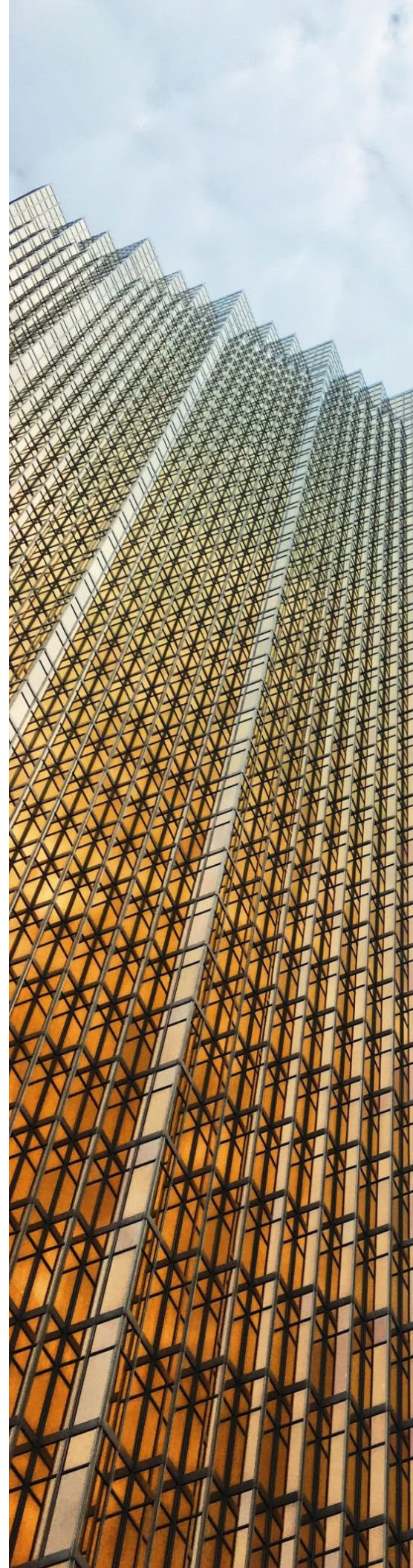


2023 Crypto Market Outlook

December 2022



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A note from the author

The dramatic events of 2022 will shape the crypto landscape for years to come.

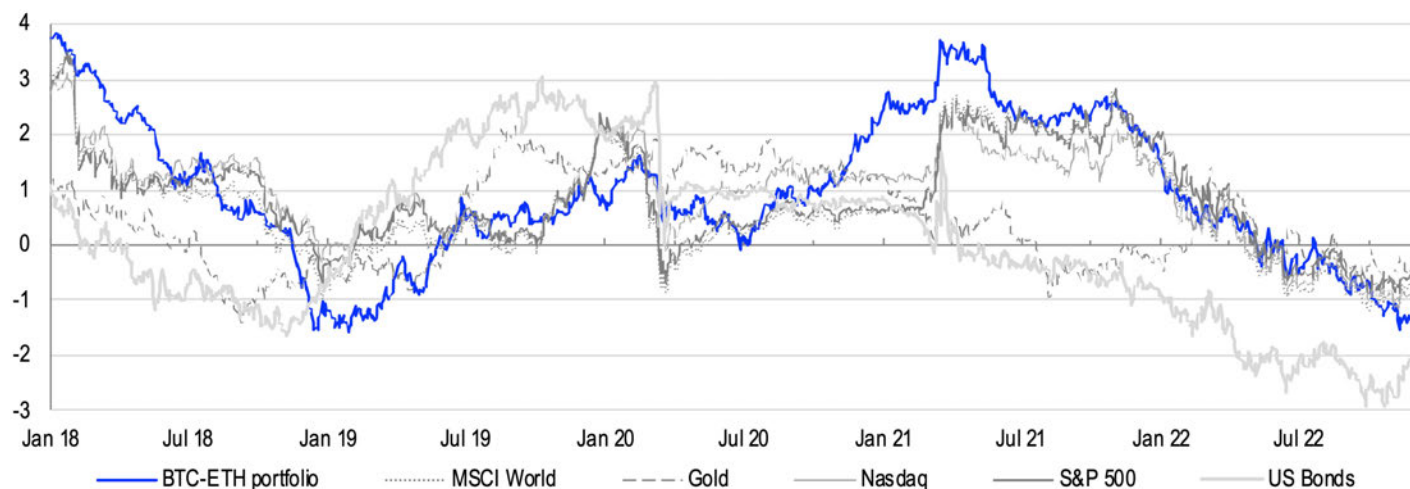
Yet, despite the uncertainty surrounding the potential fallout, there are important characteristics that distinguish this market from the previous crypto winter. For one, institutional crypto adoption remains firmly entrenched. Many investors take a long-term perspective and recognize the cyclical nature of these markets. Rather than stepping back, they are using this environment to hone their knowledge and build the infrastructure to prepare for the future.

But no one is arguing that digital assets haven't faced an important setback. The total market capitalization of cryptocurrencies is currently around US\$835 billion, down 62% from \$2.2 trillion at the end of 2021, albeit still

high relative to most of the asset class' history. Comparatively, the Nasdaq is down 30% since the end of 2021 and the S&P 500 down 18%.

From a Sharpe ratio perspective however, crypto's risk-adjusted return actually performed in line with US and global stock indices through 2022 and did much better than US bonds. Prior to the fallout in November, an equally-weighted basket of BTC and ETH offered a negative Sharpe ratio of 1.08 compared to an average negative return of 0.90 for US stocks. This is a significant deviation from the trend observed in the last crypto winter, when digital assets underperformed nearly all traditional risk assets for the duration of 2019 and into early 2020.

Chart 1. Rolling 1y Sharpe ratio



Sources: IEX Cloud and Coinbase.

The differences between these periods may also be observed in the prospective fallout from the latest crypto downturn. For instance, we expect greater calls for regulatory clarity to emerge, as institutional investors push for better governance and standards to help make the asset class more accessible, safer, and easier for all to navigate. This will take time, however, as the industry puts lessons about systemic deficiencies in the right context and applies the necessary risk controls to protect its customers.

Looking ahead, we believe the evolution of the crypto ecosystem is putting subjects like tokenization, permissioned DeFi, and web3 front and center. Meanwhile, bitcoin's core investment thesis remains intact, while Ethereum seems to be outpacing its layer-1 competition in terms of network activity.

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Additional resources

This report is part of our efforts to provide applicable market intelligence to our institutional clients, highlighting updates on our institutional practice in long-form format. We encourage readers to visit and subscribe to our team's other publications to stay up to date:

- [Institutional Research and Insights website](#)
- [Coinbase blog](#)
- [Coinbase Institutional LinkedIn account](#)
- [Weekly market update with our trading desk](#)

We are seeing a greater variety of use cases for non-fungible tokens outside of art, like using NFTs to certify and authenticate real-world assets or as ENS domain names. Stablecoins are now one of the largest sectors in the crypto ecosystem with an outsized role in storing and transferring wealth.

We discuss these trends and many more in the enclosed report, starting with the key themes we expect in 2023. If you have questions about our work or want to understand how Coinbase's institutional practice can help your firm engage with the crypto markets, please contact us at institutional.coinbase.com.

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CHAPTER ONE

Key themes for 2023

The constant stop-and-start pattern of financial markets in recent months has made it difficult for allocators to deploy capital in a meaningful way for most asset classes. But for crypto in particular, the insolvencies and deleveraging events of 2022 have culminated in a confidence crunch that we believe could extend the downcycle for at least several more months. Constraints on liquidity may also disrupt normal market operations in the short-term as many institutional entities reckon with assets being locked up in FTX's bankruptcy proceedings.

However, it is not all bad news. This environment has helped cryptocurrencies pull back from their speculative fervor and paves the way for new innovations in the asset class.

Against this backdrop, we expect three key themes to prevail in 2023:

1. A flight to quality among institutional investors
2. Creative destruction that will eventually lead to new opportunities
3. Foundational reforms that usher in the next cycle

Below, we outline those themes, as well as the trends that we expect will drive each of those ideas forward in the year ahead.



Market Insight

The high, positive correlation between cryptocurrencies like BTC and ETH versus US stocks garnered significant attention in 2022, but the coefficients have been trending lower since May. Moreover, digital assets exhibit a low correlation with other traditional financial assets including commodities and bonds. Below we look at the correlation matrix of select variables based on a one-year history (Nov 30, 2021 to Dec 1, 2022) of daily returns.

Chart 2. Correlation matrix (1Y window)

	BTC	ETH	Copper	CPI 2y	Comdty	DXY	Gold	MOVE	S&P500	US 10Y	US Bond	VIX
BTC	1.00	0.89	0.15	0.11	0.17	-0.32	0.12	-0.19	0.58	-0.07	0.19	-0.47
ETH	0.89	1.00	0.21	0.12	0.19	-0.31	0.13	-0.23	0.57	-0.04	0.16	-0.49
Copper	0.15	0.21	1.00	0.25	0.60	-0.46	0.48	-0.20	0.24	-0.06	0.10	-0.20
CPI 2y	0.11	0.12	0.25	1.00	0.57	-0.08	0.35	0.10	0.11	0.06	-0.09	-0.04
Comdty	0.17	0.19	0.60	0.57	1.00	-0.26	0.51	-0.02	0.15	-0.04	0.04	-0.13
DXY	-0.32	-0.31	-0.46	-0.08	-0.26	1.00	-0.49	0.42	-0.47	0.27	-0.38	0.35
Gold	0.12	0.13	0.48	0.35	0.51	-0.49	1.00	-0.14	0.18	-0.46	0.46	-0.10
MOVE	-0.19	-0.23	-0.20	0.10	-0.02	0.42	-0.14	1.00	-0.28	0.23	-0.33	0.36
S&P500	0.58	0.57	0.24	0.11	0.15	-0.47	0.18	-0.28	1.00	-0.17	0.31	-0.78
US 10Y	-0.07	-0.04	-0.06	0.06	-0.04	0.27	-0.46	0.23	-0.17	1.00	-0.94	0.08
US Bond	0.19	0.16	0.10	-0.09	0.04	-0.38	0.46	-0.33	0.31	-0.94	1.00	-0.22
VIX	-0.47	-0.49	-0.20	-0.04	-0.13	0.35	-0.10	0.36	-0.78	0.08	-0.22	1.00

Notes: CPI 2y is implied breakeven inflation based on 2y rates; Comdty is the Reuters/CoreCommodity CRB Index; DXY is the multilateral USD Index; US 10Y is the US 10Y Treasury; US Bond is the S&P US Aggregate Bond Index.

Sources: Bloomberg and Coinbase.

1. Flight to quality

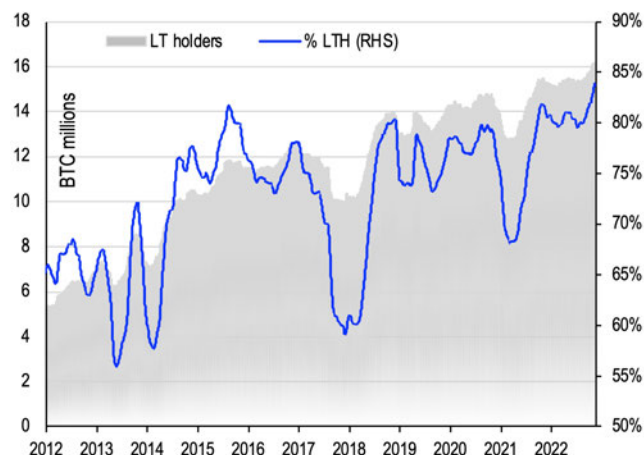
Digital asset selection to favor higher-quality tokens

Institutional investors have already scaled back their capital deployment to most risk assets in 2H22 due to rising interest rates, high inflation, and weak equity earnings. That retrenchment was happening even amid assumptions that a future recession in the United States (US) could be mild. Expectations on recession timing span from early 2Q23 to as late as 1Q24, as stimulus-backed reserve buffers and a still sizable number of job openings reinforce the economic data.

Within crypto, we expect digital asset selection will transition towards higher-quality names like bitcoin and ether based on factors like sustainable tokenomics, the maturity of respective ecosystems, and relative market liquidity. Moreover, many traditional risk assets still seem rich, and the investment theses for cryptocurrencies like BTC and ETH have not fundamentally changed in our view, which could eventually open up some key value opportunities. That said, we assign a low probability to the chances that crypto performance will decouple from traditional risk assets in the first few months of 2023, particularly without a differentiated catalyst.

We expect digital asset selection will transition towards higher-quality names like bitcoin and ether based on factors like sustainable tokenomics, the maturity of respective ecosystems, and relative market liquidity.

Chart 3. Long-term holders of BTC at 85%



Source: Coinbase.

Reinforcing the ETH narrative

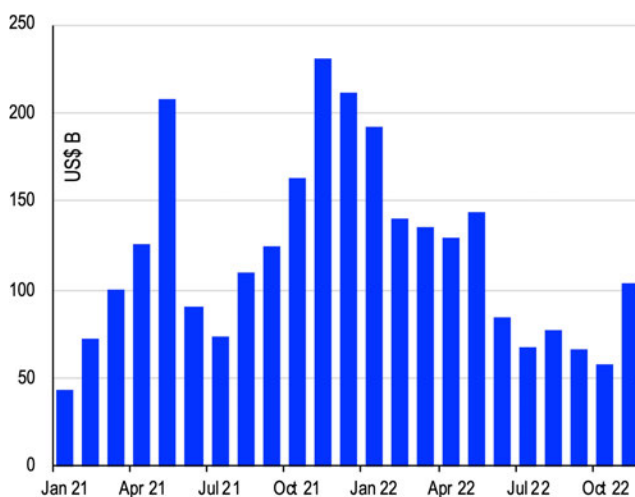
With the recent proliferation of alternative layer-1 blockchains, the marketplace for L1s has become saturated, leading many in the crypto community to question the need for additional blockspace. Ethereum’s successful Merge of its consensus and execution layers in September 2022 has also strengthened the case for ambitious future upgrades, despite the trend towards long-term core protocol ossification.¹ In our view, this supports the fundamental narrative for Ethereum as a leader in a multichain world, particularly since nearly all networks are competing for the same pool of users and capital.² Some chains/ecosystems are doing better than others, and we believe user and developer activity will aggregate to a smaller number of chains in 2023 compared to 2022. However, Ethereum’s dominance could still be challenged in other ways, as the network relies on layer-2 scaling solutions to extend its blockspace, which have their own set of risks.³ This includes centralized sequencers, a lack of fraud proofs, and a lack of cross L2 interoperability, to name a few.

Growth of a decentralized future

The movement towards self-custody and decentralized finance (DeFi) protocols (i.e. decentralized exchanges or DEXs) will likely accelerate after the developments in 4Q22. Many industry players believe that the transgressions in the crypto space in 2022 were concentrated among CeFi (centralized finance) or CeDeFi (a combination of both CeFi and DeFi) entities, such as Celsius, Three Arrows Capital (3AC), and FTX. Mainly, the actions of these bad actors come down to issues of trust and transparency, which DeFi has historically

handled well given its on-chain, auditable properties. Of course, DeFi comes with its own risks like smart contract exploits, which could put more scrutiny on how different decentralized applications are managing their protocol risks. Also, rules-based margining embodied in smart contracts needs to account for the fact that the volatility of certain digital assets can be anywhere between 50-200%, while control of the token supply is not always clear, thus affecting their true liquidity.

Chart 4. Monthly volumes across all DEXs



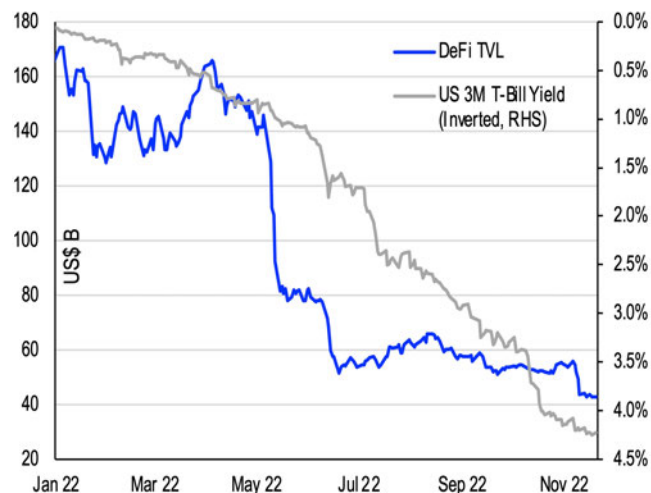
Source: DeFiLlama.

