".

This whole market episode led to a raft of regulations focused on banking trust, asset safety, investor protection, market infrastructure

soundness, settlement efficiencies, cash liquidity and collateral optimization. However, it also accelerated digitization and digitalization. The learning curve and hunger to improve should not be underestimated, since the experience gained by folks in the financial industry, especially during these market volatility or stress scenarios, remains critical for transformation.

While digitization refers to the act of making analog information digital, digitalization is all about moving existing processes into digital technologies. Digitization is for information, whereas digitalization is for processes. This obviously takes critical thinking and analysis, leadership and skill, since there is no perfect blueprint for large organizations to drive digital transformation programs 100 percent successfully.

Every external consultant will tell you they have the perfect plan. But to be honest, every financial institution executes in their own agile way, as it requires a precarious balance of culture, cost–benefit and risk–reward elements to get the timing right. Making, or rather, enabling trade–off decisions when it comes to retiring legacy systems, or building (versus joining) a platform, becomes a critical consideration when deciding to modernize or rip–and–replace pieces of the convoluted technology stack. Bringing together these facts and figures, breaking down complexity, plus enabling data–informed actions, is a valuable skillset.

There is a general opinion that financial institutions are evolving into technology companies that provide banking services.

Thus, various ecosystem players will move faster than others once they have the skilled workforce to do so. It also takes personal desire, drive and motivation to keep learning. Today, we are all engaged in some form of digitization or digitalization aspects, whether it be client, product or operations-focused. Hence, to be a part of the fast–moving digital journey will take some continued learning on the job, plus internal or external curriculums.

Putting together risk management, regulations and governance, information management, data optimization, process simplification, workflow automation, legacy and futuristic systems, ecosystem interoperability and platform scalability etc,. plus aligning this with client needs for quicker decision-making is crucial. If we simplify this from a career development perspective, then people have a great opportunity to be creative, solve problems and create new value for their clients.

As technology is at the front and center, the real recognition happens when we continually improve and accelerate this qualification, quantification and execution. Parallelly, we must also consider and manage the gap between traditional–to–digital successfully amongst people, processes and technology.

I could have used ChatGPT to write this article faster, but I did not use the chatbot today. However, I think educational programs will benefit greatly from these advancements in the future. Implementing and leveraging such tools for personal benefit, as well as your employer's, will require skill.

Section 3

The Regulatory Landscape for Digital Payment Rails

Stablecoins and CBDC

By Justin McCormack

Senior Vice President and
Head of Legal, State Street Digital®

As the storm clouds from the crypto winter start to break and calmer weather takes hold with an increased industry focus on tokenization, renewed focus is emerging on how to structure the payment leg of tokenized asset transactions. In these discussions, stablecoins and central bank digital currencies (CBDCs) are often identified as potential solutions.

While seemingly straightforward, it quickly becomes apparent that there is wide variation in the types of instruments and related arrangements included in those terms, and that the particular structure of the stablecoin or CBDC can have significant impact on its potential usefulness as a payment mechanism.

In this article, we begin with a general description of what stablecoins and CBDCs are, and then discuss the regulatory considerations and developments for each, the focus of which is to ensure financial stability while enabling growth of the tokenization markets.

What Are the Digital Payment Rails?

The digital payment rails for tokenized assts typically involve use of either a stablecoin or a CBDC.

Stablecoins
A Commercial Invention for Payments

While a single agreed definition of the term "stablecoin" does not exist, it generally refers to a digital asset that seeks to maintain a pre-determined stable value (e.g., $1 USD) such that it can be used as a means of payment or store of value. According to the Financial Stability Board, stablecoins typically have two characteristics that distinguish them from other digital assets: (i) a stabilization mechanism and (ii) a specific combination of multiple functions and activities.[1]

- **Stabilization mechanism.** The most common stabilization mechanisms are asset-linked and algorithmic. Asset-linked mechanisms are those where a pool of reserve assets is used to maintain the claimed stable value. Algorithmic mechanisms "attempt to maintain a stable value via protocols that provide for the increase or decrease of the supply of stablecoins in response to changes in demand."[2]

- **Combination of functions and activities.** Stablecoins arrangements seek to provide the following functions: (i) issuance, redemption and stabilization of the value of the coins; (ii) transfer of coins; and (iii) interaction with coin users for storing and exchanging coins.[3] This third function is one aspect that differentiates asset-backed stablecoins from money market funds.

Some commentators view tokenized deposits as a version of a stablecoin, but there are meaningful differences. As noted by the Bank for International Settlements, a key aspect of our financial system is the "singleness of money," highlighting that "[s]ingleness ensures that monetary exchange is not subject to fluctuating exchange rates between different forms of money, whether they be privately issued money (e.g., deposits) or publicly issued money (e.g., cash)."[4] Asset-referenced stablecoins are essentially bearer instruments in which the holder of the instrument has a claim against the issuer of the coin for redemption from the pool of reserve assets.

The value of that claim can fluctuate based on the level of confidence that any redemption request will be honored. By contrast, a tokenized deposit model would involve a bank issuing a token to a customer, representing a traditional deposit liability against the bank. Where tokenized deposits are used to settle a transaction, the payor would have their deposit tokens burned by its financial institution, the receiver would have a corresponding amount of deposit tokens burned by its financial institution, and the accounts of each financial institution holding fiat currency (which may be a CBDC) at the central bank would be debited and credited accordingly.

