



2022 Annual Crypto Review

#CoinDeskResearch

Executive Summary

In the following report, we aim to summarize some of the key themes and metrics that mark this year's progress in cryptocurrency.

As with all financial assets, market performance is usually the first thing that comes to mind when considering a "year in review." Bitcoin (BTC) and ether (ETH) followed a blistering 2021 with a **65% and 67% pullback in 2022**.

As for macro assets, their correlation behavior with bitcoin remains an unfinished story. **Only bonds ended the year within an uncorrelated band to bitcoin** while stock indices maintained a somewhat positive correlation, and the U.S. dollar index maintained a somewhat negative correlation.

These market performance difficulties leaked into bitcoin mining companies, as a perfect storm of headwinds led **most of the publicly traded bitcoin mining companies to cede an immense amount of value**. Of the five largest public bitcoin miners measured by bitcoin hashrate, the best performer was CleanSpark which still lost 79%. Bitcoin's hashrate marched steadily upward as mining machines purchased in the throes of the bull market came online and that, combined with poor bitcoin price performance, led to general difficulties in the mining industry.

That said, the amount of venture funding raised by blockchain and crypto companies increased in 2022, almost touching \$30 billion. While the growth was far slower than it was in 2021, there was still plenty of venture capital invested **as the venture funds that raised funds in 2021** needed to deploy that dry powder in 2022.

Executive Summary (cont.)

In the year of the bear market, we can find solace in the technology that continued to develop. The talk of the town for **Ethereum was the successful implementation of the Merge** which moved the second-biggest cryptocurrency from a [proof-of-work consensus mechanism to a proof-of-stake consensus mechanism](#). Meanwhile Bitcoin ticked along, with [more nodes enforcing 2021's Taproot upgrade](#) while adding some exciting potential use cases to the Lightning Network – its commerce layer – through growth of the network and the [announcement of Taro by Lightning Labs](#).

Meanwhile it was a strange year in the world of policy. While massive legislative efforts like the European Union's Markets in Crypto Assets (MiCA) bill have crept closer to becoming law, few nations have actually implemented any new laws providing broad clarity for the treatment of digital assets. However, [the massive failures in 2022](#) are likely to **create new pressure for regulators to actually do something about the sector**.

From a regulatory perspective, we've seen a [majority of Ethereum transactions comply](#) with the Office of Foreign Assets Control (OFAC) as the U.S. Treasury Department **blacklisted the Tornado Cash mixer program in August** which led to one of its developers, Alexey Pertsev, being arrested.

And of course, any discussion of crypto in 2022 would be **incomplete without discussing [our first proper Crypto Credit Crisis](#)**, which began with a glut of crypto lenders promising yield to customers in exchange for deposits and culminated with the arrest in the Bahamas and extradition to the U.S. of FTX and Alameda Research founder Sam Bankman-Fried (SBF). It was years in the making and it's hardly the first credit crisis in financial history, but this one is definitively crypto's.

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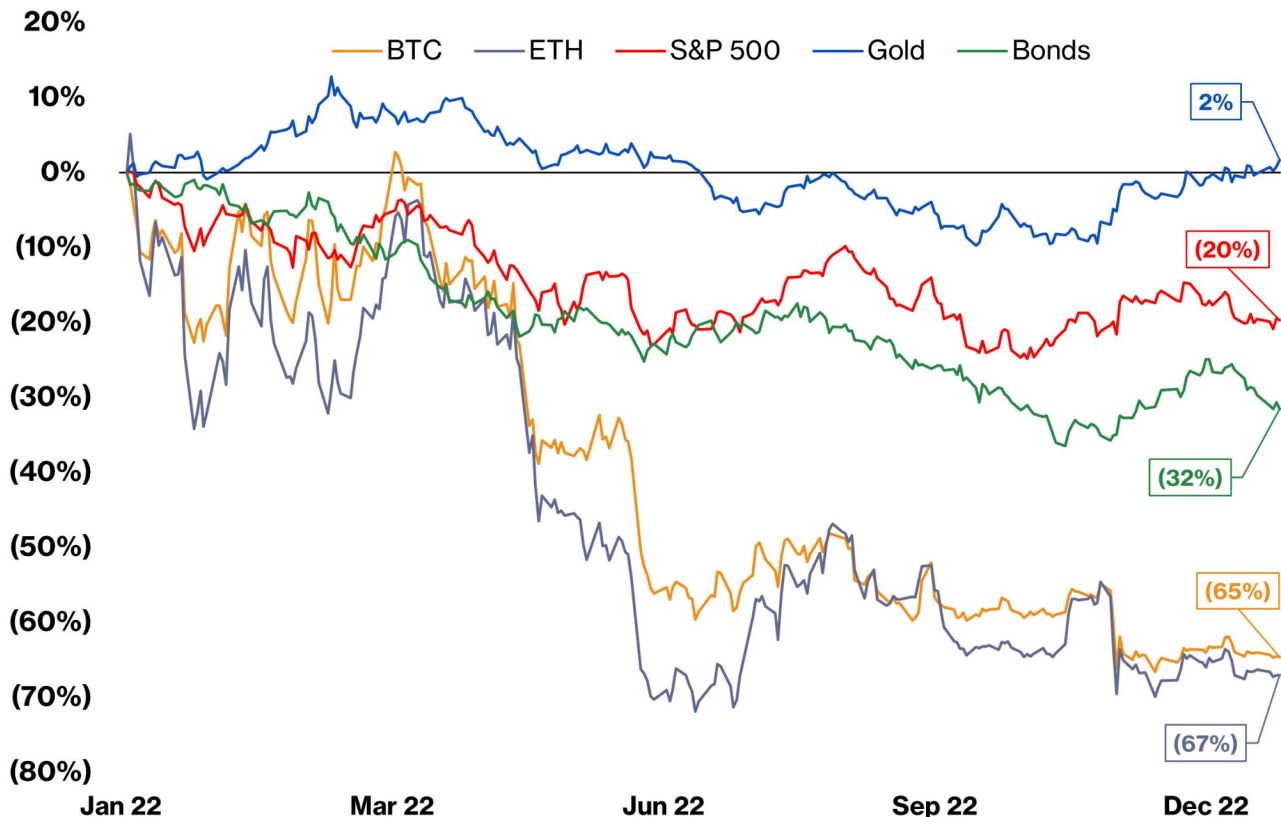
01 – Markets

Macro Returns

BTC and ETH greatly underperformed traditional benchmarks for stocks, bonds and gold in 2022, with the CoinDesk Bitcoin Price Index (XBX) and the CoinDesk Ether Price Index (ETX) losing 65% and 67%, respectively.

That said, all markets were characterized by central bank tightening which aimed to combat inflation. **The markets reared so much that most assets – save gold with its 2% return – took a beating in 2022.**

Perhaps unsurprisingly, bitcoin and ether ceded even more than other macro assets due to general market fear, and that's to say nothing of the secular shocks the assets had to absorb directly from the crypto industry.



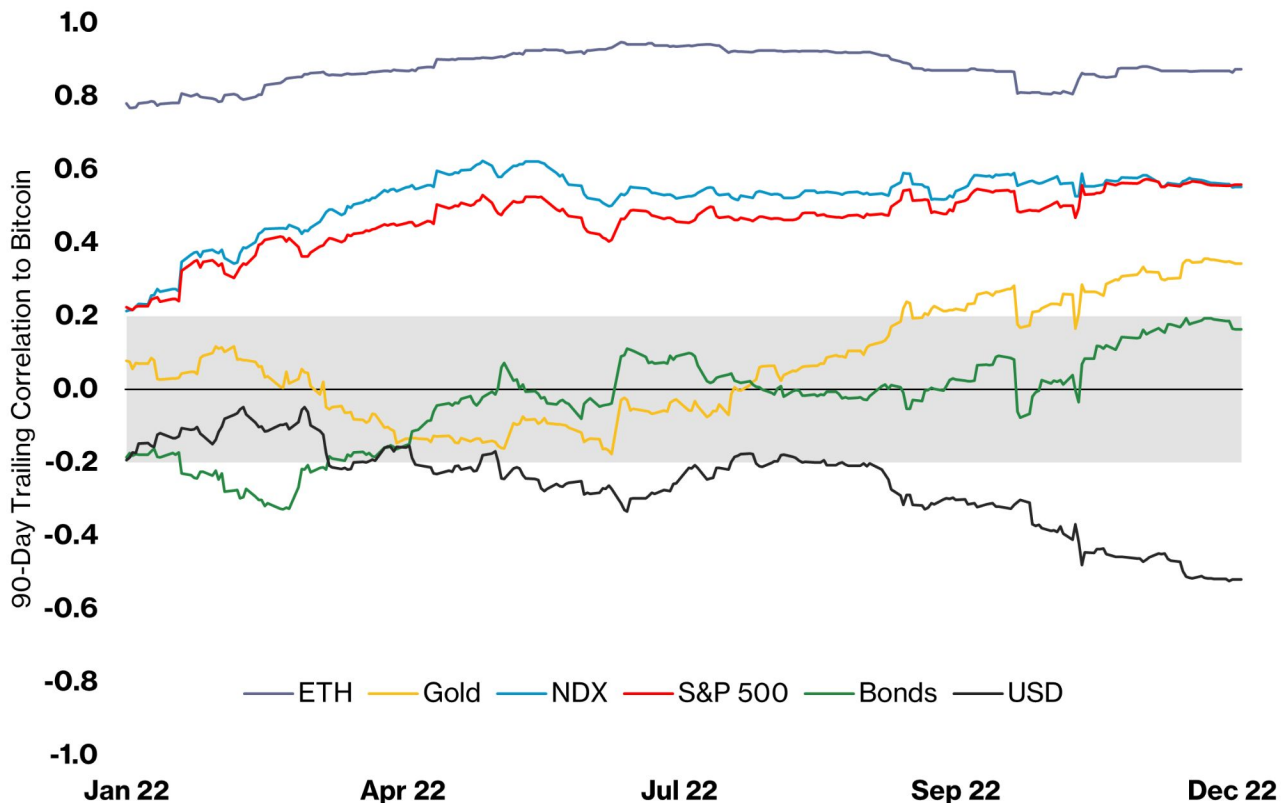
Source: CoinDesk Research, St. Louis Fed, TradingView. Bonds = iShares 20+ Year Treasury Bond ETF; Gold = London Bullion Market pm fixing price

Correlations

The correlation behavior of bitcoin to macro assets remains an unfinished story. In 2021, macro assets generally held within an uncorrelated band (-0.2 to 0.2). This year, bonds, gold and the dollar moved in and out of uncorrelatedness to bitcoin, with only bonds finishing 2022 there.

