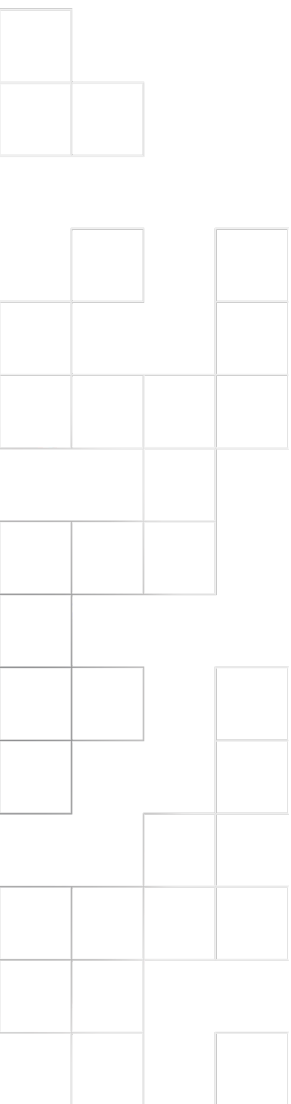


Outlook —2024

James Butterfill
Chris Bendiksen
Matthew Kimmell
Luke Nolan

Satish Patel
Alexandre Schmidt
Max Shannon
Jean-Michel Pailhon

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Executive Summary

Transformative year for digital assets

2024 is set to be a landmark year for digital assets, with the recent launch of spot-based Bitcoin ETFs in the US, potentially raising Bitcoin prices to approximately US\$60,000.

Monetary policy and bitcoin valuation

Bitcoin's value continues to be significantly influenced by monetary policy. With the US Federal Reserve likely to cut interest rates in the first half of 2024, Bitcoin, alongside gold, could see increased appeal.

US Dollar's influence

The diminishing appeal of the US Dollar, amid geopolitical shifts and concerns over US debt sustainability, could lead to a decreased appetite for the dollar and a corresponding improving interest in Bitcoin.

Investor diversification needs

The high correlation between bonds and equities is driving investors towards Bitcoin for diversification, further influencing its adoption and valuation.

Ethereum's sentiment

Ethereum saw relatively muted institutional inflow in 2023, attributed to stiff competition from low transaction fee alt-L1 protocols like Solana and scepticism over the scaling roadmap set to take shape in H1 2024 (Dencun upgrade). A successful implementation with improving L2 user interaction mechanics, alongside the possibility of a Spot Ether ETF in the second half of the year are likely to rekindle inflows.

Developer activity

Developer activity in most crypto ecosystems continues to fall from their peaks in January of 2022. With exciting new developments and upgrades in major protocols such as Bitcoin, Ethereum and Solana, a resurgence in activity is expected in 2024.

Regulatory developments

In 2024 the EU's Markets in Crypto Assets Regulation will commence and we expect more countries to provide guidance for regulated stablecoins.

Bitcoin mining and halving impact

The Bitcoin mining industry is preparing for the 2024 halving event, with miners in better shape compared to the previous halving. This event, coupled with regulatory advancements and monetary policy changes, could significantly influence Bitcoin's price.

Blockchain equities and macroeconomic trends

The shift in the Federal Reserve's monetary policy, the looming maturity walls, and the impact of interest rate cuts on blockchain equities in 2024.

Solana's solidified resurgence

Solana's advancements suggest its potential to significantly impact the DeFi market and data availability sector in 2024.

Bitcoin fee market development

The rising transaction fee market on Bitcoin paves the way for plugin technologies to be put to the test, likely capturing the demand of users who look to materially decrease their base layer footprint.

Author:

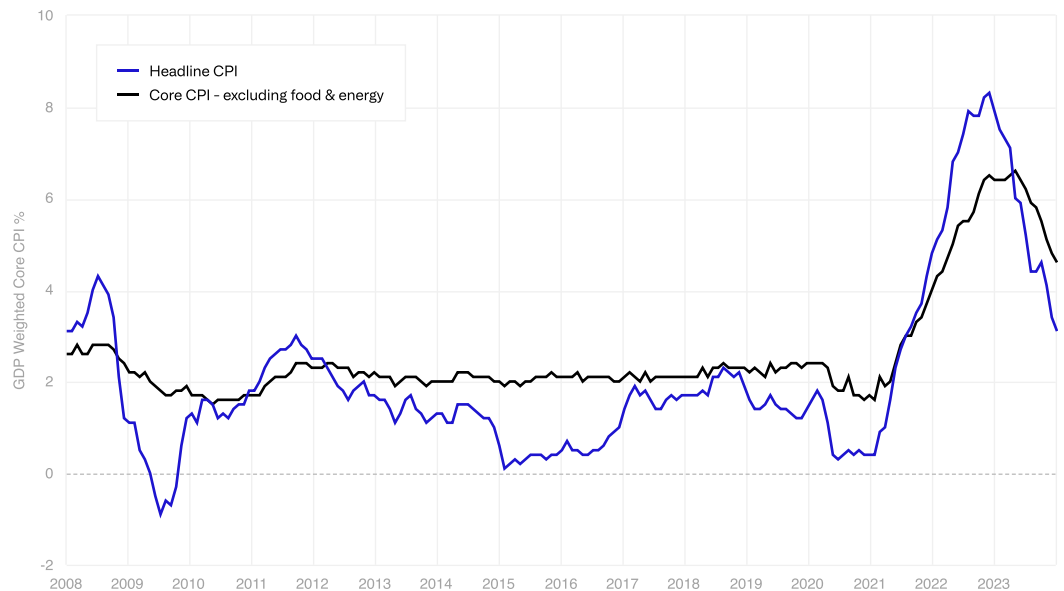
James Butterfill
Head of Research

Macro and its impact on bitcoin prices

The year 2024 is poised to be transformative for digital assets, with several significant developments on the horizon. One of the most notable is the recent launch of spot-based Bitcoin ETFs in the US. This development, a decade in the making since the initial SEC application, has opened the market to a broader range of investors, representing a major milestone in the acceptance of digital assets. While predicting the exact scale of post-launch investment inflow is challenging, a conservative estimate suggests that 10% of the current assets under management (approximately US\$3 billion) could raise Bitcoin prices to around US\$60,000.

Monetary policy remains an important factor in determining Bitcoin's value, especially as rising interest rates lead investors to shift their focus towards competing stores of value, such as US Treasuries. Additionally, the stability of the US Dollar is a significant consideration, due to Bitcoin's inverse correlation with it. With inflation rates in developed countries declining sharply, echoing the trends seen in the aftermath of the 2009 financial crisis, expectations are growing that the US Federal Reserve might reduce interest rates in the first half of 2024. A decision like this would likely strengthen the appeal of fixed supply assets, including Bitcoin and gold in favour of US Treasuries.

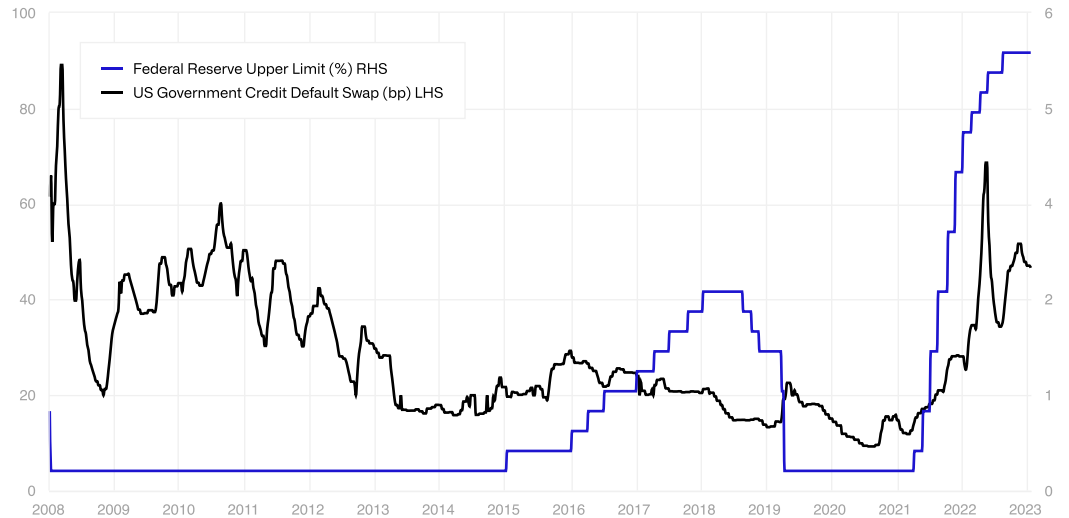
Inflation in developed markets



Source: Bloomberg, CoinShares, data available as of close 03 January 2024

Moreover, the US Dollar's appeal is diminishing due to long-term geopolitical shifts and changes in global supply chains, leading to increased use of alternative currencies and swap lines with countries like China. Concurrently, concerns about the sustainability of US debt, underscored by downgrades from several rating agencies and rising Credit Default Swap (CDS) costs against the risk of a US government default, are diminishing the Dollar's attractiveness. CDS levels, near their highest since 2011, are rising unusually during a rate hiking cycle, indicating growing investor apprehension about the safety of US debt.

US Credit default swaps versus the FED rate

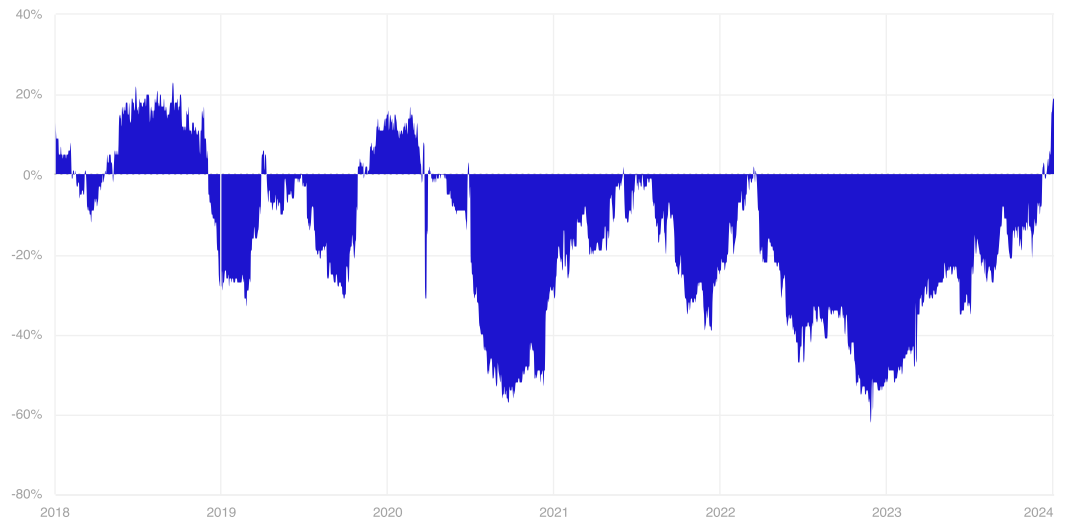


Source: Bloomberg, CoinShares, data available as of close 03 January 2024

In the event of a crisis of confidence in US debt or further instability in the US banking system, Bitcoin may see support as investors increasingly view it as a reliable asset in uncertain times.

Bitcoin typically exhibits a negative correlation with the US Dollar, which is understandable given its role as an alternative store of value. However, its correlation has recently increased, a trend often seen during periods of monetary policy shifts or market stress, when investors flock to more stable assets. We anticipate that this pattern is temporary and expect Bitcoin to revert to trading inversely to the US Dollar over the next 12 months.

Bitcoin price vs US Dollar Index



Source: Bloomberg, CoinShares, data available as of close 07 January 2024

Lastly, the recent record-high correlation of 42% between bonds and equities, excluding the COVID-19 period, is driving investors to seek effective diversification options. In this landscape, Bitcoin has demonstrated significant potential for diversification beyond traditional asset classes, as discussed here. This increasing recognition among investors is likely to further drive Bitcoin’s adoption and impact its value in the upcoming year.

