



RESEARCH ROUND-UP

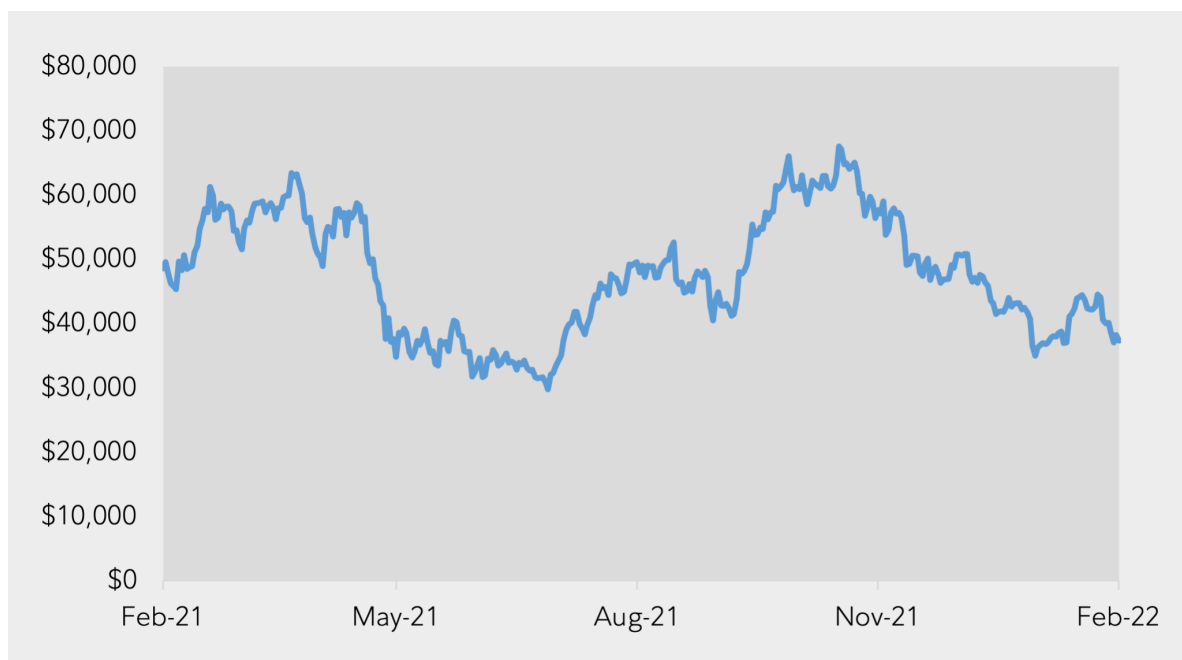
A DEEP DIVE ON WHY BITCOIN IS VOLATILE

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

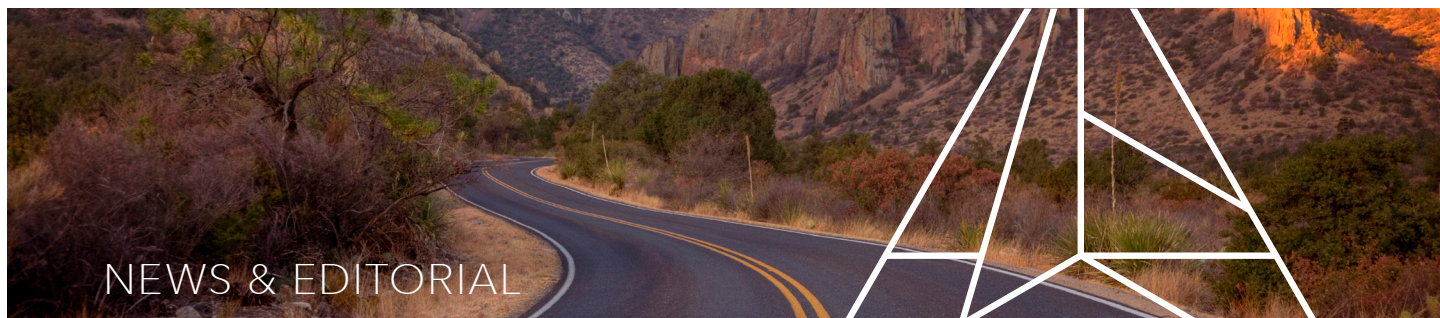


The price of bitcoin traded in a 25% band throughout the month of February, reaching a high of nearly \$45,000 by mid-month before finding its way on a roundtrip journey to end the month where it started, in the mid-to-high \$30,000 range. Much of this price action has been correlated to risky assets in general, including U.S. equities, as markets brace for potential rate hikes in March and the increasing conflict between Russia and the West. These external factors are likely to continue to drive volatility in the digital asset markets. Therefore, in this month's edition of our "Insights and Education" section, we take a deep dive into understanding why bitcoin is fundamentally volatile and some ways we think volatility should be framed.