The somewhat positive correlation we saw between bitcoin and stocks in 2021 continued in 2022 (S&P 500 and NDX), suggesting that investors are bucketing BTC as a risk-on asset and are trading it accordingly.

While bitcoin showed signs of correlation with some macro assets, it remains to be seen where bitcoin lands in the view of the broader market as it looks to prove it is still a unique macro asset like no other.



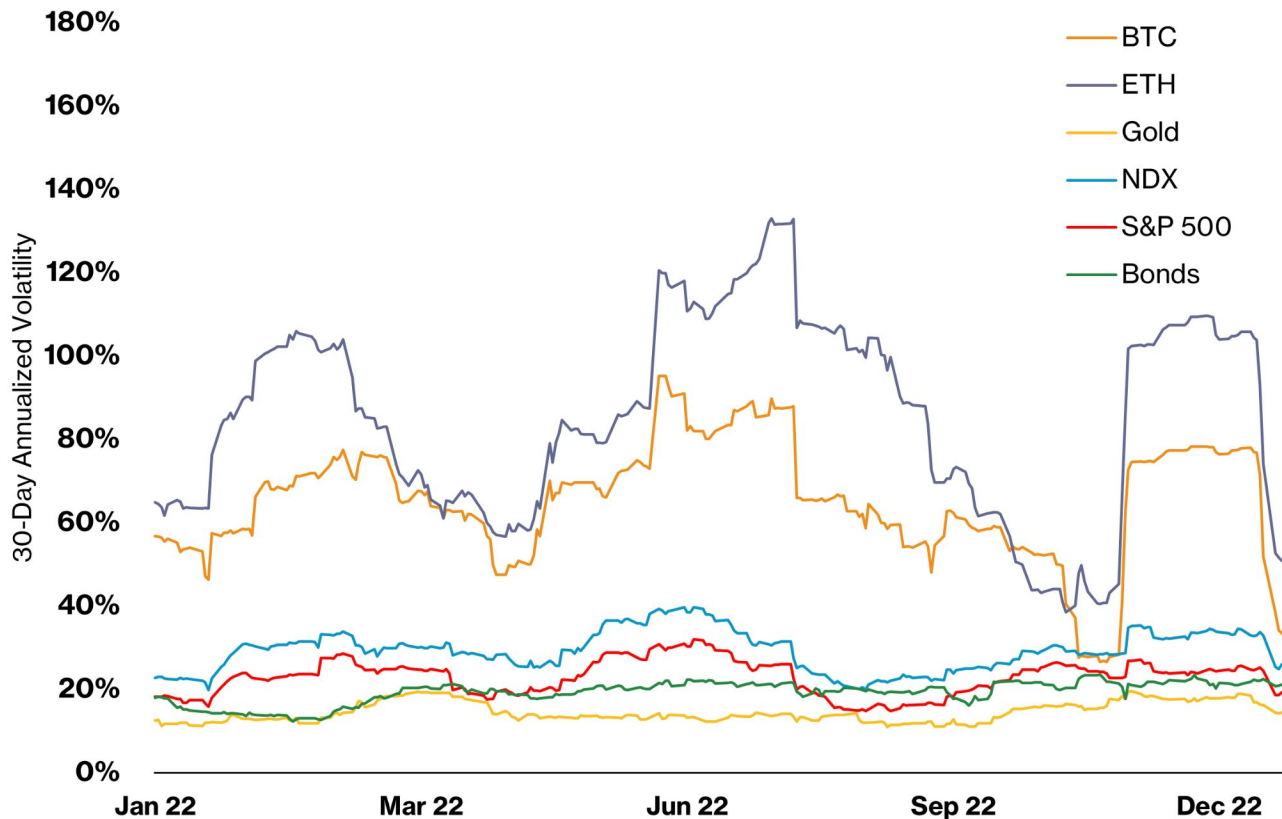
Source: CoinDesk Research, St. Louis Fed, Yahoo Finance. Bonds = iShares 20+ Year Treasury Bond ETF; Gold = London Bullion Market pm fixing price

Volatility

It was an admittedly strange year for crypto volatility in 2022.

Up until around the end of Q3, BTC and ETH volatility looked relatively normal, sitting above stocks, bonds and gold. However, as we entered September the volatility of BTC and ETH took a nose-dive. **At one point, the 30-day annualized volatility for BTC was lower than the Nasdaq 100.**

In real time, almost everyone seemed puzzled about why this was happening. The idea of a [bitcoin-stock market decoupling](#) has been floating around for some time now, but it was relatively unexpected to see crypto end the year reacting less violently to events like it had [become the established asset](#).



Source: CoinDesk Research, St. Louis Fed, Yahoo Finance. Bonds = iShares 20+ Year Treasury Bond ETF; Gold = London Bullion Market pm fixing price

ETH / BTC Chart

The uptrend in price ether experienced against bitcoin in 2021 did not continue in 2022. In fact, ETH / BTC decreased through the first half of the year until [news about the Merge](#) injected new momentum. From there, ETH / BTC hit a year-high of 0.085, just off its 2021 high of 0.088. Although market participants continue to call for “the Flipping,” the significant breakout against BTC that took place in 2017 has yet to happen. **As the Merge has altered the predictability of ETH’s monetary policy, it may be time to comparing the market capitalization of ETH and BTC rather than per token price, for a more accurate representation of relative value between the two.**

ETH / BTC Ratio Ends 2022 Where It Started

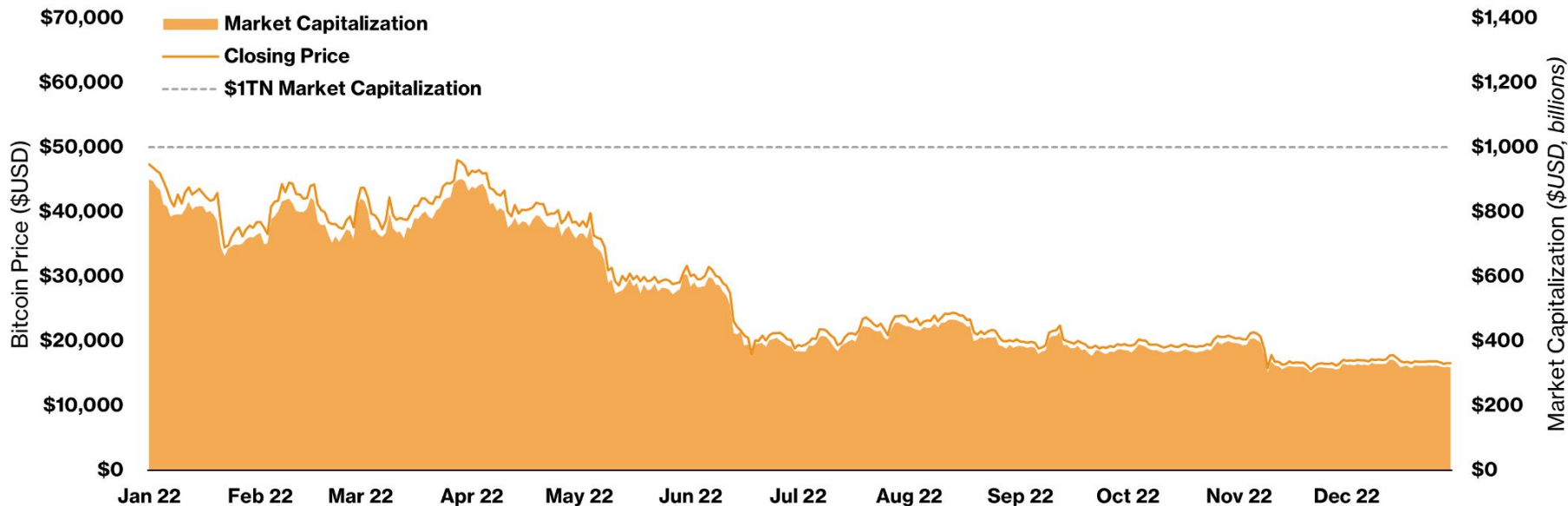


02 – Bitcoin

BTC Market Performance

After 3 years of great performance, bitcoin reversed course losing 65% in 2022. **Bitcoin's price performance is unsurprising given the broader context of crypto developments in 2022.** Beginning in May to the end of the year we had, in order: the fall of \$60B crypto project Terra, the collapse of an over-leveraged crypto hedge fund Three Arrows Capital, the bankruptcy of crypto lender Celsius, the complete wipeout of crypto exchange FTX and a full blown Crypto Credit Crisis (see pages 48-52). Do keep in mind that this list is not exhaustive as the events of this Crypto Credit Crisis are still unfolding.

Bitcoin Price Fared Poorly in 2022



Quarterly & Annual Performance

Since 2015, Q4 has been the strongest quarter for BTC price, averaging gains of 53%; granted that average is skewed by 2017 and 2020. In Q4 2022, bitcoin fell 15% which admittedly looks muted when compared to Q4 2018's 45% loss (bitcoin's last negative returning year). Last year, bitcoin was a \$800B - \$1T asset, which **put it on the precipice of an important role in global economics – naturally there is some pause from investors now that BTC's total value is around \$300B.**