More interest in permissioned DeFi

Overall activity in DeFi retreated from a peak of \$180B in total value locked in December 2021 to \$42B at the end of November 2022. Although this is primarily due to the deleveraging associated with the collapse of centralized crypto lenders like Celsius, relative yields in DeFi from borrowing and lending have fallen behind ostensibly risk-free rates in traditional finance (e.g. US Treasury bills). Consequently, we may have seen an end to the hyper-optimization of yield-seeking behavior by crypto native users, at least for now. In our view, this could be a precursor to seeing more decentralized applications (dapps) adapting their platforms for permissioned DeFi activity as regulated institutional entities seek more involvement in this sector.

We would expect to see greater demand for permissioned or “enhanced” DeFi that marries institutional-grade compliance standards with code-enforced transparency. This could have compelling use cases for settlement and cross-border payments alongside innovations in the tokenization of real world assets (RWA). Permissioned DeFi would likely target different use cases and solve for different problems (like undercollateralized credit) compared to permissionless DeFi. In the short term, that could mean markets may price permissioned liquidity pools (that are compliant with anti-money laundering or AML/KYC regulations) differently from the permissionless liquidity pools used by non-institutional participants. However, over time, we believe that users and regulators may find ways to consolidate these via web3 primitives like decentralized identity to enable the best of both worlds.

Chart 5. Total value locked (TVL) in DeFi vs US 3M T-bill yield



Sources: Bloomberg, DeFiLlama and Coinbase.



Tokenization vs tokens

While the concept of tokenizing real world assets is not new, it has gained significant traction in recent months among financial services providers as a means of resolving the inefficiencies inherent in traditional securities settlement. For some institutions, tokenization is a less risky way of having crypto exposure compared to investing directly in tokens. Whatever the reason, it's important to note that tokenization lacked similar support among such entities in the previous 2018-19 crypto winter. Instead, banks are currently utilizing tokenized versions of financial instruments across several institutional DeFi use cases, often via public blockchains.

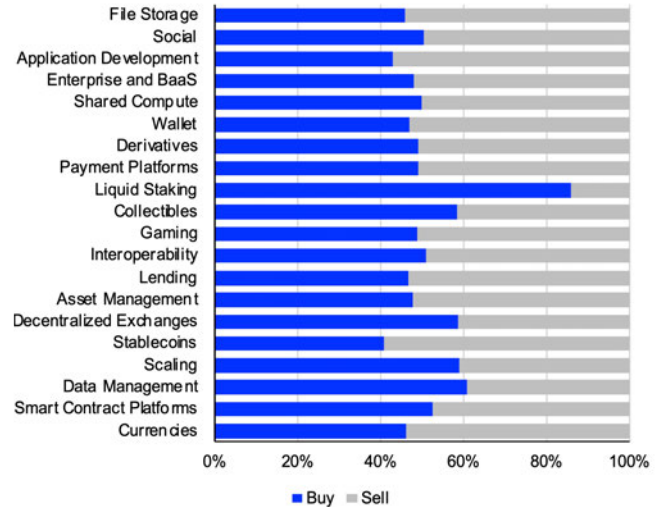
Societe Generale issued OFH tokens based on AAA-rated French home loans that can be used as collateral to borrow up to 30M DAI, while JP Morgan, DBS Bank, and SBI Digital Asset Holdings traded tokenized currencies and sovereign bonds in early November 2022 via Polygon.⁴ Other similar entities have pilots to tokenize wealth management products and other securities.⁵ That said, we think the scope of these efforts are unlikely to expand beyond financial instruments for the time being, as the RWA total value locked on Ethereum has declined to \$612M after peaking at \$1.75B in 2Q22.⁶ Part of the reason is that while issuers are resolving the financial and legal hurdles to tokenizing other less liquid real world assets like real estate, the market for these is still underdeveloped.

2. Areas for creative destruction

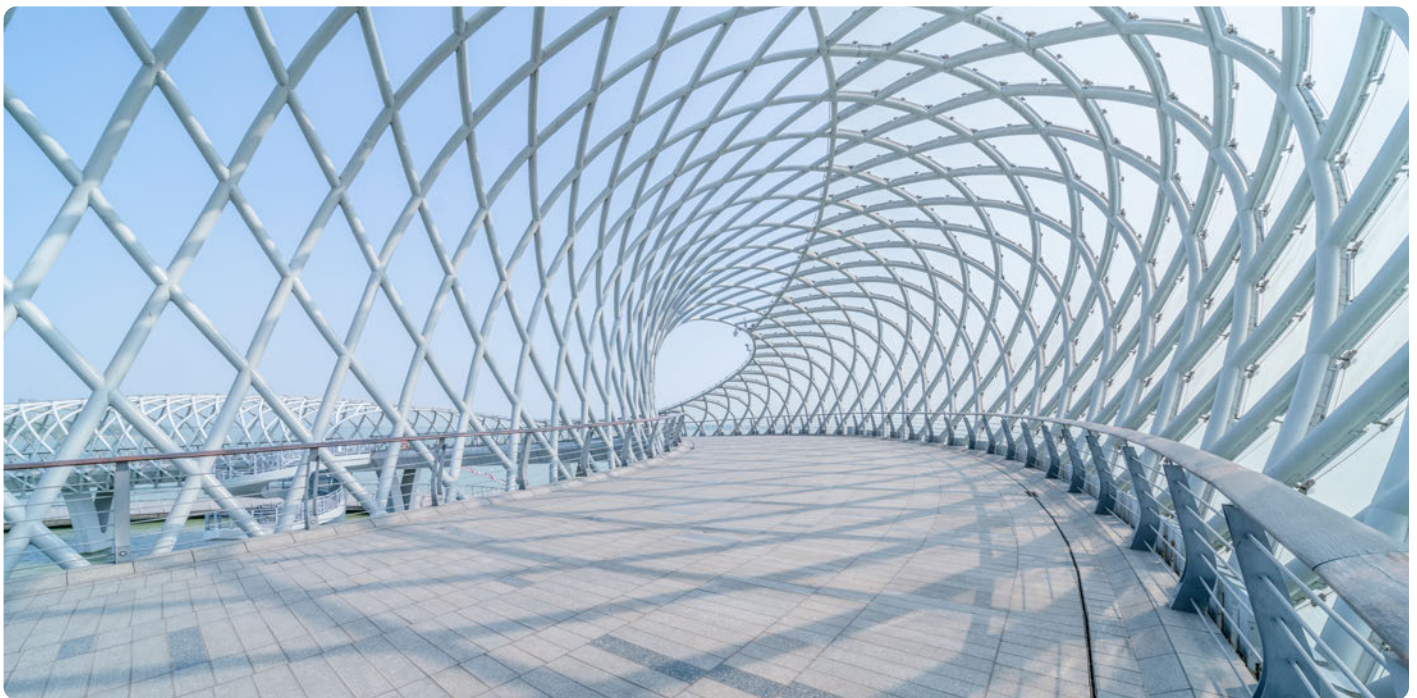
Lower liquidity spiral

Meanwhile, we think investors’ willingness to accumulate altcoins has been severely impacted by the deleveraging in 2022 and may take many months to fully recuperate. Newer projects have been hit particularly hard by recent events. In particular, some of these protocols loaned out their tokens to market makers who had used FTX as a liquidity pool. Overall, market depth has come down sharply across exchanges, according to Kaiko (November 14, 2022).⁷ Those projects must now wait until bankruptcy proceedings are finalized in order to recover their assets, meaning they may be unable to access a big part of their treasuries’ native tokens for several years. This could have important implications for developer retention and future application development.

Chart 6. Sector flows on platform



Source: Coinbase.

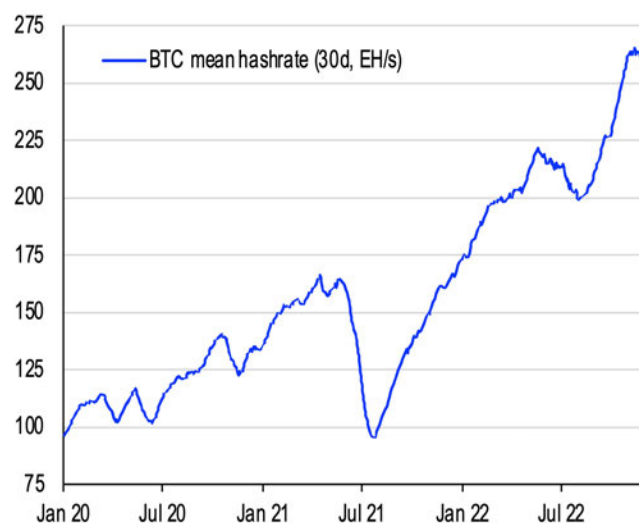


Bitcoin miners' capitulation

The precarious economic conditions for bitcoin miners appear unlikely to improve in the near term amidst continued weakness of broader crypto markets. Recent Glassnode data (November 18, 2022) suggests bitcoin miners are selling ~135% of coins mined per day, meaning miners are liquidating the entirety of their newly mined coins as well as portions of their BTC reserves.⁸ The events of early November prompted increased bitcoin miner selling, bringing aggregate miner reserves back to levels last seen at the beginning of 2022 (78k BTC as of November 30, 2022 according to Glassnode).⁹ Outside of the continued pressure on bitcoin prices, elevated network hashrate and resultant mining difficulty are further complicating matters for miners.

Challenging conditions (such as higher input costs and lower output value), combined with elevated energy prices, have resulted in a highly stressed economic environment for bitcoin miners for the past several quarters. We've observed a number of signals of stress across the industry including Compute North filing for bankruptcy in September, Core Scientific indicating they were potentially heading towards bankruptcy and halting all debt financing payments in October, and Iris Energy being forced to unplug a meaningful portion of their mining fleet after defaulting on a loan against their hardware in November. Should these conditions persist, we believe incremental uneconomical miners will eventually be forced to shut down and/or be acquired by more well-capitalized players. For that reason, we would expect the bitcoin mining industry to consolidate even further in 2023.

Chart 7. Bitcoin Mean Hashrate (30 Day, EH/s)



Sources: Coin Metrics and Coinbase.

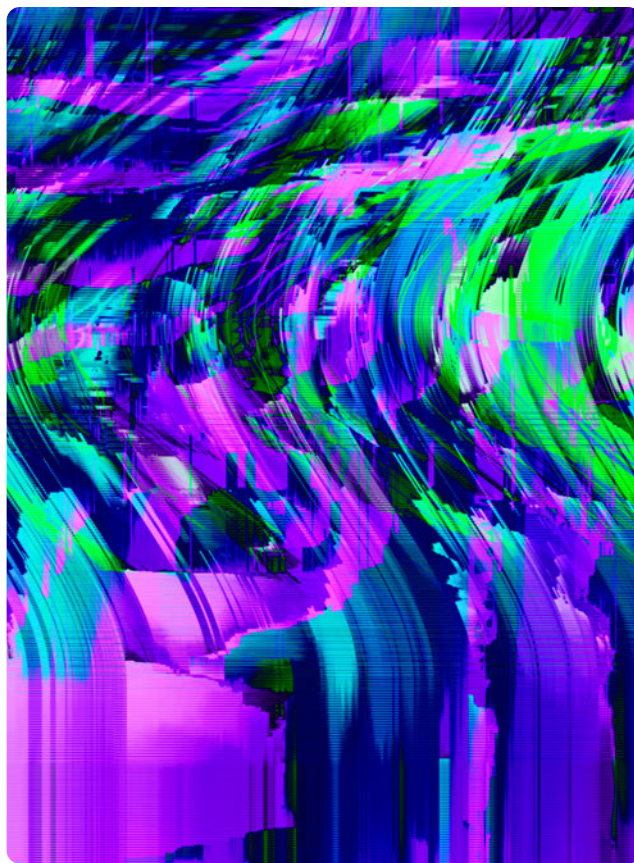
Challenging conditions have resulted in a highly stressed economic environment for bitcoin miners for the past several quarters.

Exploring new use cases for NFTs

It's still early days for the NFT market, which has had its fair share of market volatility. Trading volumes are currently far below the peaks we saw at the start of 2022. But we believe that the technological underpinnings of NFTs represent important archetypes for how ownership and identity should function in the digital economy. Indeed, the community of builders, artists, collectors, gamers, and digitally-native consumers have started to broaden their scope towards the growing utility of NFTs. We believe the recent downtrends could be perceived as part of a healthy correction in the context of a broader trajectory of cyclical adoption.

Future participation could also be driven by new forms of utility outside of art/collectibles including digital identity, ticketing, memberships/subscriptions, tokenization of real-world assets, and supply chain logistics.

Looking forward to 2023, the pressing question pertains to how subsequent waves of NFT adoption could manifest. There are no easy answers. It could be a resumption of the cultural relevance trends we saw in 2021 or an increase in global excess liquidity. More specifically, future participation could also be driven by new forms of utility outside of art/collectibles including digital identity, ticketing, memberships/subscriptions, tokenization of RWA, and supply chain logistics. Of course, investing in NFTs comes with its own set of risks. The debate surrounding the enforcement of royalties at the token level may also pick up in 2023, as it is a hot button issue for the creator community. If royalties are increasingly ignored by market participants, we believe that it could threaten the adoption of the technology more broadly.

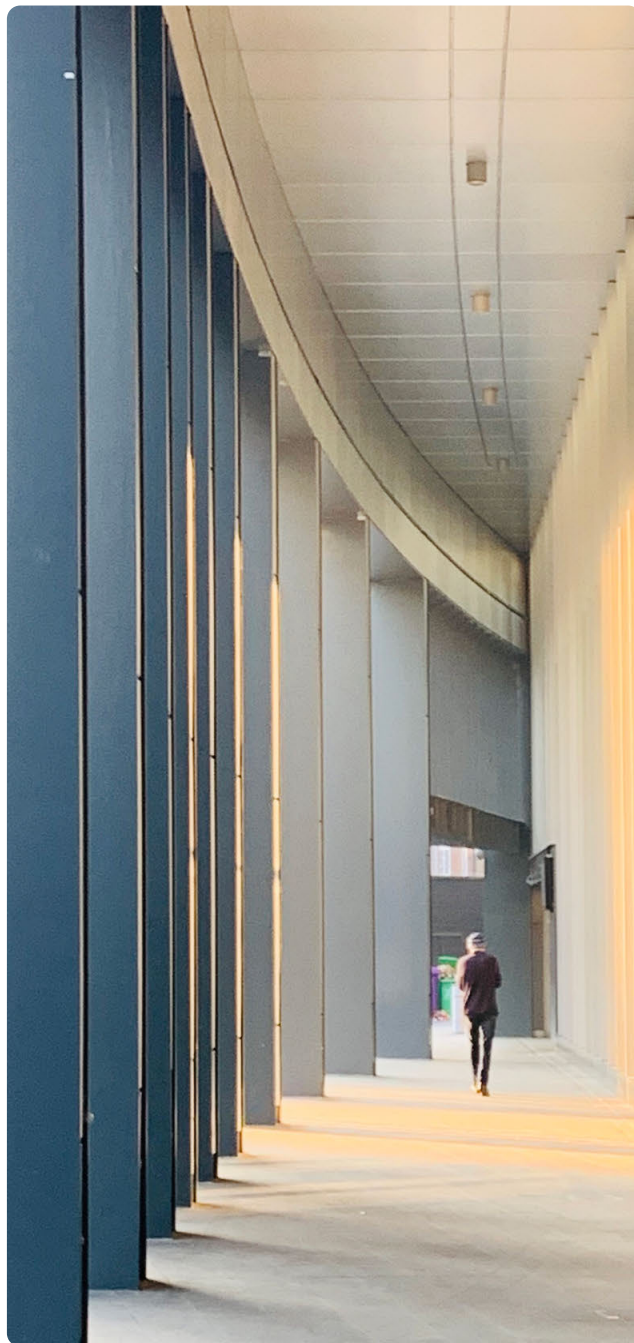


3. Foundational reforms to spur optimism

More urgency for regulatory clarity

We believe the next market cycle in digital assets will be shaped in significant part by the development of standards and frameworks for regulated entities. Clear guidance is necessary to avoid driving innovation to regions where regulatory requirements are weaker and customers may be at greater risk. In the US, we expect the new Congress to continue working on one or more of the current legislative proposals that had drawn bipartisan support, such as the Digital Commodities Consumer Protection Act (DCCPA), which would empower the CFTC to oversee spot markets in digital assets, and/or the McHenry-Waters draft bill on stablecoins.