In essence, this process mimics the existing intermediated financial model in place today, but could facilitate atomic (or near-atomic) settlement to the extent that the central bank money was in the form of a CBDC or otherwise supported instantaneous settlement, such as in the case of the recently introduced FedNow system in the United States.

Central Bank Digital Currencies
Cash by Another Name

A central bank digital currency is a digital form of a government-issued fiat currency. It is not backed by a specific commodity, but rather is backed by the full faith and credit of the government issuing the currency through its central bank. As such, it reflects a direct claim on the issuing government. Two commonly discussed models for implementing a CBDC are retail CBDCs and wholesale CBDCs.

In a retail CBDC model, the CBDC would be directly available to retail consumers, either through an account held at the issuing central bank, such as in the case of DCash in the Eastern Caribbean Currency Union, or through a financial institution authorized by the central bank to maintain CBDC accounts for its customers, such as in the case of China's e-CNY.[5] Alternatively, in a wholesale CBDC model, the central bank would only issue CBDCs to, and hold accounts for, financial institutions, where the purpose of the CBDC would be to facilitate interbank settlements.

$3.3B

Amount of reserves of a popular stablecoin held at Silicon Valley Bank upon its implosion

Developing a Regulatory Approach to Ensure the Responsible Development of Stablecoins and Maintain Financial Stability

Identifying the appropriate regulatory framework for stablecoins starts by understanding the potential risks they present. The Financial Stability Board identified a number of these risks in a July 2023 report titled "*High-level Recommendations for the Regulation, Supervision and Oversight of Global Stablecoin Arrangements.*"[6] For example, the FSB notes that asset-backed stablecoin arrangements give rise to a number of risks, such as market, liquidity and credit risks.

As the stablecoin represents a claim on the reserve assets, there is market risk associated with the potential variations in values of the underlying instruments comprising the reserve assets. This risk manifested itself in the case of USDC during the banking crisis earlier in 2023. USDC seeks to maintain a stable $1 USD value by maintaining an equivalent pool of reserve assets of cash and liquid investments. While the market's confidence in USDC and the underlying reserves has generally allowed it to maintain its $1 USD stable value, this confidence was rocked in connection with the implosion of Silicon Valley Bank earlier this year. When Circle reported that it held $3.3 billion, or more than 7%, of its reserves as deposits at SVB,[7] USDC broke its $1 USD peg until the federal government stepped in to guarantee all deposits at SVB.

Liquidity risk for stablecoins can manifest itself when there is a run on the stablecoin (i.e., a significant, simultaneous demand for redemption of the stablecoin) where the invested reserve assets either cannot be sold or may only be sold at significant discounts such that the reserve assets are no longer sufficient to immediately redeem all outstanding stablecoins.

In the case of an algorithmic stablecoin, this can take the form of the algorithm not properly functioning in times of market stress. In either scenario, this can quickly lead to a downward spiral in market valuation of the coins. One of the most notorious algorithmic stablecoins that succumbed to this risk was TerraUSD (UST).

UST sought to maintain a $1 USD stable value based on an algorithmic relationship with its companion coin, Luna. One dollar worth of Luna could always be converted for one UST. In connection with each swap, a percentage of Luna was permanently destroyed, or burned, increasing its scarcity. Thus, arbitrage opportunities based on the value of UST and the fixed conversion price of Luna were designed to keep UST at a value of $1 USD.[8] In May 2022, however, a loss of confidence in Luna and UST led to a flight out of the coins, leading to a dramatic downward spiral in the value of both UST and Luna over the course of a few days.[9]

Finally, a stablecoin holder is subject to counterparty risk of the issuer of the stablecoin with respect to their management of the stablecoin reserves. In response to this risk, a number of stablecoin operators have started to produce "proof of reserves" purporting to demonstrate the existence and sufficiency of the reserve assets held.

In an effort to mitigate these risks, the Financial Stability Board provided a number of high-level recommendations for regulatory oversight and supervision of stablecoins in their July 2023 report. This included the need for comprehensive regulatory powers to supervise and oversee these arrangements, using a "same activity, same risk, same rules" approach, the need for global regulators to cooperate and coordinate in their regulatory approaches, particularly in the case of cross-border usage, the need for strong governance requirements, the need for appropriate risk management frameworks, particularly as it relates to reserve management, operational resilience, anti-money laundering and cyber security safeguards, and the need for comprehensive and transparent disclosure regarding the operation of the stablecoin arrangement, include legal clarity on redemption and enforceability of rights.[10] Further, the report clarifies that algorithmic stablecoins would not satisfy the FSB's recommendation for a stablecoin to have an "effective stabilization method."[11]

Since the Financial Stability Board issued their original stablecoin report in October 2020, a number of jurisdictions have taken steps to enhance their regulatory frameworks by seeking to ensure that stablecoin issuers are acting in a safe and sound manner.