Author:

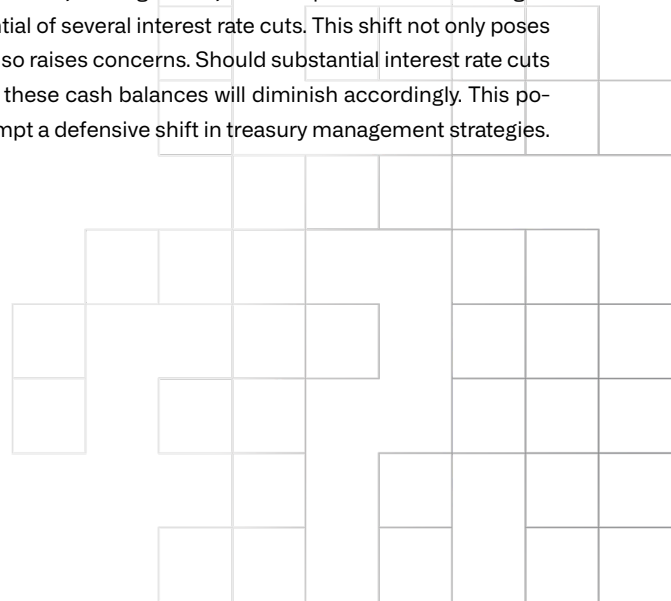
Satish Patel
CFA - Investment Analyst

Blockchain equities: Macroeconomic view and the impact of rate cuts

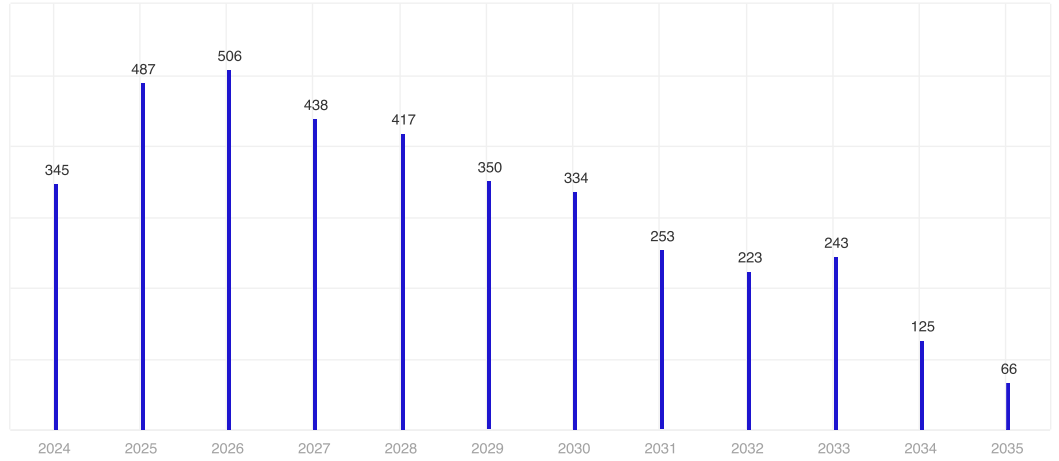
2023 appeared to have marked the conclusion of the Federal Reserve's (Fed) hiking cycle after a material decline in US inflation. From a high of 6.5% annual CPI in 2022, inflation tapered to 3.1% annually by November 2023. This shift likely steered the Fed into a new phase, characterised by a transition from actively managing monetary policy to adopting a more passive stance entailing a greater reliance on data for decision-making. Interestingly, despite concerning leading indicators like the ISM's and PMI's showing signs of deterioration, the US economy exhibited remarkable resilience. In Q3 of 2023, GDP stood at 5.3%, while the unemployment rate remained steady at 3.7% as of December 2023.

However, by December 2023, Chair Jerome Powell seemed to adopt a more dovish stance towards policy by indicating a potential cut of 75 basis points in 2024, a significantly larger adjustment than previously suggested by the September 2023 dot plot. Notably, this announcement sparked a rally across all assets with bonds, in particular, experiencing a greater change in trend from being under pressure throughout the year. Looking ahead to 2024, the landscape for blockchain equities appears promising amidst a scenario of disinflation and a return of monetary policy to historically normal levels. Adding to this optimistic outlook are positive sentiments surrounding cryptocurrency markets, the resurgence of blockchain adoption, and the incoming institutional flows following the approval of multiple spot Bitcoin ETFs. These factors collectively suggest the potential for increased corporate earnings and a re-evaluation of multiples, a trend that began to unfold in Q4 of 2023.

Taking a closer look at corporate maturities, below are the maturity walls and for both the S&P500 and the CoinShares Global Blockchain Index (BLOCK). We can see that over the next three years, approximately 23.8% and 26.7% of total S&P 500 and the BLOCK index debt expires, posing a refinancing dilemma. As these walls come into view in 2024, it is worth noting that investment-grade debt, previously issued by corporations during times of significantly lower interest rates, typically carried coupons ranging from 1% to 3%. Presently, with the Federal Funds rate resting at 5.25%, companies holding substantial cash reserves are benefiting from the spread between the interest they pay and what they earn in money markets. This trend has notably fortified their balance sheets. However, looking ahead, we anticipate debt refinancing to occur within the 5% to 8% range despite the potential of several interest rate cuts. This shift not only poses a significant drag on bottom-line profitability but also raises concerns. Should substantial interest rate cuts occur in the coming years, the interest earned on these cash balances will diminish accordingly. This potential decline could impact growth plans and prompt a defensive shift in treasury management strategies.

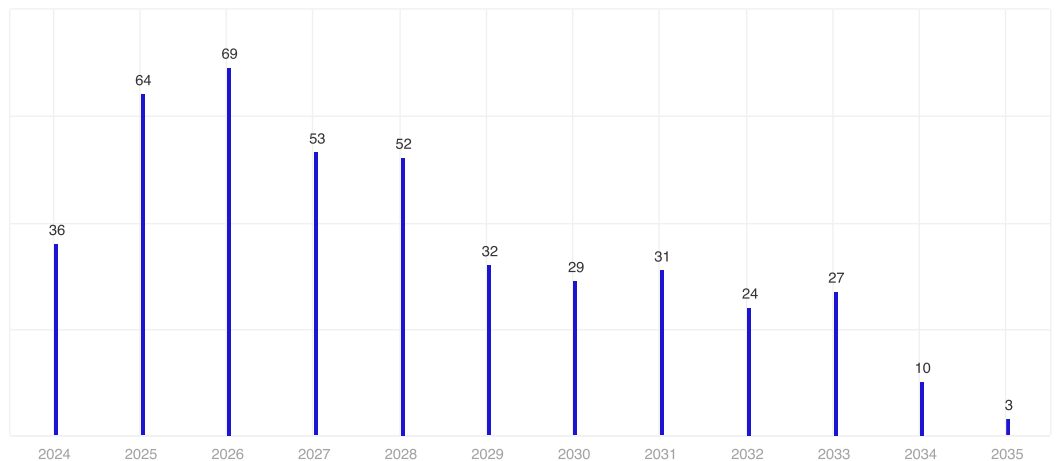


S&P500 Index maturity profile (in USD bn)



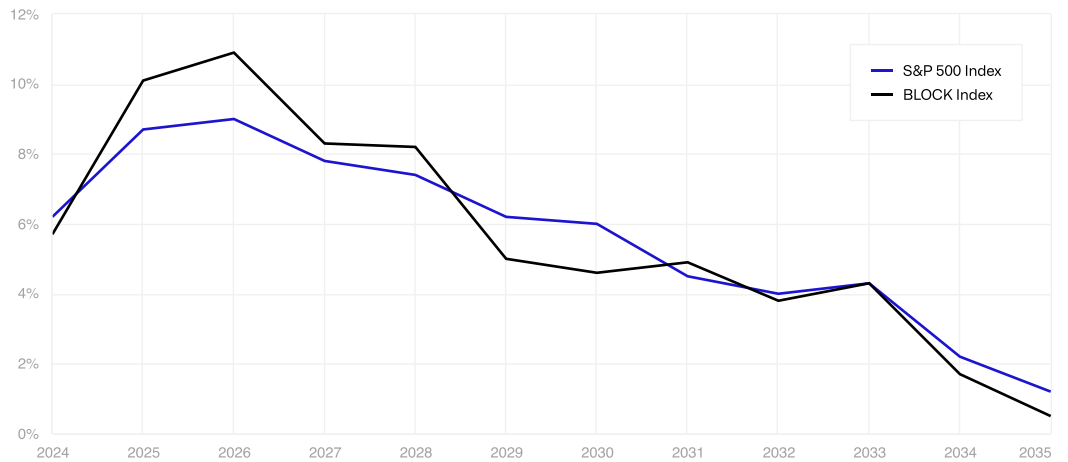
Source: Bloomberg, CoinShares, data available as of close 03 January 2024

CoinShares Global Blockchain Equity Index (BLOCK) maturity profile (in USD bn)



Source: Bloomberg, CoinShares, data available as of close 03 January 2024

Yearly S&P500 and Block Index maturities as a percentage of total debt outstanding



Source: Bloomberg, CoinShares, data available as of close 03 January 2024

In 2024, blockchain equities face two primary risks: the continuing possibility of a recession or a potential resurgence in inflation. Historically, shifts in monetary policy have taken between 12 to 18 months to fully manifest within the economy. Given the last hike in July 2023, there remains a residual impact of cumulative hikes yet to be experienced. As a consequence, if macroeconomic indicators continue on a downward trajectory, and we start to see deflation and a rise in unemployment, this could significantly impact corporate earnings even before the Fed has the opportunity to cut interest rates to counteract the situation. Conversely, a resurgence in inflation could materialise if the Fed initiates interest rate cuts too early, leading the market to price in a prolonged period of dovish monetary policy. Such an anticipation might trigger a rally in commodities and spur above-average corporate and consumer spending which could compel the Fed to react by reinstating the hiking cycle. Looking forward, balancing these potential macroeconomic risk scenarios will be critical for the industry's performance in the coming year.

Authors:

Christopher Bendiksen
Head of Bitcoin Research

Matthew Kimmel
Digital Asset Research Analyst

The mining cycle remains in a rebalancing phase

The Bitcoin mining industry moves in cycles. We believe there are three main underlying factors that come together to determine the formation and intervals of the cycle segments:

1. The (similar) cyclicalities in bitcoin prices,
2. The 4-year halvings, and
3. The fundamental lag between investment decisions and actual deployment of equipment.

We believe that the mining cycle can be distilled into four separate phases, each with a distinct set of characteristics:

1. Mining Gold Rush:; the bitcoin price is rising rapidly, outpacing hashrate growth,
2. Inventory Flush:; the bitcoin price is falling, hashrate growth continues,
3. Shakeout:; the bitcoin price is falling, hashrate starts to fall, and
4. Rebalancing:; price and hashrate move in balance.

