RESEARCH ROUNDUP

2021 TRENDS AND THEIR POTENTIAL FUTURE IMPACT

JANUARY 2022, CHRIS KUIPER, DIRECTOR OF RESEARCH & JACK NEUREUTER, RESEARCH ANALYST

LUMOS

MARKET COMMENTARY

The year was certainly a tumultuous year for bitcoin's price — starting the year at approximately $29,000 and ending at around $47,000, bitcoin notched a 64% gain for 2021. At first glance, the chart shows a general sideways movement for the year, but upon further inspection we see just how volatile the year was. First was a rapid rise to a new all-time high of over $63,000 in April (an over 100% gain within a few months) only to be followed by a drawdown of over 50%. By late July, bitcoin was pushed back to its starting year value of just under $30,000. This was then followed by a renewed bull run to another all-time high of over $67,000 in early November as strong inflation numbers hit the news. Bitcoin is now trading approximately 31% below that recent all-time high.

BITCOIN PRICE

Data Source: CoinMetrics as of 1/4/2022.

Below we review some of the biggest events and milestones that occurred in the digital asset space while "our two sats" editorial will then put those events into context and what it could mean for the near future.

Overall Awareness and Institutionalization

This year built upon the heightened level of awareness and respect for bitcoin and digital assets amongst both retail and institutional investors. 2020 marked a milestone for institutions recognizing this asset class as worthy of consideration — the first corporate treasuries made allocations to bitcoin, Paul Tudor Jones publicly stated his admiration for the asset, and even MassMutual, one of the oldest insurers in the country, allocated bitcoin. This past year, 2021, built on this trend as we witnessed additional institutional allocations, increased product access in the form of private placements and futures ETFs, and a meaningful growth in overall awareness and intent to allocate in the future shown across many surveys of institutional investors.

Our Two Sats: Allocating to digital assets has become far more normalized over the past two years for all investors. **The LumosDigital Assets 2021 Institutional Investor Survey** found that 71% of U.S. and European institutional investors surveyed intend to allocate to digital assets in the future. This number has grown across each individual region of the survey for the past three years, and we expect 2022 to show another year of higher current and future asset allocations to digital assets amongst institutions.

Product accessibility also increased dramatically in 2021 as both crypto native and traditional investment firms rolled out several fund vehicles to attempt to satisfy the appetite of retail investors, investment advisors, and other allocators. Although progress has been made, there is still no obvious solution for allocating to bitcoin through a publicly traded fund structure today, as the current suite of fund offerings each exhibit their own individual flaws. Despite the lack of an approved spot ETF, the tacit approval of multiple futures-based bitcoin ETFs is a bright spot and leaves hope for the potential future approval of other products and services pertaining to digital assets. This recognition from regulators will be key.

Today, the market cap of digital assets rests at just over $2 trillion. While its growth rate has been impressive, it is still relatively small compared to the hundreds of trillions of dollars in assets globally. The key to allowing traditional allocators to continue to pour capital into the digital asset ecosystem revolves around regulatory clarity and accessibility. As crypto native firms push the bounds for what is possible and create new and innovative products involving digital assets, new regulation will certainly be required. As this regulation begins to provide clarity on acceptable best practices for financial services companies, traditional financial firms can begin to build and partner to allow their existing clients to access these channels. The combination of proper regulation and financial firms working together to offer investors access to this asset class will likely increase overall adoption of digital assets. New channels for exposure make allocations easier and regulators providing proper guidance reduces compliance and risk concerns for investors. In this sense, we expect a reflexive loop of sorts as we enter 2022 between regulators, financial firms, and allocators. Regulation and product access work hand in hand and we are hopeful that 2022 can bring about more clarity than prior years as we feel this is key to bringing a greater portion of the hundreds of trillions in traditional assets into the digital asset ecosystem.

Government and Regulatory Developments – Diverging Paths, Which Way Will the U.S. Lean

This past year saw some major moves by world governments with regards to digital assets. We saw multiple bans from China throughout the year, most notably a call to crackdown on mining in May, then a document released detailing all cryptocurrency transactions as illegal in September, and finally, another announcement in November to shut down all mining.