The turmoil in crypto markets in 2022 has provided a sense of urgency among lawmakers to clarify which government agencies have oversight over what and to define the path forward on basic risk controls for crypto-asset activities. This will likely help resolve outstanding concerns over the less objectionable issues like collateral transparency in the wake of the FTX collapse. That said, we believe that policy makers should recognize that the problems faced this year were driven by human beings, not any unique aspect of crypto or blockchain technology. The regulatory framework should balance the need for reasonable standards for centralized entities with the need to protect the freedom to innovate at the base layer.



Reform of crypto lending practices

Borrowing in the crypto space has become incredibly challenging in 2022 as a result of all the credit that has been withdrawn from the system. Some of the historically largest digital asset lenders have gone bankrupt or are closed for business, as they face solvency risks if they are not rescued. We have previously commented on what we believe to be the proper approach to crypto financing, including the first principles of managing credit risk.¹⁰ But also, many lenders were already impaired following the downfall of Celsius and 3AC in June 2022, so what's happening in the post-FTX environment seems to be more of a continuation of that consolidation rather than renewed pressure on these entities.

More than likely, we will see a maturation of lending practices in the crypto space, including underwriting standards, appropriate collateralization, and asset/liability management. We expect lenders to perform more rigorous due diligence and stress test potential exposures in preparation for less turbulent markets in the future. Another theme for 2023 may be that the source of inventory in this space will move from a historically retail base to institutional investors. We believe it could take a few months for institutional credit to recover previous levels of activity, but borrowing will likely not be a challenge for credit-worthy, responsible borrowers. Notably, DeFi lending protocols such as Compound and Aave have remained fully operational in these conditions and defaulting institutions such as Celsius and 3AC repaid their DeFi loans ahead of all other creditors in order to withdraw their deposited collateral.



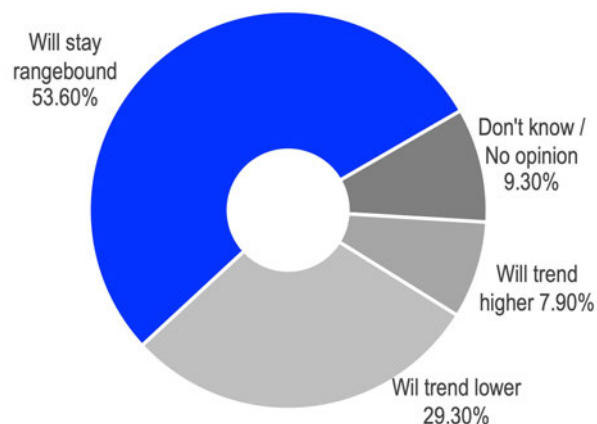
A path for institutional adoption

Despite widespread market volatility and lower trading volumes, we still witnessed broad institutional adoption of crypto in 2022 alongside the launch of many new partnerships. This isn't to say that the market turmoil in 4Q22 hasn't hit institutional involvement and confidence, which may continue into early next year. But a recent Institutional Investor survey (sponsored by Coinbase) suggests that investors believe crypto is here to stay, regardless of the poor price action in the short term or the unfortunate behavior of some bad actors.¹¹

Indeed, asset managers have continued to onboard crypto – albeit with added layers of due diligence on both the asset class and their counterparties – as they seek to have the infrastructure in place to transact digital assets in the future. Before that can happen, however, we still need to see a bottoming of the crypto markets, which may take time. It doesn't help that traditional financial markets haven't found their bottom yet either – they're still repricing on a downward trajectory, which may persist through 1Q23. On the upside, the stronger USD trend – a key constraint for holding many long duration assets – now appears more vulnerable than in early 4Q22, even if it's not over.

Despite widespread market volatility and lower trading volumes, we still witnessed broad institutional adoption of crypto in 2022 alongside the launch of many new partnerships.

Chart 8. Likely path of prices in next 12m?



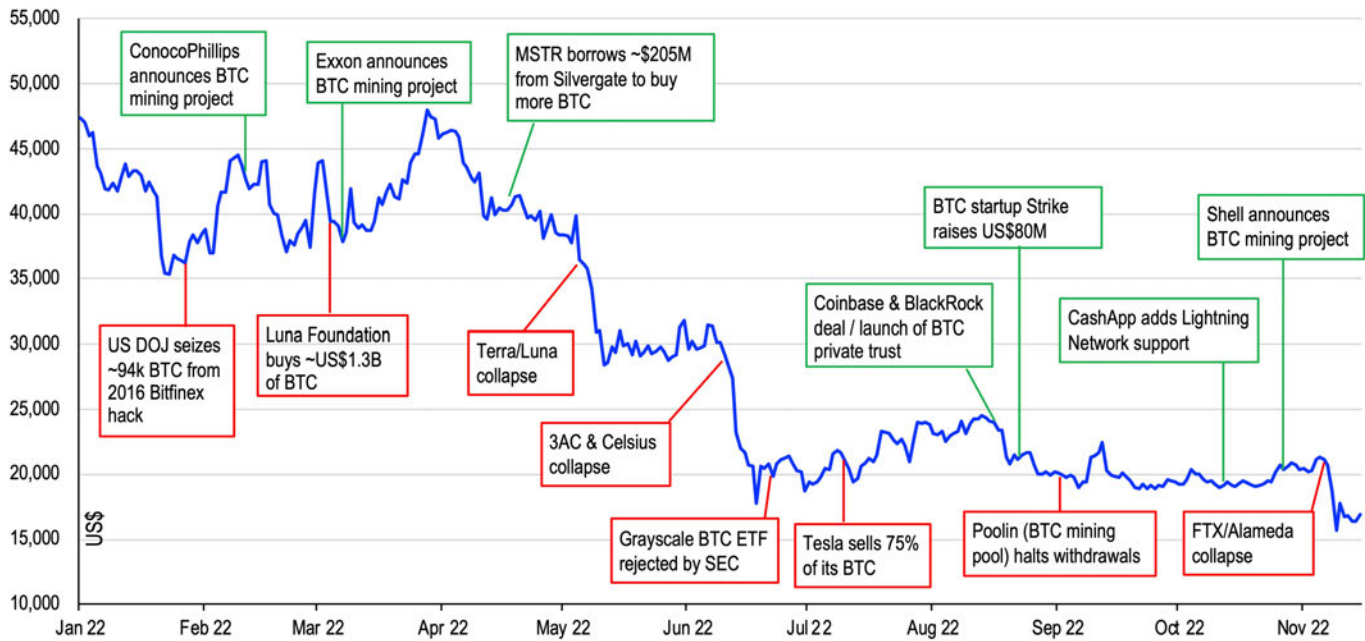
Source: 2022 Institutional Investor Digital Assets Survey, sponsored by Coinbase, conducted September 21 and October 27, 2022 among 140 institutional participants.

CHAPTER TWO

Bitcoin

Market view

Chart 9. Bitcoin (BTC) 2022 events/milestones



Source: Coinbase.

The broader weakness in digital asset markets observed throughout 2022 serves as a reminder that bitcoin remains one of the primary reserve currencies of the crypto economy. This became evident several times during the year when overleveraged players throughout the market – CeFi lenders, hedge funds, and venture capital (VC) funds – became forced sellers of digital assets across the board.

Bitcoin's resilience amid that stress suggests its long-term success is not dependent on any centralized entity either pumping or dumping it. The network continued to process an average

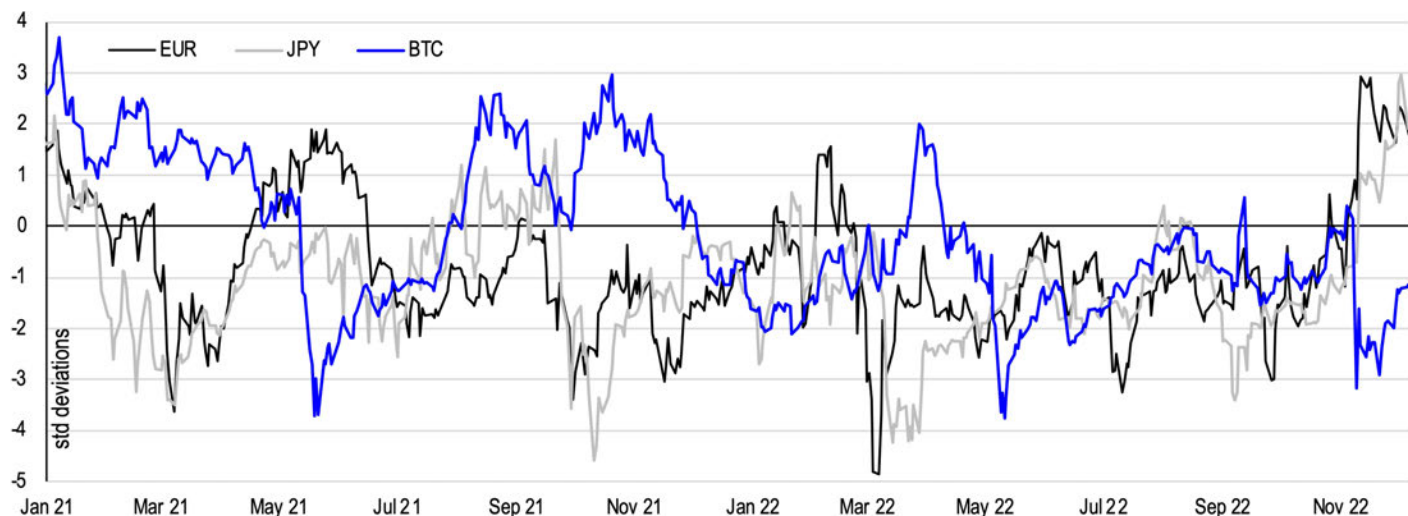
Bitcoin's resilience amid major stress suggests its long-term success is not dependent on any centralized entity either pumping or dumping it.

of 255k transactions per day in 2022 without downtime or centralized oversight, even under volatile conditions. In fact, it continues to gain traction and adoption regardless of what happens in the markets.

Further, from a macroeconomic perspective, the value proposition for bitcoin has only strengthened this year as sovereign currencies around the world have shown signs of stress and central banks continue to grapple with policy credibility. In fact, if we look at the risk-adjusted performance of bitcoin (based on a rolling 90-day window), BTC/USD returns tended to mirror EUR/USD returns in 2021, producing gains when many G10 pairs sold off.

That is partly a reflection of the global liquidity injection during that time. But also in 2022, when all markets tended to be risk-off, BTC actually outperformed most G10 FX pairs to the downside except during the deleveraging events in May, June, and November. See chart 10.

Chart 10. Bitcoin vs euro and yen in terms of risk-adjusted performance (z-score)

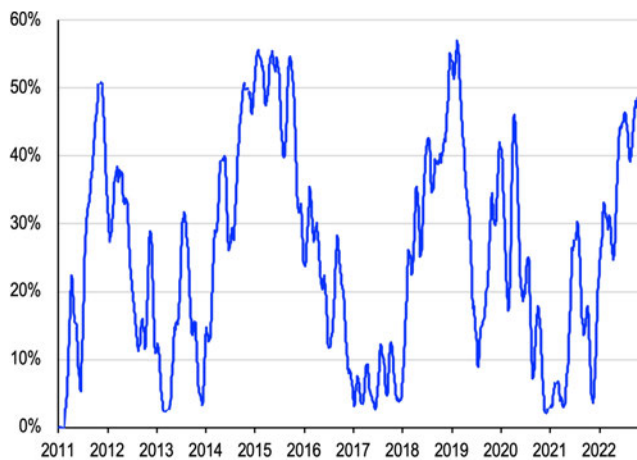


Based on a rolling 90d window.

Sources: Bloomberg and Coinbase.

It is also important to zoom out and compare this “bear market” to past bear markets for bitcoin. Chart 11 shows that the percentage of bitcoin holders currently underwater on their investments is nearing 50%, just below the historic cyclical highs reached in November 2011, January 2015, and February 2019 (together averaging around 53%). These represent major inflection points for BTC performance, preceding subsequent periods of price appreciation. It should be noted that because the metric tracks UTXO movements, the denominator of the ratio is likely understated given individuals may hold their bitcoin across multiple UTXO sets. Wallet transfers are thus indistinguishable from BTC sales/purchases, potentially overcounting the number of underwater positions. Still, we believe this metric provides important insights into current cycle positioning.

Chart 11. Percentage of bitcoin holders underwater (1m rolling average)



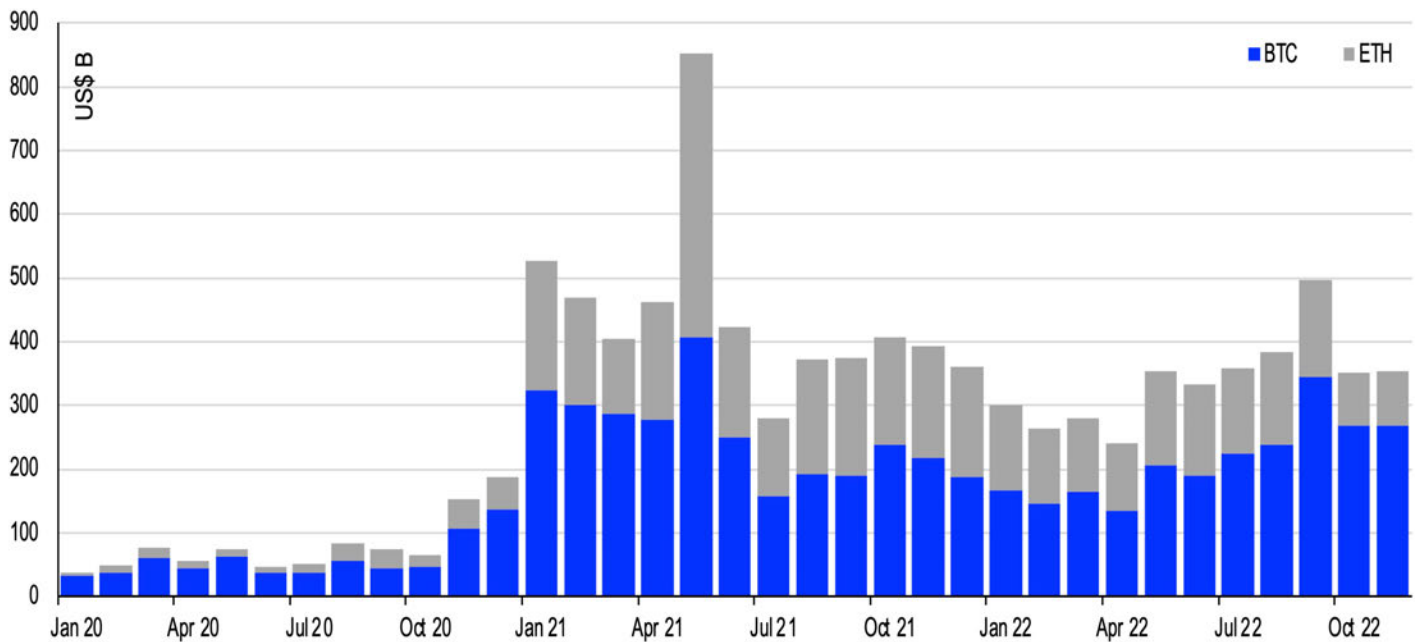
Source: Coinbase.



Also while the drop in BTC has been nearly commensurate with historical cycles, the state of play has shifted dramatically. In 2018, the Lightning Network was in its infancy and institutional adoption was relatively insignificant. Today, Lightning Network channel capacity is near all-time highs and preeminent industry leaders in finance and technology

are participating in this space. Further, there are a number of important Lightning-enabled protocols being developed – including Taro and Fedimint – that have the potential to expand the utility of the Bitcoin network beyond a store of value.¹²

Chart 12. BTC and ETH volumes on centralized exchanges by month



Source: Coinbase.