BITCOIN PRICE PAST YEAR



Source: Coin Metrics as of 2/24/2022.



A curated list of the most relevant news and developments along with our two Sats.

India Changes Course from Digital Asset Bans to Regulation

India has recently released [guidelines](#) on cryptocurrency investing through the Advertising Standards Council of India, coming into effect after April 1. These guidelines call for disclaimers on "virtual digital asset products" claiming *"Crypto products and [non-fungible tokens] are unregulated and can be highly risky. There may be no regulatory recourse for any loss from such transactions."*

Additionally, the verbiage "currency", "depositories", "securities", and "custodian" may not be used in any of the virtual digital asset products or services as these words may be associated with regulated products. Furthermore, advertisements are prohibited from including any information pertaining to returns for periods of less than year, to be sure that past performance is not indicative of future results. There is a strong focus on transparency and integrity to disclose all associated risks with digital asset products, especially as these relate to young and inexperienced investors.

Our Two Sats: This news is encouraging to see and exemplifies the game theory associated with the adoption and endorsement from federal governments. Not only is this positive headway for individuals looking to gain exposure in countries that have historically turned a cold shoulder toward these emerging assets, but it is also positive for the governments themselves and the entire digital asset ecosystem. Although the instance in India is a smaller step toward acceptance rather than outright approval, it is important to note that their acknowledgment signals the space is becoming too large to ignore completely. It is also interesting given the previous opposite stance the country had taken, and the actions to move toward regulation rather than outright bans shines a light on both the censorship resistant nature of these assets and the conflict of interest nationally if they were to not capitalize on the technology.

KPMG Canada Adds Bitcoin and Ethereum to Its Balance Sheet

In an unprecedented move for the firm, KPMG Canada recently [announced](#) a move to bring both bitcoin and ether (the native token that powers the Ethereum network) into its corporate treasury. While the exact amount added is unknown, the accounting firm has also announced it will be purchasing carbon offsets to stay committed to its goals surrounding environmental, social, and governance (ESG) initiatives. Benjie Thomas, the Canadian managing partner of advisory services at KPMG in Canada, said of the allocation: *"Crypto assets are a maturing asset class. Investors such as hedge funds and family offices to large insurers and pension funds are increasingly gaining exposure to crypto assets. This investment reflects our belief that institutional adoption of crypto assets and blockchain technology will continue to grow and become a regular part of the asset mix."* The firm also set up a governance committee to oversee this allocation, to evaluate all regulatory, reputational and custodial risks associated with the purchase.

Our Two Sats: One by one, more institutions are looking for ways to gain exposure to digital assets. KPMG joins other large financial institutions such as Visa, Mastercard, and JPMorgan Chase who have recently looked for ways to adopt these assets into their portfolios and strategy. Not only does this news prove that bigger institutions are paying attention, but could also trigger a network effect as more institutions are likely to follow suit. What is particularly interesting here is that traditional barriers to entry such as negative environmental impacts and high energy consumption are now being offset with the purchase of carbon credits. What this tells us is that regardless of the various ESG restraints or initiatives firms may prioritize, there are still possibilities to gain exposure to the assets if the firms are intent on allocating to bitcoin on their balance sheets.

NEWS QUICK HITS

Redditior [stashes away](#) bitcoin worth \$100 for 100 years in a public library.

Grayscale Investments [launches campaign](#) to encourage American investors to advocate for a spot bitcoin ETF.

[El Salvador Bitcoin Bond](#) expected to launch by March 20 with over \$500 million already verbally committed.



Legislative Developments and Adoption in States

Lawmakers in Wyoming and Arizona have [proposed](#) legislation to accept tax payments in the form of digital assets. In Arizona's case, the state has proposed recognizing bitcoin as legal tender and Wyoming has proposed that all cryptocurrencies can be used for sales and use taxes. The Wyoming proposal has been backed by the Merchant Advisory Group, a trade group that backs Amazon, Walmart, and Home Depot.