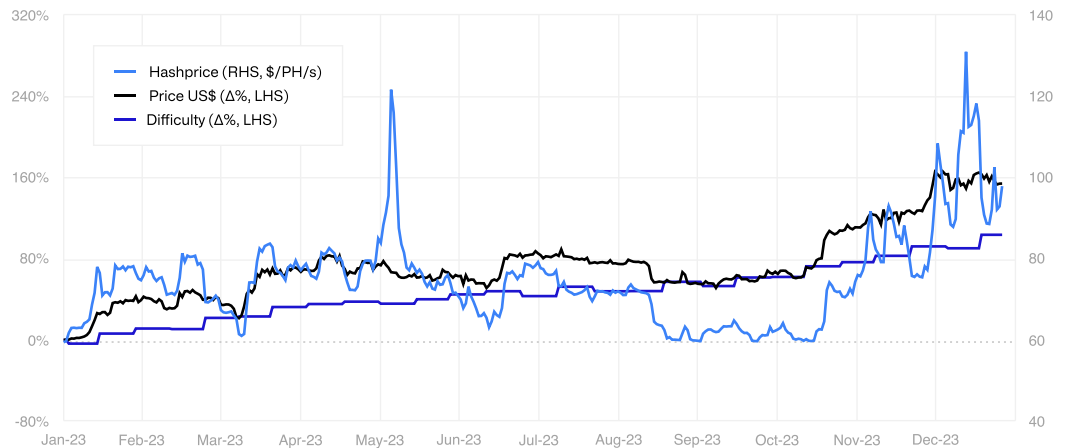
As we've laid out in detail in previous work, we believe mining cyclicalities are deeply intertwined with bitcoin's price cyclicalities and both influence and are influenced by the bitcoin price. Simply put, we believe mining

cyclicality tends to exacerbate the volatility of bitcoin's speculative bull and bear markets, making both more violent than they might have been in its absence.

At this time last year, we were right in the depths of a shakeout phase. Miners were struggling to make ends meet, and several miners were selling heavily from their treasuries, flooding the market with additional supply right when demand was at its lowest. A year before that again, it was the opposite – a mining gold rush – where margins were incredible and miners declined to sell their entire production, restricting supply right when demand was at its highest.

2023 was much more 'boring'. With the exception of a few spices, for most of the year hashprice sat somewhere between \$60-80/PH/s. This is a classic example of a rebalancing period where price and hashrate have moved in balance. Yes, the bitcoin price has increased sharply, but so has hashrate. In the middle of October, even though the price was up almost 100% YTD, so was hashrate, and the hashprice hit its yearly low.

Bitcoin mining revenues rebalanced in 2023



Source: Glassnode, Hashrate Index, CoinShares, data available as of close 31 December 2023

2024 already has all the makings of a mining industry rollercoaster. Firstly, we're starting the year off on a hashprice just south of \$100/PH/s – well above the vast majority of 2023. That's great, because come April, the halving will slice that right in half. If that happened at today's hashprice of \$97.9 that would take the hashprice right back to \$53.3, a price where we believe quite a few public miners are mining at a loss.

But then there are the possible price effects of the halving. As we've covered in the past, we believe that the halving tends to lead to a double-whammy of bitcoin market upside. First of all, it cuts the ongoing structural selling pressure from miners in half, causing upwards price pressure at demand levels that are merely equal to those before the halving. But perhaps more importantly, it tends to ignite another cycle of media interest, exposing new investors to bitcoin, or rekindling interest in people for whom it had merely slipped from attention.

We therefore believe that 2024 will be a dual cycle year. Our prediction is that we enter the year still firmly in a Rebalancing phase, and that we will remain in this phase until some time after the halving. Then, if as expected, price starts to outpace miners' ability to deploy new hashrate, we will reenter the Mining Gold Rush. If that indeed happens, mining margins will again be astronomical, causing them to restrict the already halving-restricted flow of new supply entering the market, right as demand accelerates.

This is how we believe the cyclical parabolic moves into blow-off tops tend to form. We don't anticipate a top like that to form in 2024, but at the end of 2024, we suspect the mining industry should be structurally placed such that their supply restriction could exacerbate any increased demand flows into bitcoin.

Authors:

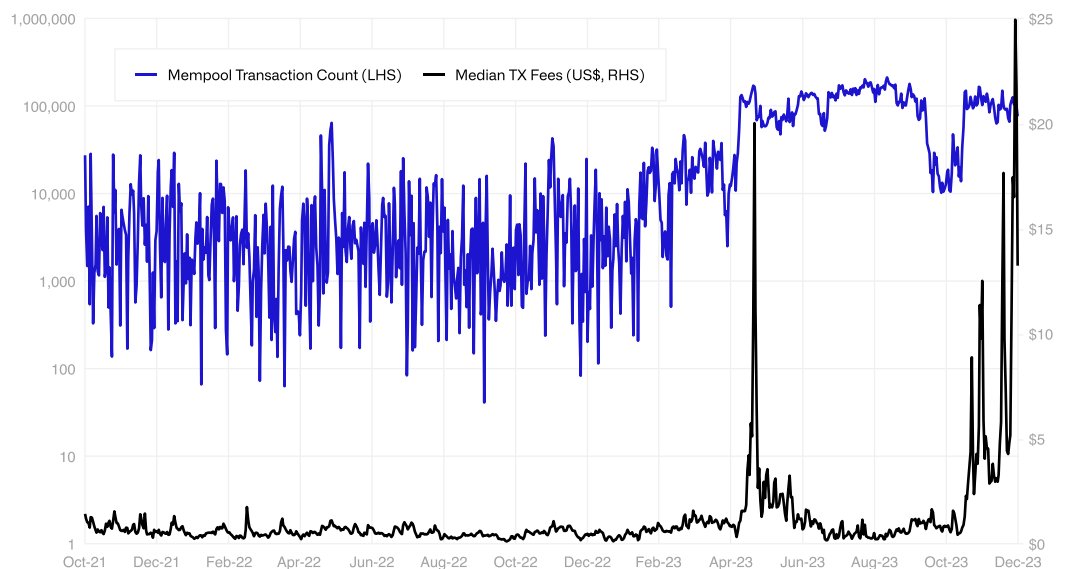
Christopher Bendiksen
Head of Bitcoin Research

Matthew Kimmel
Digital Asset Research Analyst

If the mempool fails to clear, the stage is finally set for bitcoin plugins

We're in uncharted mempool territory. Never before has the Bitcoin transaction backlog persistently failed to clear over the course of almost an entire bear market. Fees have spiked, pricing out the lowest value transactions. Is this good? Is this a problem? You may have heard it described as either.

Bitcoin pending transactions (log) vs median transaction fee



Source: Glassnode, CoinShares, data available as of close 18 December 2024

Some persistent Bitcoin critics tend to hurl two logically conflicting criticisms at the system: (1) Bitcoin fees are too low, and this threatens its protection from double-spending, and (2) Bitcoin fees are too high, and this threatens its ability to grow its network effect.

Obviously, you cannot hold these two opinions at the same time and remain consistent. Yet whenever the Bitcoin mempool regularly clears and fees are low, we hear argument (1) held up as a reason why Bitcoin has failed or must change. And then, whenever the mempool fills up and fees increase, we hear argument (2) held up as a failure condition and that change is needed.

At the bottom of each of these criticisms lies an implicit rejection of a market's ability to solve problems of economic allocation. The unspoken belief is that markets cannot be relied upon to find a workable balance between transaction costs and settlement assurance that accurately reflects the combined desires of market participants. At its very root, it is a rejection of free markets, which if held, should steer anyone completely away from Bitcoin in any circumstance.

But suppose that markets actually can and do work. What, then, might we be looking at in terms of the future of on-chain fees and settlement assurances? Let's run some quick numbers:

Assuming an average of 3,200 txs/block, what would the average Bitcoin transaction fee need to be in order to retain 2022-levels of miner income? The answer is \$93. But there's a giant unstated question tied to that figure: do miners really need \$15bn annually in order to provide sufficient double-spend protection for transactions? Might they be ok with 2018-levels of income? If so, the average transaction has to cost \$36 — only about twice the current (November 2023) cost. Might \$10 be enough? What about \$1?

This brings us back to the market argument. Fundamentally, it is currently not possible to know what level of miner income is sufficient to provide a high enough level of settlement assurance for Bitcoin transactions. There has never been a maliciously double-spent transaction on the Bitcoin Network. Only if one happens will we get our first data point on the level of miner income that is not enough. Thus far it has always been sufficient, and if a market cannot arrive at a level that achieves it, what hope can a centralised entity — with an impossibly smaller set of information — possibly have at finding one?

But let's look at it from another angle. Is \$93 dollars really an unreasonable price to pay for a Bitcoin transaction? Well that all depends. If you're sending \$100 then yes, that's a ridiculous transaction cost. If you're sending \$100,000,000 then no, it's actually really, really cheap.

This topic goes deep, and it's something that we hope to cover in full detail at some point. But what may be some more immediate effects of a full mempool? An obvious answer is high fees, and this is indeed the trend we're already seeing. Using Bitcoin on-chain is getting expensive for small transactions and these will increasingly get priced out of blocks.

But high fees may have interesting secondary effects. One effect would be increased capex going into the mining industry, raising difficulty even further. But another less obvious one might be a material movement of small-scale transaction demand to L2s, sidechains, and other Bitcoin Plugins. While usage of these systems have historically been low, during previous historical periods of high fees the plugins have not quite been mature and ready enough to take on the task of handling significant transaction volumes. This time around, that is not the case.

Our prediction this year is therefore that increasing on-chain fees caused by the clogged up mempool will create fertile ground for Bitcoin Plugins. We expect the usage of these L2s and sidechains to grow at a healthy pace, and to see an increasing amount of services make use of their ability to materially reduce on-chain footprint.

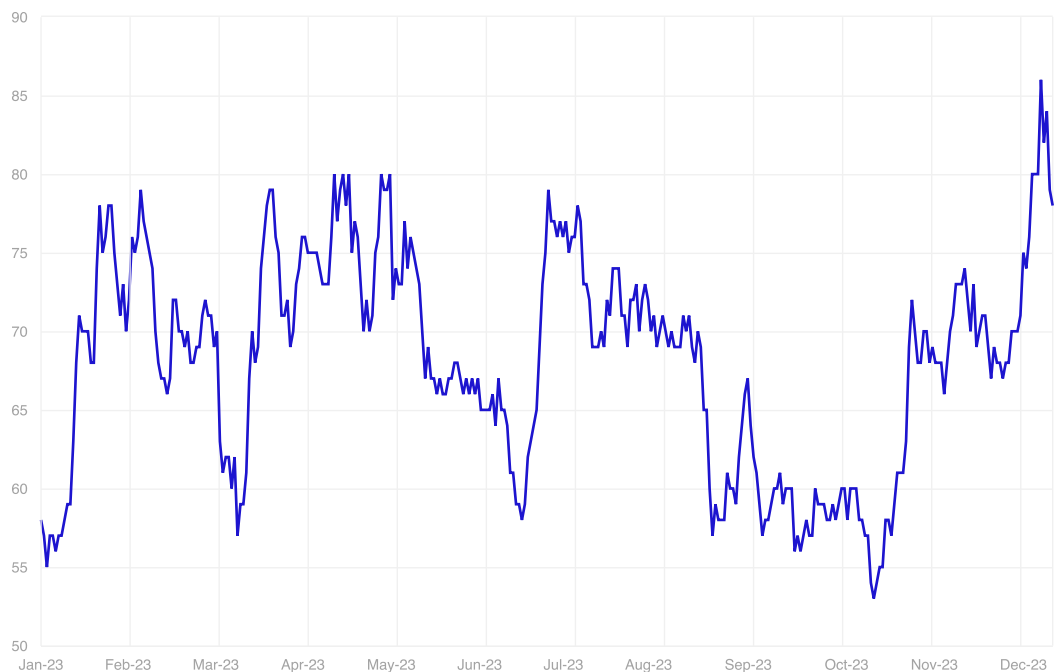
Author:

Alexandre Schmidt
CFA - Index Fund Manager

How prepared are the miners for the halving?

Halving events typically present challenges and uncertainties to Bitcoin miners, and just months before the April 2024 halving, this discussion could not be more topical. Miners had a very tough end to 2022 and beginning of 2023, with economics plummeting amidst a declining Bitcoin price and an ever increasing network hashrate. Mining conditions improved slightly from January, but with the exception of the fee-driven May peak, economics remained subdued for most of the year. With markets turning bullish towards Bitcoin again, miners' profitability has increased considerably, leading to a considerable rally in their share prices, but does that mean all is well?