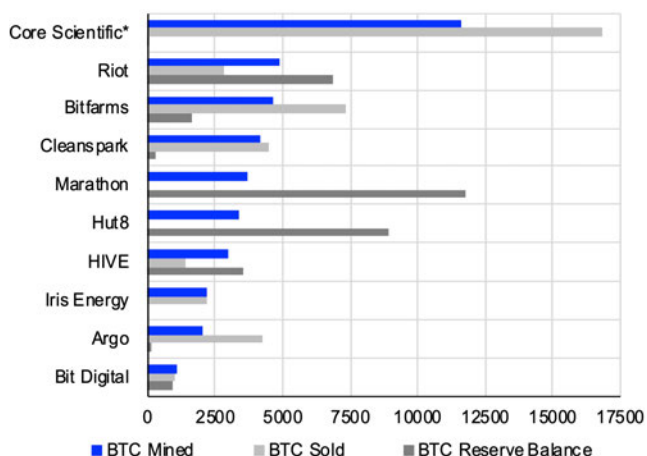
Miners as marginal sellers

Despite the positive traction in terms of mindshare, bitcoin prices have oscillated in a tight range for several months, and ASICs (bitcoin mining machines) are being sold at discounted prices. Bitcoin miners were not isolated from the leverage flush observed throughout 2022. Many miners had overextended their balance sheets throughout 2021, and when the market eventually turned, these leveraged players began to struggle, further perpetuating price declines as BTC reserves were liquidated.

As shown in Chart 13, some of the largest public bitcoin miners sold more bitcoin than they mined during 2022, depleting their reserves in the process. Other operators – such as Marathon Digital and Hut8 – didn’t sell any bitcoin during 2022, aided by the relative health of their balance sheets. In aggregate, the 10 public bitcoin miners detailed here mined ~40.7k BTC and sold ~40.3k BTC year-to-date in 2022, with ~34.2k BTC held in their reserves as of November 30.

For context, this cohort of public miners accounted for ~23% of total global hashrate at the end of November.

Chart 13. Public bitcoin miner summary (January 1 to November 30, 2022)



*Core Scientific data as of October 31

Sources: Public disclosures and SEC filings.

In early December 2022, the bitcoin network experienced its largest downward difficulty adjustment since July 2021 (which at the time coincided with China's mining ban) of 7.3%.¹³ Challenging conditions such as higher input costs (elevated energy prices) and lower output value have resulted in a highly stressed economic environment for bitcoin miners for the past several quarters. We've observed a number of signals of stress across the industry including:

- Compute North filing for bankruptcy in September
- Argo Blockchain warning in October it may need to cease operations if they're unable to source new financing
- Core Scientific indicating they were potentially heading towards bankruptcy and halting all debt financing payments in October
- Iris Energy unplugging a meaningful portion of their mining fleet after defaulting on a loan against their hardware in November

Meanwhile, economic conditions for miners worsened throughout 1H22, but hashrate curiously kept climbing higher. Part of the explanation for this phenomenon is that many operators – particularly in the US – had overextended their balance sheets throughout 2021 in order to build out mining capacity as fast as possible to take advantage of rising prices. Due in part to supply chain constraints, the delivery of incremental hardware (often purchased on credit) was slower than expected.¹⁴ By the time their machines arrived, mining conditions had become tougher, and many of these operators were forced to either amend/extend their debt obligations or mine

near breakeven levels in hopes of a price rebound or competitors shutting down first.

Further, many mining operators in the US arranged prepayment deals with power providers (often for reduced rates), meaning those operators would be willing to mine uneconomically for the duration of those prepaid energy contracts. However, these strategies can only sustain operations for so long and we are beginning to see signs of meaningful capitulation.

Absent a near-term increase in the price of bitcoin, further declines in hashrate (and in turn difficulty), and/or declines in energy prices, it's possible that more operators will be forced to shut down in the coming months – particularly in light of stressed crypto market conditions. As a result, we would expect the mining industry to consolidate even further in the year ahead as more well-capitalized players acquire hardware and capacity at attractive prices. That said, whether hashrate will continue to decline and result in subsequent downward difficulty adjustments remains to be seen.

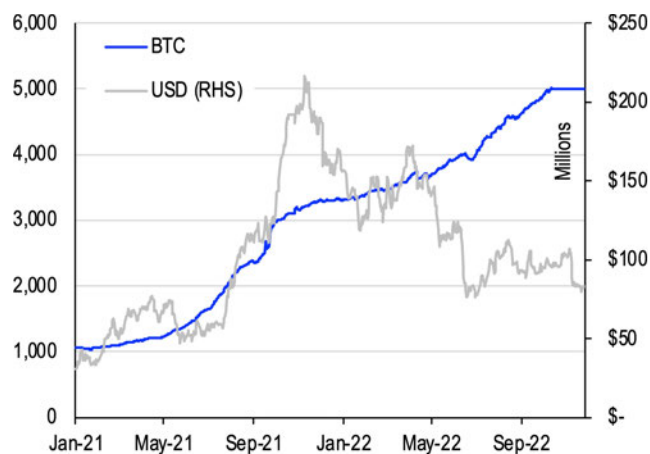
Outside of the US, it has been reported that Russia has been aggressively building out mining capacity to leverage stranded and cheap energy in the region.¹⁵ Additionally, mining in China has recovered despite the 2021 ban, and while many operators in the region may have access to cheap energy sources, there also may be operators that have decided that it's worth the premium to mine unprofitably due to stringent capital controls in the country.¹⁶ These potential sources of incremental hashrate may counteract the impact of distressed miners in the US shutting down.

State of the Lightning Network

The Lightning Network is a layer-2 protocol built on top of bitcoin that can theoretically scale to millions of instant transactions per second that cost fractions of pennies to send.

Much of the future adoption of the Bitcoin network, particularly in developing countries, may be driven by the asset’s utility as a medium of exchange. In order for this vision to become a reality, the growth and development of Bitcoin’s more scalable second layer infrastructure will be critical.

Chart 14. Lightning Network channel capacity growth



Source: Bitcoin Visuals.

The current public node capacity of the Lightning Network – as measured by the amount of BTC locked in public Lightning channels – is at all time highs. It is worth noting that an estimated 30% of channels are private, meaning the true value of the network is likely understated by available metrics. Despite being at all-time highs, however, public node capacity in USD terms totals less than \$100M, which pales in comparison to the total value locked on a network like Ethereum (~US\$24B as of end-November).

Further, while certain projects – such as Taro – are actively developing methods to issue stablecoins or other non-bitcoin assets via the Lightning Network, dollar-pegged stablecoins on other blockchains are currently far more widely used as a medium of exchange. Additionally, in order for bitcoin itself to gain market share within the medium-of-exchange use case, it will likely need to grow into a larger, more mature, and less volatile asset. That said, the growth trajectory of the network is encouraging and there is a robust ecosystem of developers and startups building on this L2.¹⁷

Mt. Gox disbursements

As we look ahead to 2023, it is worth monitoring bitcoin-related events with potential market impact. One such event is the pending disbursement of bitcoin and other funds from the Mt. Gox rehabilitation plan. Over 11 years since its initial security vulnerability (and over eight years since filing for bankruptcy), the now defunct and much maligned bitcoin exchange Mt. Gox is preparing to potentially distribute funds to its creditors in 2023. The latest notification as of October 2022 (from the committee in charge of the rehabilitation plan) stipulated that the revised deadline for repayment registration is January 10, 2023, with disbursements assumed to begin thereafter.¹⁸

For context, the Rehabilitation Trustee approved a plan in 4Q21 to distribute 141,686 bitcoin (~\$2.4B at December 2022 prices) to the creditors whose BTC was lost by the exchange. Market participants continue to speculate about the potential price impact of this large swath of bitcoin supply hitting the market in 2023. However, we believe the situation is more complex than that.

- First, some hedge funds and private equity firms began acquiring claims from creditors at discounted prices starting in mid 2019. The Block reported in March 2021 that Fortress was spending \$100M to buy BTC from creditors at up to 80% of what they're owed.¹⁹ Thus, many of the most motivated sellers may have already disposed of their claims to these funds. Those firms who purchased such claims may be more likely to hold these eventual repayments and/or hedge their exposure, as opposed to immediately selling their interest, given their historically

constructive view of the industry.

Fortress, in particular, was one of the first tradFi entities to enter the space when they purchased \$20M of BTC in 2013 and later partnered with Pantera Capital to launch the Pantera Bitcoin Partners Fund in 2014.

- Second, creditors who opted not to take an earlier payout and instead await resolution from the rehabilitation plan were relatively early to bitcoin (pre-2014). Those that continued to accumulate bitcoin across other venues between 2014 and today would likely have other methods of managing their investment exposure outside of immediately selling their rehabilitation payment.
- Third, the notification from Mt. Gox issued in July 2022 stipulated that any movement of creditors' funds would be restricted "until all or part of the repayments made as initial repayments is completed."²⁰ That statement suggests that once repayments actually commence, it's likely that not all repayments will be distributed at once. Without more concrete details from the rehabilitation committee, it's difficult to say whether the potential supply of bitcoin hitting the market would be sold in pieces over the course of several months or all at once after all repayments are completed.

CHAPTER THREE

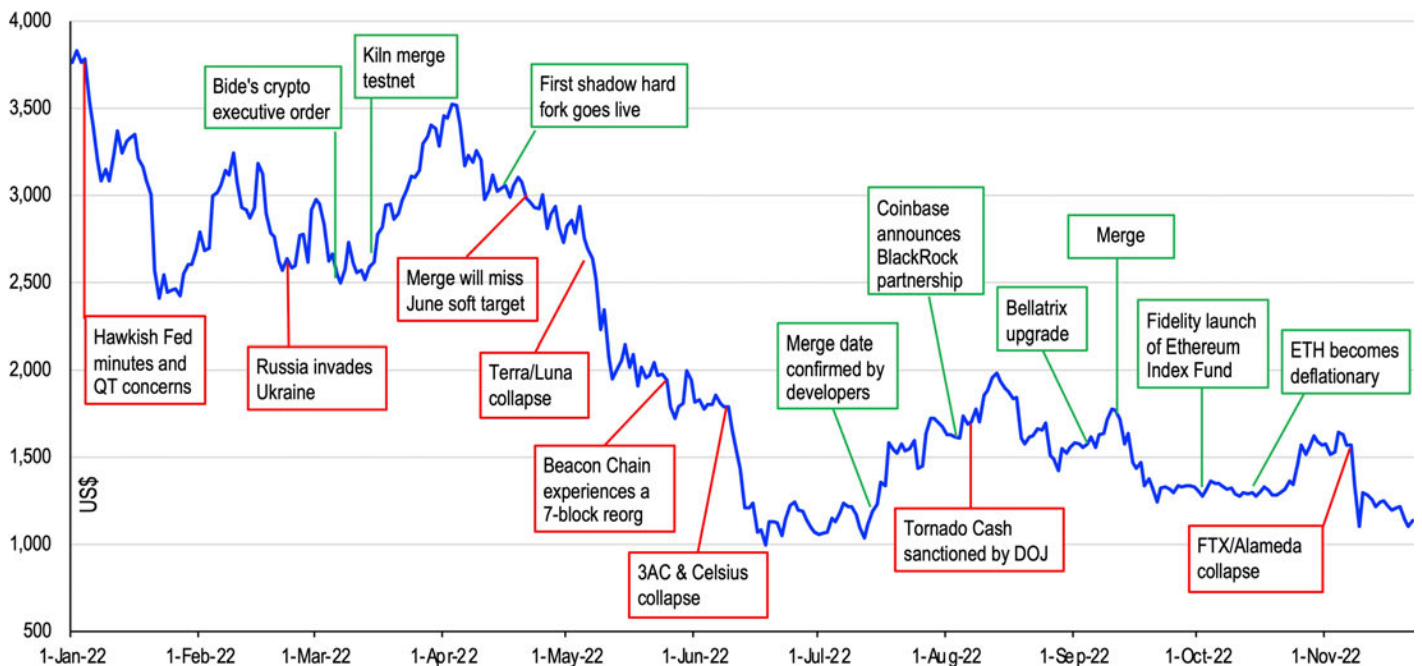
Ethereum

Market view

Ethereum’s Merge of its consensus and execution layers in September 2022 represented a critical turning point for the network as it transitioned from proof of work (PoW) to proof of stake (PoS). The magnitude of that accomplishment cannot be stressed enough. Consider that a task so complex was completed not via a central authority but through the active and organic coordination of like-minded individuals. This is not to elevate the humanistic effort above the technological one, as it is significant that the Merge changed Ethereum from a monolithic to a modular

blockchain. It increased the network’s energy efficiency and reduced the growth of ETH supply in the process. More importantly, at least from an investment perspective, it reinforced the market’s confidence in future upgrades to the platform. Despite the trend towards long-term core protocol ossification, it showed that the community can deliver on ambitious projects, of which there are plenty more. That has partially helped fend off attacks about Ethereum’s high gas fees and lower throughput compared to alternative L1s.

Chart 15. Ether (ETH) 2022 events/milestones

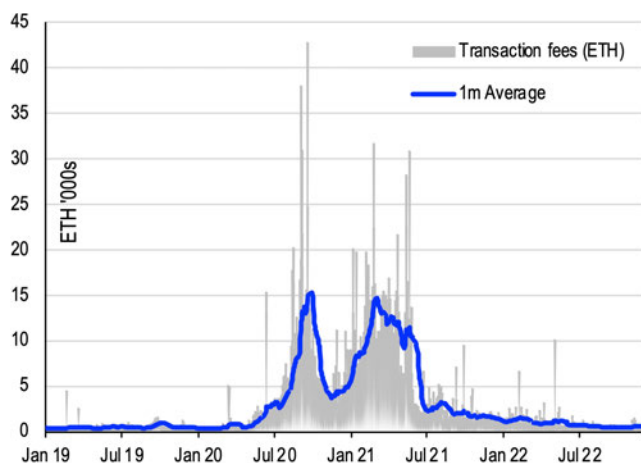


Sources: Etherscan.io and Coinbase.

On-chain activity has declined since the Merge, reflecting broader crypto market dynamics like a decline in total value locked for DeFi and subdued NFT demand. But network traffic has also held up much better than other chains including Solana, Avalanche, and Fantom. In fact, average daily transactions on Ethereum’s base-layer network slipped this year, but not meaningfully – from 1.27M in 2021 to 1.13M in 2022 (through end November) compared to larger declines on other layer-1s (see next section on L1s/L2s).

Moreover, even though usage and new launches have slowed down significantly, we saw in October and November 2022 that just a few small bursts of activity were enough to meet the ETH burn threshold and make the token deflationary.²¹ That suggests that in a bull market, we could see significant improvement to ETH’s technicals.

Chart 16. Transaction fees (ETH)



Sources: Etherscan.io and Coinbase.

There is still a healthy distribution of overall rewards among validators at the moment – keeping per capita earnings high. That staking ratio is low in part because stakers cannot withdraw their ETH until after the Shanghai Fork.

But the reduction in network activity has certainly impacted the transaction fee component of staking yields as well as maximal extractable value (MEV). Fortunately, the sum of all effective balances of staked ETH (15.5M ETH worth ~\$19.8B) as a percentage of total ETH supply (120.5M ETH) is only around 12.9% as of early December 2022.

As a result, there is still a healthy distribution of overall rewards among validators at the moment – keeping per capita earnings high. That staking ratio is low in part because stakers cannot withdraw their ETH until after the Shanghai Fork. Once withdrawals are enabled, we would expect to see a sharp increase in ETH staked, albeit perhaps much less than the 50-75% (of token supply) observed in other alternative layer-1 networks given the relative amount of Ethereum usage.

Future upgrades

The Shanghai Fork will represent the first major upgrade to the network following the Merge, which could happen as early as 1H2023 though no definitive date has been set. The Shanghai Fork testnet (Shandong) was launched in mid-October to let developers experiment with the potential fork. One reason for the uncertainty in the timeline is that the complete list of Ethereum Improvement Proposals (EIPs) that will be included has not yet been finalized. Core developers are debating which additional EIPs belong in Shanghai versus the subsequent Cancun upgrade.²² Two of the more hotly debated topics are Ethereum Virtual Machine Object Formatting (EOF) and proto-danksharding, which both may warrant more research. But developers have confirmed that the fork will

include staked ETH withdrawals (EIP-4895), which has strong demand from Ethereum users.²³ Consequently, this means that supply that has been locked on the market for several years will become liquid again.