According to Article I, Section 10 of the U.S. Constitution, states cannot make their own money. Therefore, this could be one potential obstacle to implementing these proposals, particularly for Arizona as it looks to designate cryptocurrency as legal tender, whereas the Wyoming bill is only applicable to tax payments. Colorado has echoed a similar sentiment as Governor Jared Polis has pushed to accept bitcoin as payment for taxes, as well as other state related fees. New Hampshire has established a commission for bitcoin and cryptocurrency to research ways to incorporate these assets into their economy and Missouri has [introduced a bill](#) to exempt bitcoin from property taxes at the state, county, and local levels. Tennessee has recently [introduced a bill](#) that would allow both the state and municipalities to invest in bitcoin, and California is [introducing a bill](#) that would allow for state agencies to accept cryptocurrencies as payments for services.

Our Two Sats: While many of these proposals are still in the very early stages of their path to implementation, the overall attention and acknowledgement to adoption at these state levels is very encouraging. Not only do each of these proposals highlight the potential use cases for bitcoin and other digital assets, but they also draw attention to the desire from local officials to find ways of adopting and getting exposure to these assets. The fact that multiple states are pushing legislation for acceptance speaks volumes to the overall influence of the asset class and the potential for disruption. These proposals would also help decentralize the existing financial structures around them, as all tax payments would be visible on the blockchain. While we would expect many of these proposals to receive pushback at the state level, it is favorable to see the endorsement from local officials as they realize the benefits that digital assets possess. Beyond this, it is also a vote of confidence for the individuals living in these states as they would be given the opportunity to see the real-world application of bitcoin as a monetary good.

Decentralized Finance Project Hacked for \$320 Million, but Losses Backstopped by Investors

Earlier this month, a decentralized finance (DeFi) protocol known as the Wormhole token bridge was [hacked](#), resulting in the loss of 120,000 wrapped ETH worth around \$320 million at the time of theft. It was the second largest DeFi hack ever, second to only the Poly Network hack where around \$600 million was stolen. Like the Poly Network, the Wormhole protocol acts as a token bridge to connect multiple blockchains and allows users of the protocol to send and receive various tokens without having to rely on a third-party intermediary or exchange to intervene in the transactional process. While only wrapped ETH was affected in this hack, similar vulnerabilities could exist on other blockchain networks that use this same cross-chain structure.

Jump Crypto, one of the larger investment backers of Wormhole, backstopped the theft by making all affected users whole and replaced the 120,000 ETH that was stolen. While Jump has been an open advocate for cross-chain technology, there has been some [concern](#) from industry leaders.

Our Two Sats: This situation illustrates two significant things about the current state of the digital asset ecosystem. The first is the security of these protocols and how well the security of these protocols can be improved over time. Is there a place for cross-chain functionality in the future? Possibly, but the challenges of security and scalability seem to be evident, and the alternatives such as multi-chain protocols seem to have more upside potential. On the positive side, many of these current challenges help to illustrate the nascent nature of these ecosystems and paint a bigger picture of the attention and development going into the space. Sure, there will be initial challenges and obstacles to face, but that is to be expected when experimenting with these new applications.

Second, it is encouraging to see the response by Jump Crypto stepping in to make the users whole and taking steps to further secure the network. This speaks volumes to the institutional awareness and support, and also shines a light on the collective effort and interests of everyone involved in managing the integrity of these ecosystems. Overall, these challenges are expected, and while it is disheartening to see large hacks like this happen, the long-term implications this will have on the security of the protocols and what forms of technologies work the best will lead to a much more fruitful future.