Revenue per 1TH/s of hashing power

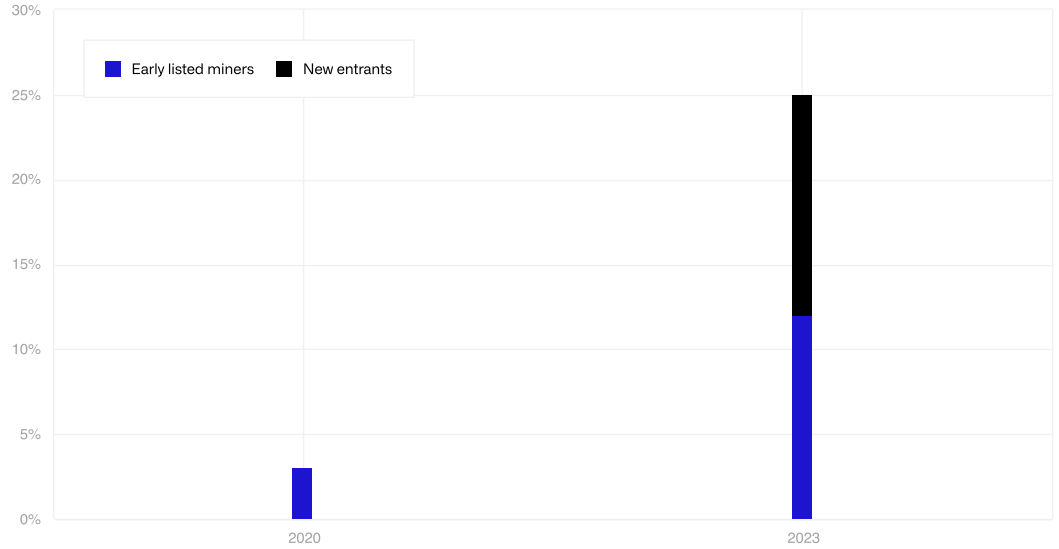


Source: Bloomberg, CoinShares, data available as of close 20 December 2024

In this piece, we draw a comparison of Bitcoin mining companies' financials and operations between now and before the previous halving to gauge how these names could behave post the 2024 Bitcoin halving event. For the pre-2020 halving analysis, we have used data from miners' March 2020 quarter filings, while for 2023, we have used the latest set of accounts, from the September 2023 quarter.

Back in 2020, there were seven listed miners, which accounted for a hashrate of 2.9EH/s, or 3% of the 110EH/s network hashrate as at 31 March 2020. Currently, listed miners account for a much larger share of the hashrate, at 25%, with the legacy miners (i.e., the ones listed in 2020) having grown their share to 12% of the total network hashrate of 395EH/s (as of September 2023).

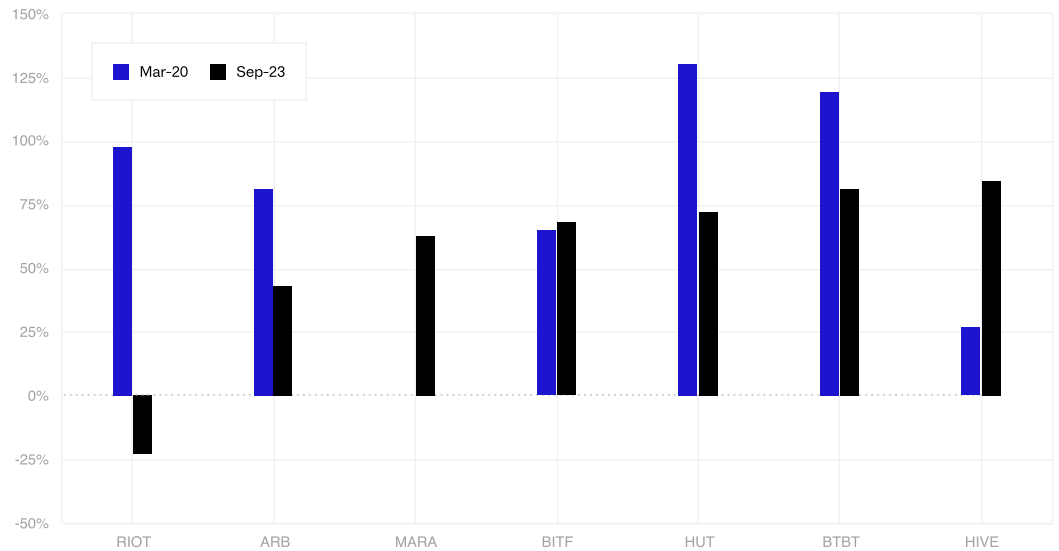
Listed miners' share of the network hashrate



Source: Bloomberg, CoinShares, data available as of close 20 December 2023

The Bitcoin price, difficulty and machine efficiency were at very different levels back in 2020. Hence, in order to compare the cost of production between then and now, we have taken the direct mining costs per bitcoin (net of power credits, when applicable) as a percentage of the prevailing bitcoin price at quarter close (31 March 2020 and 30 September 2023).

Direct cost per Bitcoin (% of Bitcoin price)



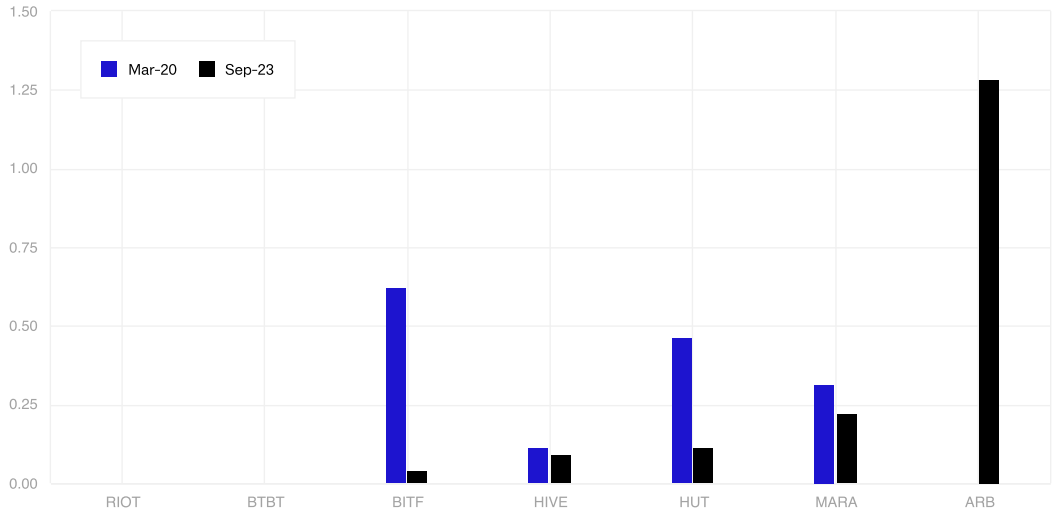
Source: Bloomberg, CoinShares, data available as of close 20 December 2023

As the chart above shows, most miners have been able to reduce their costs in relation to the Bitcoin price, despite the price and hashrate headwinds, suggesting that miners have been able to operate more efficient facilities and machines as well as better power pricing conditions.

Going into the 2024 halving, miners are much less indebted than in 2020. There are a couple of reasons for this. Firstly, interest rates are considerably higher now, making debt capital scarcer and more expensive,

especially after the collapse of Genesis and Celsius. Loans, which at 0% interest rates already had some hefty spreads of 10-12% would be borderline unaffordable in the current state of the market. Another reason, however, is the listing of several miners in the Nasdaq, where companies have access to at-the-market (ATM) offerings in order to equity finance their capex and operations, reducing the need for debt financing and also allowing higher leveraged players to repay their debt using equity capital.

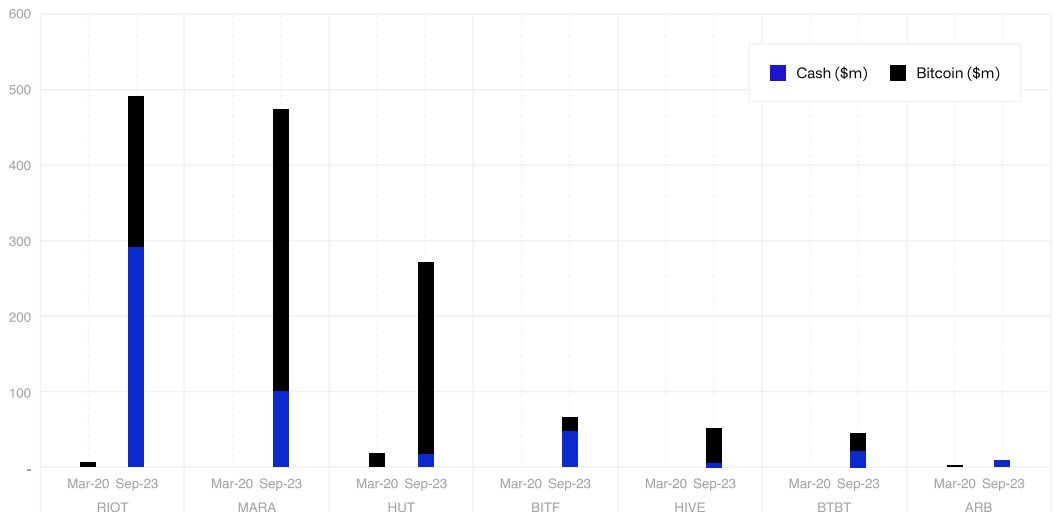
Indebtedness (Debt-to-equity ratio)



Source: Bloomberg, CoinShares, data available as of close 20 December 2023

Another stark difference between 2020 and now is the scale of operations. While until 2020, management would talk about petahashes and operating out of containers, mining operations now are considerably larger scale, measured in exahashes (or one thousand petahashes), and are run out of purpose-built sites with power contracts large enough to allow grid operators to use miners as balancing levers when grid-wide demand goes up and down, also providing additional sources of revenue via demand response schemes. The larger scale of miners has allowed them to accumulate considerable sums of cash and Bitcoin, providing solid cushions for when times are not as good.

Miners' cash and Bitcoin balances



Source: Bloomberg, CoinShares, data available as of close 20 December 2020

Bitcoin miners went through the 2020 halving event largely unscathed, and although economics initially deteriorated, the price response was enough to allow miners to continue their operations. Our analysis in this piece reveals that miners are in much better shape now than before. In addition, a series of recently announced machine deals suggests that miners are working to improve their fleets and efficiency, which should reduce costs even further going into the halving.

Finally, we believe that, differently to 2020, Bitcoin has two significant catalysts ahead: the recent approval of a spot Bitcoin ETF in the US and the easing of monetary policy by the Fed. Both factors are likely to provide a considerable boost to the Bitcoin price and further contribute to clearing the halving hurdle in a similar or better fashion as last time.