Another Terrible 2nd Quarter, But This Time During A Terrible Year

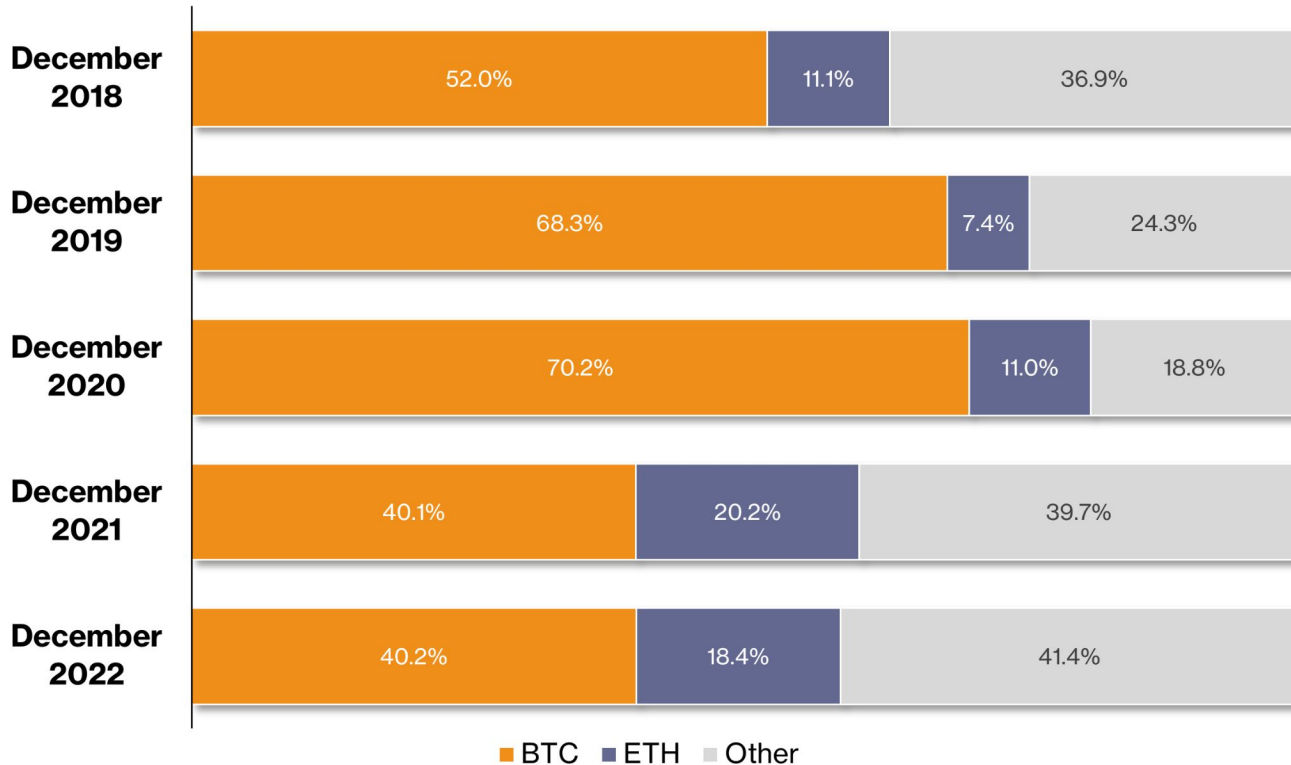
Quarterly Returns

	2016	2017	2018	2019	2020	2021	2022
Q1	(2.5%)	10.1%	(46.6%)	11.0%	(10.2%)	101.7%	(2.3%)
Q2	53.2%	142.9%	(9.0%)	167.0%	41.9%	(40.6%)	(58.6%)
Q3	(4.8%)	65.2%	4.8%	(24.6%)	17.4%	25.7%	3.2%
Q4	57.6%	210.4%	(44.5%)	(12.9%)	171.0%	6.7%	(15.0%)
Annual	124.1%	1,271.4%	(71.8%)	94.6%	305.5%	60.5%	(64.5%)

BTC Market Capitalization Dominance

Since 2018, bitcoin dominance, the measure of BTC value compared with the value of all cryptos, has moved upward. That changed in 2021 and 2022, with dominance ending 2022 flat at 40.2% after closing 2021 at 40.1%.

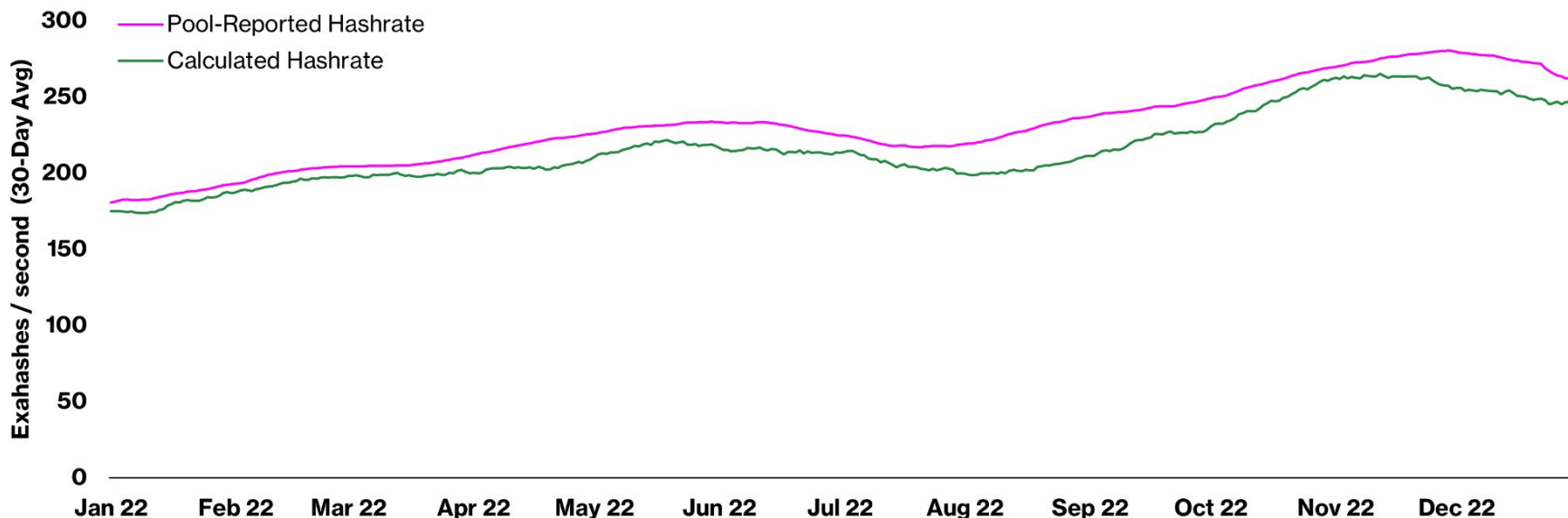
As with ETH / BTC, **we may need new methodology to glean takeaways from Bitcoin dominance** now that it fell in a bear market when **the opposite was expected**. Rather, given the glut of illiquid coins in existence, there is suggestion to move to using **Realized Capitalization to calculate dominance**, which adjusts for items like non-circulating supply and other value distorting behavior.



BTC Hashrate

Following a turbulent 2021, **hashrate, the amount of computational power being used to process Bitcoin transactions, behaved resiliently especially given the amount of bad news coming from the mining industry and the market in general.** The year started with pool-reported hashrate around 180 EH/s and gained steadily to end the year around 260 EH/s. All the while, bitcoin's price was down 65%, public mining companies lost almost all their market value and mining difficulty (a technical parameter in the Bitcoin network) increased by 46%.

BTC Showcased Resilience Through Market and Industry Turmoil

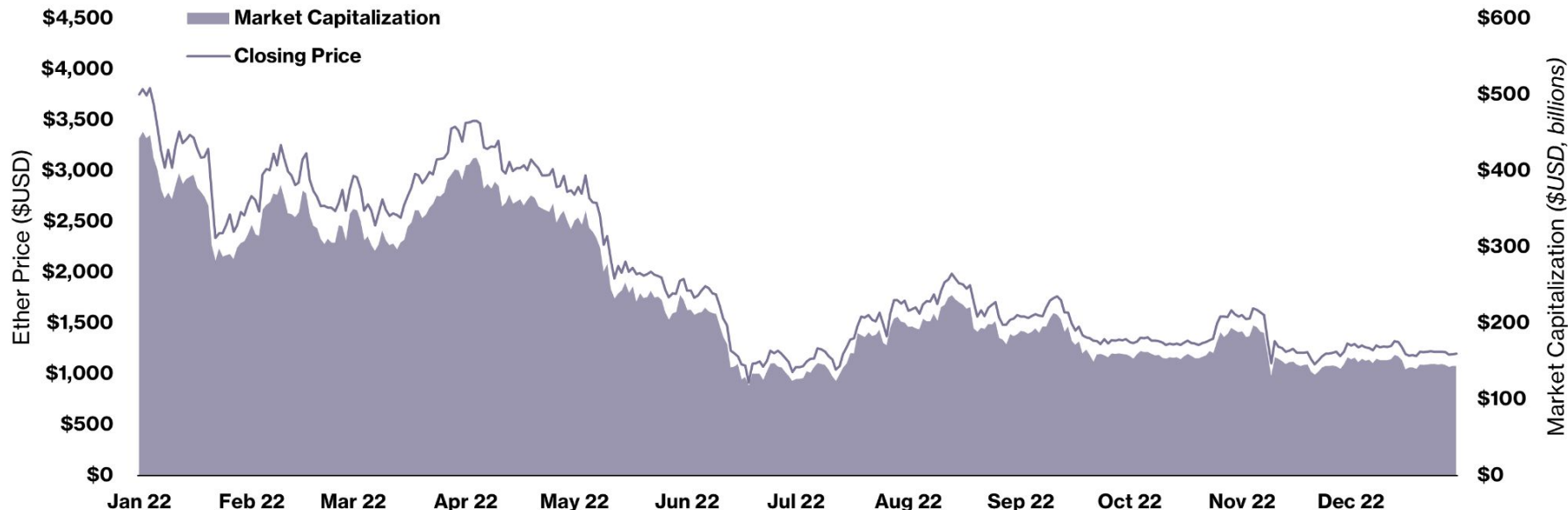


03 – Ethereum

ETH Market Performance

BTC and ETH tend to move in tandem, so with BTC ceding 65% of its value it is unsurprising ETH ended 2022 down 69%, losing roughly \$300B of market capitalization ending at \$143B. ETH saw its lowest level in years during the March 2020 crash, bottoming at \$90.10 on Coinbase and returning a multiple of 54.1x at the November peak. **That said, the investment thesis for ETH is shifting in realtime now that the protocol has moved to proof-of-stake with the Merge which changes its monetary policy and offers a medium in which to natively earn yield.**