United States   **European Union**   **Japan**

Singapore
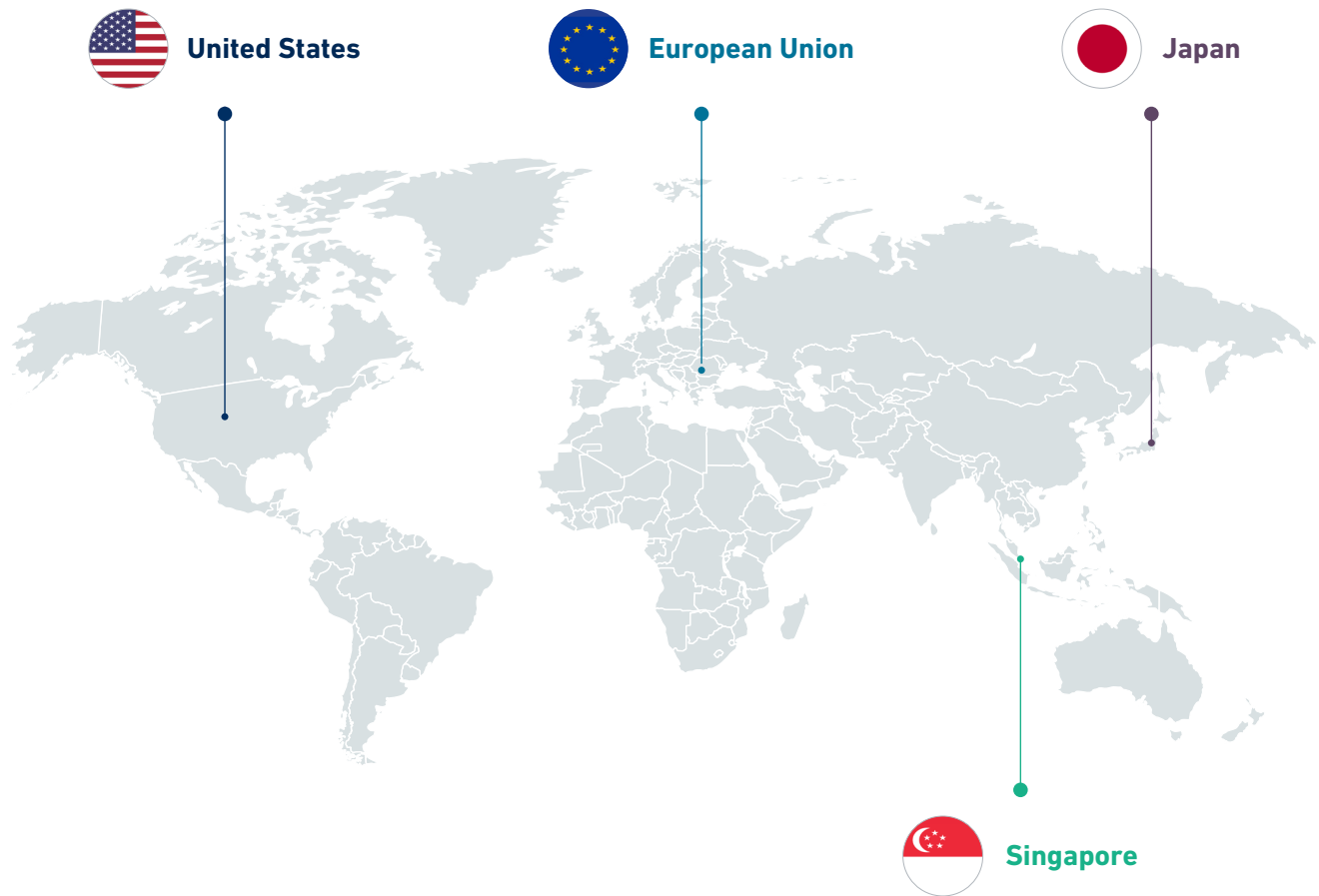
Japan

In June 2023, the regulatory framework for stablecoins adopted by Japan one year prior became effective. This framework requires that the stablecoins be linked to a fiat currency and guarantee redemption at par, and limits issuers to licensed banks, registered money transfer agents and trust companies[12]. Recent reports indicate that at least one large Japanese financial institution is in discussions with established stablecoin issuers to use its blockchain platform to mint stablecoins, which would be governed under the new law.[13] Leveraging this regulatory framework could help bolster confidence in stablecoins issued under its remit, helping them gain broader market acceptance.

European Union

The European Union has recently adopted the Markets in Crypto Assets Regulation (MiCA),[14] which contains a comprehensive regulatory framework for stablecoins, referred to as either asset-referenced tokens, which seek to maintain a stable value by referencing multiple fiat currencies, commodities or other crypto assets, and electronic money (e-money) tokens, which seek to maintain a stable value by referencing a single fiat currency. Algorithmic stablecoins are not permitted. MiCA subjects issuers of asset-referenced tokens and e-money tokens to more stringent requirements than issuers of other crypto assets in recognition of the increased consumer protection and market integrity risks they pose.[15]

These requirements include the obligation to maintain reserves to fully back the stablecoins, to properly manage the reserves in accordance with specified standards — including investment restrictions, segregation requirements and the requirement to hold the assets at a credit institution — and to maintain a separate buffer of highly liquid proprietary capital (referred to as "own funds") based on the value of the coins in circulation. In addition, these stablecoins must be redeemable at face value in the referenced currency at any time. Finally, in the case of e-money tokens, the issuers can only be credit institutions or authorized electronic money institutions, and in the case of asset-referenced tokens, the issuers must be authorized to issue the coins prior to any issuance. Further heightened standards apply to stablecoins that are deemed "significant" by the European Banking Authority.

