BITCOIN INVESTMENT CASE

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EXECUTIVE SUMMARY

The purpose of this paper is to provide an investment case for bitcoin. While recognising that investors have different personal circumstances and attitudes towards risk, my primary contention is that the appropriate allocation for all investors should be above zero.

The challenge to understanding bitcoin is that it doesn't fit into any existing mental models and conceptions of the modern financial system. It is also by definition, abstract and technologically complex. Notwithstanding these challenges, those who take the time to properly understand it will soon develop an appreciation for its underlying purpose, the elegance of its design and ultimately, its potential.

Bitcoin was established in 2009 in the aftermath of the 2008 GFC by its founder, a pseudoanonymous cryptographer by the name of "Satoshi Nakamoto". The reason for creating Bitcoin is made explicit within the original white paper where he argued that:

"The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust".

Enter Bitcoin - the world's first digital currency (known as a cryptocurrency) and the underlying protocol and payment network upon which the currency works. Critically, it is non-sovereign, decentralised (without any central bank or single administrator) and allows for peer-to-peer payments without the need for any intermediaries (making it "trustless").

All transactions between participants are verified by network nodes through cryptography and represent a permanent and transparent record on a public distributed ledger known as the blockchain. Approved transactions are added to the blockchain by "miners" who earn bitcoins as reward, which is how newly-minted bitcoins come into existence.

The total amount of bitcoins that will ever exist is limited to 21 million. In addition, it has a fixed monetary policy in that the amount of newly-minted bitcoins created per block verified is pre-programmed to be halved every 4 years or 210,000 blocks (known as "halving events"). From 50 bitcoins per block in 2009, it has since been halved to 25 then 12,5 and as of May 2020, 6,25 bitcoins per block. In short, the total supply is fixed and the new supply is growing at under 2% per annum. Ultimately, new supply will reach zero in 2140 when the last bitcoin is minted. At present, 90% of the total bitcoin supply limit has been created.

Within the existing financial system, central banks control monetary policy, commercial banks custody assets and payment processors facilitate consumer transactions. Bitcoin by contrast has no centralised authority, it permits intermediary-free transfers of value and allows self-custody of assets.

For these reasons, I argue that bitcoin is best understood as a store of value – a new scarce digital asset independent of the current financial system that can be conceived as "pharmaceutical-grade synthetic digital gold". In fact, it is better at being gold than gold since it

is easier to store, transport, verify and divide, as well as being censorship resistant and confiscation-proof. If gold price doubled you could guarantee an increase in supply as miners are incentivised to increase production. Not so with Bitcoin, as an increase in demand has zero impact on supply and therein lies the elegance of its design.

To that extent, the value proposition is clear. Bitcoin is digital store of value that preserves its purchasing power over time by having a limited supply and fixed monetary policy making it incapable of monetary debasement. These qualities have led some to describe it as the world's most pristine global reserve asset.

Why should investors take a position in bitcoin and more importantly, why now? In March 2020, everything changed.

Pre-Covid 19, the world was already awash with unprecedented levels of sovereign and corporate debt, high levels of debt-to-GDP, low to negative real interest rates and low to negative real bond yields. These structural problems were then amplified by governments' post-pandemic response as entire industries were shut down and central banks embraced unprecedented levels of fiscal stimulus (otherwise known as printing money). Given the actions of central bankers since 2009, there are good reasons to believe that fiscal stimulus is likely to remain for much of 2021, if not far longer. In addition, despite record levels of unemployment and a weak economic environment, equity markets remain close to historic highs.

These factors coupled with the rapid increase in money supply (up to 25% in 2020 within the United States alone), creates legitimate concerns about current and future monetary debasement.

Historically, when conditions such as those described above prevail, smart investors have sought refuge in stores of value to preserve and grow future purchasing power. Traditionally, gold used to fulfil such a role. Today, it is bitcoin. Its inbuilt scarcity and defined monetary policy stand in direct opposition to the limitless abundance of other stores of value such as the US dollar. From a bitcoin perspective, the macro economic backdrop has never been as favourable as it is right now.

Aside from the macro environment, other reasons to consider including bitcoin in one's portfolio are diverse and extensive:

- It is materially de-risked in 2021 as institutional adoption is growing rapidly – hedge funds sovereign funds, endowments, corporates, fund managers and insurance companies are increasingly adopting bitcoin on their balance sheets;

- Cryptocurrencies are here to stay and bitcoin enjoys a 70% market share;

- At $750 billion, bitcoin is bigger than Facebook, Visa and Berkshire Hathaway. The gold market is around $11 trillion by comparison;

- It has enjoyed compound annualised growth of over 200% over the past 10 years, outperformed all traditional asset classes in 10 of the last 12 years and further, has enjoyed superior absolute and risk-adjusted returns over almost all meaningful periods;

- Bitcoin infrastructure and the availability of products have shown tremendous growth and maturation across both the retail (CashApp, Paypal) and institutional (futures markets, derivatives, institutional-grade custodianship) sectors;

- It has a network effect meaning that the value of the network grows exponentially with user adoption (which is shown to be increasing); and

- It is scarce, antifragile and more resilient over time.

From a valuations perspective, it is worth noting that it follows a distinct pattern subsequent to a halving event – typically a 2-year bull market followed by a correction until the next halving. Given the amount of institutional involvement in this cycle relative to the last, it's conceivable that this current bull run will continue beyond May 2022. Technical forecasts for the coming 12-18 months range from $70,000 - $400,000, none of which ought to be overly relied upon. I do however foresee a wall of institutional money coming into the space during the second half of 2021. This will necessarily drive the price upwards as increased demand meets limited supply.

Overall, in considering the case for bitcoin relative to the risks (regulation being foremost amongst them), I believe that bitcoin offers investors a highly attractive opportunity for asymmetric returns. None of this is to say that the path clear. Volatility is necessarily the price early adopters pay for extraordinary returns. My sense however is that mainstream adoption is inevitable and I'm not inclined to bet against the march of technological progress.

"There are decades where nothing happens; and there are weeks where decades happen"

- Vladimir Lenin

Since the release of bitcoin in early 2009 and the subsequent emergence of a plethora of cryptocurrencies, investors have been faced with the confusing and often controversial decision as to whether it ought to be included in a diversified portfolio. There are innumerable reasons as to why this may be the case, ranging from its obscure origins to its early association with illicit online activities. Some remain cautious because it is new, intangible and highly volatile. Others are deterred by the technical nature of the asset. Not only are such concerns understandable, they are entirely justified considering the polarised nature of bitcoin's media coverage. Little coverage of bitcoin can be considered truly balanced. For proponents, it tends towards becoming a secular religion and for critics, it is delusional, fanciful and ultimately worthless.

As an active investor and market enthusiast of 10 years, I too found bitcoin a confusing notion to comprehend. From the outset, I was deeply sceptical. I first heard of it in 2013 when it hovered around $800 and ignored it. Later, when it crashed in 2017, I almost celebrated its demise as I was convinced that it had no intrinsic value. In 2020, as I explored various macroeconomic themes in a post-pandemic world, I became more informed and ultimately changed my mind. Looking back, I realise that my earlier dismissal of bitcoin was largely due to ignorance, rather than an honest assessment of the opportunity and electing not to participate due to the perceived risk. This brings me to this white paper and the reason for publishing it.

This white paper is intended for reasonably experienced and sophisticated investors who may have some or limited knowledge of bitcoin, and who are potentially interested in exploring it more deeply as an investment opportunity. From the outset, my goal is to provide a sound case for a non-zero bitcoin position within a diversified portfolio.

Admittedly, bitcoin is innately complex, technical and difficult to simplify without losing a degree of logical coherence. Notwithstanding, I have sought to provide a relatively broad and holistic account of bitcoin specifically in relation to its features, benefits, operating mechanisms, use cases, valuations, risks and other pertinent issues. In short, my intention is to provide a sound theoretical foundation upon which investors may seek to further analyse and investigate the investment case for bitcoin. The path to understanding bitcoin is different for everyone. For me, Parker Lewis of Unchained Capital's sentiment aligns with my experience:

"...practically everyone is unequipped to evaluate bitcoin because it does not fit any prior mental framework...To make it even more difficult, bitcoin is so abstract an application and so far from a tangible phenomenon, that it is like staring into the abyss. Bitcoin is both difficult to see and impossible to unsee once discovered".

Bitcoin has outperformed all traditional asset classes by a considerable margin in 10 of the past 12 years. Today with a market capitalisation ("market cap") of around $735 billion, it is bigger than each of Visa, Walmart, Johnson and Johnson, Berkshire Hathaway and Facebook.

From its origins as a fringe libertarian movement favoured by technologists and cryptographers, bitcoin has since steadily gained increased levels of mainstream adoption amongst both retail and institutional investors. How did this happen? As Ernest Hemingway spoke of going bankrupt, "gradually and then suddenly".

The same may be said for bitcoin in 2020 - a year characterised by historically low interest rates and unprecedented levels of sovereign debt and fiscal stimulus. Against this macro backdrop of extraordinary monetary debasement, the investment case for bitcoin has arguably never been stronger. As renowned venture capitalist Chamath Palihapitiya opined, "independent of whether or not one supports fiscal and monetary policy, an argument can be made that at least 1% of one's net worth should be invested in something completely uncorrelated to the world and how it works".

To be sure, at approximately $735 billion, the asset remains relatively insignificant, particularly in relation to the $123 trillion bond market, the $99 trillion equity market and the $10 trillion corporate real estate market. Bitcoin, often compared to gold, is still at least 22 times smaller than gold's market cap of around $11 trillion. In that sense, it has been argued that bitcoin is an emergent store of value with potential for asymmetric returns.

2020 will undoubtedly be remembered for many reasons, the least of which is the emergence of bitcoin as a recognised institutional-grade investment. For probably the first time in the history of financial markets, retail investors have been front-running Wall Street. The modern financial system is seemingly in turmoil, a state of affairs that is likely to present both hardship and opportunity in equal measures. Bitcoin may be one such opportunity.

Bitcoin was established by an individual or group of anonymous individuals known as Satoshi Nakamoto ("Satoshi") in 2009 in the wake of the Global Financial Crisis ("GFC") of 2008. Satoshi provided an alternative solution to the centralised, debt-based fiat monetary system and the moral hazard posed by quantitative easing and currency debasement. Specifically, Satoshi solved the problem of digital scarcity or the "double spend problem" (i.e. when a digital token is spent more than once) using cryptography, mathematics and blockchain technology. In doing so, the world's first scarce digital asset was created, a "cryptocurrency" known as Bitcoin.

Confusingly, "Bitcoin" (capitalised "B") refers to the decentralised peer-to-peer network, whilst "bitcoin" (small "b") is the underlying digital currency or electronic asset that can bought, sold and transferred around the world using such network. From the outset, it may be useful to consider two definitions upon which our discussion shall commence:

1) "Bitcoin refers to both a digital currency, also known as a cryptocurrency, and the protocol and payment network the currency works on."

2) "Bitcoin is a decentralized digital currency without a central bank or single administrator that can be sent from user to user on the peer-to-peer bitcoin network without the need for intermediaries. Transactions are verified by network nodes through cryptography and recorded in a public distributed ledger called a blockchain. Bitcoins are created as a reward for a process known as mining."

The Bitcoin network represents a fundamental change relative to the mechanics of the existing financial system where central banks control monetary policy, commercial banks custody assets and payment processors facilitate consumer transactions.