ETH Finishes 2022 Down 67%

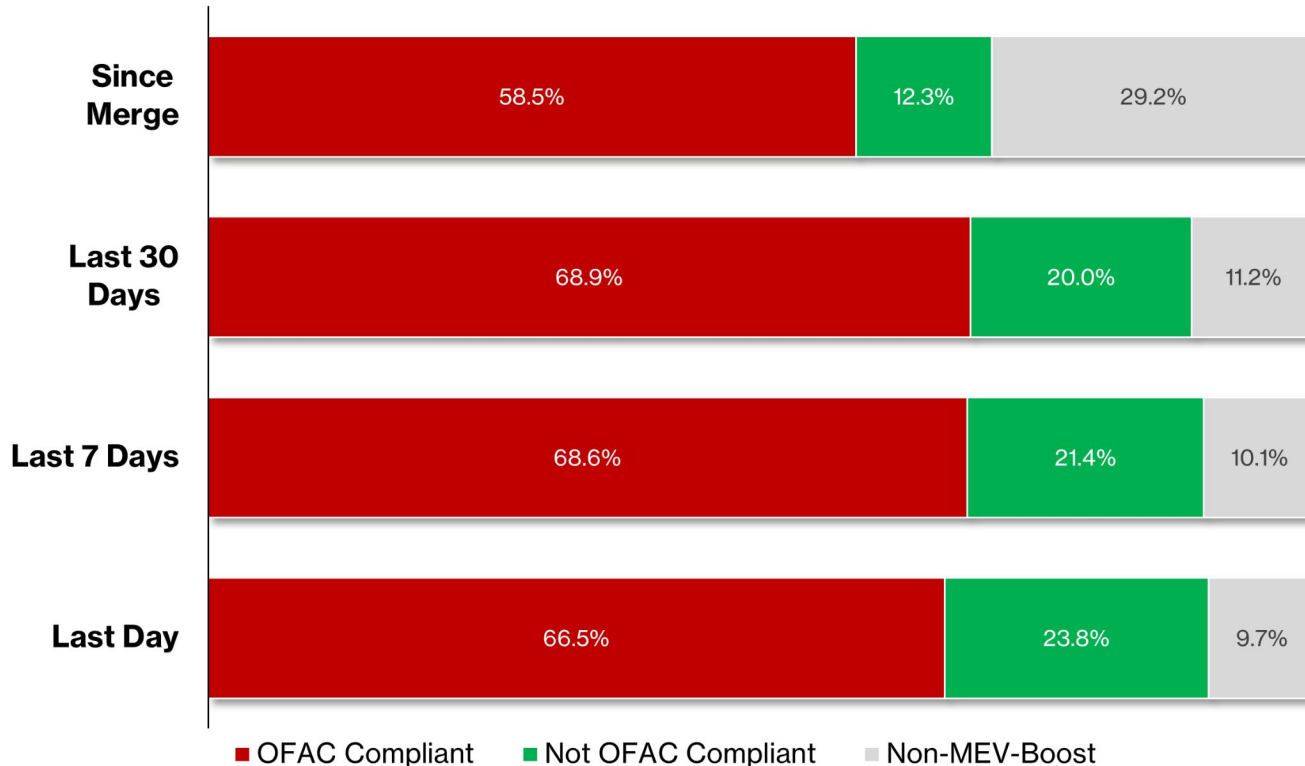


ETH OFAC Compliance

Soon after the [U.S. Treasury's Office of Foreign Asset Control \(OFAC\)](#) blacklisted the [Tornado Cash](#) mixer program in August, Ethereum research and development firm Flashbots announced that it would, in accordance with U.S. Treasury Department sanctions, begin censoring transactions by means of a key piece of infrastructure used by many of the [validators](#) that run Ethereum's proof-of-stake blockchain.

The Flashbots technology stack makes up a significant portion of Ethereum infrastructure which has led to most ETH transactions complying with OFAC sanctions.

Many developers have voiced concerns, but it still remains to be seen how this trend develops.



Source: <https://www.mevwatch.info/>
Data as of December 30, 2022

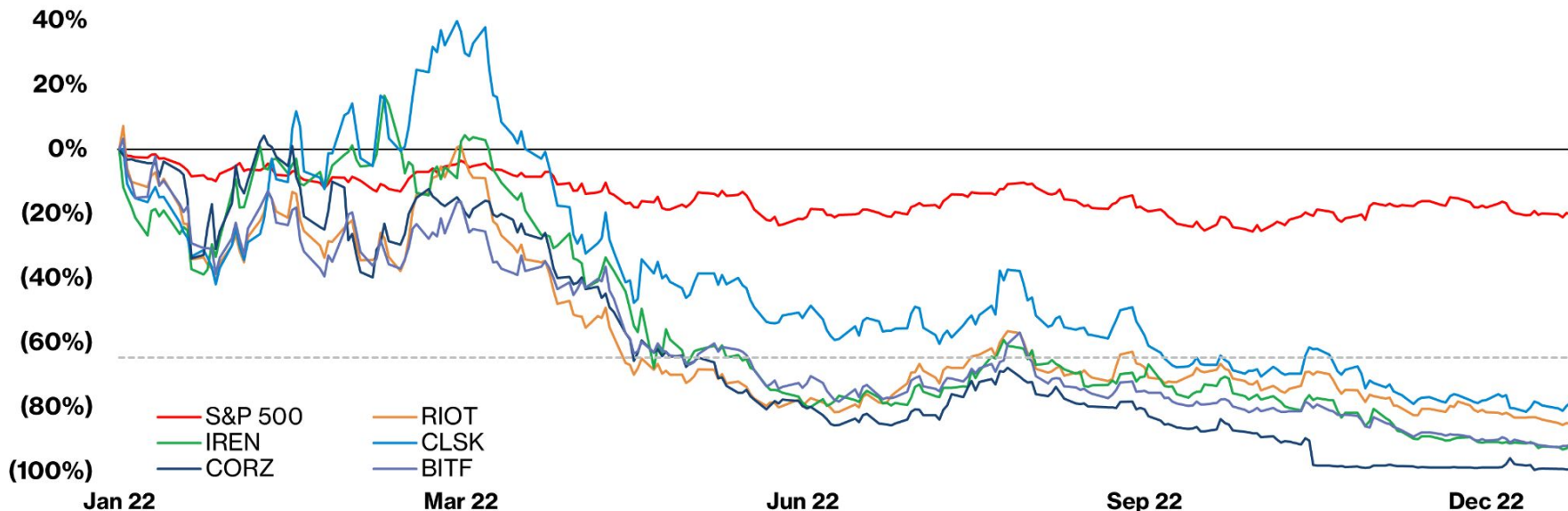
04 – Companies

BTC Mining Stocks

It was a perfect storm for miners in 2022: Interest rate hikes increased the cost of capital, bitcoin's price fell and bitcoin's hashprice fell by 75%. Looking at the top five public miners by bitcoin hashrate, they lost an average of 89% of their value, well below bitcoin's 2022 tumble (gray, dashed line below). For the last few years, miners have largely held on to the bitcoin they mined, opting to [finance operations with debt and other types of exogenous capital](#).

Moving forward, bitcoin miners will likely need to implement a strategy that involves exchanging a portion of mined bitcoin to fund their businesses as a going concern.

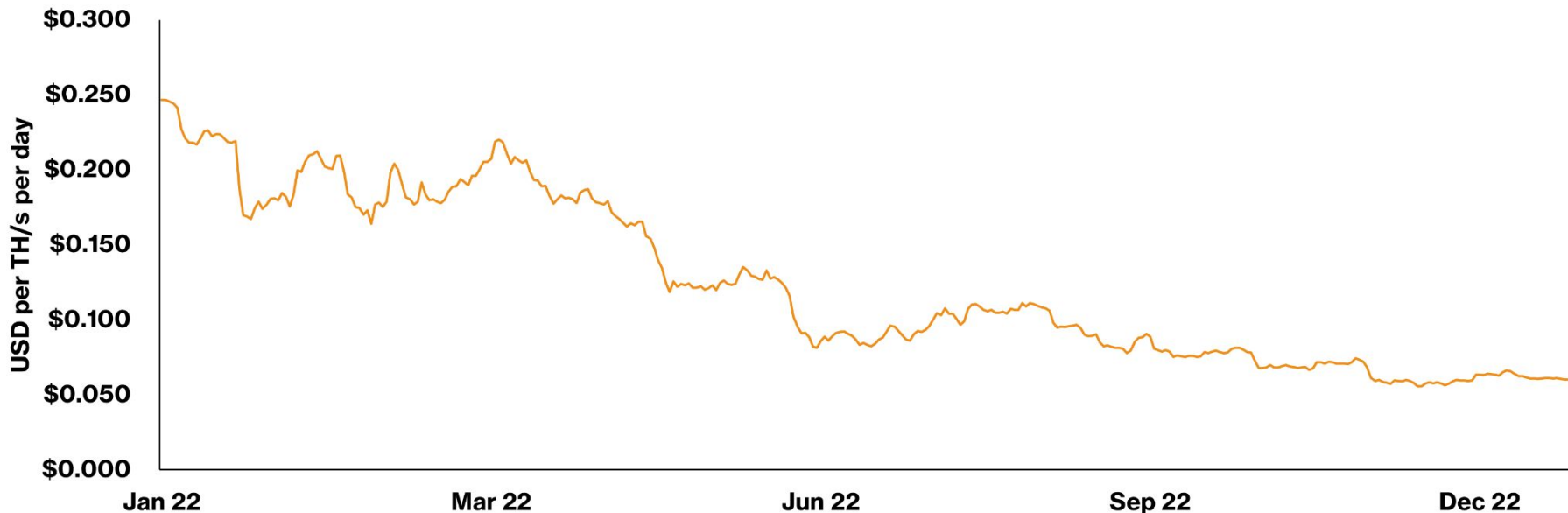
Bitcoin Mining Stocks Were Ravaged in 2022



Bitcoin Hashprice

Hashprice, a term coined by [Luxor Technologies](#), refers to the expected value of 1 terahash per second of hashing power per day. The metric aims to quantify how much a miner can expect to earn from the hashrate it owns. As hashrate of the entire network increased steadily in 2022 while the price of bitcoin fell precipitously, hashprice fell even more. The decrease in hashprice is emblematic of the difficulties faced by both hobbyist and corporate miners as the profitability of mining setups has fallen.