The lack of a firm deadline for the Shanghai Fork has been an impediment for some users who want to stake their ETH but don't want the tradeoff between liquidity and yield. Other investors are concerned that once staked ETH withdrawals are enabled, that could potentially flood the market with sellers. But current specs would rate-limit withdrawals to six validators per epoch or a maximum of 1,350 validators per day compared to the ~478,000 validators currently staked.



Also, developers have confirmed that withdrawals will be processed according to the validator index number – unique and permanent identifiers assigned at the start of the staking process – rather than the order of requests in the exit queue. Concerns that the queue could get clogged should be alleviated to some extent by the dynamic nature of staking rewards, as they are inversely proportional to the square root of the total balance of all validators. A decline in net validators causes the protocol to automatically increase inflationary rewards; transaction fees and MEV rewards are also

shared among a smaller number of validators. This should in theory increase the overall rate of reward and act as an incentive for ETH holders to stake.

The Shanghai Fork also only represents the next step in the Ethereum development roadmap. Ethereum co-founder Vitalik Buterin has laid out six stages (five additional) for future upgrades including the Merge, the Surge, the Scourge, the Verge, the Purge, and the Splurge (see table 1 below).²⁴

Table 1. Ethereum’s future upgrade roadmap

Stage	Description	Future goals
Merge	Transitions Ethereum from a PoW to a PoS consensus mechanism	Permission withdrawals of staked ETH
Surge	Scale the network via layer 2s to achieve 100k transactions per second	Enable rollup-specific EIPs like lowering gas fees on calldata to achieve a fully scaled network
Scourge	Address potential centralization issues and other protocol risks at the transaction inclusion level	Advance in-protocol proposer-builder separation, proto-danksharding (blob construction), and frontrunning protections
Verge	Achieve verification of blocks while ensuring transactions are private and fully encrypted	Implement scaling upgrades like Verkle trees to make stateless clients a viable prospect; achieve a fully “SNARKed” Ethereum
Purge	Remove old data and network history to free up hard drive space	Historical data not needed for validating new blocks can be pruned, resulting in less bandwidth usage
Splurge	Make miscellaneous fixes	Fine tunes the network with additional smaller upgrades (e.g. EVM enhancements, account abstraction)

Source: Vitalik Buterin, co-founder of Ethereum.

Censorship resistance

Notably, censorship resistance remains a major theme among the blockchain's core developers, and its presence is likely to be felt in everything from the design of future network upgrades to the decisions of Ethereum's validators. On Ethereum and many other smart contract chains, searchers (bot operators performing arbitrage, liquidations, etc.) began to form exclusive deals with miners or validators for prioritization of their transactions ahead of competing searchers. This was a centralizing risk to Ethereum which was addressed by Flashbots, a research and development organization that aggregated most validators and searchers to a single open platform, removing the centralization risk from backroom deals.

After the Merge, Flashbots introduced MEV-Boost, which is optional software that validators can adopt to capture MEV rewards. It is a form of proposer-builder separation (PBS) that has removed the centralization risk of large validators. But although it's a step in the right direction, it has also introduced new potential centralization vectors at the relay and block builder levels. Put simply, block builders aggregate transactions to form blocks and send them to relays. Validators subscribe to one or more relays and propose the most profitable block (without first seeing its contents) from among the blocks they receive from relays.

The challenge is that block builders and relays are able to censor, which could slow down valid Ethereum transactions from being included on-chain. For example, around 56% of all blocks on Ethereum (post-Merge) censor addresses sanctioned by the Office of Foreign Assets Control (OFAC), in part because Flashbots' relay abides by OFAC and it holds a dominant position.²⁵ Although several alternate relays exist, and new non-censoring relays are launching weekly, we believe more diversification is necessary to mitigate this problem.²⁶

The Ethereum community is committed to ensuring the network remains decentralized and credibly neutral. In the short term, Flashbots is building an open-sourced upgrade to its software known as the Single Unifying Auction for Value Expression (SUAVE).²⁷ This would help tackle issues like censorship, private or exclusive order flow, and cross-domain MEV that can give certain builders a dominant position in block production. In the long term, Ethereum core developers are also planning to permanently enshrine PBS into the protocol.

New income streams with re-staking

The growth of validator middleware solutions could be a major theme in 2023 from an innovation perspective, with companies like Obol and EigenLayer at the forefront of these opportunities. Re-staking by EigenLayer in particular could be a way for validators to secure new features in Ethereum, possibly earning additional rewards in the process. Developers would benefit by having their middleware run and secured by Ethereum's validators, avoiding the more time-intensive alternatives of either changing the Ethereum network or launching their own new protocol.

How it works is validators would potentially stake 32 ETH to validate on Ethereum, but set the EigenLayer smart contract as the withdrawal address for their ETH, thereby "re-staking" it.

Doing so enables the validator to provide additional services – like data availability networks, bridges, etc. The validator could then earn additional rewards for performing additional work, but can also be slashed by the EigenLayer network for part or all of their 32 ETH deposit if the validator provides faulty service or maliciously attacks EigenLayer. While this could be a capital efficient solution for adding new middleware services to Ethereum and would not necessitate changes to the Ethereum blockchain itself, the additional slashing risk may temper adoption until EigenLayer is sufficiently battle tested. Over time, popular middleware services that can convince all validators to opt in would in practice provide that particular feature with a level of trust akin to Ethereum itself.



CHAPTER FOUR

The L1/L2 Landscape

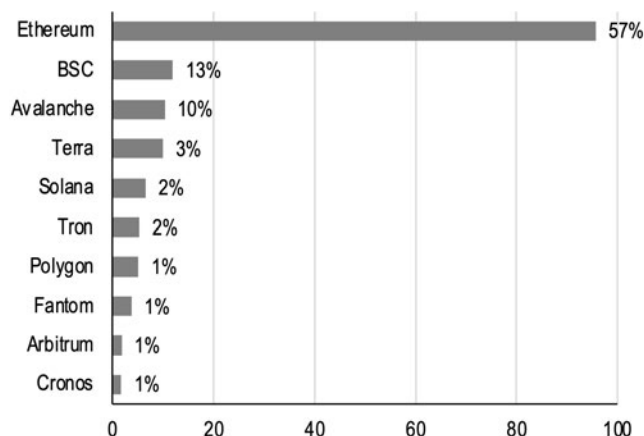
The competition

With the recent proliferation of alternative layer-1 (standalone) blockchains and layer-2 scaling solutions, the marketplace for L1s and L2s has become significantly more saturated. There are currently around 140 smart contract-enabled blockchains and rollups being monitored by DeFiLlama’s activity tracking, although Ethereum accounts for over 57% of the total value locked (TVL) sitting on these networks.²⁸ (That’s US\$24.3B out of a comprehensive TVL of \$42.2B as of early December 2022.) That share is unchanged from the end of last year, albeit down from Ethereum’s almost 70% dominance in mid-2021, when the L1 race took off in earnest.

Other L1s and L2s among the top 10 platforms account for the next 34% of TVL in the crypto ecosystem. Amid the top L1s/L2s, the names haven’t changed much in the last year except for the notable loss of Terra-Luna and the inclusion of Optimism (see charts 17 and 18). But the ordering is now different. For example, TVL data suggests that activity has been drifting away from alt L1s like Avalanche and Solana in favor of Tron and Ethereum-based scaling solutions like Polygon, Arbitrum, and Optimism. Indeed, Tron was able to increase its proportion of TVL activity from 2% to 10% of the crypto universe total.

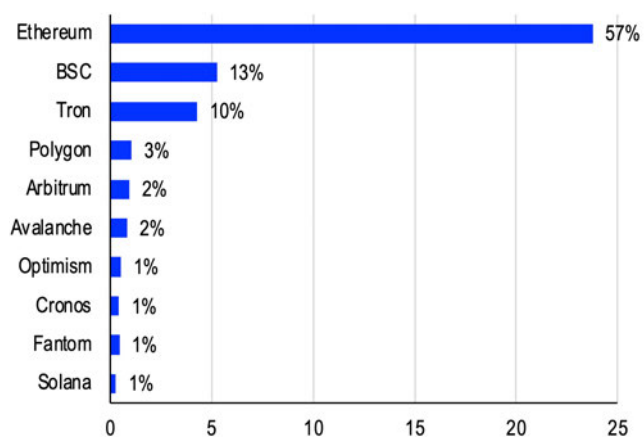
Separately, BNB Smart Chain has been able to maintain its share of the overall market (13%), second only to Ethereum. Notably, the largest DeFi protocols on Tron and BNB Smart Chain are both forks of Ethereum-based protocols,

Chart 17. TVL by L1/L2 (31 Dec 2021)



Sources: DeFiLlama and Coinbase.

Chart 18. TVL by L1/L2 (30 Nov 2022)



Sources: DeFiLlama and Coinbase.

Compound and Uniswap, respectively. One way to look at the corresponding tokens backing these networks is to estimate the expected market capitalization as a percentage of ETH’s market cap. That can provide a better sense of how well the value corresponds to the relative level of development on these chains. From that perspective, BNB (BNB Smart Chain) has been the clear winner increasing its valuation in 2022 to around 30.2% (from 19.6% at the end of 2021), followed by MATIC (Polygon) at 5.2% (up from 3.5% at the end of last year). Meanwhile, the market caps of previous “blue-chip” names like AVAX (Avalanche) and SOL (Solana) have come down from their peaks reached in 2Q22 and 4Q21 respectively to 2.7% and 3.3% (of ETH’s market cap).

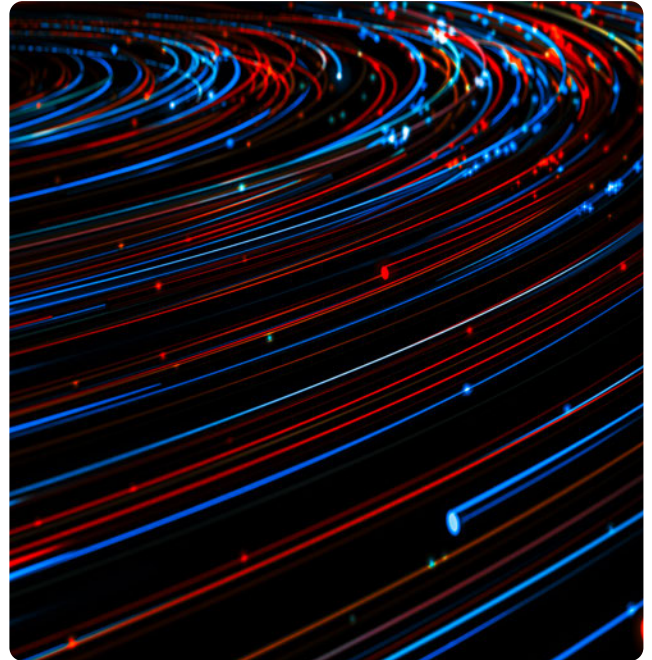
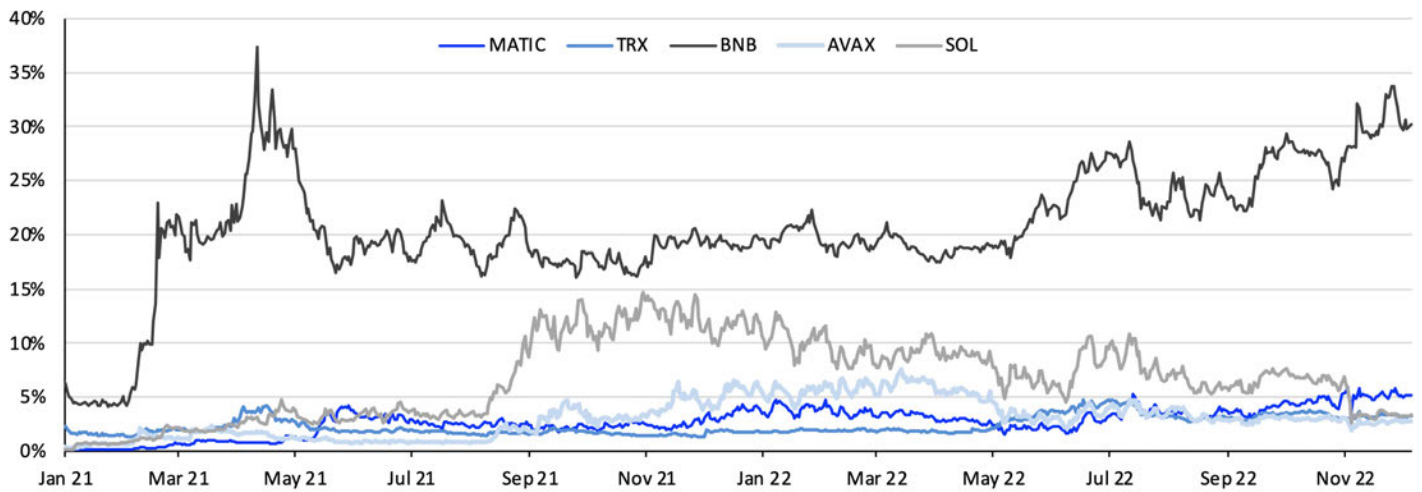


Chart 19. Market cap of select tokens as percentage of ETH

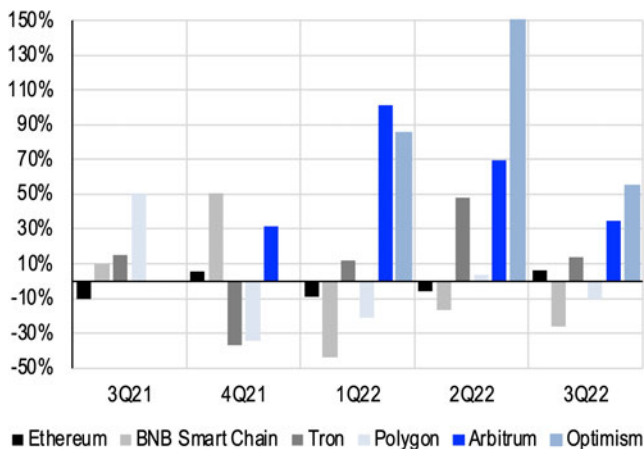


Sources: TradingView and Coinbase.

Something peculiar about the activity patterns on these L1s and L2s, however, is that their respective network traffic does not necessarily follow the cyclical up and down trends in the crypto markets, as one might expect. The change in quarterly transaction growth varies by network rather than moving in tandem with other chains, which may hint at the broader competition among L1s and L2s for an ostensibly finite pool of users and capital. In our view, this proves that there is healthy user demand for solutions that address issues of scalability, speed, and/or transaction fees, but what is less obvious is whether this will become a winner-take-all market.

There is healthy user demand for solutions that address issues of scalability, speed, and/or transaction fees, but what is less obvious is whether this will become a winner-take-all market.

Chart 20. Quarterly transaction growth by chain



Sources: Etherscan, BcsScan, TRONScan, PolygonScan, ArbiScan, Optimistic Etherscan and Coinbase.





From Fat Protocol to Fat Application

Most if not all protocols start out following the Fat Protocol thesis, which proposes that value tends accrue to the protocol layer over the application layer.²⁹ This approach is different from the web2 internet model where investing in companies like Google, Amazon, and Meta (formerly Facebook) has historically produced higher returns than investing in web infrastructure technologies. This was the case for Ethereum back in 2016, when the theory was first proposed.

But over time, as user adoption grows and developers build more applications on these networks, mature protocols seem to be expressing the Fat Application thesis. That

is, the value of all the things built on top of a blockchain must eventually surpass the value of the underlying blockchain itself. Moreover, the ardent competition among blockchains has pushed fees lower and lower to capture a greater share of network activity, while application users have often continued to pay for specific services, depending on factors like product/market fit. (Incidentally, this reduces the utility of metrics like TVL in our view because it fails to capture important factors like revenues and cash flows.) The investment thesis should thus focus on whether the growth rate of dapps on a given network is higher than the growth rate of the network itself and judge the investment opportunity accordingly.