Singapore

The Monetary Authority of Singapore (MAS) conducted a consultation on stablecoins[16] and, following receipt of public comments, announced its intention to publish feedback by the middle of this year. In the consultation, the MAS proposed the creation of a new regulated activity of "stablecoin issuance service" focusing on single currency stablecoins, similar to the model adopted in Japan. The MAS differentiated stablecoins from e-money on the basis that stablecoins can be transferred on a peer-to-peer basis in contrast to a direct account-based relationship with the issuer for e-money under Singapore law. The consultation contemplated that single currency stablecoins could be issued both by banks and non-banks, although non-banks would need to be separately regulated as either a standard payment institution or a major payment institution, based on the value of stablecoins in circulation.
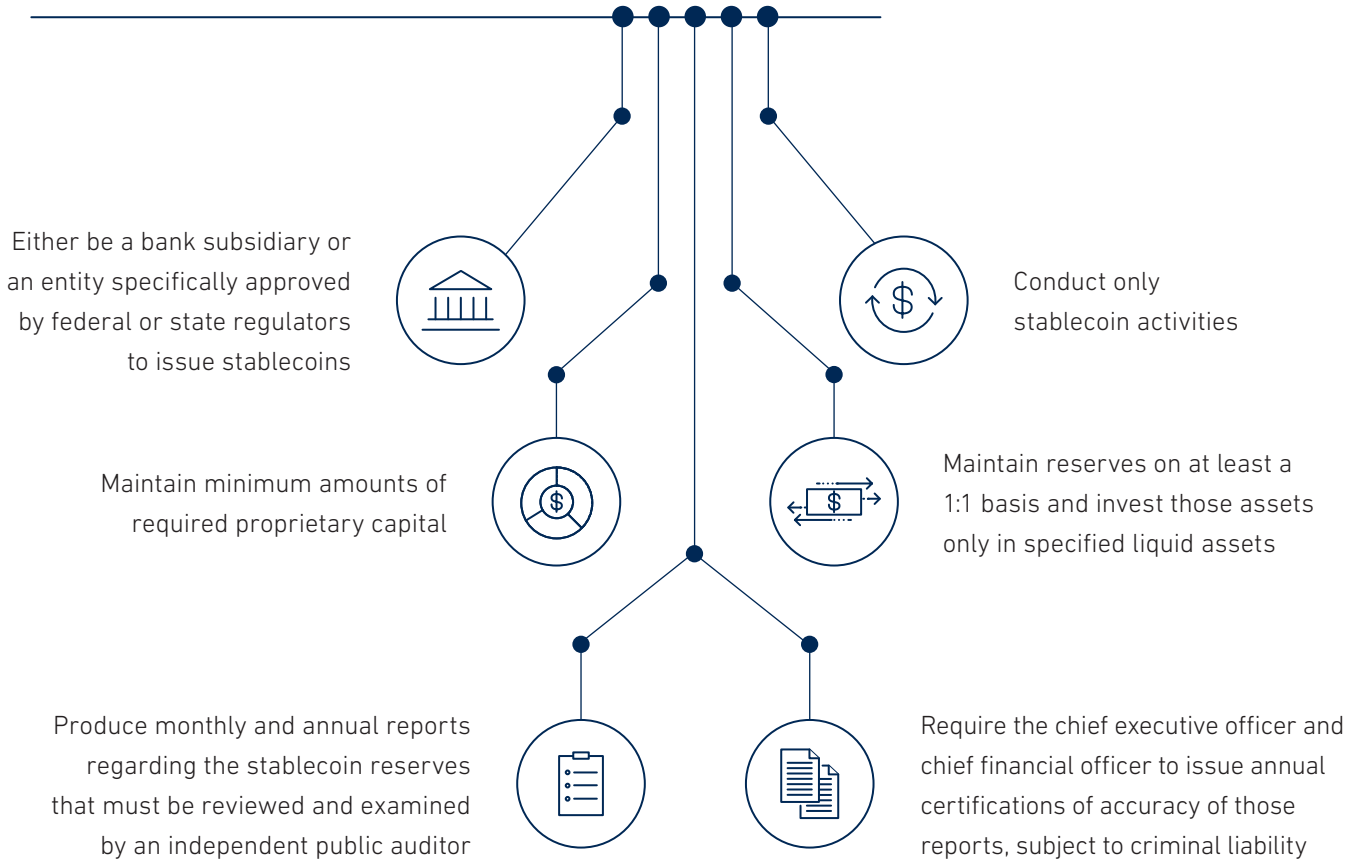
Similar to MiCA, the MAS consultation contemplated imposing:

1. Reserve Asset Requirements
2. Timely Redemption Requirements
3. Own Capital Requirements
4. Anti–Money Laundering Requirements
5. Cyber Risk Management Requirements

United States

The chairman of the United States House Financial Services Committee unveiled a draft stablecoin bill on June 8, 2023 that, unlike some earlier drafts released, appears to reflect bipartisan support.[17] The bill contemplates the U.S. Federal Reserve as the primary regulator for stablecoin issuers, although still permitting state regulators to have certain oversight responsibilities.