The government of El Salvador took the opposite approach, becoming the first-ever sovereign nation to make bitcoin legal tender in its country (El Salvador still uses the U.S. Dollar, but all businesses must accept bitcoin as payment as well). In addition, El Salvador has rolled out its own digital wallet, distributed free bitcoin to its citizens, and the president of El Salvador made multiple announcements that the country has purchased bitcoin for its reserves and will also be offering a “bitcoin bond” of $1 billion USD with half used to purchase more bitcoin and the other half used for related bitcoin infrastructure.

Our Two Sats: We think the two developments observed this year couldn’t be more opposed. Time will certainly tell which path is more successful but given our view of digital assets, it isn’t surprising that we think an outright ban will be difficult to achieve at best, and if successful, will lead to a significant loss of wealth and opportunity. History has shown capital flows to where it is treated best and embracing innovation leads to more wealth and prosperity. We also think there is very high stakes game theory at play here, whereby if bitcoin adoption increases, the countries that secure some bitcoin today will be better off competitively than their peers. Therefore, even if other countries do not believe in the investment thesis or adoption of bitcoin, they will be forced to acquire some as a form of insurance. In other words, a small cost can be paid today as a hedge compared to a potentially much larger cost years in the future. We therefore wouldn’t be surprised to see other sovereign nation states acquire bitcoin in 2022 and perhaps even see a central bank make an acquisition.

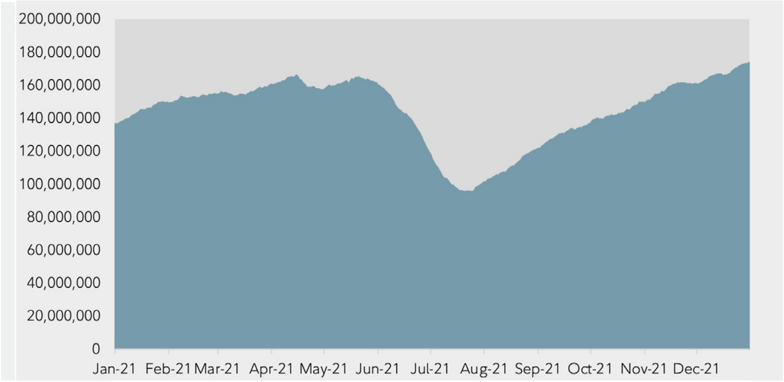
While we previously mentioned the lack of regulatory clarity from the U.S. on digital assets, one interesting development in 2021 was the broad digital asset regulation that was included and passed in the latest infrastructure bill. The legislation is relatively vague and far reaching, particularly in its definition of a “broker,” which could impose reporting requirements on not just traditional brokers but miners, hardware manufacturers, and software developers. Leaving aside the contents and implications of the legislation itself for now, what we thought was of particular interest was how it caused a stir in Washington as a large amount of grass-roots opposition emerged and even managed to hold up the bill, sending lawmakers scrambling over the weekend to try to create amendments and save the bill. The legislation isn’t slated to go into effect until 2024 and there are already multiple amendments being proposed, so time will tell what becomes of the legislation itself. But what we think is most notable is that digital asset regulation becoming law is another milestone as the asset class comes of age and establishes itself.

Bitcoin Mining – A Year of Resilience and Bullishness

As noted above, due to China banning all proof-of-work crypto mining, bitcoin's hash rate plummeted by over 40% in the span of a few months from May through July of 2021. Analysts expected it would take at least a year for the hash rate to recover to previous highs as mining rigs would have to be packed up and moved or sold to other operators if they were even re-employed at all. Therefore, the most surprising result in 2021 was how quickly the hash rate rebounded, with the 30-day hash rate now approximately 5% over the previous high! The U.S. has been the biggest winner in the "great migration" of mining rigs, with an estimated 35% of bitcoin's global hash rate now residing in the U.S., the largest of any country, up from a mere 4% just two years ago, according to the University of Cambridge. [i]

In addition, publicly traded mining companies have been showing signs of bullishness by not only holding more bitcoin on their balance sheets, but buying more and for some, issuing debt to make additional purchases and capital expenditures.