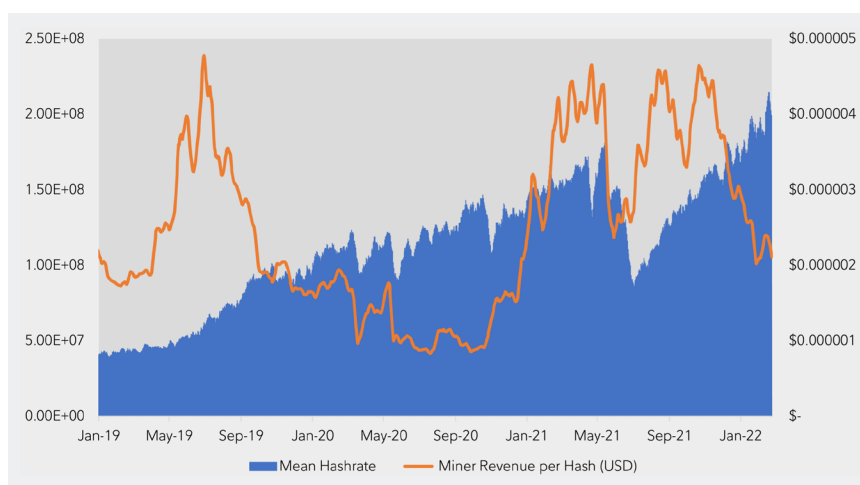
Data we are currently keeping an eye on and our commentary.

Bitcoin Mining Stats

Bitcoin's hash rate has, yet again, reached a new all-time high this month. We don't see this stopping anytime soon either as many of the large public mining operations have purchase orders still waiting to be fulfilled. This increase in hash rate, combined with a consolidating bitcoin price, does bring about questions

regarding miner profitability. The issuance rate of bitcoin follows a predetermined schedule that over the long-term operates irrespective of Bitcoin's hash rate. Therefore, an increase in miners leads to an increase in competition that can crowd out old mining rigs that operate with higher costs of electricity. This isn't necessarily an issue today, but something to watch if price were to continue to trend sideways or down and hash rate continues to rise.

BITCOIN MINING STATS

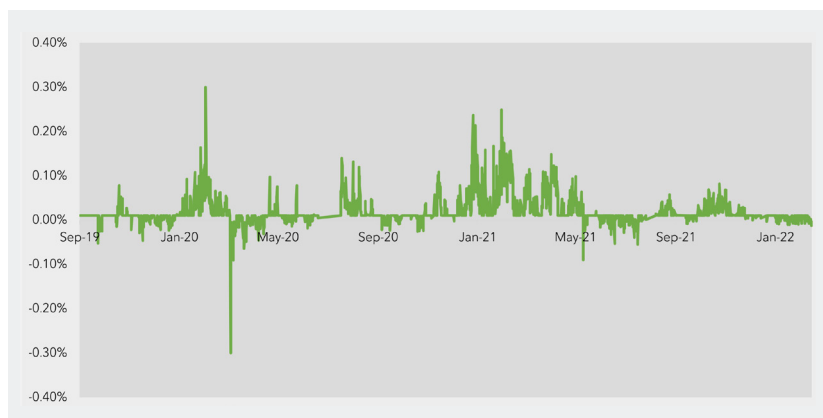


Source: Coin Metrics as of 2/23/2022.

Funding Rates

The perpetual futures market for bitcoin is extremely important to the short-term price action that the asset follows. These derivative contracts trade with an ongoing interest rate known as the funding rate, paid from one side of the contract holder to the other in order to keep the price of the future in line

FUNDING RATES



Source: Binance as of 2/23/2022.

with its underlying asset. Funding rates on their own certainly aren't indicative of where markets are headed. However, high funding rates are often seen when markets become too euphoric and historically have been associated with periods of time where price has drawn down, while low funding rates are often seen near market

bottoms when sentiment is bearish like they were this past Summer. Today, funding rates are negative across many of the most popular exchange platforms.

MVRV (Market Value to Realized Value)


Market capitalization to realized capitalization (MVRV) is a metric that is often referenced when discussing whether the majority of bitcoin is held "in profit" or not. Realized capitalization is simply calculated by multiplying each bitcoin (or fraction of bitcoin) by the price at the time in

BITCOIN MVRV (Market Cap/Realized Cap)



Source: Coin Metrics as of 2/23/2022.

which it last moved, so it is a rough proxy for aggregate "cost basis" of all bitcoin. Lower price to realized capitalization would indicate that the average bitcoin holder is less "in the money" relative to when market capitalization to realized capitalization is higher. We believe that these holders may be more willing to hold onto their bitcoin than they would have been if they purchased it at a lower price. Today, MVRV is at levels not seen since this past summer's price bottom. In recent months, MVRV has declined due to realized value remaining relatively stable while the market price of bitcoin has declined.