Key aspects of the bill would require stablecoin issuers to:

Either be a bank subsidiary or an entity specifically approved by federal or state regulators to issue stablecoins

Conduct only stablecoin activities

Maintain minimum amounts of required proprietary capital

Maintain reserves on at least a 1:1 basis and invest those assets only in specified liquid assets

Produce monthly and annual reports regarding the stablecoin reserves that must be reviewed and examined by an independent public auditor

Require the chief executive officer and chief financial officer to issue annual certifications of accuracy of those reports, subject to criminal liability

Finally, the bill would prohibit the issuance of any algorithmic or crypto-asset-backed stablecoins (which are collectively referred to as "endogenously collateralized" stablecoins in the draft bill) for two years from the effective date of the Act while the Treasury conducted a study on such coins. While this bill will almost certainly be modified as it makes its way through the legislative process and there is no guarantee that it will ultimately be adopted, its bipartisan nature demonstrates that it is one of the few areas where consensus may be achieved.

Regulatory Interest in CBDCs Is High, But Adoption Remains Low

While the regulatory framework for stablecoins is progressing at pace, the situation for CBDCs is more measured, and is largely focused on the research phase. The Bank for International Settlements, through its BIS Innovation Hub, has championed numerous research initiatives involving both wholesale and retail CBDCs.

Much of the work has been done in conjunction with both central banks and private sector banks, such as Project Jura, which explored the cross-border transfer of euro and Swiss franc wholesale CBDCs between French and Swiss commercial banks on a third-party-operated distributed ledger technology platform.[18] In May 2023, the Bank for International Settlements, along with a working group of six central banks,[19] published a paper summarizing policy perspectives on the issuance of CBDCs.[20] While the members of the working group have, and are continuing, to research both retail and wholesale CBDCs, to date none have launched a CBDC. As they continue their research, though, they provide some guidance for central banks considering the topic. Interestingly, they note that "the use of blockchain technology within CBDC systems remains a possibility, although it is not deemed essential to the functioning of a potential CBDC system."[21] While certain aspects of blockchain technology, such as enabling programmability or micro payments, may be helpful, the trustless validation model can be unnecessary and introduce inefficiencies given that there is only a single trusted issuer: the central bank.[22]

From a legal perspective, the working group noted that central banks contemplating issuing a CBDC should consider:

The legal classification of a CBDC, particularly in a retail CBDC context

The authority of the central bank to issue a CBDC

The concepts of settlement and payment finality, particularly in a retail CBDC system

Anti−money laundering and competition law issues[23]

Non−resident access to a CBDC

Data governance and privacy
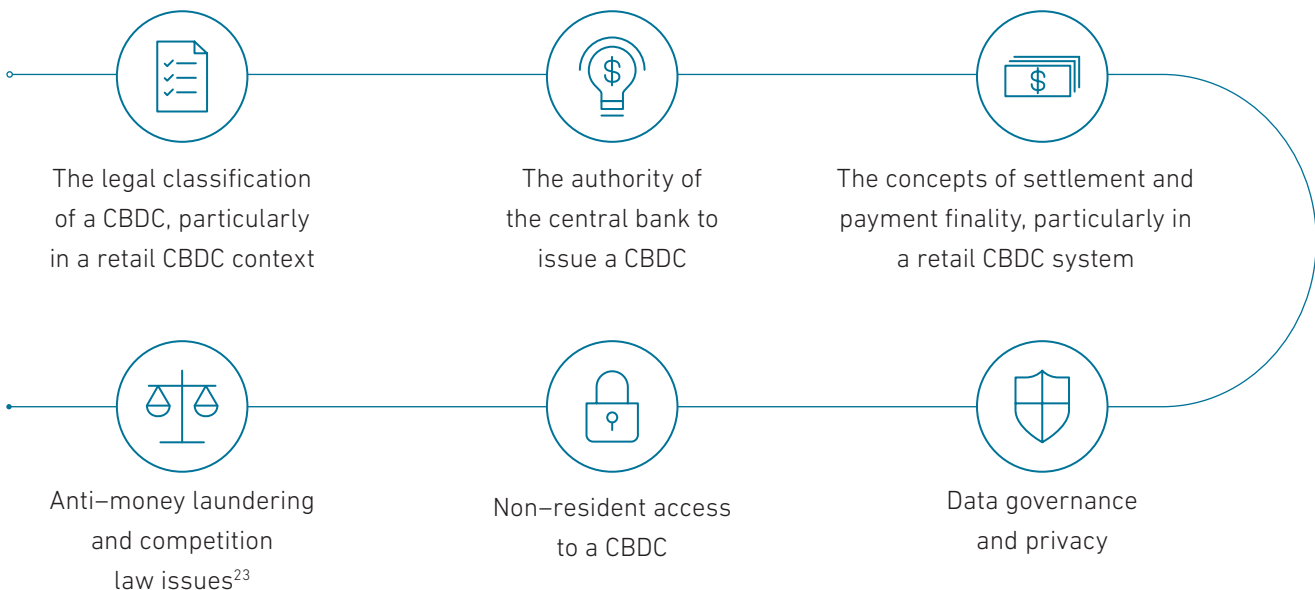
More specifically, they note that jurisdictions will need to consider whether they want to legally classify a retail CBDC as cash, a deposit or a new type of instrument, the decision of which would likely impact questions around legal finality of payments and settlements.