CHAPTER FIVE

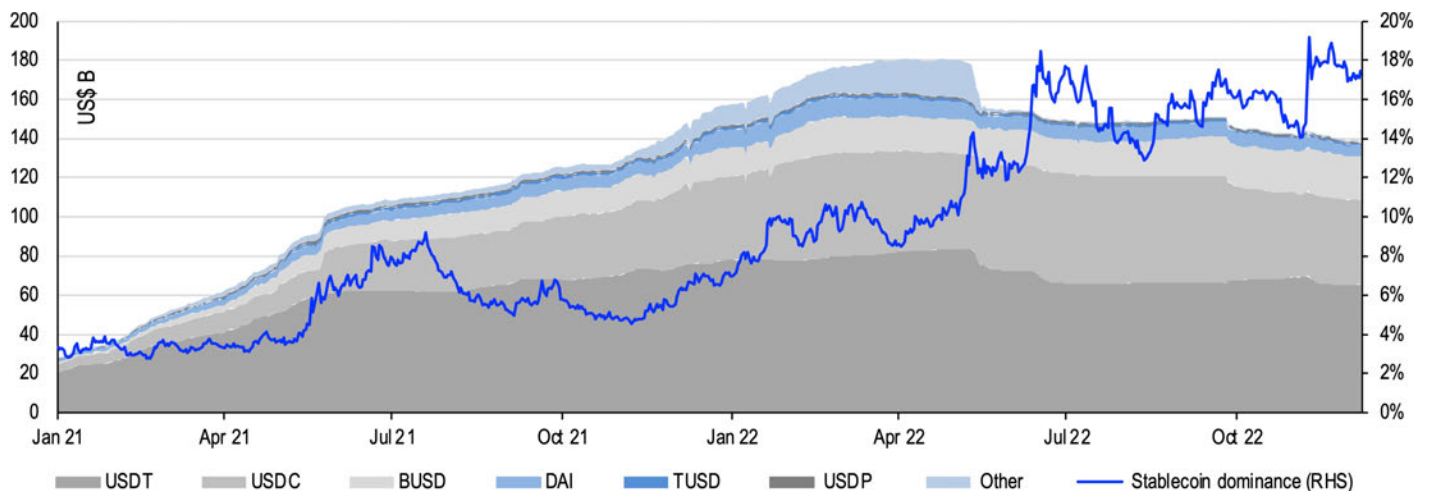
Stablecoins

Rising dominance

Approximately US\$145B in stablecoins are currently in circulation, representing about 17-18% of the total crypto market capitalization. That’s more than 5x higher than the 3.4% stablecoin ratio at the beginning of 2021 against a similarly sized market cap. While the rise in that ratio coincides with the broader crypto market drop, the increasing dominance of stablecoins affirms that there has been a shift in the composition of cryptocurrencies towards higher-quality assets. Indeed, bitcoin, ether, and stablecoins together make up nearly 78% of the digital asset class at publication.

We believe that having a higher proportion of crypto’s market cap parked in stablecoins is a supportive technical factor for the digital asset class. Not only does it mean that market participants are willing to remain digitally native during a market downturn, but it also represents a significant amount of dry powder sitting on the sidelines that can be deployed when investor confidence returns. Transactions involving just the top four stablecoins by market cap (USDT, USDC, BUSD, and DAI) represent a 76% share of all trading volumes across centralized exchanges, according to CryptoCompare.

Chart 21. Stablecoin market capitalization vs % dominance



Sources: TradingView and Coinbase.

Fiat-backed stablecoins represent 91.7% of this crypto sector of which Tether (USDT at \$67B) and USDCoin (USDC at \$44B) comprise the majority, leaving crypto-backed and algorithmic stablecoins to make up the remainder.³⁰ Both USDT and USDC are highly liquid and offer comparable convenience for trading purposes, though USDT tends to have greater geographic presence outside of the US for historical reasons.

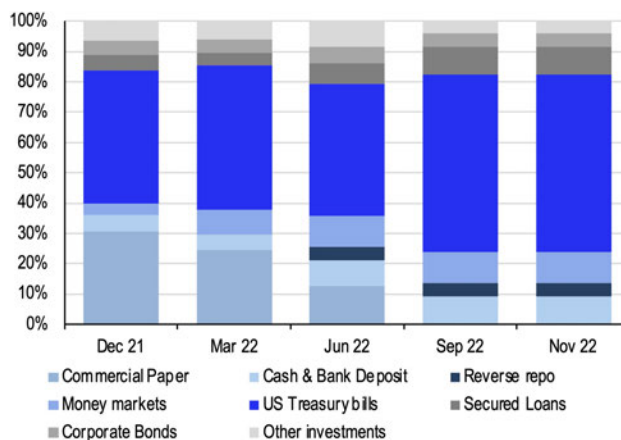
Fundamentally, the composition of a fiat-backed stablecoin’s reserve assets is the most important factor determining its ability to maintain its peg. According to self-reporting by Tether, the stablecoin issuer has reduced its commercial paper holdings to near zero (0.09%) in early 4Q22, compared to a 31% position at the end of 2021.³¹ Part of those holdings has been replaced by US Treasury Bills, which now make up the majority 58% of their reserves (~\$39B), while cash and bank deposits comprise 9% of all assets (see chart 22). Tether says that they plan to produce an audited statement of their reserves in the near future, although as of end-August 2022, Chief Technology Officer Paolo Ardoino has said that this is still months away.

Meanwhile, Circle (issuer of USDC) started backing its stablecoin exclusively with cash and short-term US Treasuries starting in September 2021 and began disclosing the full breakdown of its holdings starting with a June 30, 2022 statement.

Note that Circle and Coinbase together co-founded the CENTRE Consortium in 2018, a joint venture that technically oversees USDC and is aimed at providing the governance and standards for adopting fiat stablecoins.

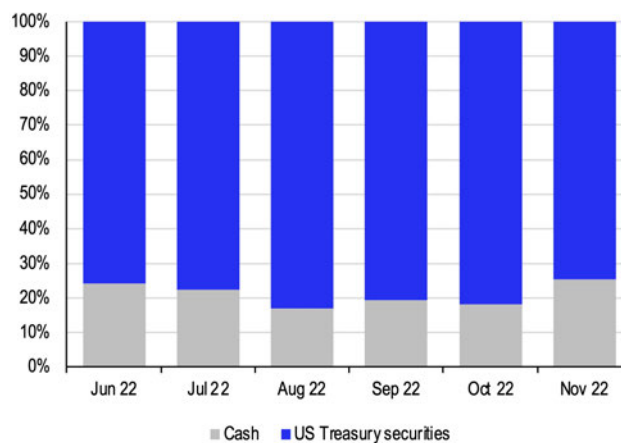
Fundamentally, the composition of a fiat-backed stablecoin’s reserve assets is the most important factor determining its ability to maintain its peg.

Chart 22. Tether reserves backing USDT



Source: Tether.

Chart 23. Circle reserves backing USDC



Source: Circle.

The killer app?

We believe stablecoins represent one of the largest opportunities in the crypto ecosystem, as they play a crucial role in enabling market participants to price assets in a common currency and retain assets on-chain during periods of higher market volatility. Indeed, paired-trading with other digital assets remains their heaviest use case, offering near-instantaneous transaction settlement. This results in greater market liquidity and depth for digital assets.

But stablecoins also have the potential for mainstream commercial uses such as merchant payments and cross-border remittances. Indeed, we are seeing more stablecoin payments being sent globally via public blockchain networks, suggesting these assets are not just a store of value relevant only to crypto market players but rather represent a genuine improvement over traditional payment rails.

Thus, we expect demand for stablecoins to grow over the long term, which is one reason more DeFi protocols have started to launch their own platform-native stablecoins as a way to source liquidity and integrate service offerings. For example, the team behind automated market maker Curve has released plans on Github for a new stablecoin design called a Lending-Liquidating AMM Algorithm or LLAMMA, where the collateral type is contingent on price performance.³² Decentralized lender Aave has also released a technical paper for its upcoming overcollateralized GHO stablecoin, which could help it lower capital efficiency costs.³³ Despite deflated crypto markets more broadly, we are seeing growth in the stablecoin sector, as many anticipate that over time, a greater proportion of

transaction activity across networks could be associated with these assets.

As stablecoins achieve scale, this is likely to put more scrutiny on stablecoin regulation, although no jurisdiction has fully implemented a comprehensive regulatory framework for stablecoins as of yet. In the US, the House Financial Services Committee is expected to continue working on a bipartisan proposal from Representative Patrick McHenry (R-NC), who will become the Committee's Chair in January 2023, and outgoing Chair Rep. Maxine Waters, that would establish a federal regulatory framework for fiat-backed stablecoins. While the details are still being worked out, the bill is expected to provide a path for nonbanks (like Circle), as well as banks to become regulated stablecoin issuers. Approved firms would also need to fully back stablecoins with highly liquid assets like cash or short-term government debt.

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CHAPTER SIX

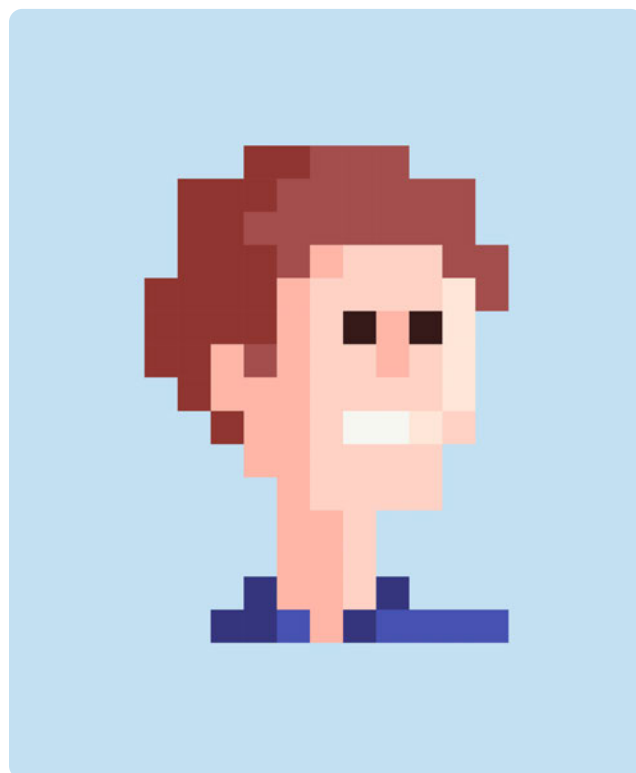
NFTs

Market view

NFTs facilitate the creation of scarcity for digital assets that would otherwise be infinitely replicable, as well as represent important archetypes for how ownership and identity should function in the digital economy. They're an easy way to prove ownership over a digital asset such as art, objects in games, or even memberships and loyalty programs that offer special experiences with businesses or creators.

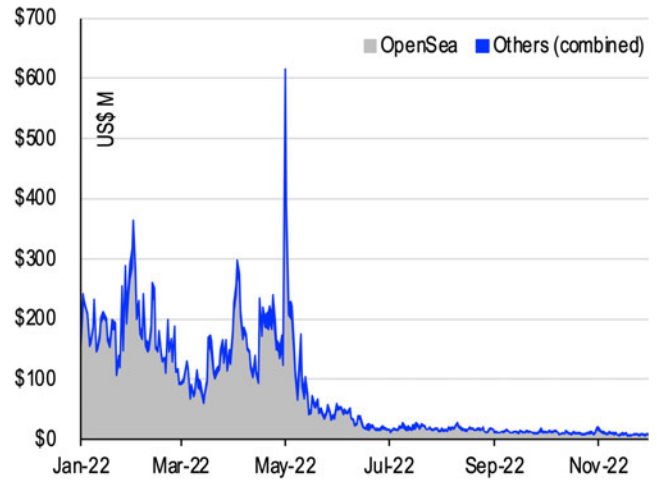
Despite the media attention on near-term fluctuations in trading volume and floor prices, which admittedly have trended lower in 2022 alongside all risk assets, it is important to appreciate the long-term fundamental capabilities of the technology. As the world continues to shift towards the digital realm, NFTs will be a critical component of the infrastructure that allows ownership and identity to function in a frictionless environment. The art/collectibles segment of NFTs has served as a powerful onboarding mechanism for the broader crypto industry in recent years. But it is the depth and breadth of potential use cases for NFTs that we believe could represent a possible catalyzing force to enable true mass adoption of these technologies going forward.

As the world continues to shift towards the digital realm, NFTs will be a critical component of the infrastructure that allows ownership and identity to function in a frictionless environment.

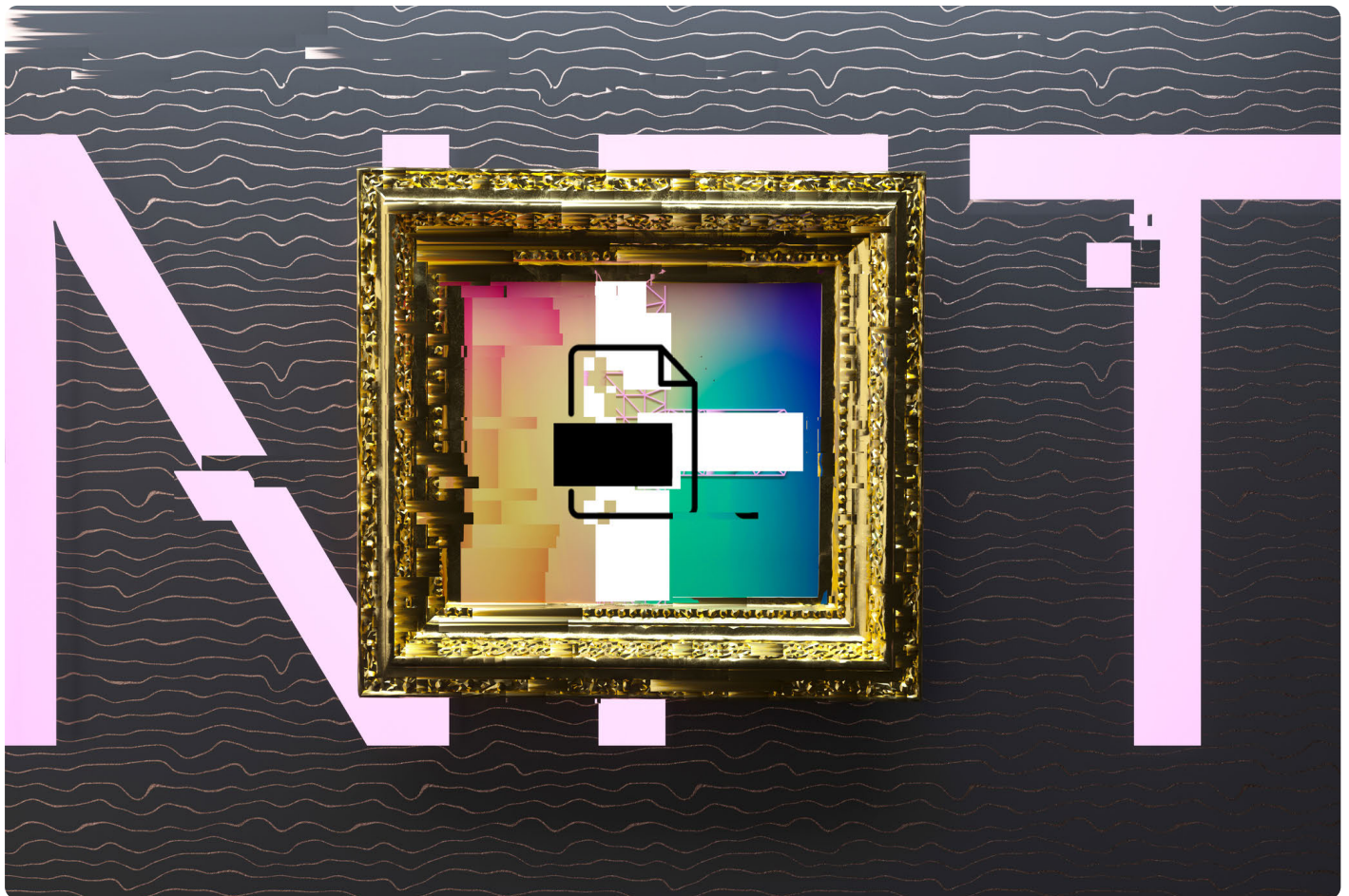


The first meaningful manifestation (in terms of mainstream adoption) of the value proposition of NFTs largely occurred within the realm of “digital collectibles” or assets that represent 1-of-1 art, generative art, or profile pictures (PFPs). These subcategories of assets inherently led to speculative market dynamics, akin to those observed in markets for traditional art. Importantly, this use case for NFTs significantly lowered the barriers to entry for creators. On OpenSea alone, creators have earned over US\$1B in aggregate royalties in 2022 (through November 30). Further, the category of art/collectibles reinforced the notion of digital property rights and demonstrated the potential advantages of on-chain ownership, including increased transparency and programmability.