By contrast, within the Bitcoin network, there is no centralised authority with the ability to influence the supply as the software is written to provide that there only ever will be 21 million bitcoins. This codebase is fixed and is enforced across a decentralised network of thousands of computers around the world. With a fixed money supply and a predictable monetary policy (to be covered later), Bitcoin's value cannot be inflated away through increased supply. This is perhaps its best quality and one that makes it arguably the best form of money created to date – an innately scarce, divisible, transferable, verifiable and fungible form of money incapable of centralised debasement or confiscation. Naturally, this is what first attracted the libertarian early adopters.

Aside from its scarcity, the other differentiating feature of the Bitcoin network is its decentralised nature which allows for both self-custody of digital assets (eliminating banks) and the facilitation of swift, securely encrypted transfer of value (bitcoins) directly, peer-to-peer, across jurisdictions, eliminating the need for third party payment processors. Being decentralised, it cannot be inflated away or confiscated, because no one person, company, or government controls it.

In summary, while the current financial system is centralised (i.e. regulated by central banks) and relies on the trust of third parties (i.e. banks to custody and intermediaries to transfer value), the Bitcoin network is decentralised and "trustless" (i.e. no-one controls the network, bitcoins can be self-custodied and the transfer of value does not require an intermediary).

"Bitcoin is a technological tour de force."

– Bill Gates

As noted above, one should distinguish between the cryptocurrency (bitcoin) and the network (Bitcoin), the latter's innate features giving the former its perceived value. In providing an explanation of Bitcoin's mechanics, I have sought to find an appropriate balance between simplicity and sufficient technical insight to appreciate the robustness and significance of the network.

As a starting point, bitcoins are transferred, stored and distributed within a decentralised ledger system known as the blockchain, best understood as a collection or series of interconnected blocks. However, to understand how bitcoins are stored and transferred, it is useful to discuss each individually.

Storage

To receive and store bitcoins, you need both a public and a private key. They "keys" are long strings of numbers and letters linked together through an encryption algorithm that was used to create them. The term "public key", also commonly referred to as a "bitcoin address", is analogous to a bank account number. This is the address published to the world and to which others can send bitcoin. The private key, by contrast, is analogous to an ATM pin and must similarly be kept strictly private.

An example of a bitcoin address or public key - 1BvBMSEYstWetqTFn5Au4m4GFg7xJaNVN2

Much like your home address or bank account number may be publicly known, only you have the keys to the front door or the ATM pin. Similarly with Bitcoin, while your public address may be known (it most often is not), only you have a "private key" mathematically linked to your public address which is fixed and cannot be changed. A private key is therefore critical for both sending and receiving bitcoins.

Importantly, the bitcoin keys or addresses should not be confused with a Bitcoin wallet which is a physical or digital device that facilitates the trading of bitcoins. Those who wish to self-custody digital assets have the choice of using "cold" or "hot" wallets. The former are typically physical hardware devices and regarded as being most secure since they have no internet connectivity compared to the latter, which is typically a mobile application and therefore connected to the internet. As a point of clarification, it is worth noting that the use of the term "wallet" is in itself technically incorrect as bitcoins are not stored on a wallet but rather in a decentralised blockchain and accessed using a private key.

Transfer

As mentioned earlier, the Bitcoin network is underpinned by blockchain technology which in layman's terms can be conceived as a series of interlinked blocks. These individual blocks store collections of validated transactions, which are fully transparent and publicly accessible. The individual blocks contain transaction level data confirming that a specific number of bitcoins (or parts thereof) have been sent from one address to another. This is the network's public ledger where all approved transactions reside.

In order to send bitcoin from one address to another, a user broadcasts a transaction to validators, known as nodes, within the Bitcoin network. These nodes are volunteer computers running specialised Bitcoin software that secure the network, store copies of the blockchain and ensure that all transactions are compliant with Bitcoin's protocol. Once all nodes have received the transaction, "miners" compete to solve mathematically complex problems with the goal of adding a block to the blockchain. The successful miner picks up the approved transaction data and adds it to other approved transactions to create a chain.

The chain of mined transactions is the block which the miners add to Bitcoin's blockchain. The importance of validating nodes cannot be understated as they verify the work performed by miners, presenting checks and balances on their ability to create blocks and process transactions. The main reason for this is to ensure that Bitcoin remains decentralised since no one group has outsized power and influence.

Mining is therefore the process of adding transaction records to Bitcoin's public ledger of past verified transactions. Importantly, unlike the present financial system, transactions are verified in a distributed manner (i.e. not centralised) through a consensus mechanism. There are various ways in which a consensus mechanism can function. In the case of Bitcoin, it is known as proof of work, and functions as a constant audit to ensure that all nodes (which maintain full copies of the blockchain) are synchronised with each other and agree on which transactions are legitimate and added to the blockchain. Approved transactions are immutable, meaning that once a transaction is validated, it is stored in the blockchain and becomes an unalterable, permanent record of the transaction.

Since transactions are verified in a distributed manner, the primary purpose of mining is therefore to set the history of transactions in such a manner that it becomes computationally impractical for any single entity to modify the record. Mining is intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady.

In fact, by design the mining difficulty increases or decreases to ensure that a new bitcoin is added to supply every 10 minutes. This elegant solution is to ensure that supply remains constant, independent of bitcoin's price. Unlike gold mining where miners would necessarily find the means to increase supply if the gold price was sufficiently high, Bitcoin miners are not able to alter the supply due to the increase in mining difficulty.

For the service they provide, miners are rewarded with newly-created bitcoins (currently 6.25 bitcoins) and transaction fees per block added to the blockchain.

Aside from rewarding miners for their efforts, the process of mining itself is how bitcoins are generated and introduced into circulation. This important point will be elaborated on later when discussing Bitcoin's monetary policy, which provides that the number of newly minted bitcoins is halved approximately every 21,000 blocks or every four years.

Having considered the technical nature of the Bitcoin network and the mechanisms at work for storing and transferring bitcoins, the investment case can now be examined.

Crypto assets such as Bitcoin are an interesting phenomenon for investors to contemplate since they have potential use as both a medium of exchange (or form of money) and a store of value. Additionally, they aren't backed by a physical commodity and unlike securities, bonds and real estate, they cannot be valued using a discounted cash flow model. Bitcoins falls into a different category of goods known as monetary goods whose value is derived not from the asset's cash flow, but instead, through an appraisal of whether and how much other participants in the market value it. Adoption, rather than cash flow, is what drives value. To fully appreciate Bitcoin, Vijay Boyapati provides a compelling account of the history of money, the attributes of a good store of value and the evolution of money. The most salient aspects of his thesis are outlined below and forms the foundation of the discussion that follows.

A Brief History of Money

In early human societies, it was quickly established that bartering was inefficient as one did not always desire the goods of the person with whom you wished to trade. Collectibles such as shells, teeth and flint were introduced into the equation as they were rare and had symbolic value. These however passed hands relatively infrequently and were used more as a store of value – like an heirloom today. Over time, this created a game theoretic dilemma for early man – they needed to decide in advance what objects others would consider valuable. Critically, the sooner they could forecast what others valued, the greater their ability to accrue wealth in the short term since they could acquire it cheaply.

Over time as demand and adoption grows for the good, so does its value. This creates a feedback loop that ultimately results in a society adopting a good as a singular store of value where all participants' interests are aligned. Once such point is reached, trade and the division of labour follow.

As societies and trade routes developed, individual societies had their own stores of value that competed with others. Merchants then needed to decide whether to save the proceeds of their trade in their own store of value or that of the other party's. Through the evolution of time, in the 19th century the world ultimately converged on gold as the single store of value. This led to the single greatest explosion of trade the world had ever seen. Since stores of value compete with each other, one ought to consider what qualities a good store of value should have. We can then consider whether Bitcoin possesses these qualities.

Qualities of a Good Store of Value

A good store of value would ideally have the following attributes:

- Durable – not easily perishable/destroyed
- Portable – easy to transport and store
- Fungible – interchangeable with another of equal quantity
- Verifiable – quick and easy to identify,difficult to forge
- Divisible – easy to sub-divide
- Scarcity – probably the most important and defining attribute
- Established history – the longer it has been around, the greater its perceived value
- Censorship resistant – a new attribute particularly important in the era of surveillance and capital controls

A short assessment of these attributes in relation to Bitcoin is helpful in assessing whether it a good store of value, relative to gold or fiat currency.

Durability

- Gold is durability personified whereas the institutions that issue fiat are not. Consider all the failed nation states in history and currencies that no longer exist.
- Despite numerous prominent attacks on the network by hackers and regulation by nation states, the Bitcoin network remains remarkably resilient and antifragile.

Portability

- Bitcoin is the most portable store of value ever known as enormous sums of value can be transferred almost instantaneously around the world in minutes.
- Contrast this to fiat which is subject to regulation, capital controls and tends to be slow and expensive to move internationally. Even worse, gold bullion is costly, risky and time-consuming to transport.

Fungibility

- Gold is the standard for fungibility, since one ounce is equal to an ounce anywhere else. Likewise for fiat, assuming governments don't attempt to stamp out use of certain currency denominations.
- Bitcoins are fungible on a network level, however if used for illicit purpose, merchants or exchanges may be compelled not to accept and on that basis, bitcoins cannot be considered as fungible as gold.

Verifiability

- Both gold and fiat currency are easy enough to verify for authenticity but carry the risk of being counterfeited.
- The use of private keys means the owner of a bitcoin can publicly prove that he/she owns the bitcoin. In that sense, bitcoins are more verifiable than gold.

Divisibility

- Gold is difficult to divide into quantities small enough to make it useful for day to day trades. Fiat however is divisible into small coins which generally have little use in practice.
- Bitcoin can be divided to a hundred millionth of a bitcoin and transmitted, even in such small amounts.

Scarcity

- This is where Bitcoin is the clear winner on what ought to be considered the most important characteristic feature of a store of value. Programmatically, there are only ever going to be 21 million.
- Fiat currencies tend to be inflated over time through increases in supply, while gold is not immune to such supply increases. Although scarce, the supply of gold could rise dramatically if new methods of mining became economic (sea-floor or asteroid mining)

Established History

- Gold has, by far, the longest track record and coins minted thousands of years ago remain valuable today. The history of fiat currency is that eventually, the value is debased through supply and it cannot be trusted as a store of value in the medium or long-term.
- Despite being new, Bitcoin is showing a high likelihood that it will not disappear as a valuable asset any time soon – particularly if one considers the challenges encountered and overcome to date. Much like the internet, which is a permanent feature of the modern world, many argue that Bitcoin will be that too.

Censorship Resistance

- Bitcoin is a “permissionless”, “trustless” system that requires no human intervention. Bitcoins can be self-custodied and these qualities make them censorship-resistant and confiscation-proof.
- Contrast this to fiat currency which is held by third parties and where capital controls may prevent it from being transferred. Similarly in the case of gold where its physical nature makes it difficult to transmit distances.

In considering the qualities above, there are compelling reasons to believe that Bitcoin is a superior monetary good to gold and fiat currency. Further, given its absolute scarcity and censorship resistant quality, there are strong incentives for increased levels of Bitcoin adoption. This creates a feedback loop that ultimately leads to its use as a medium of exchange, discussed below.

As outlined in the history of money above, a pattern has emerged where money evolves in 4 stages:

Stage 1 – Collectible

Here, it is held by the possessor for its particular qualities and is not tradeable.

Stage 2 – Store of Value

Once enough people demand it, it increasingly becomes recognised as a store of value. Over time, its purchasing power increases until it is widely held and its use as a store of value plateaus as the influx of new people desiring such store of value diminishes.

Stage 3 – Medium of Exchange

Once money is established as a store of value, its purchasing power stabilises. Once stabilised the opportunity cost of using money as a medium of exchange diminishes. In other words, until such time as its value is established as a store of value, its use as a medium of exchange may require the possessor to forego the opportunity of price appreciation.