INSIGHTS & EDUCATION

A monthly long-form section where we provide a Fidelity Digital Assets's perspective or educational piece.

Deep Dive on Volatility

In this month's insights and education section we step away from analyzing the events and drivers of the recent volatility and delve into volatility on a more fundamental level, exploring why exactly bitcoin is so volatile and how to think about it.

Why is bitcoin so volatile?

Nearly everyone is familiar with bitcoin's volatile price swings – certainly if they own some but also because the swings make for great news headlines. But why exactly is bitcoin so volatile? What is it on a fundamental level that causes this?

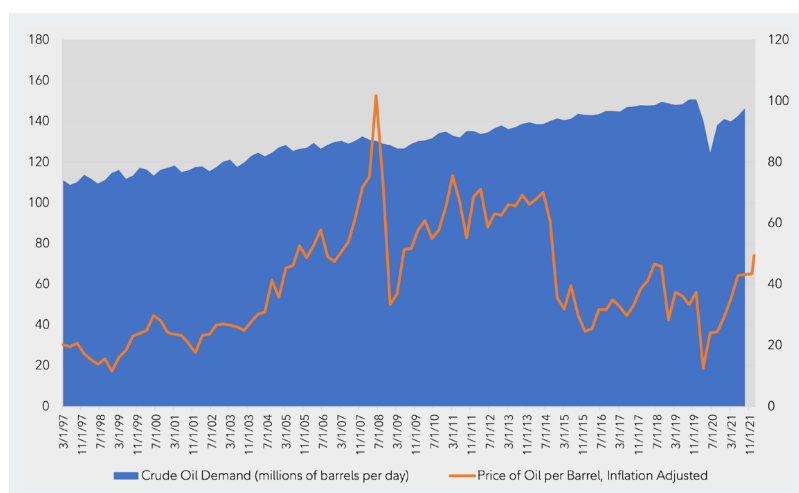
First, it is helpful to distinguish between short-term and longer-term volatility. Short-term volatility factors could include things like news flow (particularly negative news), major moves in macroeconomic indicators or conditions, and the state of bitcoin futures and leverage, all things we have discussed and analyzed in past issues of this newsletter. These are some of the same factors that drive short-term volatility for stocks and other assets as well and is therefore not as hard to comprehend.

However, the question remains: why is bitcoin also still volatile on a longer-term horizon? Why have we seen multiple months and years of bitcoin's price rising by thousands of percent, only to crash by 50% or more? Part of this answer lies in bitcoin's unique characteristic of a fixed supply and issuance schedule.

Unlike other goods, bitcoin's supply curve is fixed

Bitcoin is unique in that it is a good whose supply is completely inelastic to changes in price. In other words, supply does not (and cannot) change in response to price. Bitcoin's token issuance policy is pre-programmed. Therefore, all changes in demand for bitcoin will be reflected by changes in price. There is

CRUDE OIL DEMAND VS PRICE



Source: Bloomberg and IEA – International Energy Association as of 2/22/22.

no change in supply to dampen the effect of price moves, even over the longer-term.

An example of a different good or commodity can help illustrate this, such as oil. The world demand for crude oil has been almost always increasing, only declining for brief periods during recessions. However, the long-term price has not shown a similar pattern of only ever

increasing. In fact, the inflation adjusted price of a barrel of WTI crude oil has actually *declined* nearly 9% over the past 15 years while demand is up approximately 14% (using prices as of the end of 2021 according to Bloomberg data).

Going back to economic principles, we know that when demand increases for a good, in the short-term the price will rise. However, the higher price then incentivizes suppliers to produce more. More supply will then bring down the price. The United States witnessed this when the price of oil stayed high enough to make previously uneconomic fracking profitable, which then increased supply. In summary, if demand increases, prices may rise, high prices incentivize increasing supply, which then pushes down prices. The ability for supply to change acts as a stabilizing force on prices.

With bitcoin, supply cannot change regardless of what price does. Therefore, any change in demand, short-term as well as long-term, will have to be reflected by changes in price. This means price will therefore be more volatile.