Chart 24. NFT secondary sales volume (Ethereum-based marketplaces YTD)



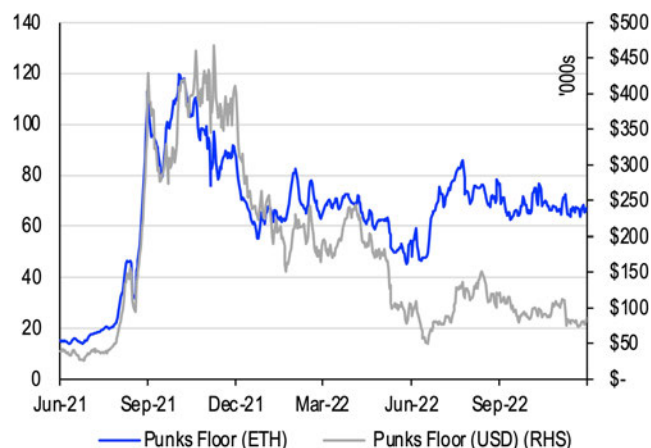
Sources: Dune Analytics and Coinbase.



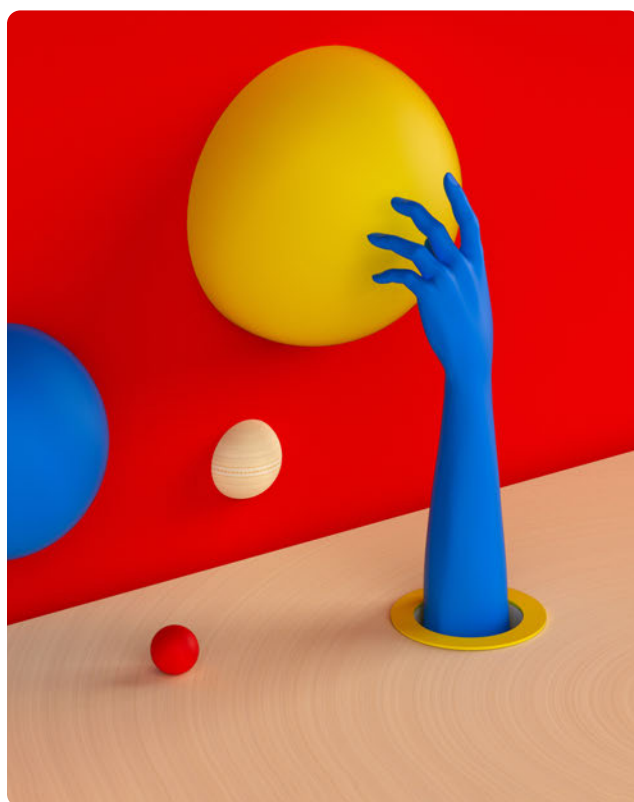
Lower barriers to entry for creators, however, have also meant that these subcategories can quickly become saturated. As mentioned in our report published in April 2022, “Demystifying NFTs,” the market dynamics which characterize NFTs differ significantly from the broader crypto market in terms of available liquidity, as well as the concentration of activity in a small subset of collections.³⁴ Although there are over 100,000 projects in existence, the vast majority of secondary sales volume occurs within collections representing under 5% of the overall universe. Nevertheless, NFT marketplaces are still generating trading volumes ranging between \$5-15M per day. Market liquidity remains a concern, but marketplace aggregator functionality – available on Coinbase NFT and now Uniswap, following their acquisition of Genie – have the potential to improve the liquidity dynamics for NFTs.

While certain “blue chip” collections or otherwise “high-quality” NFTs have been able to maintain relevance and even grow market share due to broader consolidation of liquidity, USD values have struggled to keep pace with ETH-based values as the price of ETH has fallen over 66% year to date in 2022. This has been the case for even the most prominent NFT collections with outsized historical sales volume such as CryptoPunks, evidenced by Chart 25. That being said, comparisons to all-time-highs in terms of floor prices may not be all that insightful – the fact that pixelated jpegs are still regularly changing hands for tens and sometimes hundreds of thousands of dollars should not be diminished.

Chart 25. CryptoPunks floor price (ETH vs USD)



Sources: Dune Analytics and Coinbase.

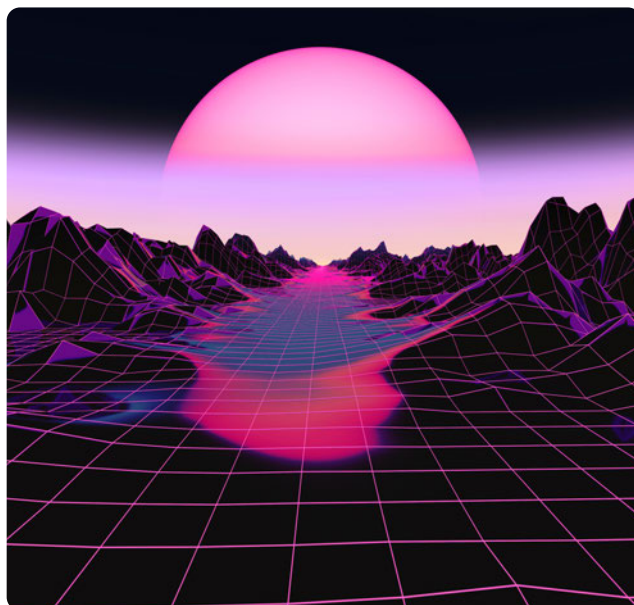


Next waves of NFT adoption

We believe NFT adoption is still in its early stages and the recent downtrends could be perceived as part of a healthy correction in the context of a broader trajectory of cyclical adoption. The bigger question today surrounds how subsequent waves of NFT adoption will manifest – to which there are no easy answers. But almost daily, we’re seeing new utility and opportunities for brand building, customer engagement, and rewards:

- Starbucks announced in September 2022 that their popular loyalty program is powered by NFTs (albeit referring to their collectible assets as “journey stamps”)³⁵
- Adidas is pairing NFTs with physical merchandise
- The New York Knicks are offering NFT holders access to exclusive events and tickets to home games
- Reddit has avatar NFTs which they refer to as “digital collectibles,” which have amassed over 4 million unique holders and over US\$11M in secondary sales since launching in July 2022³⁶
- Tiffany & Co. collaborated with CryptoPunks³⁷ to create 250 digital passes that were minted and redeemed by CryptoPunk holders in exchange for punk-themed jewelry

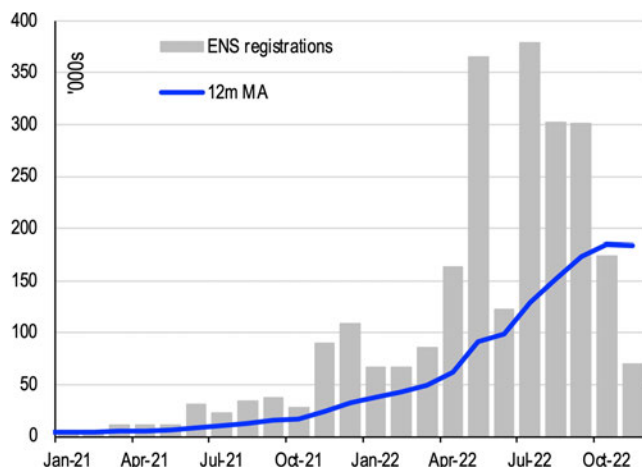
We believe corporations and brands will likely continue to view NFTs as a differentiated form of marketing spend and create projects that act as powerful onboarding mechanisms for non-crypto-native consumers. Indeed, we believe this technology allows businesses to connect in more authentic ways with their audiences. Beyond these use cases, corporations are also beginning to utilize NFT technology to provide digital verification of physical goods. We think creating immutable and auditable chains of ownership for things like luxury watches or sneakers could help demonstrate the utility of NFTs outside of pure speculation.



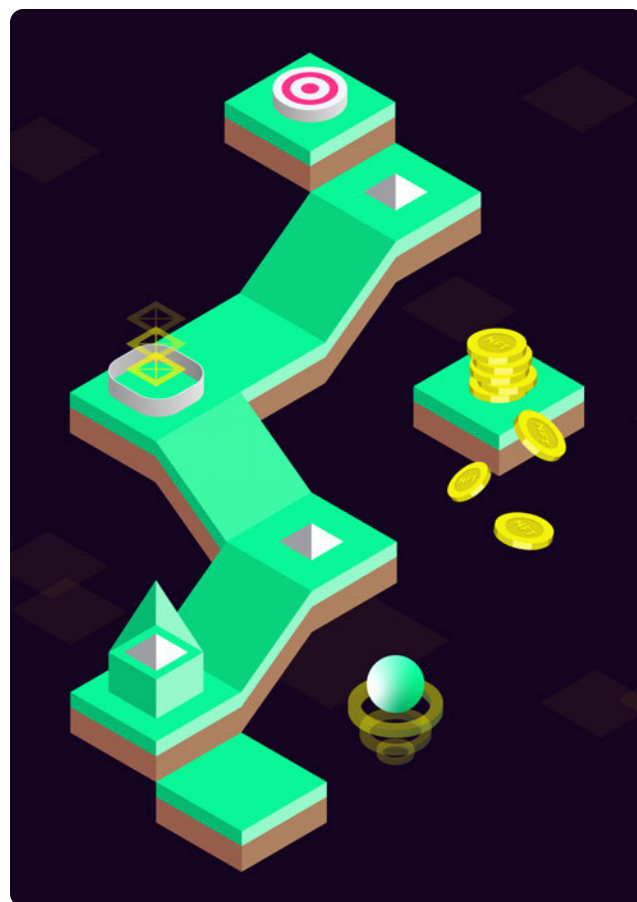
Another notable endeavor that has been able to maintain its growth trajectory despite the broader market turbulence is the Ethereum Name Service (ENS), which represents an illustrative example of the utility of NFTs outside of art/collectibles. In this vein, it's possible that the next wave of NFT adoption could be driven by forms of utility more directly tied to the core innovation of digital property rights. Themes such as digital identity, digital footprint mapping, soulbound tokens, and the tokenization of real world assets have the ability to strip away the speculative nature of art/collectibles and emphasize the fundamental advantages of non-fungible tokenization.

We're also watching the development of NFTs in the gaming space. The outstanding question is whether the best crypto-enabled games will be developed by crypto-native firms or by incumbent video game developers who decide to integrate crypto into a game in some manner. Given the relative advantage in terms of funding that top-tier video game studios have access to, it's possible it's the latter scenario. In that case, crypto could be integrated into the backend of the video game, making it not necessarily noticeable to the user.

Chart 26. Monthly ENS domain registrations



Sources: Dune Analytics and Coinbase.



Enforcing royalties

An area of recent debate within the NFT community is centered around the concept of artist royalties and specifically, the enforceability of said royalties. While the customizability and perpetual nature of royalties for NFT artists are at the core of the value proposition of the web3 creator economy, the reality is that royalties are not embedded at the token level, but instead at the marketplace level. This means that NFT holders can choose to transact peer-to-peer and circumvent both fees and royalties that are implemented by marketplaces.

While peer-to-peer transactions have always existed at the periphery of the NFT market, they came into greater focus in 2022 as more readily accessible tools were created to facilitate the circumvention of centralized marketplaces like OpenSea. Sudoswap and Blur are two such decentralized protocols that – amongst other functionalities such as pooled liquidity for NFT trading – allow users to circumvent fees and royalties. Platforms such as x2y2 and LooksRare also facilitate royalty-free transactions. In recent quarters, these alternative marketplaces have eaten into OpenSea's market share, which has dropped to nearly 50% in terms of ETH trading volume (as of November 30).

OpenSea has committed to enforcing royalties on the platform and even introduced new

functionality (for new collections only) that allows the issuer to disable trades on royalty-free platforms. While this is certainly a step in the right direction, it still doesn't solve the issue for existing collections and limits the salability of collections that opt to use the new functionality, as they then can only be sold on OpenSea. Conversely, FXHASH is a platform – focused on generative art on Tezos – that has taken a firm stance alongside artists/creators and will not allow optional royalties on their platform.

Realistically, for the large swath of the NFT market that is purely profit driven, this avoidance of fees and royalties will likely continue to be an attractive proposition. Therefore, if artists/creators want to benefit from programmable royalties going forward, they'll likely need to emphasize fostering a collector base that genuinely cares about the art itself and is willing to pay royalties. However, the actions taken by OpenSea to support artists/creators is important, as much of the rationale for NFT-based art stems from creator royalties. If royalties are increasingly ignored by market participants, we think it could threaten the adoption of the technology more broadly. OpenSea taking this stance alongside artists/creators is meaningful, given the platform still accounts for an outsized portion of NFT trading volume.

CHAPTER SEVEN

Regulation

In the wake of recent events, we have seen calls for more stringent regulation of the crypto industry ranging from user access to ecosystem activities. However, many of the failures and insolvencies of the crypto entities in 2022 share certain commonalities like undue leverage, insufficient risk controls, and in some cases, unethical business practices. These characteristics are seen (too often) in traditional finance as well and should not be interpreted as an indictment of blockchain technology or its potential to improve the future of financial markets and services. In fact, the fundamental intent of decentralized protocols is to minimize the need for trust, remove frictions posed by centralized intermediaries, and foster transparency.

Appropriately tailored regulatory standards are needed to build a workable framework for the cryptoeconomy that appropriately mitigates risk, while enabling the development and adoption of digital innovation for the broader benefit of society.

While regulatory clarity is certainly needed for this market to mature, the risk is that heavy-handed regulation drives crypto participants offshore, which can put customers at even greater risk. Appropriately tailored regulatory standards are needed to build a workable

framework for the cryptoeconomy that appropriately mitigates risk, while enabling the development and adoption of digital innovation for the broader benefit of society. The first step is putting clear guidelines in place that developers and users alike can follow. Our experiences in 2022 show that crypto is a globally important asset class with widespread commercial and investor appeal, and it needs thoughtful legislation to encourage innovation and protect consumers.



Awaiting clarity in the US

We believe crypto policy in the US is at an inflection point.

In March 2022, President Joe Biden issued an executive order focused on laying out organizational principles and regulatory objectives for the crypto space, asking government agencies to research various topics related to digital assets.³⁸ Some of the resulting reports included helpful proposals, like the Treasury's report on payments, for example.³⁹ It recommends the establishment of a federal framework for payments regulation to replace the patchwork of state laws governing money transmission. Others were light on specific recommendations and reinforced the status quo: continuing to assess risks across the digital asset space, pursuing enforcement

actions where they see fit, and (slowly) advancing discussions around a potential US central bank digital currency, or CBDC.

One of the most important outstanding regulatory issues today is the critical question of how to classify a digital asset. In August 2022, bipartisan senators introduced the Digital Commodities Consumer Protection Act (DCCPA) that would establish the Commodities Futures Trading Commission (CFTC) as the primary regulator of digital asset commodities and thus close one of the biggest gaps in the existing crypto regulatory system. While there are unresolved issues with this legislation, such as its treatment of DeFi, it represents a major potential step forward on crypto policy.



That said, the failure of FTX has stalled legislative progress on the DCCPA for now, primarily because of its association with the former CEO of FTX, Sam Bankman-Fried, who was a major proponent of the bill, and because of concerns that the DCCPA on its own would not have prevented FTX's collapse. The current CFTC Chairman, Rostin Behnam, suggested in December 2022 that lawmakers pause the advance of legislation such as the DCCPA and work to fill any remaining gaps.⁴⁰ In a late 2022 hearing, senators suggested they anticipate taking up revised legislation in 2023.

Securities and Exchange Commission (SEC) chair Gary Gensler has also been vocal about his views on what jurisdiction he believes his agency should have over digital assets.⁴¹ In September, the SEC filed a lawsuit against a crypto influencer for allegedly having undisclosed incentives linked to an initial coin offering in 2018. The case references ETH transactions that the SEC states "were validated by a network of nodes on the Ethereum blockchain, which are clustered more densely in the United States than in any other country," and that "as a result, those transactions took place in the United States."

This line of reasoning suggests that the SEC believes it can assert jurisdiction over the entirety of the Ethereum network due to the number of US-located nodes. A plurality of ETH nodes, around 47%, are currently located in the US, which is more than any other country.⁴² But Ethereum nodes can be permissionlessly spun up by anyone, anywhere in the world, and it is unclear if the SEC is willing to follow its own logic and relinquish their jurisdictional claims if or when the majority of Ethereum nodes reside in a different country.