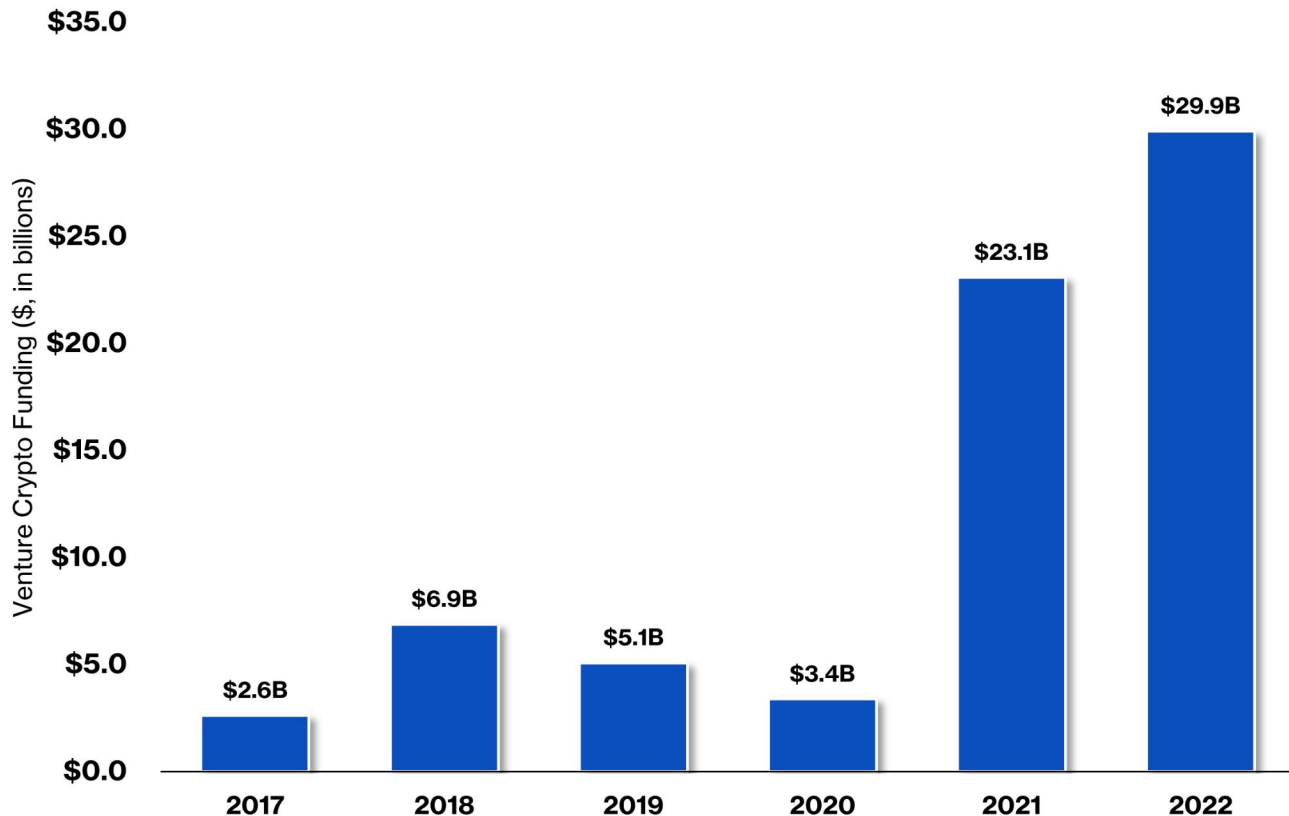
BTC Hashprice Showcases Mining Company Woes



Capital Raises

2021 was a monumental year for capital raises and funding rounds for blockchain and cryptocurrency companies. With the immense, 500% growth in funding in 2021 came a swath of venture capital firms entering the fold to raise capital in order to invest in crypto companies.

With that, even though there was a substantial downturn in the broader crypto market, funding given to companies still grew nearly 30%.



Source: CoinDesk Research, Blockdata, Messari

2022 Annual Review

05 – Policy and Regulation

Policy and Regulation – 2022 in Review

2022 was the year of [unfulfilled promises](#). In the U.S. and other nations, it almost felt like the year that passed regulators by. While massive legislative efforts like the [European Union's Markets in Crypto Assets](#) bill have crept closer to becoming law, few nations have actually implemented any new laws providing broad clarity for the treatment of digital assets. However, the massive failures in 2022 are likely to create new pressure for regulators to actually do something about this sector.

The U.S. introduced a number of bills, but the most highly anticipated bill actually has not been introduced yet: **A House Financial Services Committee [bill to regulate stablecoins](#) has been on the table all year, and may see some traction this coming year.**

The number of exchanges and other crypto platforms [filing for bankruptcy](#) raised new questions about customer privacy and protections. These questions will only become more pertinent as regulators begin grappling with them in 2023.

Over in the E.U., the landmark **Markets in Crypto Assets (MiCA) legislation got one step closer to law, after legislators adopted the text of the bill.** A number of countries are starting to signal their intention to comply with the multinational law.

India implemented two taxes on crypto transactions, imposed on both exchanges and individuals transacting with crypto, which collectively drove down the overall ecosystem in India.

We're starting to see the results of [criminal investigations and prosecutions of crypto figures](#). People like Arthur Hayes and [Virgil Griffith were sentenced](#) this year, and criminal investigations are only heating up with the coming trial of Sam Bankman-Fried.

Policy and Regulation – 2022 in Review (cont.)

Regulators are also starting to approach issues like [decentralized autonomous organizations \(DAOs\)](#), trying to wrangle them into existing regulatory frameworks however they can.

Broadly, an increasing number of countries or regions are discussing actually [launching a central bank digital currency](#). The U.S. published papers addressing both policy and technical questions around a digital dollar, India has committed to launching one within the next year, the European Union is edging closer to launching one and some nations are even experimenting with live versions, such as Nigeria.

– [Nikhilesh De](#), *Managing Editor for Global Policy & Regulation*

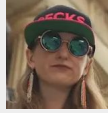
Policy and Regulation – A 2022 Timeline

Jan. 20:



U.S. Federal Reserve published its central bank digital currency (CBDC) report

Feb. 8:



Federal officials arrested two and seized \$3.6B in BTC tied to the 2016 Bitfinex hack

Mar. 9:



Joe Biden announced a "whole-of-government" approach to regulating digital assets with an executive order

Apr. 6:



SEC approved Teucrium's Bitcoin Futures ETF, hinting at a path forward for approval of a spot ETF

Apr. 14:



North Korean hacking group linked to \$625 million Ronin bridge hack

Jan. 4:  CFTC
COMMODITY FUTURES TRADING COMMISSION

CFTC filed an enforcement action against Polymarket

Jan. 31:  diem

Facebook-backed Diem Association shut down operations

Feb. 16:



Canada sanctions 34 crypto wallets tied to trucker 'Freedom Convoy'

Mar. 25:



EU's MiCA bill moved forward without Bitcoin limiting provision

Apr. 25:



Elon Musk came to terms with the board of Twitter Inc. (TWTR) to acquire company

Policy and Regulation – A 2022 Timeline (cont.)

June 28:



Deputy Treasury Secretary said that U.S. wants to promote responsible crypto innovation

June 15:



Three Arrows Capital faced insolvency after liquidations

Jul. 21:



The SEC alleged that nine cryptocurrencies are securities in connection with insider trading case

Aug. 15:



U.S. Federal Reserve opened pathway for crypto banks to tap central banking system

Aug. 27:



Grayscale (a CoinDesk sister company), disclosed the SEC asked about analysis of cryptos, suggesting some may be securities

May 9:



terraUSD and Luna collapsed, prompting reaction from regulators

June 15:



Crypto lender Celsius hired restructuring lawyers after pausing withdrawals

Jul. 8:



Grayscale and Bitwise bitcoin ETF applications rejected

Aug. 8:



Crypto-mixing service Tornado Cash blacklisted by U.S. Treasury

Sep. 2:



One of Congress' stablecoin oversight efforts hit a snag as negotiations drag

Policy and Regulation – A 2022 Timeline (cont.)

Sep. 22:



The Commodity Futures Trading Commission (CFTC) sued Ooki DAO

Jul. 13:



Crypto lender Celsius filed for Chapter 11 bankruptcy

Oct. 3:



Kim Kardashian settled SEC probe for hyping EthereumMax without disclosing payment

Oct. 5:



Terra founder Do Kwon's passport invalidated by South Korea

Nov. 11:



FTX Group filed for Chapter 11 bankruptcy

Sep. 16:



The White House, Treasury, Commerce and Justice departments published reports in response to March executive order

Oct. 3:



The Financial Stability Oversight Council (FSOC) published its highly anticipated report in response to March executive order

Jul. 6:



Crypto lender Voyager Digital filed for Chapter 11 bankruptcy

Nov. 2:



Report surfaced showing blurred line between the companies in Sam Bankman-Fried's crypto empire

Nov. 22:



FTX kicked off bankruptcy proceedings with first hearing

Policy and Regulation – A 2022 Timeline (cont.)

Dec. 7:



Three Arrow Capital
founders subpoenaed
in U.S. bankruptcy
case

Dec. 12:



SEC filed brief
defending its denial
to allow conversion of
GBTC into a spot
bitcoin ETF

Dec. 14:



U.S. Senators Warren,
Marshall introduced
Digital Assets
Anti-Money Laundering
bill

Dec. 22:



Sam Bankman-Fried
released from custody
after posting \$250
million bond

Nov. 28:



Crypto lender BlockFi
filed for Chapter 11
bankruptcy

Dec. 9:



Sam Bankman-Fried
agreed to testify before
U.S. House Financial
Committee after media
tour

Dec. 13:



SEC charged SBF for
defrauding FTX
investors; CFTC sued;
SBF remanded into
custody in the
Bahamas

Dec. 21:



Sam Bankman-Fried
extradited to U.S.
from the Bahamas

Dec. 27:



Justice Department
launched criminal probe
into \$400M FTX hack

06 – Technology

Technology – 2022 in Review

Price declines invite the cynics in droves and once-pompous, [paper-rich day traders are suddenly “in it for the tech.”](#) Yes, crypto has minted many a paper millionaire, but by and large **it’s not a get-rich-quick scheme**. Given price performance in 2022, it was a good year to be in it for the technology.

Ethereum, the second largest cryptocurrency, went through its [biggest update ever with the Merge](#). It has come with growing pains, [like some issues with censorship resistance](#), but it has been largely viewed as a good thing for Ethereum. **There’s plenty to look forward to in 2023 as [Ethereum works towards the Shanghai upgrade](#).**

Bitcoin, the largest cryptocurrency, in contrast did not go through any big updates at the base layer. Bitcoin did what it did best: Tick on without any particular issues. Most development came through via the Lightning Network (Lightning), a Bitcoin second layer. Development showed its face **through general growth of Lightning** and the continued work on [privacy tools like BOLT12](#) and [multi-asset network tools through Taro](#).

Rest assured, **crypto is technology and the technology will continue working and improving no matter the price of the underlying asset**. 2022 was no exception.

– [George Kaloudis](#), Research Analyst

Technology – 2022 Ethereum: The Merge

The following is excerpted from [Sam Kessler's](#) and [Sage D. Young's](#) article: [“Ethereum Merge: What You Need to Know”](#)

What was the Merge?