Bitcoin's value and volatility are inexorably linked

This also illustrates a somewhat profound point about bitcoin and volatility, which bitcoin educator Parker Lewis [succinctly sums up](#) as, "Bitcoin is valuable because it has a fixed supply and it is also volatile for the same reason." In other words, one of the reasons bitcoin has value is because it has scarcity, but that scarcity comes from its fixed supply, which in turn makes it more volatile as we have explained above. *Therefore, you cannot remove bitcoin's volatility without removing the fundamental value proposition of bitcoin.*

Putting volatility in the right framework

While volatility is typically not something that is *desired* by investors, it is helpful to question whether or not it *matters* for a core investment thesis. For example, let's say an investor had the investment objective of allocating a certain percentage of capital to an asset class that preserved value *over the long-term* (say, at least ten years).

Furthermore, as a hypothetical let's say there were two very different asset class choices. The first has very low volatility but is not expected to preserve value in terms of purchasing power. The second has incredibly high volatility but is believed to possess the ability to store value. The second asset class would be the correct choice for the investor because it is the one that has the better chance of fulfilling the investment objective of preserving value over the specified time horizon. Volatility, despite being undesired, is not part of the objective and does not matter over the 10 years. What matters is whether the objective has been achieved at the end of the ten years, not necessarily achieved at all times throughout the 10-year time period.

These two asset classes illustrate the actual performance of the U.S. dollar versus bitcoin over the past 10 years. For example, \$10,000 ten years ago would have the purchasing power of only \$8,070 today as measured by the consumer price index, an erosion of over 19% of its value.

Of course, ten years ago bitcoin was trading at just over \$5 dollars, so any return calculation for bitcoin would capture some of bitcoin's most astonishing performance, albeit when it was a nascent or virtually non-existent asset class. However, looking at the past five years still shows the poor store of value proposition for the U.S. dollar compared to bitcoin:

ASSET	AMOUNT INVESTED 5 YEARS AGO	NOMINAL DOLLAR AMOUNT TODAY	INFLATION ADJUSTED AMOUNT TODAY	MAX DRAWDOWN OVER 5-YEAR PERIOD
U.S. Dollar	\$10,000	\$10,000	\$8,640	None
Bitcoin	\$10,000	\$477,031	\$412,155	-84%

Source: U.S. Bureau of Labor Statistics and Coin Metrics for the period 1/01/2017 through 1/01/2022.

The U.S. dollar is not volatile but has also not been a good store of value in terms of purchasing power, while bitcoin is considered very volatile, but has been a much better store of value over the past ten and even five years. The point is that something that has low volatility is not necessarily a good store of value in the long run, while something that has high volatility does not mean that it can't be a good store of value in the long run.

Emerging asset classes cannot avoid volatility

We know today that at an approximate \$700 billion market cap, bitcoin has reached the status of an emerging or small asset class in the eyes of many investors. We also know that bitcoin started at a market cap and value of zero. But what exactly happened in-between? How did we get from point A to B and how might bitcoin get to a larger and more established asset class?

On a macro level, the answer may appear simple: more people adopted bitcoin and purchased at ever-higher prices. But a deeper dive into the microeconomic process reveals some key insights into the role of volatility.

Investors are no doubt very familiar with how efficient the market is on a macro level and are used to seeing a price for nearly everything on their screen and the value of their holdings or portfolio. What is often forgotten is that "the market" is not a monolithic machine that is good at finding the value of securities and investments, but that it is made up of literally billions of individuals. The incorporation of new information and "the market" reflecting that information through prices is a *process*, not a static or one-time evaluation.

Markets are made up of acting individuals, and a large group of those individuals now see value in

bitcoin and have therefore acted on that belief by buying bitcoin. But that group did not all come to that belief at the same time, nor in the same way. Each individual had to go through the process of understanding bitcoin and its value proposition. Some may have purchased and held at different times, while others may have first traded it before choosing to make a long-term allocation.

Therefore, this process of individuals all coming to adopt bitcoin in different ways and timeframes necessarily must produce volatility. Volatility is a byproduct of price discovery, and there is no other way for price discovery to happen in a free market.