BITCOIN HASH RATE (30-DAY MOVING AVERAGE)



Data Source: CoinMetrics as of 1/4/2022.

Our Two Sats: The recovery in hash rate this year was truly astounding and one that we think demonstrates several issues that will be important to keep in mind for 2022 and beyond. First, this demonstrated another real-world risk to bitcoins core network: what happens if a huge percentage of the miners get switched off? It was always known that the code stipulated the mining difficulty would adjust every two weeks as programmed and the network should keep operating normally so that on average a new block of

[i] https://ccaf.io/cbeci/mining_map

transactions are added every 10 minutes. This has now been tested and bitcoin's network performed perfectly.

We also note that this removed a major investment and operational risk to bitcoin that we previously considered a real threat: the potential for a nation-state attack on the network. Because as much as 75% of the network's computing power was previously located in China, there was in our opinion a credible threat to China taking control of a majority of this power and therefore the potential to gain over 50% of the network's power. However, it is clear this is not China's intention and the fact that so many mining rigs have been moved out of the country adds to the credibility this will not likely happen in the future. Bitcoin's hash power has now been more widely distributed around the world, making it even more secure and hardened against such nation state attacks.

Finally, as bitcoin miners have the most financial incentive to make the best guess as to the adoption and value of bitcoin, we think their recent actions lend to the thesis that the current bitcoin cycle is far from over and that these miners are making investments for the long haul and not a quick profit, therefore strengthening the resiliency and reliability of the bitcoin network.

Ecosystem Expansion

The digital asset ecosystem continued to expand, and the number of promising projects continued to grow in 2021. The biggest non-Bitcoin themes put on display this past year included the massive issuance of stablecoins, the maturation of decentralized finance, and the early days of non-fungible tokens.

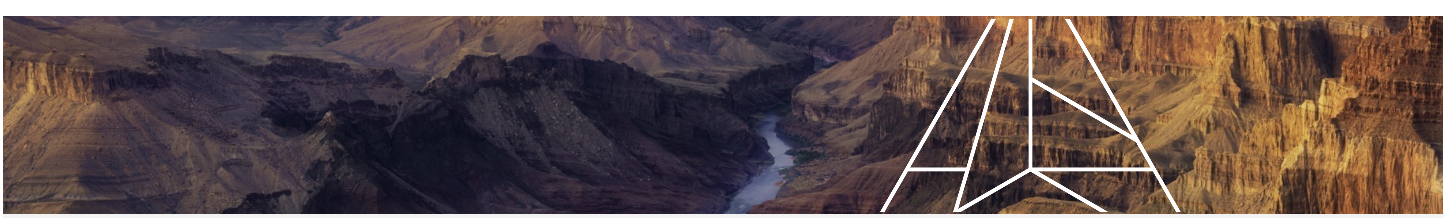
Stablecoins have become an increasingly critical part of the decentralized finance or “DeFi” space, growing over 385% over the course of 2021 from less than $30 billion in circulation to over $140 billion at year-end according to Coin Metrics [ii]. While many have raised concerns over the issuance of Tether, its growth rate paled in comparison to the growth rate of Circle's more regulated stablecoin, USDC, each having annual growth rates of roughly 260% and 810% respectively. USDC is now the

[ii] https://charts.coinmetrics.io/network-data/

second largest stablecoin and effectively 50% of the market cap of Tether after starting the year at under 20% its size. This massive issuance has shown no signs of slowing down. Much of these stablecoins find themselves locked into borrowing, lending, and trading decentralized finance protocols as the total value of collateral locked in DeFi protocols grew from an estimated $25 billion to over $100 billion throughout the course of the year. Non-fungible tokens, also known as NFTs, reached center stage in the first half of 2021 for the wild prices that were being paid for digital art. The record for the highest price paid for a digital artwork in a sale at Christie’s featured a $69 million NFT by an artist known as Beeple. Many institutional allocators have long viewed art as an asset class, and the evolution of digital art as non-fungible tokens has begun to show some level of promise as a new form of digitally verifiable art.