The working group also notes that central banks need to carefully consider the implementation of a CBDC model, including potential consideration of quantity holding limits or fee-based mechanisms, to protect against potentially harmful levels of disintermediation. This could impact available levels of credit in the financial system, as well as retain functionality, enabling the central banks to conduct monetary policy activities in stressed market scenarios.

According to the Central Bank Digital Currency Tracker published by the Atlantic Council,[24] over 110 jurisdictions are either evaluating, conducting pilots or have launched CBDCs. The vast majority of these jurisdictions are still in the researching phase, but four jurisdictions have actually launched CBDCs, all of which are retail focused: Jamaica (JAM-DEX), The Bahamas (Sand Dollar), Nigeria (e-naira) and the Eastern Caribbean Currency Union, which comprises eight Eastern Caribbean island nations

(DCash). Increasing financial inclusion and reducing costs have been important drivers in the launch of these instruments. For more widely used currencies, however, the focus on wholesale CBDCs has been growing. BIS and the working group note that "compared with today's central bank reserves, wholesale CBDC might enable programmability, composability and tokenization within the future financial system."

Increasing Regulatory Supervision Over the Digital Payment Rails Should Build Confidence and Help Facilitate the Advancement of Tokenization Initiatives

As described above, regulatory interest in both stablecoins and CBDCs is high and progress is being made, particularly in the case of stablecoins. The fact that regulatory developments for stablecoins are progressing with more speed is not surprising, given that they already exist in the market, and regulation is largely viewed as necessary to ensure their continued operation and growth in a way that maximizes consumer protection and financial stability. Enhanced regulatory supervision over these digital payment rails should help build market confidence in the instruments, thereby helping to facilitate the continued development of tokenization of real world assets.

Section 4

Crypto Markets Update

Long–Term Investors Stay Away Despite a Good Month

By Michael Metcalfe
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Bitcoin continues to recover ground lost during last year's crypto bloodbath, gaining 10 percent in June, having now retraced approximately 25 percent of its peak–to–trough decline.

This marks a sharp outperformance versus other major asset classes and added approximately 60 basis points (bps) of incremental return to a diversified portfolio (Figure 1).

However, the flow–based drivers of Bitcoin's performance are perhaps grounds for caution.

Figure 1: A Good Month – But Underperforming Equities
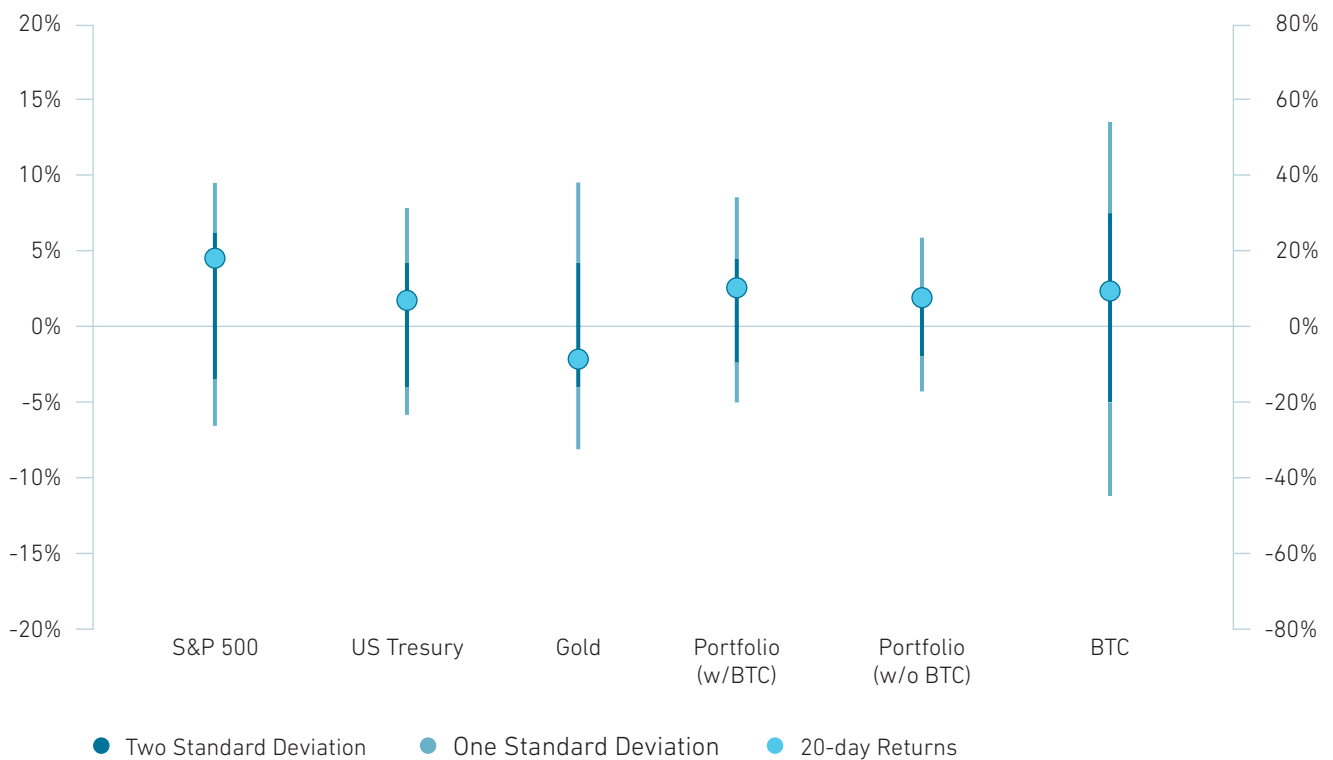
Source: State Street Global Markets, Bloomberg