Stage 4 – Unit of Account

This is when money is widely used as a medium of exchange, priced in terms of it and merchants are willing to accept such money. Using the Bitcoin example, this would occur when coffee is priced in bitcoins.

Undoubtedly, the path from a collectible to unit of account is far from predictable, straightforward and linear. There are also plentiful nuances and complexities worth noting.

For example, although day to day trade is done in pesos, few Argentinians regard the currency as a store of value. Instead, they tend to spend in pesos and save in US dollars. This is unlike the United States ("US") where the dollar fulfils the role of a store of value, medium of exchange and unit of account.

Despite bitcoin being capable of use as a medium of exchange, it is best conceived at this point in time as a store of value, or perhaps more accurately, a potential or emergent store of value on the path to monetisation.

If one uses the framework above, it is clear that bitcoin's value has yet to be fully established. In order for it to be accepted as a medium of exchange, it needs to be widely valued, which at present, it isn't. In the process of becoming widely valued, its purchasing power will necessarily soar, creating an opportunity cost to relinquishing it for use in exchange.

Over the last 5 years alone, bitcoin's value is up over 8,000%. In the short to medium term, given the asset's propensity for price appreciation, the costs of using it today in exchange can prove to be costly. To illustrate, consider the example of a man in bitcoin's early days exchanging 10,000 bitcoins for 2 pizzas – today those pizzas cost him close to $400 million.

As Vijay Boyapati notes "...*a monetary good will only be suitable as a medium of exchange when the sum of the opportunity cost and the transactional cost of using it in exchange drops below the cost of completing a trade without it."*

Bitcoin is evidently a nascent, speculative store of value on a price discovery journey. This in part explains its extreme volatility, at least in relation to other asset classes. Volatility is a logical consequence of the price discovery process. Once its value is widely recognised and its price settles within a broad range, one can expect volatility to be dramatically reduced. For these reasons, investors should presently consider bitcoin more as a store of value rather than a medium of exchange.

Having outlined what bitcoin is, how it works and how it ought to be conceived as a store of value, it is now appropriate to discuss the main reasons investors may wish to invest in bitcoin.

Reason 1: Scarcity and the Network Effect

Scarcity

To reiterate an earlier point, the Bitcoin network is decentralised and is limited to 21 million bitcoins, each of which can be further divided into 100 million units or "Satoshis". Critically, unlike centralised authorities such as reserve banks, no centralised authority is capable of altering this inbuilt limitation. This feature of the Bitcoin protocol gives bitcoins their scarcity and potential value. The inability of any single entity to debase the value of a bitcoin is not only a feature of the technology but more importantly, its raison d'etre. For these reasons, bitcoin has been characterised as a rare digital commodity that despite having no industrial use, has a number of features of money or "potential money". These include scarcity, durability, portability, divisibility, verifiability, storability, fungibility and global recognition. Unsurprisingly, bitcoin is therefore frequently compared to gold, which in the absence of technological advancements or the discovery of significant new deposits, remains very scarce.

Since Bitcoin technology is open-source and not proprietary, other cryptocurrencies can and have been created. On the back of the retail-led digital asset boom of 2017, countless newly created cryptocurrencies came on stream. Many of the estimated 7,800 crytocurrencies share similar characteristics to bitcoin but have been optimised for different purposes such as speed or security. Naturally, this is quite unlike precious metals where both the scarcity and number of valuable commodities is relatively small – gold, silver, platinum, palladium and a perhaps a few others. Nature isn't readily creating more gold or new rare commodities. If however cryptocurrencies can be created at will, why is bitcoin more valuable than the other 7,800? The answer lies in the network effect outlined shortly.

Bitcoin Dominance Ratio

To begin, consider the "Bitcoin Dominance Ratio" – a measure of how big bitcoin's market cap is as a percentage of the entire cryptocurrency market. Being the first of its kind, it started at 100% and after a brief stint at around 40% following the flood of initial coin offerings in 2017, it has persistently represented close to 66% of the crypto asset market. As of January 2021, it has again exceeded 71% and when adjusted for liquidity, is probably closer to 90%. The first mover advantage cannot be understated as this provided bitcoin with a distinct security and trust advantage over its competitors. Cryptocurrencies are here to stay and bitcoin has been and still remains, the clear market leader.

Network Effect

Turning to the network effect, consider the analogy of a social media network such as Facebook. A group of skilled developers could easily build a better, faster or more engaging social media platform. The real challenge is not in constructing the platform, but rather in building a network based on trust and a critical mass of users. In the absence of both, a new social network would be worthless. To be valuable, you need people who attract more people who over time create an increasingly valuable self-reinforcing network.

Understandably, assets with potential network effects are difficult to evaluate, particularly at the earlier stages since their growth tends to be exponential. Many analysts were not sure how to value Facebook in 2012 and arguably, the same can be said for bitcoin today.

Much like the near impossible task of building a new Facebook, it would take a near impossible effort for a newly created cryptocurrency to surpass bitcoin as the most trusted, secure and in demand cryptocurrency. As of January 2021, there 137 million users of bitcoin and the number of unique wallet addresses are up 42% from a year ago at just under 64 million. As the network grows through increased levels of adoption, so does its market cap. Current available evidence tends to indicate towards greater bitcoin dominance, rather than less.

In summary, the number of bitcoins is fixed and this makes it a truly scarce commodity or monetary good – there is no centralised authority capable of altering either the supply of newly minted bitcoins or the total bitcoins that will ever be in circulation. In addition, bitcoin's value lies also in its network effect which is demonstrating increased levels of growth and adoption. These are amongst the reasons why investors may wish to consider including bitcoin in their portfolios.

Reason 2 – Antifragility and the Lindy Effect

Antifragility and Lindy Effect Described

The Lindy Effect, famously described in Nassim Nicholas Taleb's "Antifragile: Things That Gain from Disorder", is a phenomenon that has frequently been used to describe the antifragile nature of the Bitcoin network. Whilst interesting, the origins of the Lindy Effect are not as important as the overarching principle that can be extracted, namely: the future life expectancy of a non-perishable thing, such as a business or technology, is proportional to its current age. Put differently, the mortality of technology typically decreases the longer it survives.

Antifragile is therefore the notion that disruption, discord, stress and exogenous shocks have a tendency to strengthen and reinforce rather than weaken and disintegrate. Over the past 12 years since inception, Bitcoin has repeatedly demonstrated such qualities on the back of persistent and repeated challenges, threats and shocks that have all served to reinforce the strength of the network.

In 2009, bitcoin was an aspirational long-shot one event away from complete and utter collapse. Today, with a market capitalisation of around $750 billion and 24-hour settlement volume of $11.6 billion, the network is undoubtedly more robust and stronger than ever. How it reached this point is worth exploring further.

How is Bitcoin Antifragile?

Bitcoin is natively digital and decentralised. It exists across a broad network and is relied upon by millions of people despite being controlled by no-one. Without a single point of failure, Bitcoin is impossible to control as it is dynamic, adaptive and constantly evolving. Increased levels of adoption lead to greater decentralisation which results in a more robust network.

Each time external forces attempt to influence the network or individuals make errors within the network, Bitcoin becomes stronger. As the network survives shocks and learns from its errors, much like an immune system, it becomes stronger. Each shock provides learnings that cause Bitcoin to adapt in spontaneous ways, a feature unique to decentralised systems.

As the Bitcoin network becomes increasingly decentralised as a function of time and adoption, each individual error becomes less critical to the proper operation of the network as a whole. Weak points are eliminated and the system strengthens on aggregate. Rather than eliminating threats, the system uses them as an opportunity to learn, adapt and immunise against such threats in the future.

In aggregate, as a currency and as an economic system, Bitcoin benefits from disorder, volatility, stressors and randomness. Each time commentators have forecast the demise of Bitcoin due to some shock, it has emerged stronger each time.

It has been suggested that what doesn't kill the legacy monetary system makes it weaker. In the case of Bitcoin, what doesn't kill it seems to make it stronger.

Examples of Challenges, Threats and Attacks that Bitcoin has Overcome

Reputational Attacks – Exchange Hacks

*I*n 2014 the world's largest cryptocurrency exchange at the time, Mt Gox, was hacked resulting in a loss of 744,000 bitcoins. While not a direct attack on the network itself, this reputational hit resulted in countless forecasts predicting the demise of cryptocurrencies. Notwithstanding this episode and other high-profile exchanges being hacked (not to be confused with the Bitcoin network being hacked), Bitcoin survived.

Bitcoin Forks & Competing Cryptocurrencies

Then in 2017, the Bitcoin community underwent an existential crisis of sorts. Without delving excessively into the technicalities, the disagreement related to the block size in the blockchain, and resulting transaction speeds and fees. Some construed the Bitcoin vision as one of a medium of exchange, rather than a store of value. This led to a so-called "hard fork" – the creation of a separate blockchain optimised for speed. Most pertinently, this resulted in the creation of Bitcoin Cash. At the time, investors were rightly concerned that this threatened bitcoin's market dominance and could result in a highly fragmented and diluted asset class. Largely on the back of security concerns, Bitcoin Cash has never quite taken off and with a market capitalisation of $8.4 billion, it represents less than 1,5% the size of bitcoin.

Of the estimated 7,800 cryptocurrencies in existence, bitcoin has a market share of approximately 70%. It is not only capable of withstanding competition, it beats it comprehensively. Despite repeated attempts to bring different coins to market with perceived advantages and use cases, Bitcoin has continued to accumulate the vast share of human and financial capital in the cryptocurrencies space.

Government Bans

Since inception, various governments have made failed attempts to ban or otherwise restrict bitcoin's use. To demonstrate the point, I'll focus only on 2 of the world's most populous countries with a combined population of 2.7 billion, India and China.

In India, the central bank took action to prevent banks from servicing bitcoins and cryptocurrency-related companies. Not only was this ultimately overturned by the Indian Supreme Court in 2020, but more importantly, people continued to access and use bitcoin. In China, the government imposed regulations that banned cryptocurrency exchanges. Again, this has not prevented its citizens from using and mining it. In both cases, the network has continued to operate without interruption.

When these sorts of restrictions are imposed, more stable jurisdictions such as the US enjoy increased levels of investment into bitcoin mining operations, not to mention the investment in companies supporting the cryptocurrency ecosystem.

Government bans and the risk posed to bitcoin will be discussed in greater detail later, save to say at this juncture that in all instances, it has simply served to make the network more decentralised and resilient.

Reason 3 - Ideal Macro Environment

Post-GFC – High Levels of Debt, Low Interest Rates and Negative Bond Yields

As highlighted from the outset, Bitcoin was first conceived in the aftermath of the 2008 GFC banking crisis, a global recession characterised by widespread banking failures, bailouts and perhaps more importantly, the global adoption of quantitative easing ("QE") as a central bank policy tool. Quite correctly, QE is popularly referred to as "printing money" as central banks create new money to buy government bonds and in some cases (such as Switzerland), securities. This goes to the heart as to why Satoshi created Bitcoin in the first place:

"The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust".

Rather than being considered an event, the GFC is best understood as a process that took years to unfold, leading to the structural problems in the current financial system. In the aftermath of 2008, US budget deficits continued to rise and QE didn't end until late 2014. At the same time across the Atlantic, Europe experienced its own sovereign debt crisis which saw countries like Greece, Portugal, Spain and Ireland face the possibility of debt defaults, bringing into question the viability of the euro. Across the Western world in particular, debt levels continued to rise.