Authors:

Christopher Bendiksen
Head of Bitcoin Research

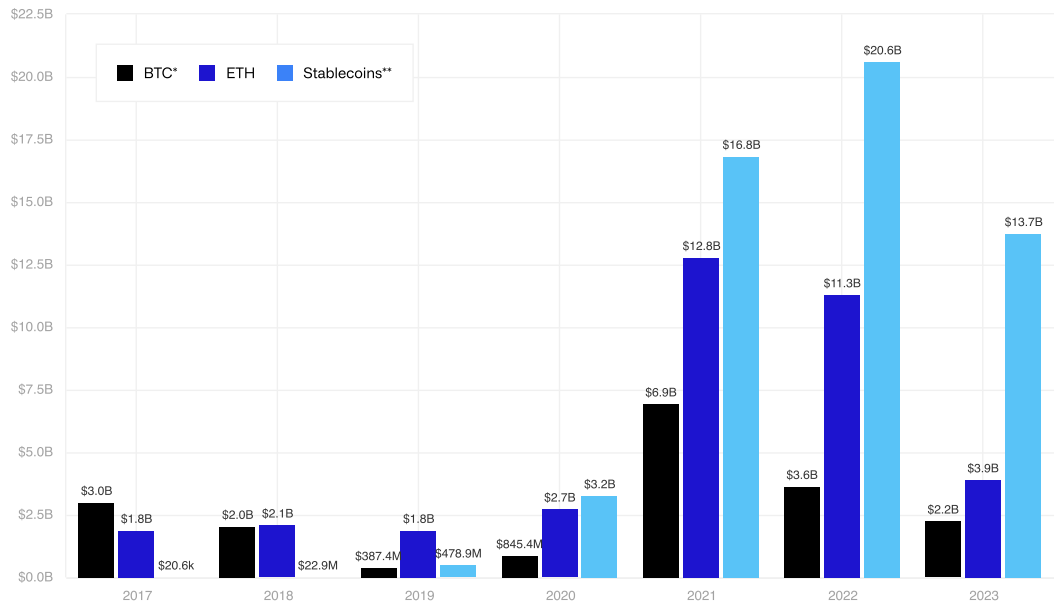
Matthew Kimmel
Digital Asset Research Analyst

A bitcoin-based stablecoin emerges

Now well into the second decade of Bitcoin's existence, the conversations around crypto have moved out of the awareness phase and into the merit phase. Nowadays, for those still on the outside looking in, the concern is often not one of what crypto is, the focus instead tends to be whether crypto assets solve real problems. Questions like why is it useful? Why is it valuable? Who actually uses it? And to the advocate, in a game of persuasion, stablecoins can serve as a quick and intuitive way to demonstrate a crypto use case – even to someone who isn't sold on the assets themselves. While the native assets tend to be a contentious topic, the already familiar concept of a digitised, "crypto dollar" tends to be a more inviting, and even intriguing, first step.

It is not hard to imagine the benefit of tokenizing US dollars. It makes a widely trusted and tenured monetary form more globally accessible, easier to transfer, and individually custodial—even in a digital format. In our opinion, the positives clearly outweigh the negatives, and the market seems to agree. The success of stablecoins is clearly evident in their growth: an 1100% increase in less than 4 years, reaching a current market size of US\$123 billion; their collective transfer volumes totalled close to US\$5 trillion this past year, more than a third of payments leader Visa (US\$14 trillion); And impressively, the largest stablecoin issuer held US\$57 billion in US treasury bonds as of September, making it the 25th largest foreign holder of US debt.

Daily average USD transfer value by asset



Source: Glassnode, Coinmetrics, CoinShares, data available as of close 28 December 2023

However, despite being a sweeping success, stablecoins are not without their challenges. They almost entirely rest upon blockchain platforms that are somewhat politically encumbered, centralised and/or unstable due to being pushed to the technical limits of what blockchains can actually do. As a result, unsuspecting users have been vulnerable to systemic failures or access restrictions, as was the case for certain Terra and Ethereum users in recent history.

The facts of the matter have presented an opportunity for developers to bring stablecoins back to the Bitcoin ecosystem. The Bitcoin blockchain boasts the longest history, greatest stability, least technical debt, and strongest assurances. However, the path to a Bitcoin stablecoin is technically challenging.

Not only is Bitcoin architecturally designed without the flexibility to natively support external assets like dollar-pegged tokens, but history has shown that stablecoin adoption tends to flock towards the platform offering the cheapest transaction costs and highest speed, not necessarily where settlement is most reliable or technical assurances the best.

Despite these challenges, we anticipate 2024 as a pivotal year for Bitcoin in the stablecoin arena. We predict viable, at least in theory, development projects finally emerging as accessible tools. Ones that rival the speed and cost of alternatives, while inheriting much of the fundamental stability of Bitcoin infrastructure. A full exploration of the possible contenders is out of scope for this post, but for those curious, we explored one proposed option in detail late last year.

For now, it's interesting enough to explore the potential implications of a high-speed, reliable Bitcoin-based stablecoin, because we ultimately find it likely that some share of stablecoin users adopt these new tools, given the improvement in system reliability, cost, and speed. So we now turn to answer the question of what the effects of stablecoin settlement on Bitcoin will be.

And our answer is two-fold; we anticipate a migration of stablecoin activity into the Bitcoin ecosystem could both enhance bitcoin's monetary properties and accelerate its global adoption.

We find a successful integration likely both increases transaction demand and onboards a new set of users to Bitcoin. Higher transaction demand then begets higher transaction fees, improving bitcoin's ability to

resist censorship, or, in other words, be freely spent. Secondly, stablecoins could very well act as a gateway, introducing bitcoin to a broader audience of users, who perhaps have not yet explored its potential and properties as money.

Altogether our prediction is that a Bitcoin project focused on competing in the modern stablecoin sector will be made easily accessible to users this year. We suspect that businesses and Bitcoin plugins will then steadily integrate stablecoin spending, paving the way for continued usage growth. And lastly, we speculate that long-term, if successful, it will be a positive for bitcoin adoption, as a catalyst by which bitcoin discovery increases and the barriers to natively use it decreases.

Author:

Luke Nolan
Ethereum Research Associate

EIP 4844 - A crucial piece in ethereum's scaling roadmap

The highly anticipated Dencun upgrade for Ethereum is set for sometime in H1 of 2024. After a few development delays to resolve carefully thought out considerations, there are now 9 EIP's scheduled to be included. The one that is most fundamentally impacting Ethereum moving forwards is EIP-4844.

EIP-4844 introduces an innovative concept known as "Proto-Danksharding", a new way for Layer 2's, more specifically Rollups, to add data to blocks in a cheaper and more optimised manner. This is done through the use of blobs, which are specific storage outlets for L2's. Currently L2's post their transaction data to L1 using calldata, and this is by far the most expensive part of L2 transaction costs. When rollups bundle multiple transactions together off-chain, the participants get a reduced fee because they are sharing the cost of 1 transaction (that incorporates many) as opposed to 1 each.

The reason calldata is comparatively expensive to the upcoming blob space is that it costs ~16 gas per byte, and the gas price is determined as a function of demand to utilise block space (ergo, the network). Blob space will have its own segregated fee market, and therefore will be disconnected from demand to use L1 block space. This, in addition to the fact that blob space's longevity in terms of being stored by validators is capped at ~18 days means there will be a decrease in the gas fee paid by users transacting on L2's by orders

of magnitude (10-100x). The more technical background to how this all works has been outlined in one of our previous pieces. Below we can see the overview of the differences between blockspace and blobspace:

	BLOCKSPACE	BLOBSPACE
Seen by all nodes	Yes	Yes
Longevity	Forever	Pruned after ~2 weeks
Visibility to EVM	Yes	No
Storage	Execution client	Consensus client
Size	~940kB max. target	Target: 384kB (3blobs)
Price	~16 gas/byte (expensive)	Very cheap

The highly optimised nature of blobspace also allows for L2's to include more transactions into each block, and is a crucial step towards increasing transactions per second (TPS) of the network (L1+L2).

USE CASE	GAS COST	BYTE COST*	BASELINE TPS	POST 4844 TPS	4844 TPS GAIN
ETH transfer	21,000	12	60	2700	45x
ERC20 transfer	50,000	20	25	1600	64x
DEX trade	100,000	14	12	2160	180x

* Estimates from Source

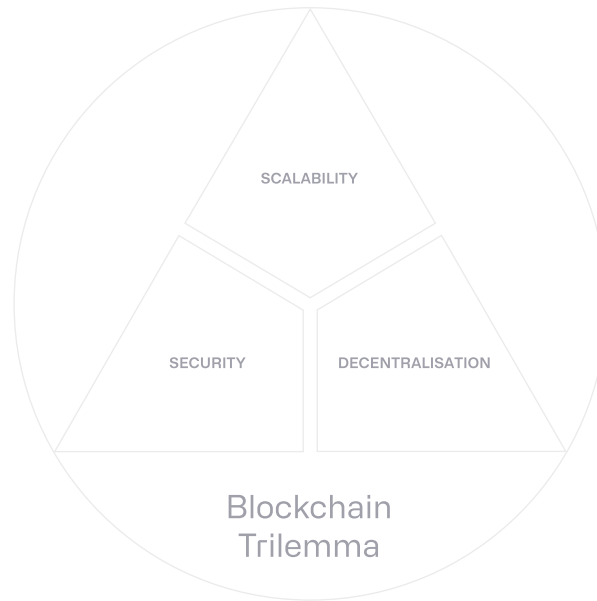
**4844 TPS gain = $((128k/\text{byte cost}) * 3) / (15m / \text{L1 gas cost}) / 12$
Baseline TPS is based on Gas Target of 15m and not Gas Limit of 30m as continuous block production of 30m Gas is unsustainable

What is abundantly clear is that at least in the short and medium term, Ethereum is focusing on increasing the efficiency and throughput of Layer 2 solutions as opposed to making any fundamental modifications that would increase the scalability and TPS of Layer 1 itself.

“Rollups are in the short and medium term, and possibly in the long term, the only trustless scaling solution for Ethereum.”

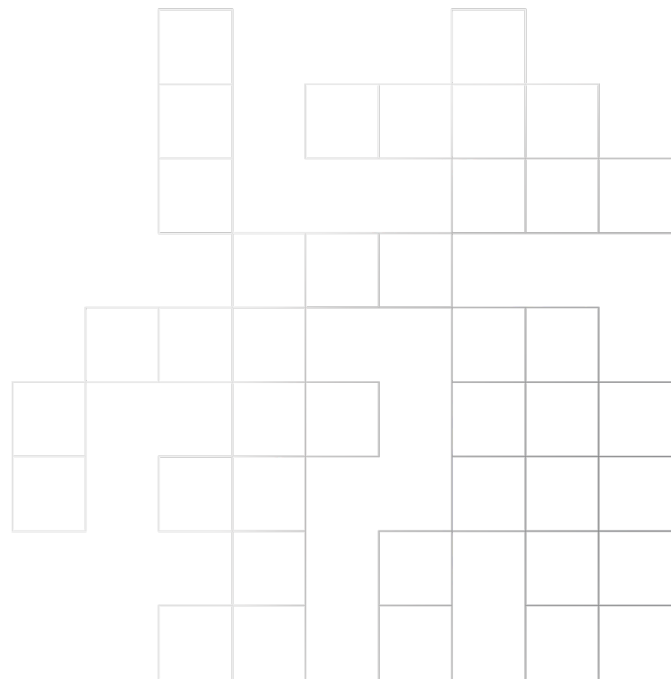
—Vitalik Buterin

Many years ago, Vitalik coined the term “Blockchain Trilemma” as a challenge blockchain’s have in order to achieve optimal levels of three components simultaneously: Security, Scalability and Decentralization; An improvement in one direction will usually lead to a decrease in one or more of the other components. The approach made by the Ethereum community is to try and face this challenge at present through EIP-4844 (and later through full sharding).



While there will be some decrease in decentralisation (the cost of being a full validator will increase) and security (verifying rollup sequencers), this tradeoff is viewed as much more favourable than an alternate scenario where L1 scales and the cost to validate increases much more (with greater decrease in decentralisation and unknown territory in terms of security).

2024 will mark an important year for Ethereum to begin achieving its scaling roadmap, and the decreases in fees for users transacting using Layer 2 solutions such as Optimism and Arbitrum, as well as the increase in TPS are set to vastly optimise the networks ability to capture value in the Smart Contract Platform market. While many are sceptical about the approach Ethereum has taken until this implementation plays out and the market digests the implications, we firmly believe that the reasoning behind this approach is sound and its successful implementation will lead to a strong return of the network vs. peers (like Solana) in the second half of the year.