Gold as an emerging asset class example

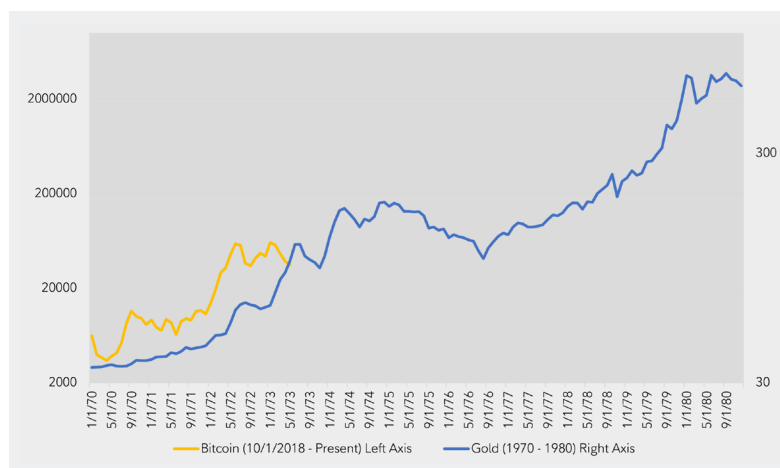
If this sounds a bit too esoteric or all theory, a relatively recent example of gold's emergence as an asset class may be helpful. Up until 1971, gold had in various forms been money or at a minimum tied or anchored to the U.S. dollar, such that there was a hard peg of gold to a certain amount of U.S. dollars.

This changed with President Nixon abandoning all linkages of the U.S. dollar to gold in 1971, removing the peg or fixed exchange rate of gold to U.S. dollars and adopting a free-floating exchange rate.

This created a market for gold where the price of gold was now set by free supply and demand forces. Investors were now confronted with the question of what was gold worth? Today, all of the world's gold is estimated to be valued at approximately \$12 trillion, a large and established asset class in the eyes of many investors.

As can be seen on the right, gold did not get to this established asset class in a consistent, easy to predict, or low volatile manner. Furthermore, it is interesting to see how bitcoin has roughly followed a similar pattern. Please note,

GOLD (1970-1980) VS. BITCOIN (PRESENT)



Source: Bloomberg as of 2/23/22.

however, that simple overlays or comparisons of charts should never be used as any kind of model or indicator. We are only emphasizing here a historical example of an emerging asset class that had very volatile periods as it went through its own price discovery process.

Historical and future volatility

As gold went through a major price discovery process in the 70's, which then resulted in amassing a larger base of investors, volatility naturally declined. We believe bitcoin could go through the same process, and in fact the

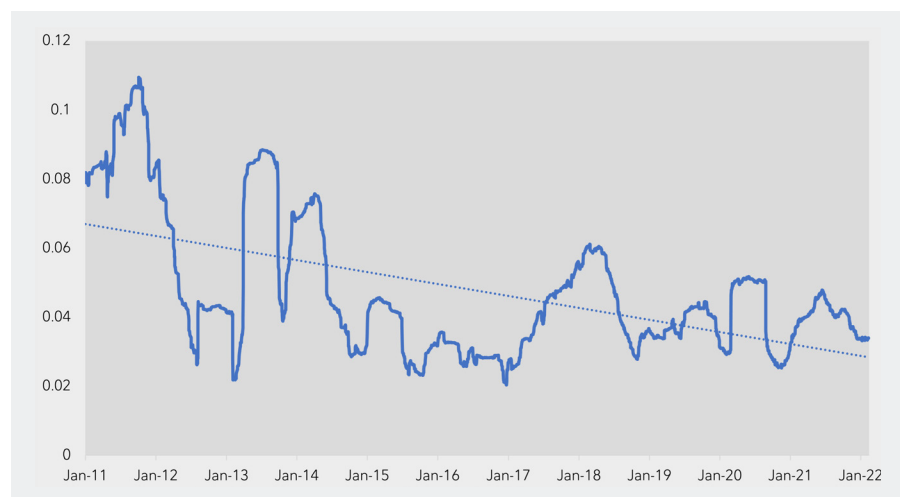
limited historical evidence we do have so far appears to be showing volatility declining over the long-term.

In conclusion, we think it is helpful in times of high volatility for investors to revisit some of the seemingly basic foundations of bitcoin's properties and why it is so volatile. Bitcoin's volatility

is also why it has value,

and although it is uncomfortable at times, the volatility is demonstrating bitcoin is going through its emergence as an asset class and therefore may be fulfilling its ultimate investment objective of preserving wealth over long time periods.

BITCOIN VOLATILITY
(Daily Returns, Calculated over 180 days)



Source: Coin Metrics as of 2/23/2022.



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