It would be far to say that the post-GFC world was characterised by record low interest rates, negative (nominal and real) sovereign bond yields and high levels of sovereign debt. However, it took a health crisis in March 2020 for these structural issues to be amplified and thrust into mainstream consciousness.

Covid-19 and the Response

In the wake of the Covid-19 pandemic, governments around the world took the extraordinary decision to effectively shut down their economies. Overnight, entire industries were eviscerated – from leisure and travel to fast food and services. As a result, we witnessed a major deleveraging event within capital markets, resulting in the collapse of most asset classes. In response, central banks and governments around the world took unprecedented fiscal and monetary actions in an attempt to mitigate the effects of the shutdown. These actions have resulted in conditions that have provided the perfect macro case for bitcoin.

Despite focusing on the US, the discussion below and patterns revealed are arguably similar to that witnessed across most of the world (save for China).

Increased Sovereign Debt and Debt-to-GDP

In 1980, US debt-to-GDP was just under 35%. Between 1994 and 2007, it hovered around 60% until the GFC at which point it ballooned to 95% by 2012.

Following enormous fiscal stimulus by the Federal Reserve Board ("Fed") including the $3 trillion CARES Act in 2020, by January 2021 the US' national debt had reached $27 trillion or 136% debt-to-GDP. Historically, countries that exceed 130% debt-to-GDP have been unable to service their debt without defaulting or experiencing currency debasement.

The charts hereunder illustrate the gradual increase of the US' debt-to-GDP since the early 1980's (Figure 1) and increase in sovereign debt since 2008 (Figure 2), both showing a sharp spike in 2020.

Figure 1

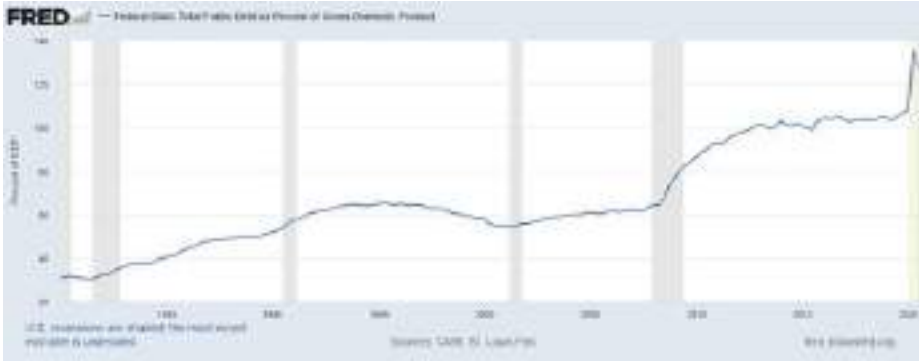
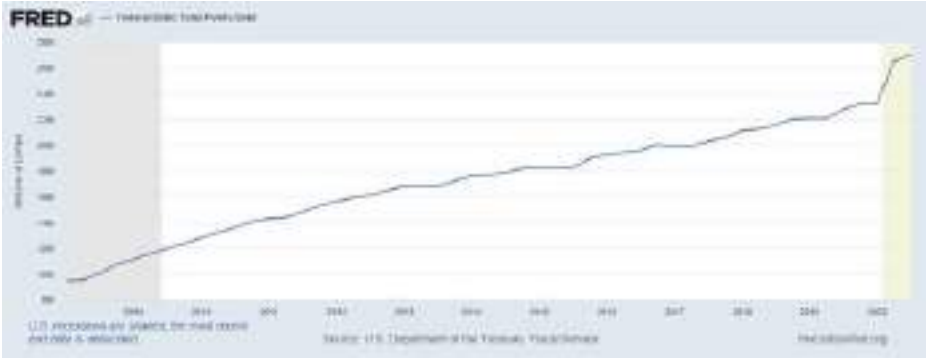


Figure 2



Increased Levels of Money Supply

"M2 Money Supply", is a common measure of the amount of currency in circulation. Generally, M2 growth has surpassed 10% in times of crisis when expansionary monetary policy was deployed by the central bank to repurchase assets such as sovereign bonds. In 2020 alone, the Fed increased M2 by close to 25%. Put differently, almost a quarter of dollars in circulation were printed in 2020. In 2020, Fed Chairman Jerome Powell stated that:

"We're not out of ammunition by a long shot…there's really no limit to what we can do with these lending programs that we have".

The apparent limitless abundance and growing supply of fiat currency stands in stark contrast to the inherent scarcity of alternatives like bitcoin or gold. To illustrate the vast injection of money supply into the system, consider the chart below (Figure 3) and the likelihood that fiscal stimulus is likely to continue into 2021 as the effects of Covid-19 appear set to linger for some time.

Increased Budget Deficits and Declining GDP

Much like most of the developed world, it's been almost two decades since the US last experienced a budget surplus. As the graph below (Figure 4) illustrates, the GFC-era deficits appear trivial in comparison to the $3.2 trillion deficit of 2020. It's quite conceivable that this trend will continue or even accelerate into 2021.

While the obvious way to reduce the deficit is to increase taxes and reduce spending, it isn't clear that either will be palatable in the current climate without significant economic and social costs. While it is challenging to reduce a deficit during prosperous times, it becomes exponentially more so in a declining economic environment. In real terms, few nations have emerged from 2020 with positive growth (see Figure 5).

The longer budget deficits such as this persist, the stronger the argument can be made for the long-term debasement of the US dollar and preference for alternatives stores of value such as bitcoin.

Figure 3

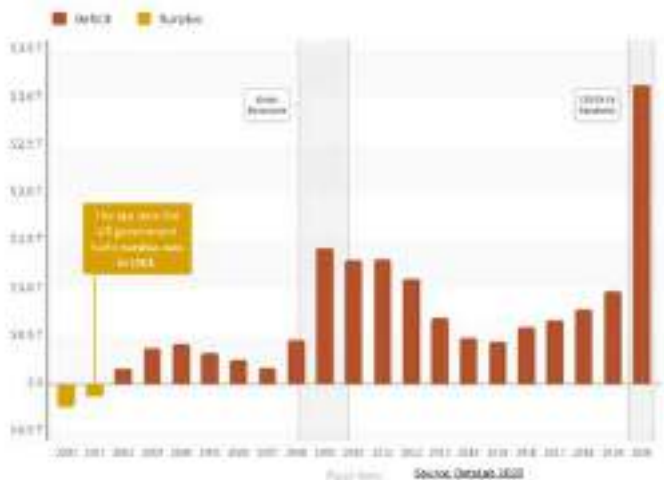


Figure 4

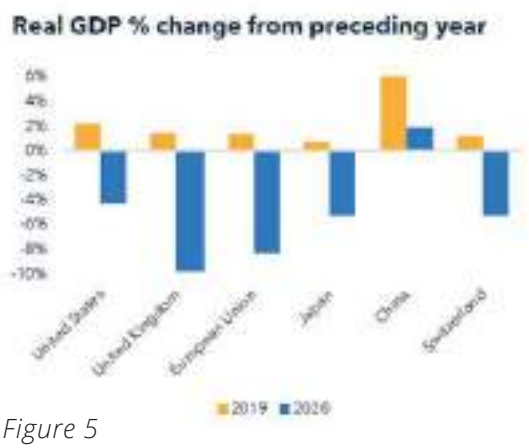


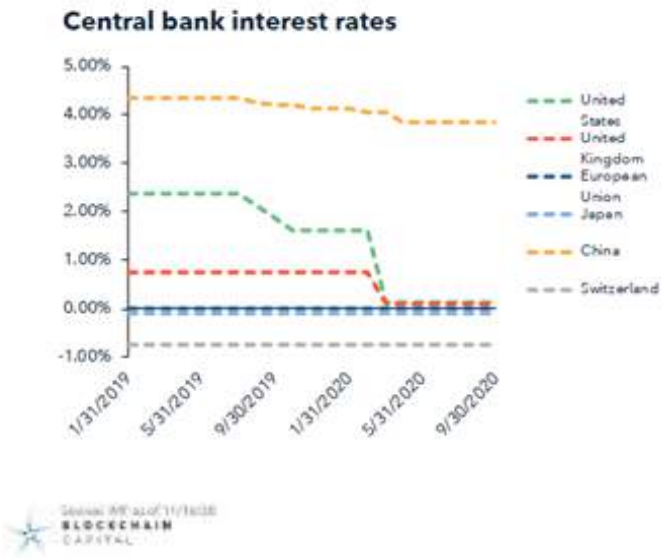
Figure 5

Record Low Interest Rates and Negative Yielding Bonds

Interest rates have traditionally been one of the levers available to central banks to drive economic growth. It would appear however that for the most part, central banks are "out of bullets" in the current low interest environment. Interest rate levels today were last seen during World War 2 when debt-to-GDP exceeded 100%. From its all-time high of 15.8% in 1981, they have been on a steady decline and in many developed countries are in negative territory in nominal and real terms.

Naturally, this has resulted in fiat currency and most sovereign bonds becoming an increasingly less attractive investment over time, particularly since they offer returns below the official annual price inflation. Aside from providing a disincentive to save, this sort of environment starts to shatter some of the illusions people have about money, particularly when they are asked to pay for the privilege of having their money in the bank. Inevitably investors in search of yield shun cash and bonds in favour of equities (explaining at least in part the recent historically high valuations) and hard assets such as bitcoin and gold. The charts (Figure 6 adjacent and and Figure 7 below) serve to illustrate this point.

Figure 6



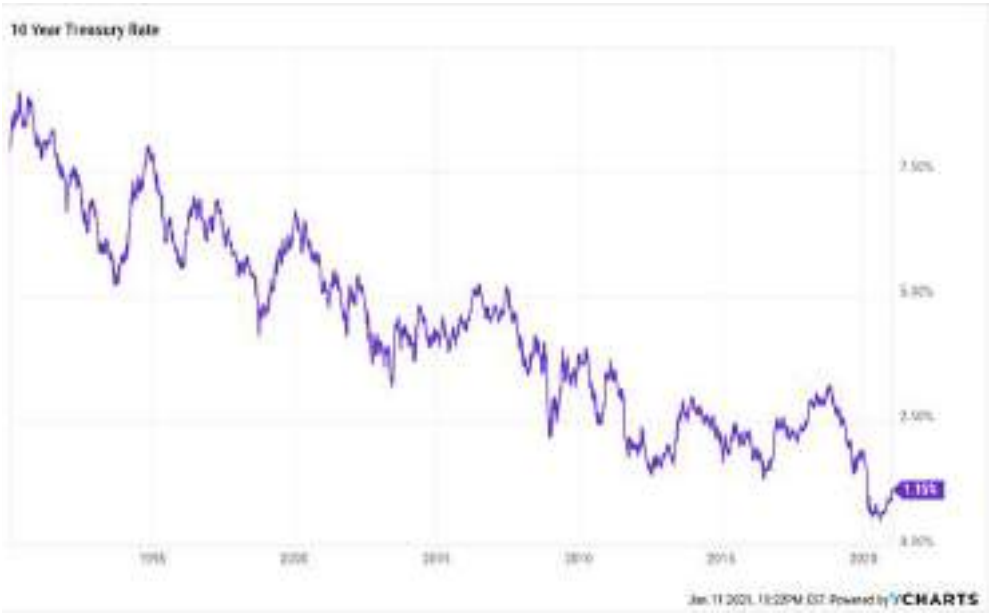


Figure 7

Record-Level Equity Markets

After the initial sell-off in March 2020, equity markets shocked analysts by not only regaining prior losses, but quickly reaching new highs. This was at a time when unemployment hit record highs across the US. Never before has the bifurcation between Main Street and Wall Street been so pronounced as ordinary people found themselves unable to work and reliant on government stimulus. Despite this, the equity markets roared.