Aggregate flows, as captured in data from Glassnode, suggest aggregate inflows in the first six months of the year were modest, when compared to investor interest in equities and fixed income (Figure 2). Indeed, outside of brief and shallow periods of inflows in mid–April of 2021 and 2022 respectively, aggregate interest has been flat-to-negative for the last 18 months.

Figure 2: Net Inflows, USD (Billions) Four–Week Rolling Average
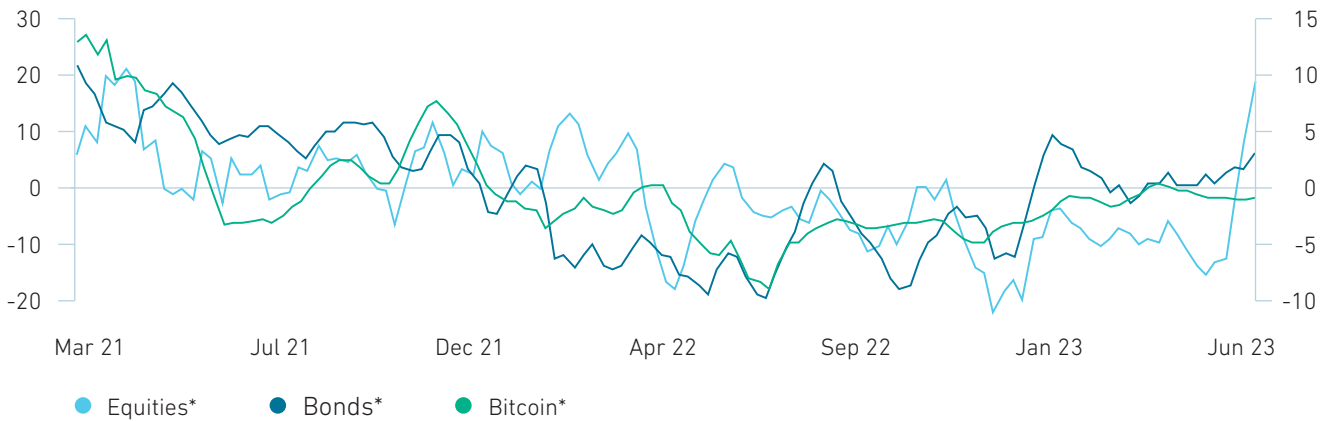
Source: State Street Global Markets, , *ICI, ** Glassnode

The flows of long– and short–term focused investors cloud the outlook even further. Looking at the monthly change in illiquid holdings of Bitcoin, which we proxy to be an estimate of flow of longer–horizon holdings of cryptocurrency, we can see that none of the recent gains were driven by these presumably steadier hands (Figure 3).

Figure 3: Long–Term Flows Into Bitcoin
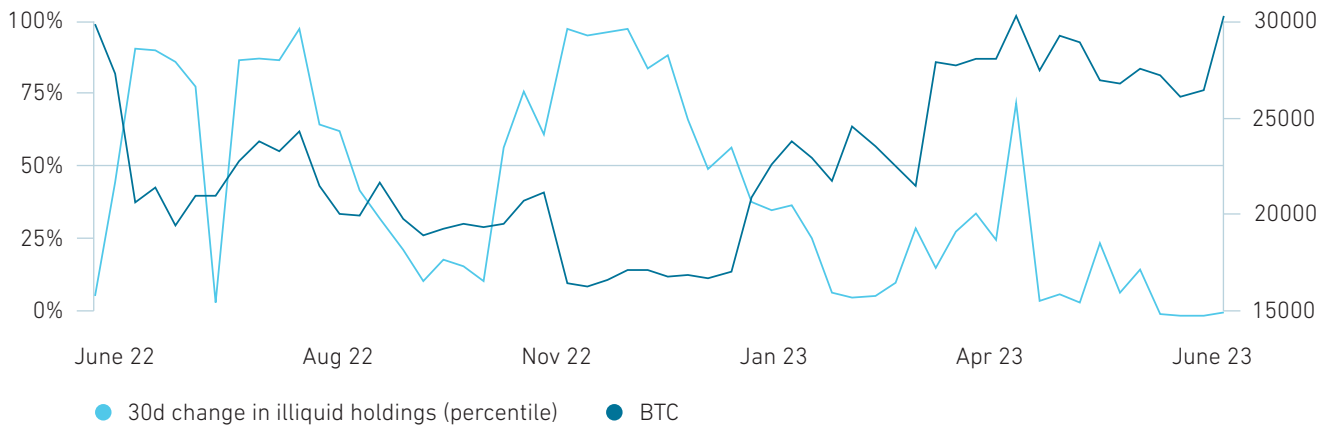
Source: State Street Global Markets, Glassnode