The Merge represented the Ethereum network's shift to proof-of-stake (PoS), its new system (also called a “consensus mechanism”) for authenticating crypto transactions. The new system will replace proof-of-work (PoW), the more power-hungry mechanism pioneered by Bitcoin.

Why is it called the Merge?

Before the Merge, Ethereum already had a PoS network called the Beacon Chain (introduced in 2020), but it was not yet used for processing transactions. The Beacon Chain acted as a staging area for computers operating the Ethereum network to prepare for the upgrade. Ethereum's full transition to PoS required the merging the Beacon Chain (called the “Consensus” layer) with Ethereum's PoW mainnet (the “Execution” layer).

How does proof-of-stake (PoS) differ from proof-of-work (PoW)?

Proof-of-stake (PoS) and proof-of-work (PoW) differ in how they decide who has the right to record the next “block” of transactions on the network. In the old PoW system, Ethereum miners competed to publish blocks by racing to solve cryptographic puzzles, like in Bitcoin. In the new PoS system, validators that stake (lock up) at least 32 ether with the network are randomly selected to create blocks. The more ether one stakes, the more likely one is to be selected.

In both systems, the miner/validator that wins a block is rewarded with a mix of transaction fees and newly minted ether (ETH). PoS validators also receive rewards for doing other activities to help secure the network.

Can I become an Ethereum validator or staker?

Yes, if you have some ETH. Staked ether will accrue network rewards, but it will be impossible to withdraw until an update after the Merge. Staking requires some know-how; if you screw up or go offline, your stake can be “slashed” (ie, reduced).

Those with less blockchain expertise can stake via centralized services like those offered by Coinbase (COIN) or Kraken. In addition to handling the technical nitty-gritty, these services – in exchange for a cut of users’ rewards – open up staking to those with fewer than 32 ETH.

Also popular for those with fewer than 32 ETH are liquid staking pools like Lido and Rocket Pool. When users stake via these services, they are handed “staked ETH” tokens which trade at a slight discount to regular ETH.

What’s on the Ethereum roadmap after the Merge?

After the Merge, Ethereum’s core developers will continue working on the open-source network as they did before, with improvements to network fees, speeds and security slated for the months and years ahead. One focus for developers post-Merge will be [sharding](#), which aims to expand Ethereum’s transaction throughput and decrease its fees by spreading network activity across several “shards” –

almost like lanes on a highway. (Updates of this sort were initially slated to accompany the Merge – originally called “Ethereum 2.0,” or “ETH2” – but were deprioritized with the success of [third-party rollups](#) at addressing some of the same problems). Also on the roadmap is enshrined [proposer builder separation](#) (PBS), which will separate the “builders” that add transactions to blocks from the “proposers” who put them forward for approval from the wider network. PBS is pitched as a way to help tackle [Ethereum’s maximal extractable value \(MEV\) problem](#).

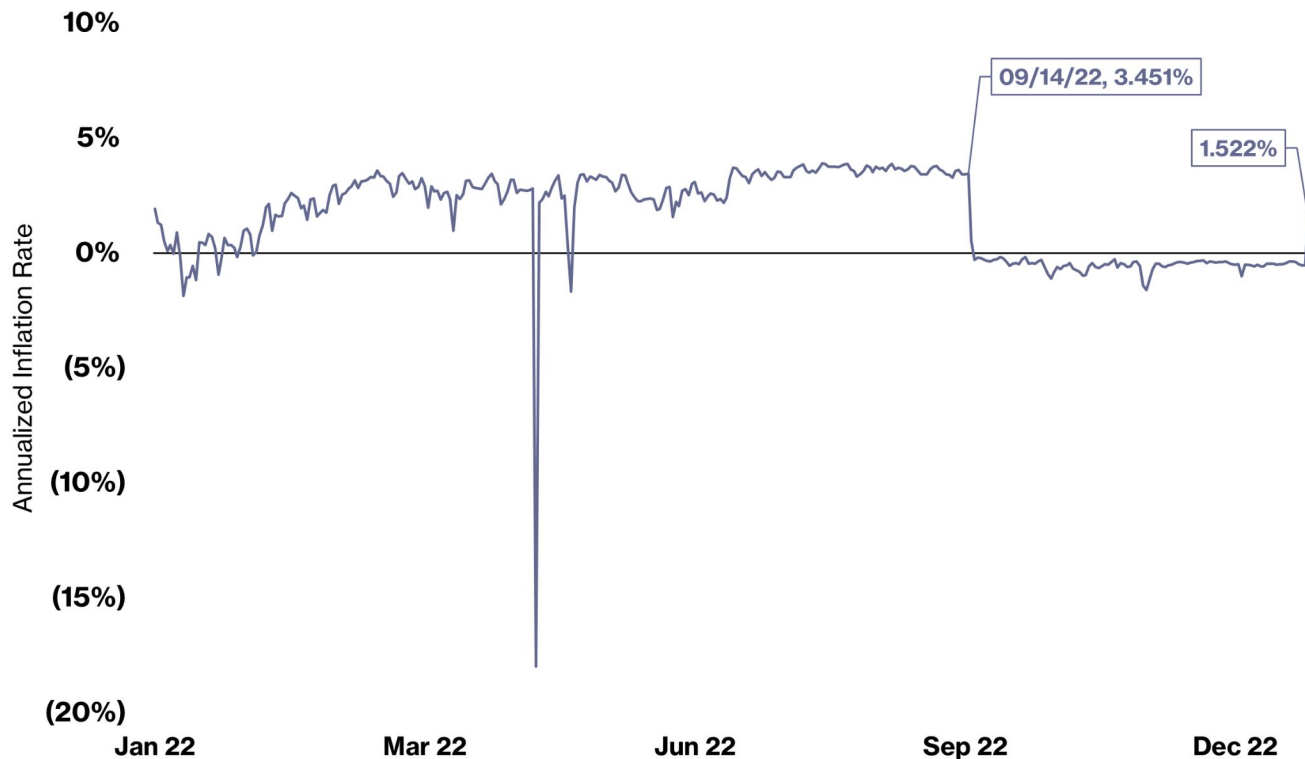
– [Sam Kessler](#), *Technology Reporter*; [Sage D. Young](#), *Technology Reporter*

Read more from [Margaux Nijkerk](#), *Ethereum Protocol Reporter*: [Ethereum After the Merge: What Comes Next?](#)

The Merge in One Chart

Ethereum's 2022 was largely defined by the success of the Merge on September 14th. With the Merge, Ethereum moved from a proof-of-work consensus mechanism to a proof-of-stake consensus mechanism, among other things. One of those other things includes the way in which the protocol issues new ether into circulation. The way Ethereum mints ether now includes a burning mechanism which adjusts based on network demand. As such, there is an expectation that Ethereum may become deflationary over time.

It remains to be seen where Ethereum's inflation rate settles given it has only been ~100 days since the Merge.



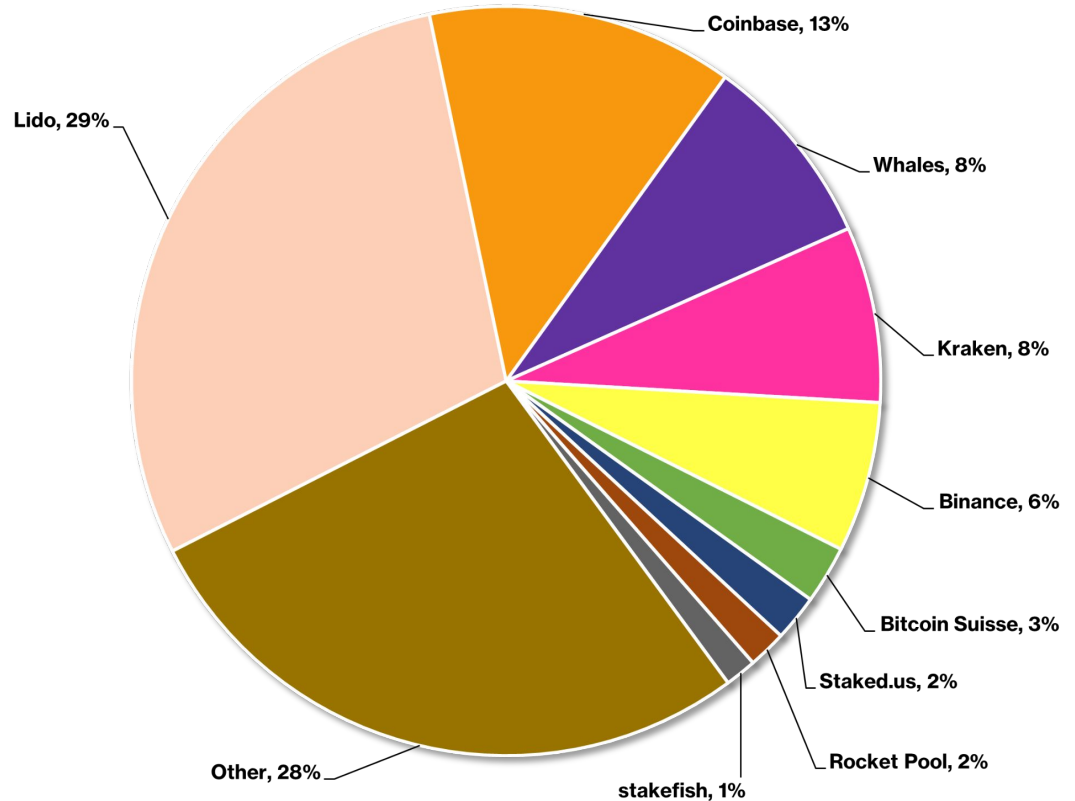
Source: Etherscan

Staked Ethereum by Staking Service

Centralization of Staked ETH

Due to the amount of capital (32 ETH) and technical know-how needed to stake ether, many opt to use staking services which allow users to deposit any amount of ETH to earn staking rewards. The services are meant to bypass the capital and technical requirements needed to run a validator node, in exchange for a fee.

Staking services are popular since they grant access to ETH staking to more people. **However, this has led to centralization of ETH staked with a few big staking services.** Lido, for example, is a DAO that holds 29% of all staked ETH. This could pose an issue going forward as the decisions afforded to validators (like whether to censor transactions or not) falls into fewer and fewer hands.



Source: Etherscan
Data as of December 30, 2022

Technology – 2022 Bitcoin: Bitcoin OpTech

The following is excerpted from [Frederick Munawa's](#) article: "[Built on Bitcoin in 2022](#)" which summarizes the [Bitcoin Operations Technology Group](#) (OpTech) 2022 overview.