Looking at the price-to-earnings ratio ("PE Ratio") for the S&P 500, it has risen by 40% in just over a year from 21.75 to 31.24. As further evidence of the speculative froth characterising 2020 equity markets, consider the following PE Ratios of a handful of companies that benefited strongly from Covid-19 induced lockdowns.

As of January 2021:

- Tesla – 1,767
- Amazon – 93
- Netflix – 82

Even if one uses the CAPE Ratio (Cyclically Adjusted Price-Earnings Ratio), at 34.77, the US stock market is currently at historically high valuations.

These signals tend to indicate that equity markets are potentially trading at inflated levels and that a market correction may be a possibility in the short to medium term.

Given that there is potentially more downside rather than upside baked into the equity market, investors may be willing to consider a position in an uncorrelated, inflation-hedge such as bitcoin.

Bretton Woods 2 and the Use of Central Bank Digital Currencies (CBDC's)

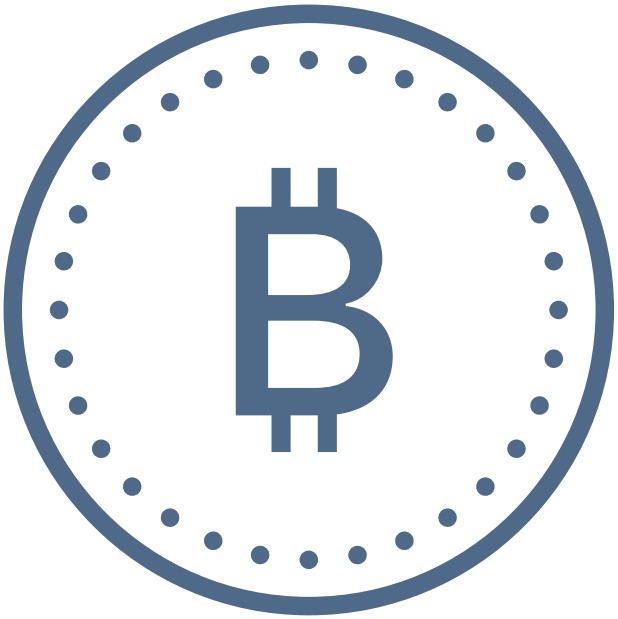
Initially, we need to briefly outline the context of "Bretton Woods 1". In the aftermath of World War 2, delegates from 44 countries met in Bretton Woods, New Hampshire to create an efficient foreign exchange system that promoted economic growth and prevented competitive devaluations. In addition to creating the IMF and the World Bank, an international settlement system was established to facilitate cross-border payments. The US dollar was established as the global reserve currency and it was pegged to gold. In the early 70's, President Nixon elected to temporarily suspend dollar's convertibility into gold. This turned out to be permanent and formed the basis of the current fiat monetary system.

In 2020, the Covid-19 pandemic and economic devastation that followed resulted in calls from the IMF for a "new Bretton Woods moment". Global macro investors such as Ray Dalio signalled in 2018 that the end of a long-term debt cycle was near, although few could have predicted the manner in which it would occur. Against a backdrop of over-leveraged economies, Dalio highlights the threats posed to the US dollar as the global reserve currency. One of the more interesting threats to dollar hegemony emerging, this time from the IMF, is reference to CBDC's.

2020 was what you could call a "soft launch" of universal basic income. Around the world, varying quantities of so-called "helicopter money" were given to both individuals and businesses upon meeting certain perquisites. In most cases, federal governments were slow to respond, often resulting in social unrest. Part of the inertia and lack of pace is because such payments needed to go through the legacy banking system. CBDC's aim to eradicate that problem by enabling direct payments to the individual, straight from the central bank, using blockchain technology. Aside from providing cheap and speedy transfers both inside and outside of international borders (by avoiding the SWIFT system), these payments would serve to directly stimulate specified sectors, businesses or individuals within the economy. This will undoubtedly disrupt the legacy banking system, be an innovative way to collect taxes and provide differential incentives to market participants (higher interest rates for small businesses, negative rates for large savers).

Although far from clear, it has been suggested that the outcome of a "Bretton Woods 2" could be the adoption of a global CBDC comprised of a basket of global currencies, weighted by market cap (i.e. 50% US dollar, 17% Euro etc). While the benefits of CBDC's are clear, an argument can be made that they will only further serve to reinforce the case for bitcoin.

While CBDC's will be centralised and limitless in supply, bitcoins are inherently scarce and decentralised. CBDC's may result in greater adoption of digital wallets, but it will come at the expense of privacy. In addition, CBDC tokens will be capable of confiscation, debasement or having penalties imposed upon them for breach of conditions attached to them. Whatever the outcome of Bretton Woods 2, it is likely to be positive for bitcoin in the long-run.



Summary of the Ideal Macro Backdrop

Across most of the world, we are currently living through a time of extraordinary levels of debt, debt-to-GDP, money supply and budget deficits.

Many economies around the world are contracting at time when interest rates are at record lows and the effects of the Covid-19 pandemic are likely to linger for some time. Savers have little incentive to save (due to negative real interest rates) and bonds offer little in the way of an inflation-hedge as some 30% of investment-grade sovereign bonds are in negative territory. Many are now questioning the continued viability of the traditional 60-40 portfolio allocation.

To further complicate the matter, many equity markets are experiencing record highs, suggesting that a correction is a real possibility in the short to medium term. All of this has occurred at time when geopolitical tensions remain high and potential shifts in power are increasingly likely.

Viewed individually and in conjunction with one another, these factors provide a strong macro case for a bitcoin position since the asset is sovereign and scarce, incapable of monetary debasement or confiscation, and the alternatives (cash, bonds, equities and to an extent, real estate) are either potentially capital depleting or inappropriately priced.

Reason 4 - Bitcoin's Trusted Monetary Policy and the "Halving Cycle"

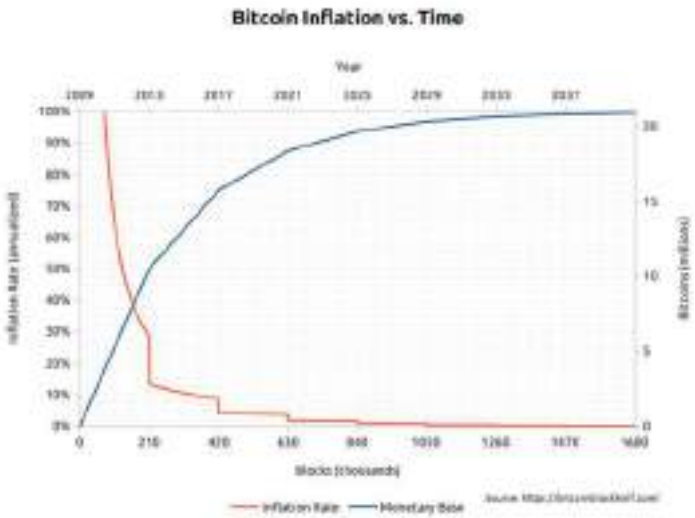
Bitcoin is a Manifestation of Untainted Supply and Demand Dynamics

As described earlier, new bitcoins are created every 10 minutes or so from "miners" who verify a new block of transactions and add it to the blockchain. However, the elegance of the Bitcoin network and underlying incentive structure is that the amount of new coins created per new block decreases over time.

In fact, the protocol is designed for the block reward to be halved every 4 years or 210,000 blocks. From 50 coins per new block in 2009, it reduced to 25 in November 2012, 12.5 in July 2016 and in May 2020, was reduced further to 6.25 coins. Now that the halving has passed, bitcoin's annual issuance rate stands at 1.81%, bringing it to parity with gold and building on the store of value narrative.

As of January 2021, approximately 18.6 million (89%) of the hard cap 21 million supply limit has been mined. In the graph below (Figure 8), note the inverse correlation between the monetary base and new supply. In the long run, this lends credibility to the claim that bitcoin will retain its purchasing power.

Figure 8



Historically, bitcoin has tended to perform well in the 12-24 months following a halving event as increased demand and reduced levels of supply result in the price being pushed up. During this period, speculators of course get involved which ultimately leads to the price correcting and stabilising around a trading range until the next halving cycle. As long as demand and adoption increases, halving cycles are likely to be followed by bull runs. This pattern is reflected in the chart (Figure 9) below.

Bitcoin's price and the response to halving events is a simple reflection of supply and demand. Bitcoin has a fixed supply and the number of new bitcoins coming on stream is predetermined and unalterable. When critics argue that bitcoin is "backed by nothing", the appropriate response is that it is back by the credibility and stability of its monetary policy. On that basis, if it does ultimately progress from a store of value to a medium of exchange, it will unquestionably be the hardest and best form of money ever known.

There are 3 other factors worth noting at this point, which are relevant to supply.

1) All-Time Highs of "Hodling"

"Hodling" is the term used by the crypto investment community to describe an investor who buys and holds a digital asset, irrespective of price. The term originates from an early online forum and a misspelling of the word "holding". Most relevant for current purposes, recent data suggests that 61% of bitcoins have not moved in over a year. 44% haven't moved for more than 2 years. These all-time highs are indicators that there are additional supply constraints to the inbuilt limitations of the creation of new bitcoins, as described above.

2) Increased Adoption by Millenials

Millenials have been and remain the biggest retail driver of demand for bitcoin. In some countries, up to a third of millenials own cryptocurrency and research suggests that this will increase to 50% of adults aged 44 and lower by 2024. Part of the reason is no doubt their experience of the current economic climate which they tend to view as being one characterised by high levels of debt, depreciative currencies and unaffordable housing.

Millenials are however more financially aware than other generations and have a preference for with all things digital. As demographics and spending power shifts away from the baby boomers to the millenials, it appears reasonable to conclude that demand for digital assets such as bitcoin will continue to grow.

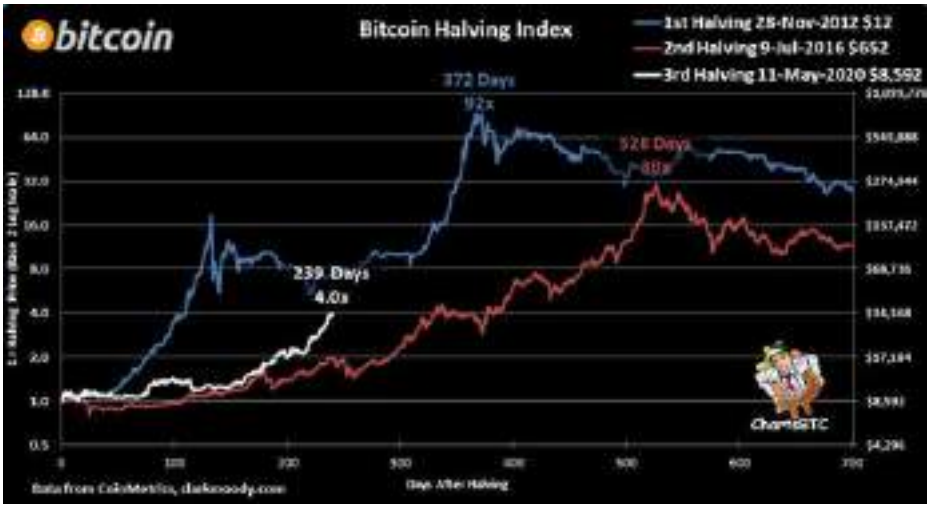


Figure 9

3) New Supply Gobbled by Institutions

One of the trends of 2020, outlined in greater detail later, was the increased levels of institutional adoption of bitcoin. Various data points suggest that up to 1500% of new bitcoin daily supply is being purchased by PayPal, the Cash App and other institutional investors.