Almost the entirety of Bitcoin's recovery since January has come with this flow estimate biased to position reduction, with the most recent read of their flows at the lows of the last year.

The change in short–term holder positions, capturing more of a speculative element, provides the best explanation for price action (Figure 4).

Figure 4: Short–Term Inflows, A Bit More Attention

Change in Short-Term Holdings
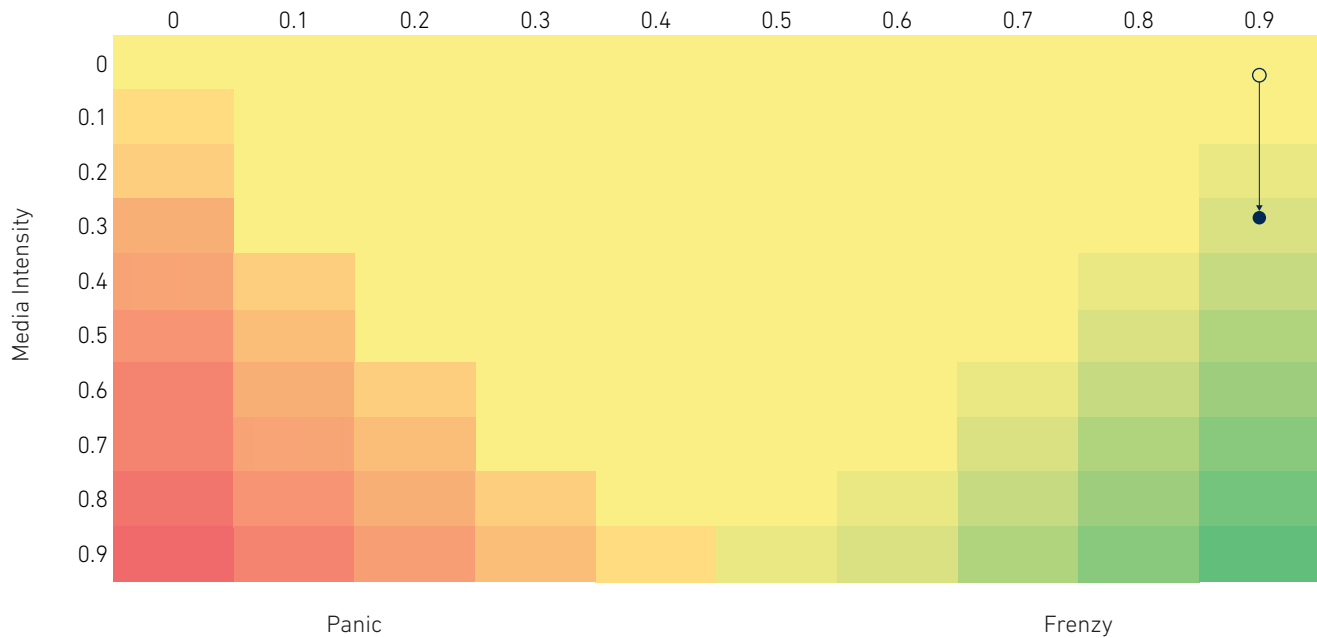
The change in positions of these momentum–focused buyers has not garnered much attention in the financial media. However, this latter factor is now changing — perhaps allowing for further gains — if more nimble investors adopt this trend, as it is worth nothing that Bitcoin's performance is currently driven by speculative elements, rather than committed investors.

Glossary

- **Bitcoin:** A decentralized digital cryptocurrency, with the token issued 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

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

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

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

- **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 a central government

- **Decentralized Finance (DeFi):** Distributed ledger technology-based financial services without traditional intermediaries and central authorities

- **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

- **Distributed Ledger Technology (DLT):** A system of record that is shared and stored across a network of participants such as a blockchain

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

- **Fourth Industrial Revolution (AKA, 4IR or Industry 4.0):** AKA 4IR or Industry 4.0. The current age of automation and interconnectedness in business.

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

- **Layer 1 Systems :** A base network and its underlying infrastructure that can validate and finalize transactions without the need for another network

- **Nonfungible Tokens (NFT):** 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

- **Quantum Computing (AKA, parallel computing):** In this computational model, traditional chips are replaced by ones capable of more than just binary chains of logic and instruction. A nascent technology, it has the potential to vastly increase computer processing speeds.

- **Smart Contract:** A dynamic, open-ended mechanism that provides 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

- **Tokenomic:** An analysis of the fundamental characteristics governing a token's utility and value

- **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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