Three major themes highlighted by OpTech sparked both vigorous debate and vigorous coding: replace-by-fee, or RBF (a way to replace unconfirmed Bitcoin transactions), several soft fork proposals and 16 major Bitcoin ecosystem software releases.

Replace-by-fee

One topic that seemed to polarize Bitcoiners all year long was the debate over Replace-By-Fee (RBF), a feature in [Bitcoin Core](#) that gives users the option to replace unconfirmed transactions with new transactions, as long as they're willing to pay a higher fee for the replacement transaction. (Bitcoin Core is the dominant software used to connect to the Bitcoin network.)

Why would anyone want to replace an unconfirmed transaction? Imagine Bob desperately needs to send one bitcoin (BTC) to Alice during a period of peak transaction volume (say, [during a surge in Binance withdrawals](#)). Bitcoin transactions are typically confirmed – accepted into a block of transactions that gets added to the Bitcoin blockchain – every 10 minutes or so. It's been over 30 minutes and three blocks have already been confirmed, but because the network is at peak volume, no miner has accepted Bob's transaction because other transactions are paying miners much higher fees. (Bitcoin miners process transactions and secure the network.)

Bob's unconfirmed transaction is officially "stuck." With RBF, Bob can replace his original transaction and pay a higher fee to get it accepted by a miner.

There are two main flavors of RBF. Opt-in RBF allows Bob to mark or "flag" his unconfirmed transactions as replaceable or not replaceable. Full RBF simply makes all unconfirmed transactions replaceable. Here's where the controversy lies. According to some Bitcoin business owners, certain vendors are willing to accept riskier unconfirmed transactions because they deal with low value goods and services. Those vendors have strategically optimized their operations to minimize the risk from these zero confirmation (unconfirmed) transactions. The catch, though, is that optimization is only based on opt-in RBF and not full RBF.

Other bitcoiners argue zero-confirmation fraud is a risk independent of RBF. Whatever the case may be, full RBF (menu option "mempoolfullrbf") was introduced in [Bitcoin Core version 24.0](#) last month. However, it's switched off by default, meaning node operators running the Bitcoin Core software must proactively switch it on if they want to make all transactions replaceable.

Soft fork proposals

Soft forks are upgrades to a blockchain that are backwards-compatible. Nodes (computers on the Bitcoin network) that don't upgrade still view the upgraded chain as valid (all nodes are still one big happy family). Conversely, hard forks result in a permanent change to the blockchain that isn't backwards-compatible (nodes either accept the change or split off onto a separate blockchain).

Technology – 2022 Bitcoin: Bitcoin OpTech (cont.)

Bitcoin developers prefer adding new features to Bitcoin via soft forks rather than hard forks ([unlike Ethereum developers](#)). According to OpTech, there was significant interest in soft fork proposals, especially around [CheckTemplateVerify](#) (CTV), a proposal by developer Jeremy Rubin, and [AnyPrevOut](#) (APO), a proposal by developers Christian Decker and Anthony Towns.

CTV allows Bitcoin users to restrict or specify how their coins are spent, a concept known as a covenant. For example, a sender can use CTV to create a bitcoin cold storage vault that automatically releases a small amount of bitcoin to an assigned hot wallet on a scheduled basis (Rubin calls them [structured liquidity vaults](#)).

APO is a proposal for a new type of public key that allows certain adjustments to a transaction even after it's signed. This could be applicable for use cases like [Eltoo](#), a proposed enhancement to the Lightning Network (Bitcoin's layer 2 scaling system).

Many of these proposals were discussed and updated but haven't been implemented. Vibrant discussions are continuing.

– [Frederick Munawa](#), *Technology Reporter*

Lightning Network

The Lightning Network, one of Bitcoin's most-used commerce layers, followed its 2021 size tripling with another year of strong growth adding over 1,500 BTC to the network, which represents a 46% growth rate. **With the price of bitcoin falling 65% in 2022 the amount of dollars in the Lightning Network is down, but there are many companies and open-source developers working on bringing Lightning-enabled products to users.** With Bitcoin's base layer designed for relatively low transactions per second (to allow for wide-reaching consensus to proliferate), many believe that scaling solutions like Lightning are critical to bringing bitcoin to mainstream audiences.

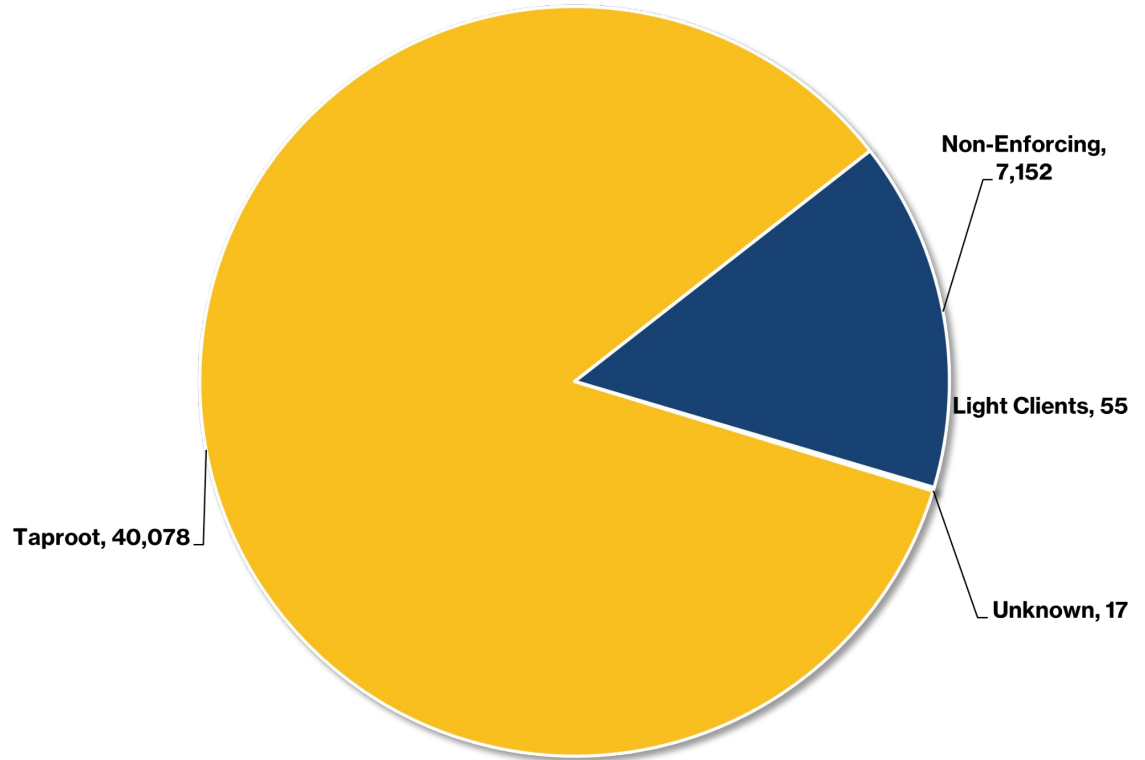
Lightning Network Continued Growing in 2022



Taproot Enforcement

2021 brought a significant upgrade to the Bitcoin protocol known as Taproot ([read more here](#)). Taproot was as bundle of three upgrades, but experts warned that the benefits of Taproot would take both time to come to bear. What that means is that service providers needed time to build Taproot into the products they were bringing to market.

For a brief time, the amount of nodes on the Bitcoin network which were not enforcing Taproot was low. Now, Taproot is enforced by most public nodes on the network. **That, said, Taproot is not yet widely used across the ecosystem, but there seems to be validity around the idea that some useful Taproot-enabled products will enter the market in 2023.**



Source: https://twitter.com/taproot_signal
Data as of December 30, 2022

07 – NFTs

NFTs – 2022 in Review

While non-fungible tokens (NFTs) exploded into the cultural consciousness in 2021, last year saw the digital assets find new use cases and smaller, more passionate communities of collectors, cutting through the hype and weeding out opportunistic short-term investors.

In January 2022, the NFT market looked promising, with top NFT marketplace OpenSea recording an all-time high monthly NFT trading volume of over \$4.8 billion. That momentum continued into February, when CryptoPunk #5822 sold for over \$23 million, entering it into the Guinness Book of World Records as [the most expensive NFT collectible ever sold](#).

As the year progressed, NFTs continued to gain mainstream attention. Bud Light released a [Super Bowl commercial featuring an NFT](#) and Time Magazine released a magazine edition featuring Ethereum co-founder Vitalik Buterin on the cover [as an NFT](#). Celebrities [continued to swoop up collectibles from high-priced NFT collections](#) like CryptoPunks, World of Women and Bored Ape Yacht Club, proudly flaunting their purchases as their profile pictures (PFPs) on social media. Ukraine's Ministry of Digital Transformation [launched an NFT museum](#) to chronicle and reflect on the Russian invasion of the country, and major brands, including Nike, Gucci and Adidas [expanded their NFT offerings](#). NFT marketplaces, including OpenSea, [began accepting fiat payments](#) for NFTs, simplifying the onboarding process for newcomers.

But as the year continued, and as [crypto prices continued to spiral](#), the NFT market started stalling. [Ethereum](#), the blockchain that powered most early NFT projects, continued to drop from its January high of \$3,831, dropping to a low of \$994 in June. [Solana](#), another popular blockchain used for NFT projects, has also been mostly in freefall since its January high price of \$179, dropping to just \$9 by the end of the year.

NFTs – 2022 in Review

Trading volumes in NFTs continued to taper off through the summer, resulting in an overall NFT market downturn across platforms and projects. Many NFTs purchased during more prosperous times were left unsellable by the end of the year. Some major NFT platforms tried eliminating creator royalty fees to attract fast-moving traders seeking to make a profit, resulting in backlash from jilted NFT creators.

Several major hacks, rug pull scams and high volumes of wash trading of NFTs also created an environment of heightened fear, uncertainty and doubt.

But poor market conditions that continued through the latter half of the year booted hypeseekers and casual investors, allowing NFT projects to focus on strategies for long-term building and community retention.

Intellectual Property

Many projects have used intellectual property (IP) licensing agreements to create new revenue streams for holders and boost their project's reach. Bored Ape Yacht Club parent company Yuga Labs has released the IP rights of all of its projects to holders, allowing them to create new commercial opportunities using their NFT characters. Other projects, like Moonbirds, have opted for a CC0 license, essentially putting the use of their characters into the public domain.