This pattern appears to be accelerating, suggesting continued supply constraints in the foreseeable future.

Criticism of the 21 million Hard Cap

Critics often say that the 21 million hard cap is artificial and can be easily altered by consensus. While this theoretically true, the risk remains infinitesimal for a few reasons.

The first is that the incentives of the network are such that all participants have an incentive to maintain the 21 million limit including miners, validating nodes and investors. Miners of course have the strongest motivation to increase the limit of bitcoins since it would temporarily increase revenue, however in the long run, it would destroy the value of bitcoin and eliminate their revenue in fiat terms.

The second is Bitcoin's distributed governance, which means that it isn't the miners who control the network or its rules. Instead, it is the tens of thousands of independent nodes. This was demonstrated in 2017 when 95% of miners agreed to increase the block size to allow Bitcoin to scale, however this was rejected by the nodes and users.

This demonstrates that even if there is strong pressure to alter the rules, the network participants tend to reject it as they all stand to benefit more by maintaining the status quo.

Summary

The Bitcoin network and the halving cycle provide a predictable and trusted monetary policy where the value of bitcoins cannot be debased.

Together with all-time highs of "hodling", increased levels of millennial adoption and institutional buying, these supply and demand factors provide strong indicators that bitcoin will retain and grow in value in the coming years.

Reason 5 - Increased Recognition and Adoption Amongst influential and Institutional Investors

Bitcoin has been and will likely continue to be a controversial investment decision for the institutional investment community. To be sure, there is no shortage of detractors, perhaps most famous being Warren Buffet who called it "rat poison squared". One could argue that in midst of the 2017 retail-led mania, institutional investors were well-advised to remain on the fence. At the time, there were significant risks, the least of which was the "hard fork" discussed earlier.

This time is however demonstrably different as the asset class appears to have been materially de-risked within an ideal macroeconomic environment.

During 2020, we saw a host of highly-regarded and influential institutional investors invest in Bitcoin to varying degrees. Naturally, this has injected confidence into the asset and perhaps, created an opening for other institutions to follow suite. The discussion below represents a sample of the investors who took bitcoin positions in 2020.

Stanley Druckenmiller

Stanley Druckenmiller is a famed billionaire hedge fund manager and macro investor who until 2000, worked for George Soros.

Known for taking sizeable positions based on central banks and liquidity movements, he and Soros famously shorted the British pound in 1992 with great success.

In a 2020 interview with CNBC, he cited inflation as a significant risk in the coming 5 years on the back of the fiscal stimulus. As a result, inflation hedges such as gold would do well. He went further to suggest that "if the gold bet works, then Bitcoin will work better because it is thinner and has more beta to it as it continues to gain ground amongst millenials and west coast money."

Former Goldman Sachs hedge fund manager and global macro investor Raoul Pal has suggested that the significance of the world's greatest and most respected money manager being long bitcoin cannot be overstated:

"…this effectively removes any obstacle for any hedge fund or endowment to invest"

Paul Tudor Jones

Paul Tudor Jones is a highly influential billionaire hedge fund manager and macro investor who is known for his positions on interest rates and currencies.

In a 2020 letter to shareholders, he describes 2020 as the year of the Great Monetary Inflation ("GMI") – an expansion of every form of money unlike anything the developed world has ever seen. He notes that even prior to the pandemic, global debt was at elevated levels and the response since the initial shock in March 2020 has been asset price reflation.

Against this backdrop, he considers the range of investments that tend to perform well in response to massive increases in global money. In searching for a store of value, namely anything that holds purchasing power into the future, he considers gold, fiat and financial assets (such as equities) and bitcoin.

IUsing purchasing power, trustworthiness, liquidity and portability as the key criteria, he and his team assigned a weighting to each.

Recognising the increased levels of adoption and the digitisation of currencies and wallets, his view is that relative to the alternatives, bitcoin is significantly undervalued.

He sees bitcoin as an opportunity to defend oneself against the GMI and likens it to gold in 1976. Given his current conviction levels, he recommends a single digit exposure.

Bill Miller

Legendary Wall Street investor, Bill Miller of Miller Value Partners, has a track record of consistently outperforming the market. In 2020, he identified bitcoin a "strong buy at current prices" as a hedge against inflation, suggesting that the market was "underestimating the risks of inflation". In a recent letter to investors, he indicated that:

"*Warren Buffet may be right in that Bitcoin is rat poison, and the rat may be cash".*

His view is that every major bank, investment bank and high net worth firm is going to eventually have some exposure to bitcoin or what's like it, which is gold or some kind of commodity as his base case is for inflation to return due to the Fed's fiscal stimulus. In an interview with CNBC, he summed up his position:

"*The Bitcoin story is very easy, it's supply and demand, Bitcoin's supply is growing at around 2.5% a year, and the demand is growing faster than that and there's going to be a fixed number of them.*"

Using similar reason to Paul Tudor Jones, he went further:

"Back in the '70s and early '80s, people were talking about putting 5% of your assets in gold because it's a hedge. It's an insurance policy in case inflation comes back again as it did in the 1970s. I would say that if that's a sensible thing to do, then, certainly to have 1 to 2% of your assets in Bitcoin makes great sense here."

JP Morgan

In 2017, Jamie Dimon, CEO of JP Morgan, famously declared bitcoin to be a fraud that governments would eventually crush.

In 2020, the bank's position appears somewhat different as it approved 2 cryptocurrency exchange's accounts (Coinbase and Gemini) and also launched its own cryptocurrency pegged to the US dollar. In a recent report, the bank recognised the institutional demand for bitcoin and suggested that young retail investors as well as institutional investors were moving out of gold exchange traded funds ("ETFs") into the cryptocurrency.

Despite remaining sceptical, the bank has its own digital treasury services and blockchain division that have made some very bullish pronouncements on the potential bitcoin price in the coming years. Most recently, JP Morgan issued a price target of a $146,000 bitcoin for 2021 on the back of growing institutional demand at the expense of gold.

Whilst it would be a stretch to consider JP Morgan a Bitcoin bull,the bank is evidently slowly softening its stance towards recognising bitcoin as an alternative store of value to gold.

Blackrock

With over $7.8 trillion assets under management, Blackrock is the world's largest asset manager. In 2017, CEO Larry Fink referred to bitcoin as 'an index of money laundering". Today, the firm seems to have shifted its view.

In late 2020, it suggested that bitcoin was "here to stay" and something they were keeping a very close eye on as it had clearly captured the attention of millenials.

In an interview with CNBC, Chief Investment Officer, Rick Rieder, suggested that the cryptocurrency could take the place of gold as it was much more functional and easier to track. In addition, he also noted that bitcoin could threaten the US dollar's status in international markets making it less relevant.

Put differently, bitcoin could change the need for international holders of dollar-assets to hold the US dollar as a reserve currency.

Despite providing recognition to bitcoin's potential value, the firm remains cautious as it still regards it as untested and a thin, small market relative to others.

CitiBank

In 2020, CitiBank managing director Tom Fitzpatrick made some very bullish pronouncements in a report about bitcoin, heralding it "21st century gold". Monetary inflation and devaluation of the US dollar form the basis of his thesis. He compares bitcoin to gold in the 1970's when the US broke ties between the dollar and gold. He argues that in the midst of the Covid-19 crisis, governments have implemented monetary and fiscal measures that have created an environment very similar to that of the 1970's.

Furthermore, governments have seemingly committed to continue with the unprecedented money printing until such time as economic indicators improve.

The former forex analyst went further and provided an enormously bullish price target for 2021 based on an analysis of the bitcoin bull and bear cycles post-2011.

He expects bitcoin to reach $318,000 by December 2021. While recognising that traditional investors may find this price target exaggerated, his view is that it is justified based on the technical analysis and paradigm shift underway in the global currency market.

Mass Mutual

In 2020, a life insurance company, Massachusets Mutual Life Insurance Co, bought $100m of bitcoin for its general investment account. In addition, the company also acquired a minority stake in a digital asset custodian called NYDIG, formerly known as the New York Digital Investment Group for $5m.

These investments, although small relative to their investment account of $235 billion, were the first of their kind – a 169 year-old insurance giant taking a position in a digital asset. Commenting on the investments, the company indicated that their positions were based on a taking advantage of new opportunities in an increasingly digital world while remaining diversified.

Of all the institutional moves in 2020, some have argued that this was perhaps the most significant and could represent a watershed moment.As recently as a year ago, few would have contemplated the real possibility of a 169-year old insurance company taking a long bitcoin position.

MicroStrategy Incorporated

In 2020, a Nasdaq-listed business intelligence firm, headed by founder and CEO Michael Saylor, took a bold and controversial decision in relation to the company's $500 million in treasury reserves.

Describing it as a $500 million melting ice cube, he and his board considered a range of options that included returning funds to the shareholders, buying back shares or purchasing equities, real estate, gold or other assets.

As an MIT graduate with a deep technological background, Saylor ultimately chose bitcoin as he saw it akin to buying Amazon or Apple in 2012.

Bitcoin, as he saw it, was the digitally dominant monetary network, much like Google is the dominant search engine or Facebook the dominant social media platform.

The company started buying bitcoins in August 2020 and ultimately bought $500m worth. Not satisfied with the position, the company became even more bullish later in the year when it decided to take a leveraged bitcoin position. The company held a $650 million convertible senior note sale in early December to raise funds to acquire more bitcoins.

Undoubtedly, this has drawn much criticism as commentators have rightly asked the question whether the company has shifted away from business intelligence software to funds management. Presently, the company's bitcoin holdings are estimated to be $2.8 billion.

Interestingly, as recently as 8 January 2021, Morgan Stanley filed a note with the Securities and Exchange Commission ("SEC") that it had acquired a 10.9% share of MicroStrategy – a signal that the bank is potentially looking to gain exposure to bitcoin whilst mitigating some of the downside risk.

At the time of writing, MicroStrategy is set to host a seminar for over a thousand corporate treasurers and CEO's where it will share its "playbook" on how to convert corporate treasury reserves into bitcoin. The extent to which others will follow suite remains to be seen, but indicators suggest that there is more to come.

Controversial or not, the share price has enjoyed significant gains since August 2020 from a price of approximately $120 a share up to around $530 as of January 2021.

Other Noteworthy Institutional Participants in Bitcoin

Chamath Palihapitiya

The billionaire technology entrepreneur, former Facebook executive and CEO of Social Capital famously bought a million bitcoins in 2013 for around $120 apiece. His principal use case has always been as a hedge against the existing financial system and its associated fiscal and monetary policies – a form of "schmuck insurance" as he bluntly put it.

Put differently, his view is simply that it makes sense to have 1% of his net worth invested in an asset that is entirely uncorrelated to the current mechanisms of the financial system. Lately, he has been more vocal about his support for bitcoin, recognising that it also serves as a mechanism for value storage and exchange in other countries.

Guggenheim Investments

In late 2020, the $233 billion investment fund filed an amendment with the SEC to allow their subsidiary, Guggenheim Macro Opportunities Fund (with $5 billion under management) to be able to invest up to 10% into the Grayscale Bitcoin Trust ("GBTC") –a de facto bitcoin ETF-like listed product discussed later.

Speaking to Bloomberg TV, Chief Investment Officer Scott Minerd commented that bitcoin's fair value still has a ways to go, particularly in light of its scarcity and "rampant money printing by the Fed". In fact, he indicates that Guggenheim's fundamental analysis is that bitcoin should be worth around $400,000 based on its scarcity and relative valuation to things such as gold as percentages of GDP.