We expect government agencies to continue discussions over the short term to expand their jurisdiction over the digital asset space. Over the intermediate to long term, we expect that clearer lines will be drawn, which we hope will lead to deference among federal agencies regarding matters within their respective areas of authority.



Progress in EMEA

Meanwhile, leading economies including the European Union, the United Kingdom, Switzerland, and the United Arab Emirates, are taking substantial regulatory steps to secure their role as leaders in crypto. Indeed, we believe the EMEA region is leading the way in creating a safe and secure regulatory environment for the asset class. The significant progress that has been made here is an example of what can be achieved when the political will is there.

In **Europe**, there has been greater regulatory progress relative to the US, with the EU having reached agreement on the finalized text for MiCA (Markets in Crypto Assets regulation).⁴³ Once implemented, MiCA will deliver a single rulebook across the EU, as national regimes fall away and firms that receive a MiCA license gain access to the EU single market. While supervision of stablecoin issuers falls to the European Banking Authority (EBA), supervision of all Crypto Asset Service Providers (CASPs) remains at the national level. But the European Securities and Markets Authority (ESMA) is granted additional powers to take direct action against non-compliant CASPs. This is particularly important in the context of FTX's failings.

In the **UK**, Prime Minister Rishi Sunak's government has reasserted its commitment to position the country as a global crypto hub. A consultation on a comprehensive regulatory framework for crypto is expected by year-end 2022 or early 2023.⁴⁴ The Financial Services and Markets Bill (FSMB), which is making its way through Parliament, gives the UK government and regulators the powers to develop more detailed rules for crypto. This follows important work by HM Revenue and Customs (HMRC) on the tax treatment for DeFi and by the Law Commission, which is an important step towards providing legal certainty on the treatment of crypto assets.

In **Switzerland**, the regulations governing cryptocurrencies are fairly accommodative, as one might expect given that it is the home to Europe's Crypto Valley. The country enacted the "Federal Act on the Adaptation of Federal Law to Developments in Distributed Ledger Technology" (otherwise known colloquially as the Blockchain Act) in August 2021. This provided a secure legal basis for the trading of cryptocurrency rights. The main regulatory body tasked with matters related to digital assets is the Swiss Financial Market Supervisory Authority (FINMA), which classifies crypto as a distinct asset class, most similar to property or hard metals, as opposed to securities.



In the **UAE**, policymakers have created the Virtual Assets Regulatory Authority (VARA), an independent regulator for virtual assets, which aims to foster a supportive environment for digital asset innovation in Dubai. VARA's goal is to develop regulatory frameworks for investors and businesses operating in the digital asset space. In August 2022, VARA announced guidelines pertaining to the marketing, promotion, and advertising of digital assets in the region, and established penalties for failure to comply.

Africa represents one of the fastest growing markets in the world for digital assets, but the regulatory environment remains highly diverse. According to the IMF, around 25% of countries in sub-Saharan Africa regulate crypto with some restrictions, while six countries (representing 20%) – Cameroon, Ethiopia, Lesotho, Sierra Leone, Tanzania, and the Republic of Congo – have explicitly banned digital assets.⁴⁵ Zimbabwe and Liberia meanwhile have implicit bans. Conversely, the Central African Republic joined El Salvador in designating bitcoin as legal tender, becoming the second country in the world to do so.

Full Spectrum of Regulatory Approaches in Asia

Unlike Europe, there isn't a central representative group uniting regulations across Asia, and as a result, when considering the region as a whole, there is some fragmentation. That means countries are approaching regulatory clarity with respect to crypto on their own timelines and in a manner which suits their respective contexts.

In **Australia**, crypto firms currently register with AUSTRAC's AML/KYC regime and may also obtain an "Australia Financial Services License" from the Australian Securities & Investments Commission (ASIC). Those requirements are not unique to crypto – in fact, any fintech firm would be required to do the same. However, there is mounting political and regulatory interest in establishing a clear regulatory approach to CASPs. This pressure reached a crescendo when the previous-Liberal Government set forth a framework for regulation through the Treasury. However, the new Labour Government has taken a step-by-step approach to its consideration of digital asset regulation.

As such, the Treasury will imminently lay out a token mapping framework for consideration by the industry. It is expected that in short order following this release, the Treasury will author an additional consultation paper addressing custody. Over time, these exercises might constitute a comprehensive regulatory framework for digital assets in Australia. In parallel, the Reserve Bank of Australia is working on a CBDC framework and contemplating the role of stablecoins.

China has historically implemented one of the strictest approaches to crypto regulation in the world. The country has enforced a widespread ban on all activities related to digital assets, including mining, trading, issuing tokens, and providing crypto-services. There are, however, Chinese investors in other commercial hubs who do engage digital assets activity.

Conversely, in an effort to reassert itself as a global financial hub, **Hong Kong** has announced plans to permit retail trading of digital assets and establish a regulatory framework for crypto service providers. It remains unclear what that regime will entail (and what, if any limitations would remain) when in force. Additionally, a key consideration will be the pace by which entities might register within Hong Kong under its new regime. As a proxy, many fintechs have been in the proverbial "queue" awaiting their "Stored Value Facility" (SVF) license for several years due to a combination of market saturation and regulatory bandwidth.

Further, financial agencies in Hong Kong will begin piloting two different versions of stablecoins towards the end of 2022, the first of which will be an intermediated digital currency, while the second will be a CBDC-backed stablecoin circulated in the interbank system. The Hong Kong Monetary Authority has already worked on many innovative pilot programmes for CBDCs – including multi-CBDC pilots with other jurisdictions such as Singapore, Thailand, and others.

In **India**, lawmakers have shifted their view of digital assets multiple times in the past, but most recently, they have announced intentions to regulate the space via the forthcoming Cryptocurrency and Regulation of Official Digital Currency Bill. This legislation plans to distinguish between various digital assets and establish frameworks which will dictate how citizens will be allowed to interact with digital assets and crypto companies going forward. There is still some hesitation on timing of the pending legislation, particularly as the government is inclined to take a 'wait-and-see' approach in view of the ongoing work at the Financial Stability Board (FSB). India is hosting the G20 in 2023 where digital assets regulation is on the agenda and a key focus of the FSB's work. Separately, in November 2022, the Reserve Bank of India (RBI) announced its pilot programme for the retail CBDC. The RBI will continue to pilot the CBDC in select parts of India and with select banks (not unlike the approach taken in China with the eCNY).

In **Japan**, the digital asset space is governed by the Financial Services Agency (FSA), which characterizes digital assets alongside other forms of money and deems them legal property. Additionally, the Japanese Payment Services Act was enacted to create a holistic regulatory framework for payment providers and services that utilize digital assets as potential payment methods. Japan was among the first markets globally to enact broad regulatory requirements, including a licensing regime around digital assets. It places some restrictions on the number of tokens that exchanges are able to list, as well as other localization requirements.

Singapore has been an organic hub to digital asset innovation much in the way the country has attracted other financial and technology sector investments in recent years. The primary regulatory entity – the Monetary Authority of Singapore (MAS) – had previously regulated crypto within the broader Payment Services Act. The license therein was focused primarily on AML/KYC with requirements comparable to other fintech services. Currently, MAS is evaluating additional guardrails for consumer and investor protection within retail crypto trading, as well as codifying a formal regulatory regime for stablecoins. Earlier this year, MAS issued guidance preventing the advertisements of crypto-related assets or activity to the general population in Singapore. MAS has assumed a receptive posture toward stablecoins (especially those denominated in Singapore Dollar or G10 currencies).

In **Thailand**, lawmakers have historically been relatively averse to the adoption of crypto and are preparing to establish regulatory frameworks for the industry. Thailand had previously imposed significant capital gains taxes on crypto investments, but relaxed its regime in March 2022 in order to incentivize growth of the sector domestically. Finance Minister Arkhom Termpittayapaisith announced that traders would be allowed to offset annual losses against gains and would not be subject to a 7% VAT (previously contemplated). The exemption, which is set to continue until December 2023, also exempts taxation on the retail CBDC. Thailand does not permit the use of crypto for payments.

CHAPTER EIGHT

Coinbase Institutional Update

Coinbase Institutional continues to be the leading partner powering the world's largest and most sophisticated institutional investors and corporations on their crypto journey. We provide integrated solutions that marry an advanced trading platform, custody, and prime services to support all institutional client types through the full transaction lifecycle. While price declines and lower trading volumes dominate the headlines, we are encouraged by user sentiment, growing partnerships, blockchain scaling, and increasing institutional adoption.

In 2022, we continued to grow the number of institutions onboarded onto the Coinbase platform, including Brevan Howard, Invesco, GSA Capital, Millennium Global, Koch Disruptive Industries, the Chicago Bulls, Banque Syz (Switzerland), and Trading 212 UK).

Moreover, clients like PIMCO and Marex Solutions either began or continued their campaign into the crypto economy. As of the end of 3Q22, roughly 25% of the 100 largest hedge funds in the world (by reported assets under management) have chosen to onboard with Coinbase. We've also made key partnerships with BlackRock and Google Cloud, which we discuss below. Lastly, Coinbase Cloud is playing a pivotal role in onboarding institutions to (1) build on blockchains through our Node product, (2) earn rewards through staking thanks to Alluvial, the enterprise-grade staking solution, and (3) capture PBS-enabled MEV rewards via Flashbots.

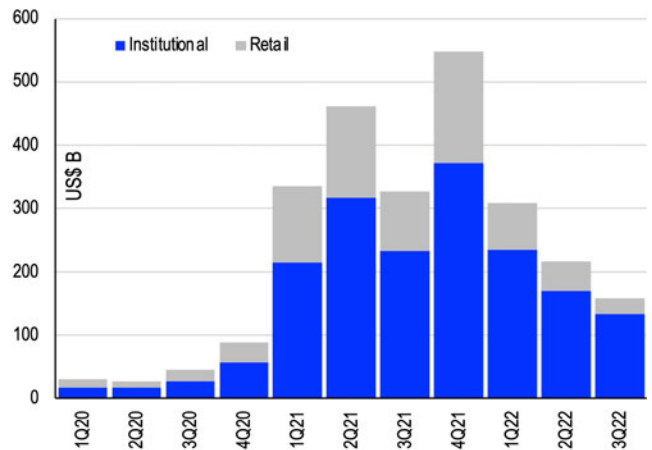
Powering the world's largest and most sophisticated institutions:



Our institutional investor client base represented half of the US\$101B of assets on our platform (\$51B), as well as 84% of all trading volumes on the exchange, as of end 3Q22. The composition of those institutional volumes, however, have shifted away from majority altcoins in 4Q21 and 1Q22 towards trading mainly in BTC and ETH (together comprising 66% of volumes) in 3Q22.

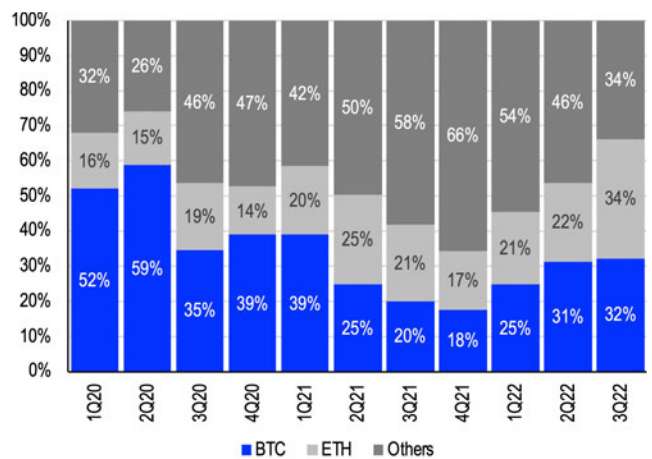
Between September 21 and October 27, *Institutional Investor* conducted a survey (sponsored by Coinbase) of 140 institutional investors to get a read on current sentiment and their outlook toward digital assets since the start of the crypto winter.⁴⁶ Despite current market conditions, overall sentiment towards digital assets remained positive, with 72% supporting the view that digital assets are here to stay (86% among those currently invested in crypto and 64% among those planning to invest). Among the top reasons to invest, participants pointed toward goals of higher returns, accessing yield opportunities, investing in innovative technology, and having the potential for long-term appreciation.

Chart 27. Trading volume on platform (US\$B)



Source: Coinbase.

Chart 28. Institutional trading volumes by asset



Source: Coinbase.

Partnerships

In 2022, we announced a series of industry-leading partnerships, reflecting Coinbase's role in helping some of the preeminent industry leaders execute on their crypto strategies.

- **Google Cloud.** In October, we announced a strategic partnership with Google Cloud. As part of this partnership, select Google Cloud customers will be able to pay for their services via select cryptocurrencies facilitated by Coinbase Commerce, our merchant payments solution. Web3 developers will also gain access to Google Cloud's public blockchain datasets via BigQuery, powered by Coinbase Cloud's Node service. And Google will use Coinbase Prime for institutional crypto services, such as secure custody and reporting.
- **SS&C.** We also announced a partnership with SS&C, a global provider of services and software for the financial services and healthcare industries, to offer its clients access to Coinbase Prime. With the partnership, traders using Eze Investment Suite can manage their crypto trading processes in one place, from pre-trade compliance to custody.
- **BlackRock.** In August, we announced a strategic partnership with BlackRock, the world's largest asset management company, to provide institutional clients of Aladdin®, BlackRock's end-to-end investment management platform, with direct access to crypto through connectivity with Coinbase Prime. Coinbase Prime will provide crypto trading, custody, prime brokerage, and reporting capabilities to Aladdin's Institutional client base, some of whom are, or may become clients of Coinbase. Since announcing the partnership, we have continued building technology and working on integration, and plan to have our offering available to clients in the first half of 2023.
- **Signet.** Coinbase Exchange has joined Signature Bank's Signet to empower users to fund and settle their Coinbase accounts in real time, 24/7/365. Users can now add USDC to the web3 ecosystem in under 10 minutes.

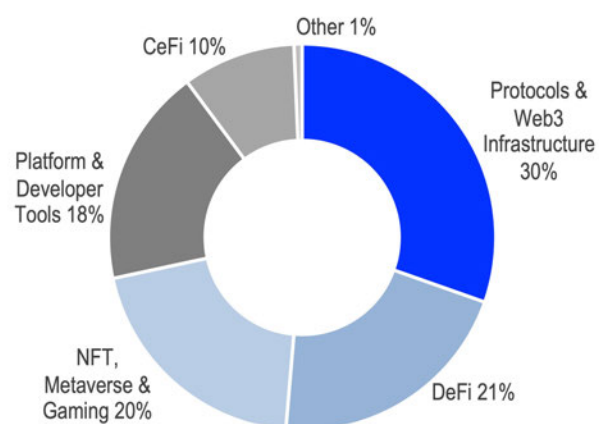
Coinbase Ventures

Coinbase Ventures was launched in 2018 with a mandate to support the growing crypto ecosystem by investing in the leading teams and projects pushing crypto forward. While venture funding conditions tightened considerably in 2022, developer activity remains healthy and the tools available to web3 developers grow more robust by the day. We also continue to see great companies emerge, though there is some dichotomy at play with respect to fundraising – highly sought after founders continue to raise despite the market conditions, while many others struggle to pull together a full syndicate without demonstrable traction. All stakeholders have had to reset valuation expectations (founders for rounds currently being raised and investors for investments made in 2021) and deals that are getting done are taking longer to come together. In an uncertain macro environment and with the fallout from FTX, investors across the board are being more patient in deploying capital.

On the upside, there's still a record amount of dry powder that ultimately needs to find a home, and many high-quality entrepreneurs continue to build in crypto and web3.⁴⁷ It's worth reminding readers that some of the most successful projects of today were funded during the previous bear market of 2018-19 (e.g. OpenSea, Alchemy, Uniswap). In the meantime, funds are dedicating more time and resources to supporting their existing portfolio founders and building out their own operational functions.

Coinbase Ventures currently has more than 400 portfolio companies, with nearly 150 added in 2022. At the highest level, we break the market down into the categories described in our pie chart below. The distribution of total investments in 2022 by sector is as follows:

Chart 29. Deals by product area in 2022



Source: Coinbase.

For more details on the team's investments and market outlook, please reference their quarterly reports ([1Q22](#) / [2Q22](#) / [3Q22](#)).

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