Author:

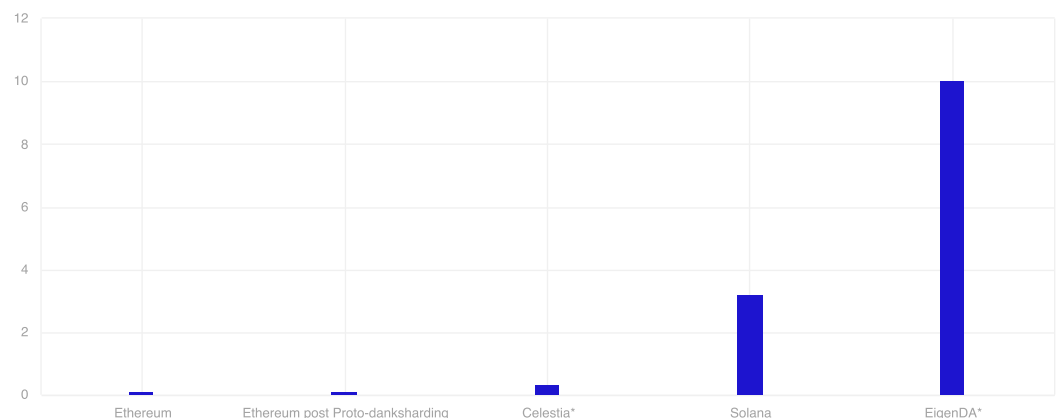
Max Shannon
Research Associate

Solana poised to eat into Ethereum's market share for DeFi Apps and Data Availability

The crypto landscape is witnessing a transformative shift toward data availability (DA) as a pivotal feature. A bit further out on the risk spectrum, is a prediction that Solana will be used more for DA, not just for execution and settlement. Alongside, a proliferation of teams building order books to steal DeFi market share from Ethereum.

Data throughput, measured in kb/s or mb/s, is most relevant to data availability layers because their primary job is to provide a high capacity for data. Ethereum after proto-danksharding (expected Q1 2024) has throughput of $\sim 106\text{kb/s}$ ($(14.2\text{m target gas}/16\text{gas per btw} = 887.5\text{kb}) + (128\text{kb} \cdot 3\text{target blobs} = 384\text{kb}) = \sim 1.27\text{mb}/12\text{s per block} = \sim 106\text{kb/s}$), however throughput has gone higher when block size has increased in periods of high activity. Celestia offers 300kb/s ($\sim 4000\text{kb}$ based on 1000 nodes/15sec block time) and EigenDA has offered 10Mbs in private settings as well. By contrast, Solana today offers a DA of roughly 3.2MB/s (6400 shreds per block at 50k tps, 1,280 bytes per shred, ~ 2.5 blocks per second). The reduction in costs after proto-danksharding, Celestia and EigenDA brings much more scale to L2s via lower cost transactions. Users have already paid over \$200m in callData costs for posting proofs to Ethereum. CoinShares believes that while Celestia's strong partnership traction has been picking up steam recently and will be hard to violate the current narrative surrounding the team and product, the weaknesses of EigenDA's 'restaking' could provide an opportunity for Solana. EigenDA comes with a lot of social complexity for app developers such as developer and team lobbying/negotiation when restaking bundles, as well as the risk of other apps decreasing the security of developers own services. The closest peer-to-peer comparison comes from Polkadot's architecture of 'shared security', which has arguably not been successful, with one of the biggest lessons being that teams should aim to minimise the surface area for social coordination - a lesson that teams, developers and users of EigenDA may encounter. Solana could be more used as a DA layer if heavy hardware requirements can be stomached, and light nodes come on line.

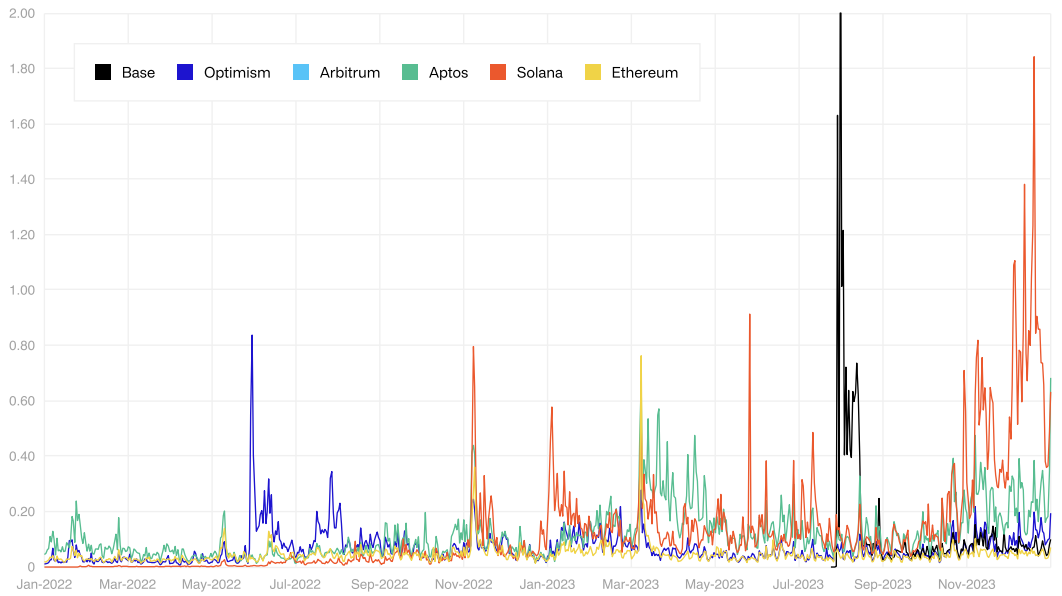
Throughput (Mb/s)



Source: CoinShares, data available as of close 07 January 2024

DeFi emerged and grew to be a very large unregulated casino, around \$180bn in size at the peak, often driven by yield farming frenzies, thin-air tokens with egregious dollar values, greed, and subsequently fear as token prices collapsed 80--100%. Now, out of a bear market, Ethereum has been side-stepped by Solana despite its lindy, liquidity and security advantages attracting real world use cases such as bond tokenisations by banks. Solana's smooth trading, high speeds, and low fees have recorded more trading activity on certain days despite having less than 5% of the Total Value Locked (\$1.46bn versus \$29.37bn respectively), as of 3rd Jan 2023. This recent catch-up is likely driven by users eager to take advantage of Solana's airdrops such as JITOs, however, users are experiencing the arguably superior technology in many ways. Solana's Firedancer technology, with its advanced data structures and integration of Google's QUIC protocol, promises scalability and robustness. And the focus on order-books will further provide better user experiences and should continue to demonstrate it's astronomically better protocol capital efficiency as reflected in a higher Vol/TVL ratio, per \$1 of TVL Solana records 53 cents of volume versus Ethereum's 5.3cents volume, approximately 10x higher) which could also be reflected in longer user retention rates, and higher lifetime value per user and earnings per user, as demonstrated in June of last year when looking at the Unit Economics of Decentralised Exchanges.

Capital efficiency (Vol/TVL)



Source: Bloomberg, CoinShares, data available as of close 07 January 2024

In conclusion, Solana's solidified re-emergence as a formidable competitor indicates a shifting tide in the crypto ecosystem due to its arguably better infrastructure as a DeFi platform and data availability layer.

Author:

Luke Nolan
Ethereum Research Associate

Developer Activity set to rebound in 2024

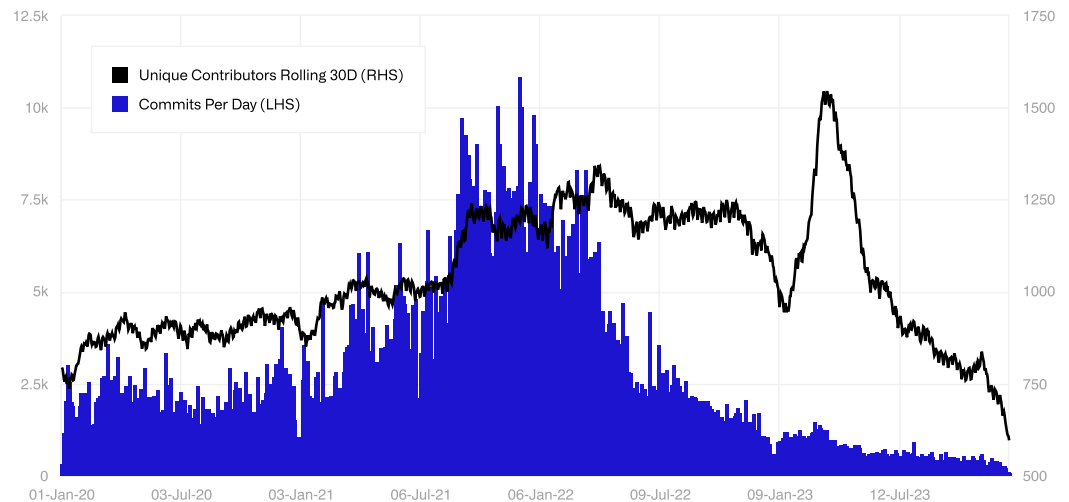
When looking at 2 key metrics for blockchain ecosystems (the blockchains themselves and protocols/applications built on them) - unique code contributors and number of daily commits to Github repositories, most charts have the same pattern that price does, peaking sometime in January of 2022. However, different from prices that have recovered substantially since then, developer activity for the most part is still falling uniformly. Thus, it is safe to say that on an absolute basis, developer activity cannot be used to gauge the market value of a blockchain and it is not constructive nor interesting to look at the developer activity for all the top 20 blockchains for instance. Over the long term however, the blockchains with the highest developer activity attract the highest TVL's, generate the applications with the most recurring users and therefore can be important indicators of how much a blockchain can retain its value when speculative fervour settles (This does not apply to Bitcoin as it does not serve, at least primarily, as a compute layer for applications and protocols).

What we believe will spark relative outperformance over the longer term given favourable market conditions is where value is being created by developers in the form of applications and protocol improvements.

This short piece will look at 3 blockchains: Bitcoin, Ethereum and Solana - and the reasons as to why we believe developer activity is set for growth in 2024.

— Bitcoin (Current Market Cap: \$845 Billion)

Bitcoin unique contributors (rolling 30D) and number of commits per day



Source: Bloomberg, CoinShares, data available as of close 30 December 2023

*The spike in unique contributors seen in January of 2023 can be attributed to the rise in popularity of Ordinals

Developer activity on Bitcoin comes in the form of making improvements to the protocol itself (in the form of Bitcoin Improvement Proposals), as well as building things like Layer 2 solutions, such as Lightning, which boost one of its value propositions as a means of payment with quick settlement.

Another Layer 2 solution that is built atop of Bitcoin is Stacks, which leverages Bitcoin’s security model and enables the creation and execution of Smart Contracts. This opens up a plethora of use cases (Defi, DApps, Cross-chain applications) that are not possible (or technically very complex) on Bitcoin, all whilst only using the Bitcoin network itself for finality. Although it is not a new protocol, it has been regaining popularity in recent months, being one of the top performers in the Bitcoin ecosystem.

Stacks (STX) price USD

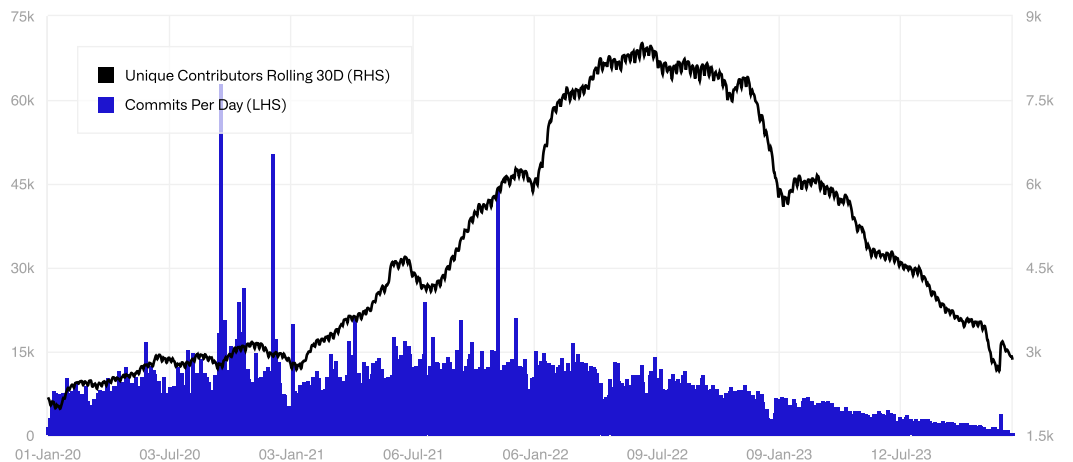


Source: CoinShares, data available as of close 05 January 2024

As the expansion of Stacks and other Layer 2’s take shape, 2024 will mark the bottom in terms of developer activity and we will see a continuous uptick of new projects crystallise.