Square Inc

In the 3rd quarter of 2020, Square, led by Twitter CEO Jack Dorsey, purchased approximately $50 million of bitcoin using corporate cash reserves. In an official statement released, the company suggested that it believed that bitcoin had the potential to become a ubiquitous currency in the future, although it recognised that it may take over a decade for this to become a reality. Square's Cash App remains one of the more popular "on ramps" for retail investors to buy and sell bitcoin.

PayPal Holdings Inc

In October 2020, PayPal announced that it would enable a feature that would allow its user base of 305 million to buy and sell cryptocurrencies, including bitcoin, natively through its platform. While payment platforms such as Square's Cash app already offered bitcoin for sale, the move was heralded as enormously positive given the enormous size of the company's userbase. As noted earlier, this has driven much of the new supply of bitcoins to be purchased by PayPal.

Summary

Institutional investors are driving up the price of bitcoin and are slowly starting to dip their toes in. Looking back at 2020, it could be argued that the expressed views of investment heavyweights such as Paul Tudor Jones and Stan Druckenmiller forced the investment management community to take notice and have a closer look.

By all accounts, institutional interest is accelerating, which naturally bodes well for bitcoin's price. As Raoul Pal of Real Vision has frequently stated, "there is a wall of institutional money coming".

Bitcoiners have been proselytising since inception, however 2020 and the subsequent price rally clearly demonstrated that mainstream adoption first required Wall Street's stamp of approval.

Reason 6 - Increased Maturity of Bitcoin Infrastructure and Availability of Products

2020 provided unequivocal evidence of the maturation and institutionalisation of bitcoin. Bitcoin has demonstrably evolved from an open-source aspirational project to a legitimate institutional investment. The narrative has shifted from retail hype to growing institutional adoption and recognition. The discussion below seeks to provide a brief overview of the most important recent developments in that process.

In bitcoin's early days, few retail investors had the technical competency to buy, trade and securely store bitcoins. In short, the infrastructure was shaky and the availability of products was limited. Fast-forward to 2021 and the picture couldn't be more different.

Today, the infrastructure is robust and retail investors have an abundance of choice in the way of exchanges (i.e.marketplaces for trading), hardware/software wallets (for storage) and decentralised applications where investors can obtain loans using their bitcoins as collateral. With user experience lying at the core of these products, friction has been reduced and retail adoption has increased, particular amongst millenials who have demonstrated a distinct preference for purchasing cryptocurrencies through platforms such as PayPal and the CashApp.

While individuals celebrate the ability to self-custody and maintain the creed “not your keys, not your coins”, institutions require an alternative custody solution. One such solution is the Grayscale Bitcoin Trust (“GBTC”), a fund that holds bitcoin. It operates like an ETF, available to accredited investors who can deposit bitcoins or cash. From 2013 to 2019, it increased from $1.9 billion to $4.7 billion.

As of January 2021, it has more than $20 billion under management with reports suggesting that it could hold up to 5% of bitcoins sometime during 2021. Recent analysis shows that GBTC, which typically trades at a 20% premium to the underlying bitcoin price, has purchased 7-15 times the number of new bitcoins mined on a daily basis.

Another product that is more structurally similar to an ETF is the CoinShares Exchange Traded Product (“ETP”), which tracks the price of bitcoin. This ETP is publicly traded and has over $500 million in assets under management, demonstrating strong interest in European markets. There are also a number of other funds including the Canadian 3iQ, Swiss 21 Shares Bitcoin ETP and Wisdom Tree Bitcoin fund that have not grown as large as their counterparts but still represent alternative vehicles for interested investors.

Within the past few years, the ability to borrow bitcoins or use them as collateral is increasing. These offerings are important for a range of businesses including market makers, exchanges and miners. One of the biggest lenders in the space, Genesis Capital, noted in early 2020 that they had doubled their loans to $2 billion year-on-year. Others in the space have similarly noticed dramatic growth within the past couple years. As an additional indication of the growing maturity of the crypto asset space, futures trading have also become increasingly popular with investors in recent years.

As we witness the institutionalisation of bitcoin, it is worth highlighting that none of this is possible without the infrastructure providing the “plumbing of the system”.

Underlying each derivative, ETF or loan are companies that enable these markets to operate efficiently. These companies include exchanges, custodians, market makers and prime brokers. The chart below (Figure 10) demonstrates the dramatic increase in venture capital investment since 2018.

Figure 10

The evidence above clearly illustrates that investors, both institutional and retail, have increased access to and choice of digital asset products in 2021. Given the current trajectory, it is fair to assume that this trend is likely to accelerate in the coming years with bitcoin being one of the main beneficiaries.

Reason 7 – The Libertarian Argument

The final reason for considering an investment in bitcoin is a philosophical one, based on the foundational principles of bitcoin.

In an increasingly digitised and technological driven world, governments have increased capabilities to censor and restrict the financial activities of its citizens. Financial systems, if in the wrong hands, can become tools of surveillance and control. A fully digitised currency or CBDC is unquestionably going to be a reality across most of the developed world in the coming years, the timing of which remains to be seen. No doubt, the appeal for governments is that it would give them full visibility into the financial activities of its citizens on a transaction level. Since trade using money (or its equivalent) represents such an integral and unavoidable component of modern life, the significance of government having unfettered access into its citizens' financial affairs cannot be understated. Aside from the ease of administrative functions such as tax collection, it would also enable them to reward desired behaviours and punish undesirable or illegal behaviour. In technocratic governments such as China, where citizens are already monitored and controlled to a significant degree, digital currencies could represent a further erosion of its citizens' rights. Naturally, one would expect there to be a degree of resistance as individual sovereignty and personal freedoms, liberties and privacy become increasingly compromised.

In addition, as has already been discussed, governments have a track record of breaching their citizens' trust and debasing the currency. For example, in 2020, Argentina's peso debased 300% against the US dollar. Within the current financial system (and certainly in an entirely digitised future), many governments have the ability to track its citizen's financial transactions and in some instances, confiscate their assets. To make matters worse, many governments, particularly in the developing world, have destroyed the value of their nation's currency.

Bitcoin is innately scarce and incapable of confiscation since it has a very stable and transparent system of property rights. This makes it highly attractive to those living within hyperinflationary environments, both as a store of value and as a medium of exchange. It isn't surprising that on a per capita basis, countries like Russia, Venezuela, Columbia, Nigeria, Kenya and Peru tend to trade more using bitcoin than most of the developed world. Of course, most of the developed world has not experienced the arbitrary deprivation of private property (at least in recent history), but it isn't unprecedented. In 1933, executive order 6102 forced US citizens to sell their gold to the US Federal Government well below market prices.

A significant portion of ideological support for and daily use of bitcoin originates within developing nations that have inherently unstable economies and governments. However, a growing case may be building for developed nations, particularly in the aftermath of Covid-19 since most countries have debased their currency and trends toward digitisation elevates the future risk of financial surveillance and control. Bitcoin protects against debasement, confiscation and surveillance. These are things the average citizen is likely to hold increasingly valuable in the coming years.

Reason 8 – Bitcoin has Outperformed Other Assets Classes

In absolute terms, bitcoin has easily outperformed all traditional asset classes across almost any significant period of time.

Over the past 10 years, it has enjoyed an average annualised rate of return of over 200% and has excelled against competing stores of value such as gold, and even against unicorn technology stocks such Facebook, Amazon, Netflix and Google.

Below are a series of charts (Figures 11 - 17) illustrating bitcoin's remarkable performance to date as of January 2021, relative to other assets

Figure 11

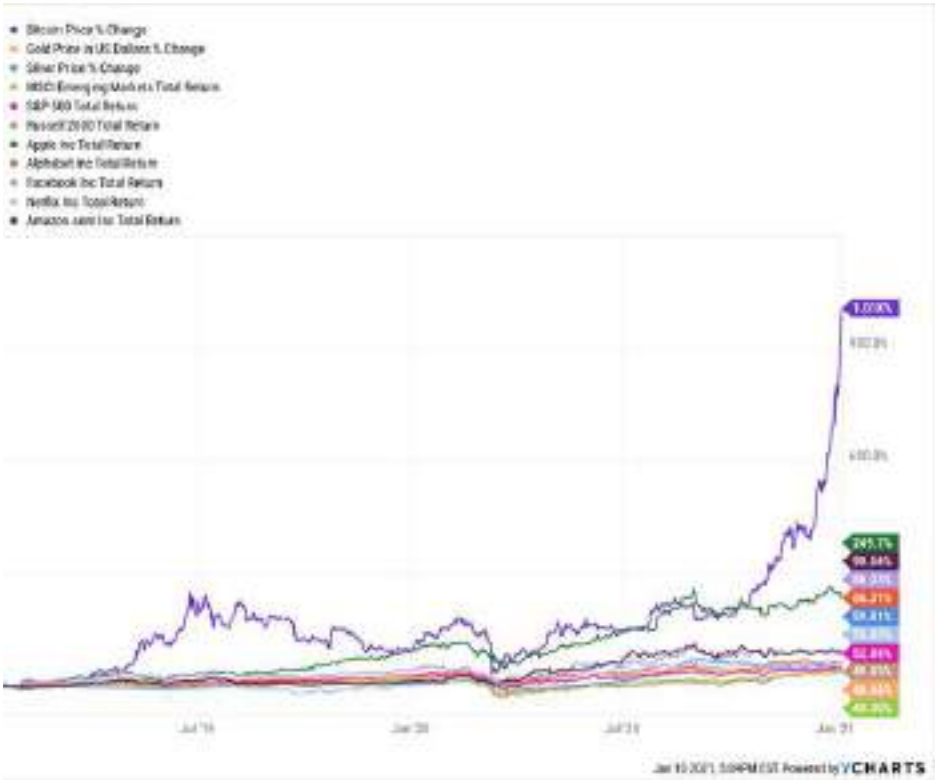
Bitcoin & Traditional Assets ROI (vs USD)

	Bitcoin	Gold	S&P 500
1 year:	+414%	+19%	+17%
2 year:	+966%	+43%	+48%
3 year:	+185%	+40%	+39%
4 year:	+4,396%	+56%	+68%
5 year:	+9,018%	+68%	+98%
6 year:	+14,256%	+52%	+87%
7 year:	+4,806%	+49%	+107%
8 year:	+289,180%	+11%	+160%
9 year:	+636,102%	+14%	+197%
10 year:	+12,480,556%	+35%	+201%