This method has transformed NFT projects from one-off collections into full-blown ecosystems, fostering brand recognition and community engagement.

NFTs – 2022 in Review

Utility

Many creators have [injected utility](#) into their projects, incentivizing collectors to hold on for the long term. NFTs are frequently being used in place of event tickets and club membership, giving digital assets broader value beyond their collectibility.

Takeaways

Generally, the NFT market has followed broader downward trends seen in the crypto space, deterring casual traders looking to make a quick profit. However, NFT projects are continuing to engage their communities in creative ways, resulting in a smaller but more passionate market sector.

“The NFT market is stabilizing on solid and engaged communities with a healthier trading behavior,” blockchain data site [NonFungible](#) wrote in its Q3 2022 NFT Market Report. “NFT collectors are fewer in number but keep their assets longer.”

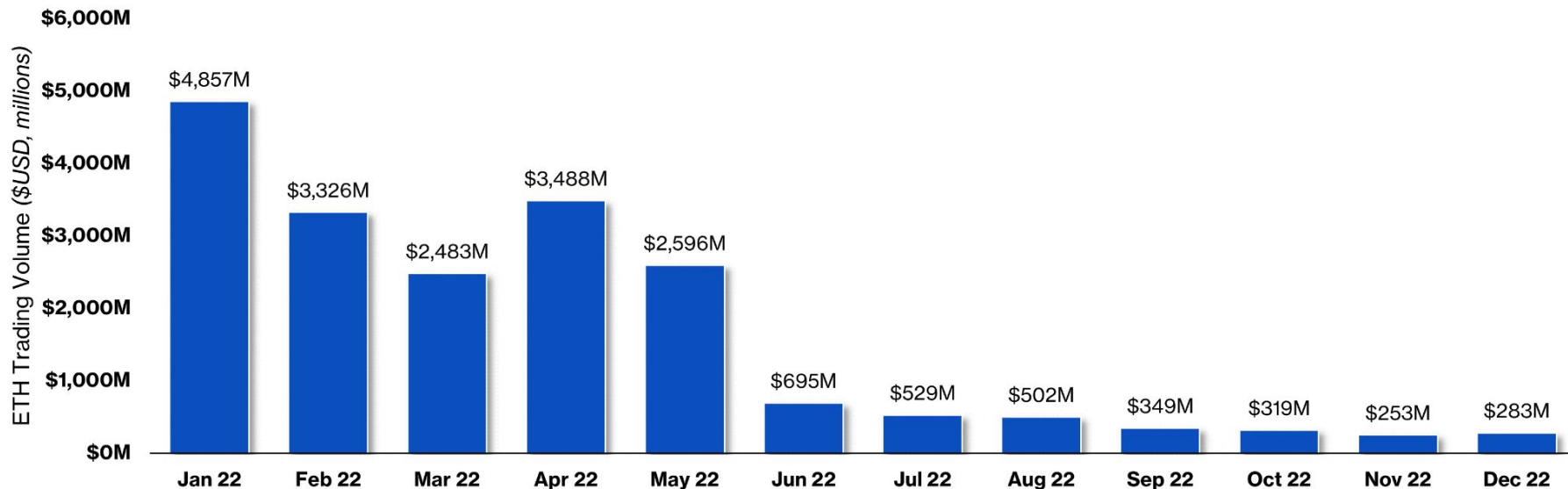
In addition, several categories of NFTs, including [generative art](#) and the [Ethereum Name Service](#), remain popular investments, according to NonFungible, a positive sign for the NFT market’s continued growth.

– [Rosie Perper](#), *Web3 Deputy Managing Editor*

OpenSea ETH Volume

OpenSea is the dominant platform used for buying and selling NFTs, with Ethereum-based NFTs being the most common type of NFT. With that, Ethereum-based NFT volumes on OpenSea in 2022 have taken a precipitous dive in the back half of 2022. As with all other crypto-related assets, NFT volumes felt the shock of the Crypto Credit Crisis and general market uncertainty. **That said, there are vibrant communities that have cropped up around NFT projects, so while down, there is a sense that NFTs are not out.**

Ethereum-Based NFT Volumes Down in 2H 2022



Grail Floor Price

While volumes were down in NFT markets in 2022, the value of so-called “grail” projects hardly noticed. NFT investors look at the floor price (i.e. the cheapest price of a certain rendition of an NFT project) of the most valuable and well-known NFT projects to determine the health of the core market.

CryptoPunks is one of the oldest NFT projects and its floor price ended the year right around where it started it in terms of ETH. It is worth noting, however, that, with the price of ETH down 67% in 2022, the value of CryptoPunks is down on a dollar-denominated basis.



Source: <https://nftpricefloor.com/cryptopunks>

2022 Annual Review

08 – The Year with the Crypto Credit Crisis

The Crypto Credit Crisis – 2022 in Review

The biggest story in 2022 was undoubtedly the Crypto Credit Crisis and its related fallout. In honor (so to speak) of the three-character acronyms that precipitated this crisis (SBF, FTX, 3AC, DCG), let's refer to the whole mess as the CCC.

[FTX filing for bankruptcy](#) protection amid allegations of fraud, embezzlement and commingling of funds with its sister company hedge fund Alameda Research (Alameda) was a resounding gong. **But the Crypto Credit Crisis didn't start with and hasn't ended with the fall of Sam Bankman-Fried's intertwined companies.**

It instead probably started with lesser-known crypto lenders and a crypto hedge fund, Three Arrows Capital (3AC). 3AC made a lot of money over the last few years, catapulting founders [Kyle Davies](#) and [Zhu Su](#) into crypto stardom. The firm started as a small proprietary trading shop arbitraging foreign exchange currencies and eventually turned to crypto.

Sticking to its playbook, 3AC continued making money arbitraging the price of bitcoin across exchanges where prices could vary widely depending on the platform. This worked for a while and, like all good stories about credit crises, 3AC's founders thought they could generate higher returns by borrowing money to make trades.

So 3AC worked the spot and futures market where there were arbitrage opportunities to sit between those who wanted **price exposure to bitcoin without the operational risk of having to hold the bitcoin physically** and those who did. Even better, in an environment flush with capital, 3AC was able to secure financing at rates below the premium bitcoin futures were trading at. This money-making strategy, while not risk-free, is generally a low-risk activity assuming the platforms 3AC were using didn't go under or

The Crypto Credit Crisis – 2022 in Review (cont.)

otherwise disappear.

Then, 3AC (and other companies, to be clear) started arbitraging the Grayscale premium. Grayscale is a digital-native asset manager that allows investors to get exposure to things like bitcoin by buying shares in a collective trust that custodies the asset on behalf of the shareholder. The specific trust involved with the Grayscale premium trade was the Grayscale Bitcoin Trust (GBTC), which holds bitcoin.

GBTC offers another way to reap certain benefits of bitcoin without holding it. So for a time, given the operational risk mentioned above, GBTC was trading at a premium to its net asset value (NAV). **In other words, investors were paying more for the Grayscale-managed bitcoin than for plain old bitcoin.**

(Grayscale, like CoinDesk, is a subsidiary of Digital Currency Group).

Because GBTC is a trust that exchanges real bitcoin for its shares, hedge funds like 3AC could have some fun making money as long as those shares were trading at a premium to the underlying asset. 3AC could borrow money to buy bitcoin and send it to Grayscale in exchange for GBTC shares. Since the GBTC shares tended to trade at a premium, that's essentially free money. **I trade you \$100 of bitcoin for \$110 of GBTC? I make \$10.**

Unfortunately, Grayscale doesn't deliver GBTC shares *immediately* after you send bitcoin in exchange for GBTC. There's anywhere

The Crypto Credit Crisis – 2022 in Review (cont.)

from a six-month to one-year lag. So instead of making a risk-free trade on the premium, **you're betting that the premium will still exist in six months to one year.**

Of course, we wouldn't be talking about this if the premium still existed. Instead, **GBTC has been trading at a discount** to its NAV since February 2021.

Ouch.

3AC went on to do a bunch of other stuff to try to make money, borrowing money to do so along the way. Following the complete, [\\$60 billion evaporation of terraUSD and LUNA](#) in May and the associated market fallout, 3AC missed margin calls. [3AC declared bankruptcy on July 1](#), the first major crypto firm to do so in this cycle.

The domino fell and the credit markets did what they do best: They unraveled.

Caught in the crossfire were crypto lenders [Celsius](#), [Voyager Digital](#), [Genesis](#) (another DCG unit and CoinDesk sister company) and [BlockFi](#). Some of which lent money to 3AC-like companies, or carried out the same GBTC premium trade, or some combination of the two. **Blame should not reside solely with 3AC here** – it takes two (or more! That's a lot of dancers in the dance hall) to tango here.

You cannot make leveraged bets without leverage; you cannot make leveraged bets without bets.

The Crypto Credit Crisis – 2022 in Review (cont.)

Then the CCC chatter went from: “Hey now, financialization might not be a good idea, but it’s not quite illegal” to “OK – now that looks illegal” when we learned about what was going on at FTX and Alameda Research.

The market fallout that came from these margin calls and liquidations hit FTX and Alameda hard. When it was eventually revealed in November by CoinDesk’s Ian Allison that the Alameda balance sheet looked rather funky, [chock full of illiquid tokens with inflated valuations](#), some were worried of a potential shock to the system because of just plain, old bad investment.

Well, it turned out that there was [allegedly commingling of funds between FTX and Alameda](#). The allegations are that customer funds deposited into FTX were at some point transferred to Alameda to either plug holes or make trades or whatever. Again this wouldn’t necessarily be illegal unless it went against the terms of service of FTX.

And it turns out, [it probably was!](#) Cue [a bankruptcy](#) filing and the [arrest of SBF](#) to cap it off.

There are countless more articles, columns and insights on all of this on the CoinDesk website.

But before we can glean many takeaways from the CCC, or from the extension of easy credit to anyone with a pulse who wanted to make a lot of money in crypto, there are still many things that need to play out from the mangled mess that was 2022.

I’ll offer one for now: **Maybe, just maybe, the financialization of everything isn’t healthy for this industry.**

The Crypto Credit Crisis – 2022 in Review (cont.)

For those who made it this far: Genuinely, thank you. I hope you got at least a little bit of something out of this.

If you did, let me know! If you didn't, also let me know.

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– *George Kaloudis, Research Analyst*

Thank you for reading!

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