— Ethereum (Current Market Cap: \$270 Billion)

Ethereum unique contributors (rolling 30D) and number of commits per day



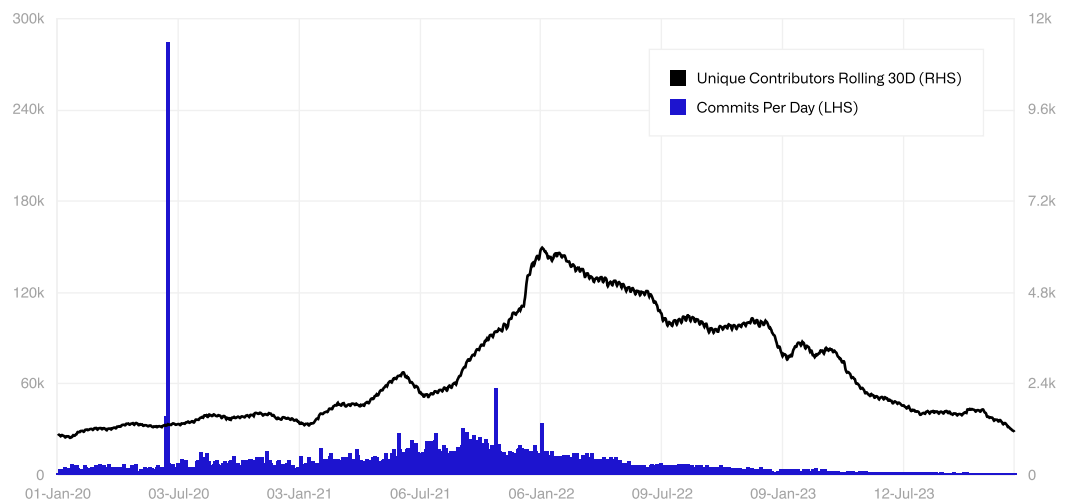
Source: CoinShares, data available as of close 30 December 2023

Ethereum remains the blockchain with the most developer activity. At present, there are ~3000 unique contributors on a rolling 30 day basis, and daily commits in the realms of 2-3,000. With a Total Value Locked of \$26.8 billion (excluding Liquid Staking), Ethereum is still the leader in the Smart Contract Platform market, albeit unique contributors are falling.

With EIP-4844 on the horizon, Layer 2 solutions are set to take the spotlight with massive increases in profitability (dependent on L2 governance) and user activity. We project that developer activity on Ethereum will uptick as competition in the segment escalates and applications that take advantage of L2 throughput and post-EIP-4844 unit economics surge. Ethereum's high security as an L1 settlement layer will be enough to maintain it as the top blockchain for developers.

— Solana (Current Market Cap: \$44 Billion)

Solana unique contributors (rolling 30D) and number of commits per day



Source: CoinShares, data available as of close 30 December 2023

Solana has been one of the top performers in 2023, with a staggering 936% price increase. In early December, SOL eclipsed Ethereum DEX trading volume on a 7 day basis for the first time ever. Given its low transaction fees and seamless UX trading aggregators (such as Jupiter), it is not surprising that speculative trading activity is shifting to Solana.

What will be key is if developer activity shifts upwards and applications that take advantage of Solana's high throughput on the consumer-facing side get built - those will be essential for Solana's long term future, as speculative activity can only be sustained as long as there is liquidity in abundance looking for a return.

We project that the grand return of Solana as a top 5 crypto will catalyse developer activity to at least more than double from current levels. With Firedancer set for late H1, the projected TPS increase to 600k+ could set the scene for a user application that can handle mass scale and data throughput. This of course, is dependent on the successful implementation of this optimistic upgrade.

Overall, we are expecting a significant pickup in developer activity for all 3 blockchains explored in this piece. For Bitcoin, the rising popularity of using Layer 2 solutions to optimise payment settlement and explore alternative use cases will drive the creation of new and innovative projects. For Ethereum, EIP-4844 will spark an increase in activity and creation for Layer 2's and underlying applications, as well as a strong return

of the network in H2, which was a laggard all throughout 2023. Lastly, for Solana, its propulsion as one of the top performers of 2023 as well as a successful implementation of Firedancer will spark huge developer interest to build applications that can handle scale.

Author:

James Butterfill
Head of Research

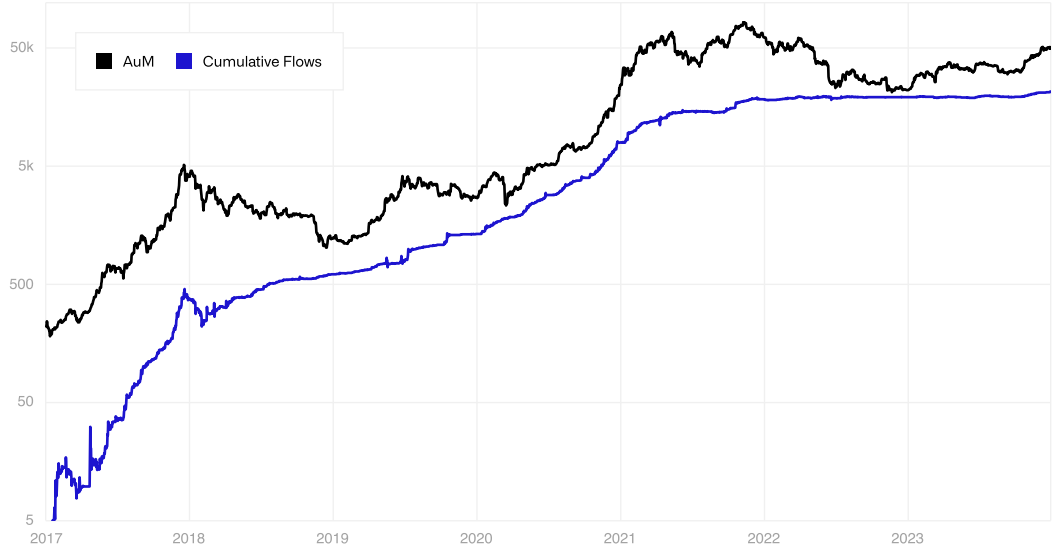
Fund Flows suggest the bull market has only just begun

The year 2024 is anticipated to mark a significant turning point in the digital asset sector, with the expectation of substantial institutional investor participation for the first time. Over the past decade, issuers have been engaged in a prolonged struggle with the United States Securities and Exchange Commission (SEC) to approve a spot-based Exchange-Traded Fund (ETF) for digital assets. Issuers have recently succeeded in launching a Bitcoin spot-based ETF in the US early. While ETFs already exist in the US, they were not spot-based products, which meet more stringent due-diligence criteria. Consequently, the introduction of spot-based Bitcoin ETPs (Exchange-Traded Products) has been a pivotal moment for many institutional investors, allowing them for the first time to gain exposure to Bitcoin.

Although spot-based Bitcoin ETPs are already available in Europe and have enjoyed relative popularity, the US market, often at the forefront of technology investments, is seen as a more significant indicator of legitimacy for the digital asset world. The launch of these products in the US represents a major victory and a step towards shedding the reputational risks that have accompanied digital assets during their maturation.

Appetite for digital assets dramatically improved towards the end of 2023 due to the hype surrounding the impending SEC decision as indicated by US\$2bn of inflows in the final quarter. But when these flows are expressed as a percentage of assets under management, they have barely moved the needle, while total AuM (Assets Under Management) at US\$51bn remain well below the US\$84bn peak seen in late 2021. This suggests that if we are truly in a new bull market, it is evident that it has barely begun.

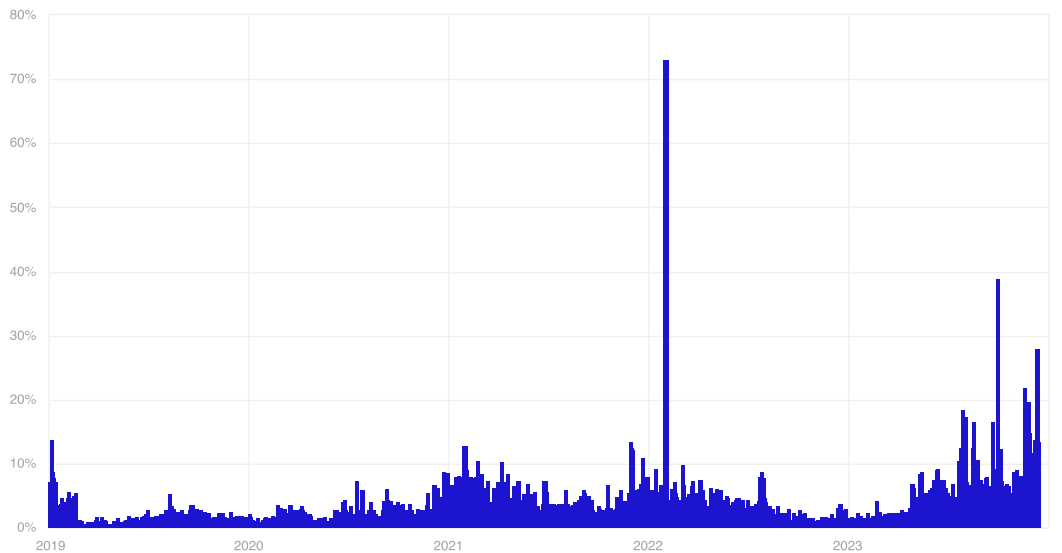
Digital asset ETP net new assets USDm



Source: Bloomberg, CoinShares, data available as of close 04 January 2024

There are concerns that the entry of US investors into the digital asset market could create overwhelming demand, potentially straining market capacities. However, we consider this scenario to be highly improbable. When examining the existing volumes of Bitcoin ETPs, they typically account for an average of around 12% of the total Bitcoin trading turnover on trusted exchanges. This figure already includes volumes from the closed-end GBTC Fund.

Bitcoin ETP & mutual fund turnover as % of total Bitcoin turnover (trusted exchanges)



Source: Bloomberg, CoinShares, data available as of close 04 January 2024

In 2023, Bitcoin was the primary beneficiary of improved investor sentiment, attracting US\$1.9 billion in inflows, which constituted 87% of the total inflows into digital assets. This level of dominance in fund inflows is unprecedented, surpassing the previous peak in 2020, when Bitcoin accounted for 80% of inflows, and greatly exceeding the 42% share it captured in 2017. With the launch of a spot-based Bitcoin ETF, we expect Bitcoin to maintain, if not increase in the short-term, its dominant position in attracting investment flows.

— Ethereum sentiment likely to improve in 2024

It was a different story for Ethereum though. The prevailing scepticism towards Ethereum's capability to effectively implement changes to its protocol is, we believe, a key factor behind its relatively low inflow of investments. This initially stemmed from doubts surrounding the Merge in 2022, followed by concerns about the unstaking process in the Shanghai upgrade, and now the anticipated Decun upgrade in the first quarter of 2024. Additionally, fund flows data suggest that Ethereum faced stiff competition from Solana, which has garnered more than double Ethereum's inflows, at US\$167 million compared to Ethereum's US\$78 million.