Our Two Sats: We’ve witnessed incredible growth across many different use cases this past year. Of particular interest to our team has been the continued development irrespective of market conditions or headline news. Projects were battle tested this year as crypto markets featured the usual bouts of volatility causing margin calls and liquidations across many of these newly created platforms.

Amongst these trends we expect institutional interest in DeFi to continue to grow. One of the emerging DeFi themes that has caught our eye includes the creation of decentralized cross-chain bridges attempting to disintermediate the need for trusted third parties being required to facilitate transactions across two chains that otherwise cannot communicate. The growth in interconnectivity between siloed blockchains is a fascinating trend and will be important to creating a more seamless interaction with digital assets and their users. Another DeFi related trend we wouldn’t be surprised to see includes the increase in traditional fintech companies partnering or building capabilities to interact with DeFi protocols more easily. This could include offering simple front ends and abstracting away the complexities of interacting with many of these protocols that exist today.



As stablecoin regulation and reserve scrutiny heats up, we also think the dawn of decentralized algorithmic stablecoins has officially begun. Regulators have increasingly started to ask questions surrounding the reserves held by many of the large stablecoin issuers and whether the rapid expansion of stablecoins could pose a threat to the legacy financial system. This has left many of the DeFi protocols and users that heavily rely on these stablecoins in a less than ideal situation. The assets backing the major stablecoins today exist in the physical world. Therefore, owners of those tokens need to trust the third party that those funds exist, can be easily accessed and liquidated, and will not be seized or otherwise interrupted by government intervention. It's rather easy to see how this could be problematic and not very emblematic of decentralization. Algorithmic stablecoins, those whose stability of assets are backed by code and using digitally native assets, offer a promising solution to bringing trustless stable value to the digital asset world. We expect rapid issuance in these "algo" stablecoins as they continue to display their ability to maintain their promised $1 per token price peg as well as continued growth in demand for more regulated, centralized stablecoins.

The implications for NFTs are wide ranging. Many may argue that the prices that have been paid today for some of the largest NFT projects are nearly impossible to justify. While the long-term value of these NFTs is not known, the impact of increased digital property rights for art, music, and content is likely to be meaningful in some form. NFTs have brought about more questions than answers over the past year, but we expect some of those questions to be better answered in 2022.

CONCLUSION

Overall, we would say 2021 was a year that further confirmed digital assets have arrived and are here to stay. We continued to see more high-profile individuals and institutional investors make allocations, more corporations add it to their balance sheet, and even the first sovereign nation to declare it as legal tender. The bitcoin network demonstrated its resiliency despite the second-largest economy in the world effectively banning it. We have seen the rapid rise and demand for stablecoins, a parallel money market-like product that has drawn the attention of regulators. Furthermore, digital assets have officially entered the legislative and political arena and will likely receive more attention come midterm elections. Finally, digital assets are spreading to the world of art, culture, music, and gaming. All of this leads us to ask, what more would a skeptic need to see to believe digital assets are not going away?

The information herein was prepared by LumosDigital Asset Services, LLC and is for informational purposes only and is not intended to constitute a recommendation, investment advice of any kind, or an offer to buy or sell securities or other assets. Please perform your own research and consult a qualified advisor to see if digital assets are an appropriate investment option.

This information is not intended for distribution to, or use by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to local law or regulation. Persons accessing this information are required to inform themselves about and observe such restrictions.

Digital assets are speculative and highly volatile, can become illiquid at any time, and are for investors with a high-risk tolerance. Investors in digital assets could lose the entire value of their investment. LumosDigital Asset Services, LLC and LumosDigital Assets. Ltd. do not provide tax, legal, investment, or accounting advice. This material is not intended to provide, and should not be relied on, for tax, legal, or accounting advice. Tax laws and regulations are complex and subject to change. You should consult your own tax, legal, and accounting advisors before engaging in any transaction. LumosDigital Assets and the Lumos Digital Assets logo are service marks of LumosLLC

LumosDigital Assets and the LumosDigital Assets logo are service marks of LumosLLC. © 2021 LumosLLC. All rights reserved.

© 2022 LumosLLC. All rights reserved.

1010568.1.0