Despite these challenges, the Ethereum Foundation has demonstrated a growing proficiency in successfully rolling out major network upgrades, as evidenced by the seamless execution of both Shanghai and The Merge. However, Ethereum seems to remain underappreciated by investors. This lack of enthusiasm appears unwarranted, especially considering that Ethereum is the only digital asset currently offering an attractive yield, with its net issuance being slightly negative. Furthermore, issuers are already applying for a spot-based ETF in the US, improving sentiment and the launch of these ETFs are likely to see Ethereum's share of flow recover in the second half of 2024.

— The Price impact of an ETF launch

The big question now a Bitcoin spot ETF has been launched in the US, is just how much inflows into ETFs this may prompt? and what impact on price those flows may have? There does seem to be a relationship between inflows as a percentage of AuM and change in price. Inflows do appear to be coincident, the week the prices rise so do flows rather than one leading the other.

Looking at weekly ETP flows from a quantitative perspective, there is a relationship. Looking at 45 day change in prices and weekly flows as a percentage of AuM, the R2 is 0.31, not perfect by any means but signifies some semblance of a trend does exist.

Using this trendline it can help us predict what inflows would have on price. If we take the aforementioned US\$3 billion of inflows, the model suggests it could push the price up to US\$60,000 per Bitcoin. Below is a simple matrix with a varied set of inflows into ETPs, and its potential impact on the Bitcoin price.

% OF AUM	INFLOWS (US\$M)	PRICE PROJECTION (US\$)
0%	-	35,515
2%	627	40,310
4%	1,254	44,904
6%	1,881	49,499
8%	2,500	54,093
10%	3,135	58,687
20%	6,269	81,660
40%	12,538	127,604
60%	18,807	173,548
80%	25,076	210,492
100%	31,345	265,437

Ultimately, it is very difficult to ascertain just how big the potential wall of demand will be now a spot-based ETF has been launched. We know that it effectively diversifies a portfolio and enhances sharpe ratios, as discussed here, but regulatory approval and corporate acceptance are slow burn issues due to Bitcoin's perceived complexity. For this reason it may well take some time for corporations and funds to build up their knowledge and confidence before they decide to invest.

Author:

Jean-Michel Pailhon
CIO - Grail Capital

Digital Art & Culture on blockchains: birth of an asset class?

— Introduction

Over the last three decades, digitalization has transformed all facets of our lives: in communication (SMTP and VOIP), information dissemination (TCP/IP), and the transfer of economic value (Bitcoin and other public blockchains). We are now witnessing a paradigm shift in art and collectibles due to an emerging technology: NFTs.

COMMUNITY	MARKET VALUE	COLLECTIBLE	PRICE DEC 2023	PRICE DEC 2022	RETURN YTD
CryptoPunks	\$1,341,000,000	CryptoPunks	\$128,000	\$87,200	48%
Yuga Labs	\$1,104,000,000	Bored Apes	\$63,200	\$98,000	-36%
Pdugy Penguins	\$288,000,000	Pudgy Penguins	\$26,300	\$9,800	168%
Azuki	\$184,000,000	Azuki	\$13,700	\$19,400	-29%
9GAG	\$139,000,000	The Captainz	\$9,800	\$1,300	654%
DeLabs	\$80,000,000	DeGods	\$7,400	N/A	N/A
Clone X	\$60,271,155	Clone X	\$3,100	\$8,200	-62%
VeeFriends	\$60,000,000	VeeFriends	\$4,300	\$7,600	-43%
Doodles	\$40,000,000	Doodles	\$4,000	\$8500	-53%
Proof	\$33,000,000	Moonbirds	\$2,900	\$11,200	-74%

Source: Grail Capital, October 2023

— NFTs: a phenomenon of significance

In a parallel to previous technological breakthrough catalysts such as the Internet and blockchain, NFTs have emerged as a buzzword in recent years. They have garnered fame, sparked lofty expectations, and, inevitably, attracted criticism.

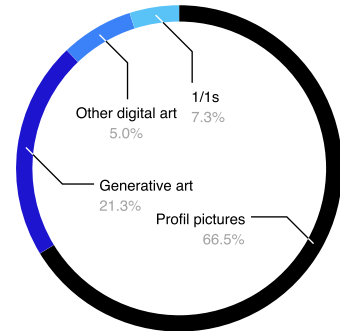
While some media outlets have disparaged NFTs as a passing fad, the NFT art market has, in specific areas, managed to maintain value and influence throughout the year 2023. Notably with Refik Anadol's "Unsupervised" artwork entering the permanent collection of the MOMA in October 2023, and Dmitri Cherniak's "Goose Ringer" posting an outstanding US\$ 6.2M sale at a Sotheby's auction in New York in June 2023..



Refik Anadol's work on view in MoMA's lobby
The Museum of Modern Art, New York / Photo : Robert Gerhardt

— Market size of digital art and collectibles on blockchains

DIGITAL ART SEGMENTS	MARKET CAP
Profil pictures (PFP)	\$4.6Bn
Generative art (GENART)	\$1.5Bn
Other digital art	\$350M
1/1s	\$500M
Total digital art (Editions + 1/1s)	\$6.9Bn



Based on Grail Capital compiled data of the top 1,000 NFT collections and artworks stored on public blockchains (predominantly Ethereum), the aggregated market value of digital art and culture on blockchains reached US\$6.9 billion as of end of September 2023.

Profile pictures and collectibles constitute a significant portion of this market, accounting for 66.5% of the total. The two most prominent contributors being Larva Labs' CryptoPunks, boasting an adjusted market cap approaching US\$2 billion, and Yuga Labs' Bored Ape Yacht Club, with an adjusted market cap of US\$1 billion.

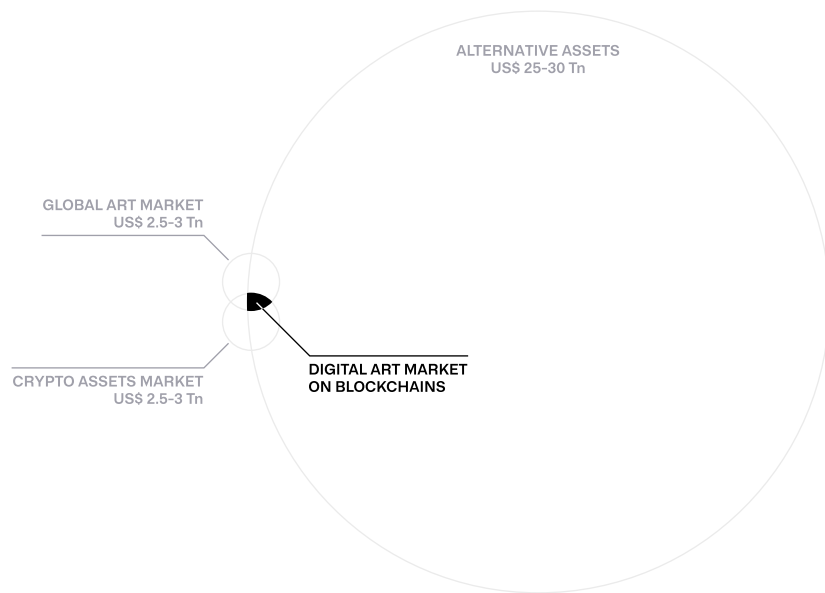
— Digital art on blockchains: fad, secular trend, or generational shift?

Grail Capital has outlined three macro scenarios projecting the future market size of Digital Art and Culture by 2030:

- In the low case scenario, NFTs serve as status symbols for affluent crypto enthusiasts, with a market size ranging from \$20 to \$30 billion. This projection hinges on the influx of newly affluent individuals driven by future crypto asset bull cycles, with a total market cap of crypto-assets of \$3-4 trillion by 2030.
- Mid case: Envisioned in this scenario is the capture by art and collectible NFTs of 2-4% of the collectibles and contemporary art market owned by HNWIs by 2030, leading to a market size ranging from \$50 to \$100 billion. This scenario hinges on the emergence of "NextGen art collectors" who display a proclivity for digital art over traditional contemporary artworks.

- **Bullish case:** The most optimistic scenario envisions NFTs catalyzing a significant contribution to the worldwide culture GDP, targeting over 100 million active users and catapulting the market size to an astounding range of \$250 to \$500 billion. This transformation of the art and culture paradigm would be triggered by an unforeseen exogenous event, akin to the arrival of the iPod for MP3/digital music in 2001.

As a mid case scenario, and in the event that digital art on blockchains secures a 3% share of the art and collectibles owned by High Net Worth Individuals (HNWIs) by 2030, its market value could ascend to US\$100 billion. This mid-case forecast would signify a remarkable 15-fold increase compared to present valuations.



Authors:

Nick Du Cros
Head of Compliance & Regulatory
Affairs - UK

Jerome Castille
Head of Compliance & Regulatory
Affairs - France

2024 Regulatory Outlook

We believe 2023 will be remembered as a pivotal year for crypto regulation. At the meeting of G20 Finance Ministers and Central Bank Governors in October a regulatory roadmap for crypto was adopted which involved all the important international standard setting bodies. Regulation, not an outright ban, is now the path forward.

In 2023, countries like Hong Kong removed restrictions on retail investors accessing crypto. Japan and Singapore provided guidance for stablecoins. The EU continued to make steady progress on implementing the

Markets in Crypto Assets Regulation (MiCA) and the Transfer of Funds Regulation (TFR). The UK joined a growing list of countries which had implemented the Travel Rule - a key recommendation from the Financial Action Task Force. To name a few of the notable accomplishments during the year.

— So what might happen in 2024?

We start 2024 with the very exciting news that the US Securities and Exchange Commission (SEC) has approved a spot bitcoin ETF. This may even be followed shortly thereafter by the approval of a spot ether ETF. However, given the partisan divisions in Congress, and this being an election year, we don't expect any legislation providing for a detailed crypto framework in the US this year.

2024 is also an election year in the UK. So unless the required legislation can be introduced and passed by parliament early in 2024 there is a real risk that there will be a delay in the implementation of the UK's proposals to regulate digital assets within its existing financial regulation framework.

So attention will be focused on the implementation of MiCA, the EU's bespoke framework for the regulation of crypto-asset service providers (CASPs) and stablecoins. MiCA is scheduled to commence at the end of the year and a number of regulators are already working with crypto-asset service providers to have them ready for authorization on day 1. This process is happening in parallel to the publication of multiple Technical Standards which aim to provide the detail for the MiCA regulation. Taken together, MiCA and these Technical Standards, will be the most comprehensive package of crypto regulations in the world and therefore likely to be setting the global standard for other countries to emulate.

MiCA also contains the EU's rules on stablecoins (for both E-Money Tokens and Asset-Referenced Tokens) which will commence on 30 June 2024. Meaning standardised rules for the governance, liquidity and disclosures of stablecoin issuers across one of the largest consumer markets in the world.

We also expect a focus on niche segments of crypto, blockchain or distributed ledger technology to either gain a competitive advantage or try to establish countries at the forefront of emerging industries. Whether it is Hong Kong's focus on web3, the UK's focus on tokenised funds for its asset management sector or France and its desire to influence the development of "virtual online worlds" (i.e. the metaverse) as an alternative to those offered by the US internet giants.

And finally, and our most extreme prediction for 2024, perhaps one or more of India, Nigeria or Turkey may introduce balanced crypto regulations instead of trying to stop or ban crypto.

And 2024 surprises? Yes, 2024 will surely bring some surprises. Possibly from litigation in the US, for instance the SEC v Binance and SEC v Coinbase cases. Also, the SEC and Department of Justice are likely to continue their approach of regulation by enforcement. We will also know the sentences handed down to SBF and CZ in the first half of 2024.

Wherever you look, it promises to be a very interesting year!

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