Source: Messari.io, bitcoincharts.com

1-Year Returns Compared

Figure 12



2-Year Returns Compared

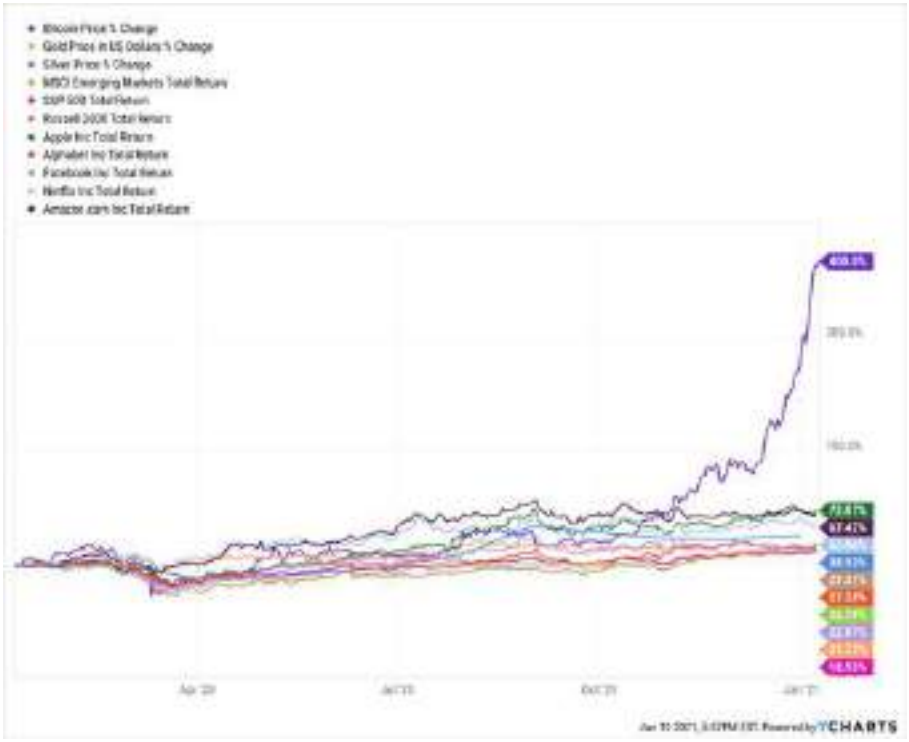


Figure 13

3-Year Returns Compared

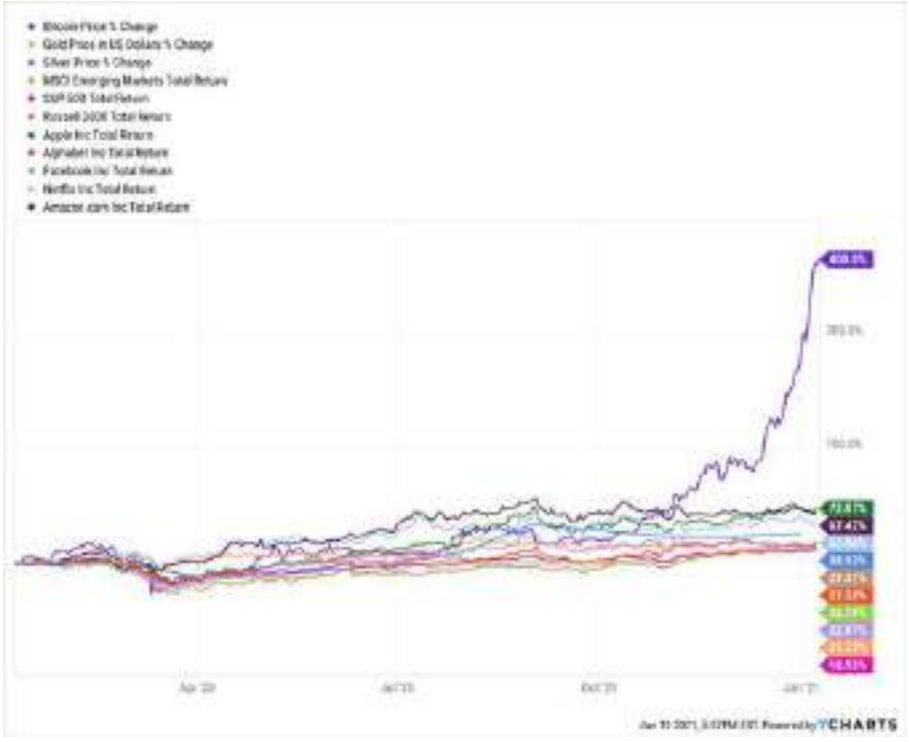


Figure 14

5-Year Returns Compared

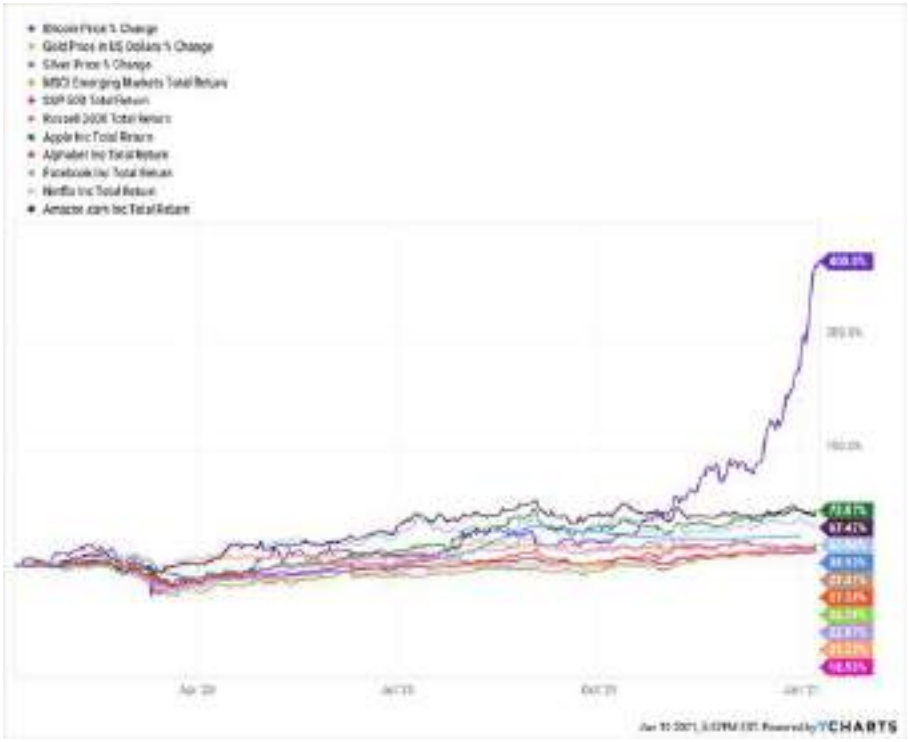


Figure 15

10-Year Returns Compared

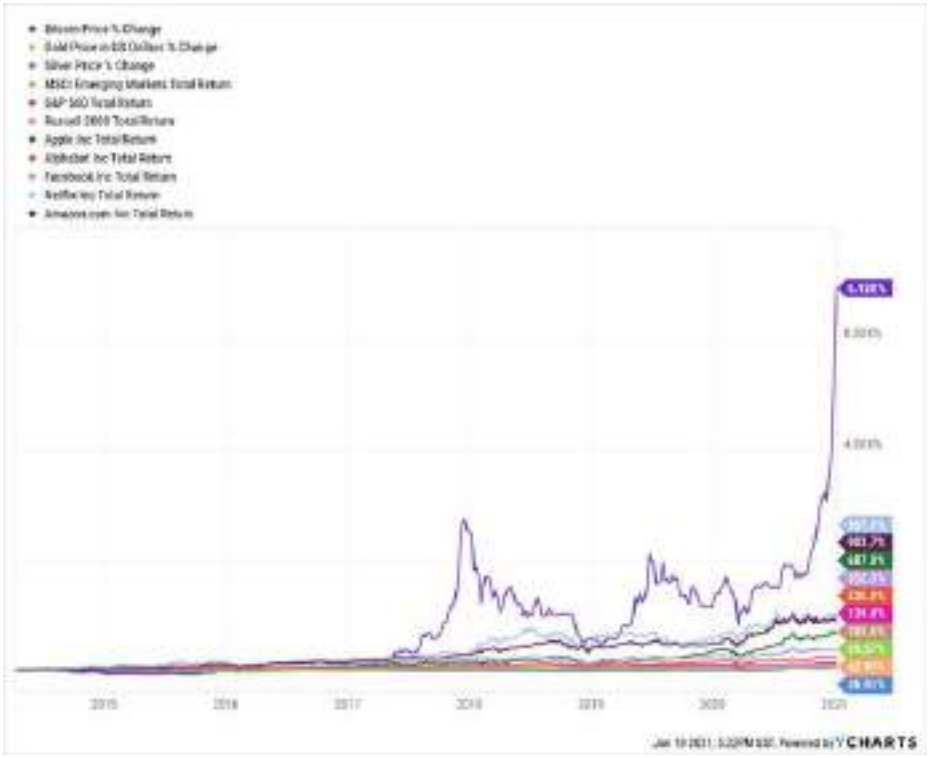


Figure 16

10-Year Asset Quit (Ex-Bitcoin)

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Annualised
Emerging debt 8.5%	REITs 23.7%	U.S. equities 32.6%	REITs 22.8%	Japan equities 9.9%	High yield 14.3%	EM equities 37.8%	Cash 1.9%	U.S. equities 31.6%	U.S. equities 21.4%	U.S. equities 14.1%
DM gov. debt 6.3%	Europe equities 19.9%	Japan equities 27.3%	U.S. equities 13.4%	U.S. equities 1.3%	Infrastructure 12.4%	Europe equities 26.2%	DM gov. debt -0.4%	Infrastructure 27%	EM equities 18.7%	REITs 7.3%
IG credit 4%	High yield 19.6%	Europe equities 26%	Infrastructure 13%	Emerging debt 1.2%	U.S. equities 11.6%	Japan equities 24.4%	IG credit -3.5%	Europe equities 24.6%	Japan equities 14.9%	Japan equities 6.8%
High yield 3.1%	EM equities 18.6%	Infrastructure 15%	Emerging debt 5.5%	REITs 0.6%	EM equities 11.6%	U.S. equities 21.9%	High yield -4.1%	REITs 24.5%	IG credit 10.1%	High yield 6.5%
U.S. equities 2%	Emerging debt 18.5%	High yield 7.3%	IG credit 2.5%	Cash 0.1%	Emerging debt 10.2%	Infrastructure 20.1%	U.S. equities -4.5%	Japan equities 20.1%	DM gov. debt 9.5%	Infrastructure 6.5%
REITs 1.7%	U.S. equities 16.1%	REITs 2.8%	Cash 0.1%	Europe equities -2.3%	Commodities 9.7%	High yield 10.4%	Emerging debt -4.6%	EM equities 18.9%	High yield 7%	Emerging debt 6%
Cash 0.1%	IG credit 12.4%	IG credit 1.8%	High yield 0%	High yield -2.7%	REITs 6.9%	Emerging debt 9.3%	REITs -4.8%	Emerging debt 14.4%	Europe equities 5.9%	Europe equities 5.9%
Infrastructure -0.4%	Infrastructure 11.9%	Cash 0.1%	DM gov. debt -0.8%	DM gov. debt -3.3%	IG credit 6%	IG credit 9.3%	Infrastructure -9.5%	High yield 12.6%	Emerging debt 5.9%	IG credit 4.9%
Commodities -8.2%	Japan equities 8.4%	EM equities -2.3%	EM equities -1.8%	IG credit -3.8%	Japan equities 2.7%	REITs 8.6%	Commodities -10.7%	IG credit 11.8%	Cash 0.7%	EM equities 4%
Europe equities -10.5%	DM gov. debt 1.8%	DM gov. debt -9.3%	Japan equities -3.7%	Infrastructure -11.5%	DM gov. debt 1.7%	DM gov. debt 7.3%	Japan equities -12.6%	Commodities 11.8%	Infrastructure -5.8%	DM gov. debt 2.2%
Japan equities -14.2%	Cash 0.1%	Commodities -5%	Europe equities -5.7%	EM equities -14.6%	Cash 0.4%	Commodities 1.7%	EM equities -14.2%	DM gov. debt 5.6%	REITs -8.1%	Cash 0.7%
EM equities -18.2%	Commodities -3.3%	Emerging debt -6.6%	Commodities -17.9%	Commodities -23.4%	Europe equities 0.2%	Cash 0.8%	Europe equities -14.3%	Cash 2.3%	Commodities -9.3%	Commodities -6.1%

Source: https://www.blackrock.com/

Figure 17

Bitcoin's Risk-Adjusted Returns

One of bitcoin's main criticisms is that it is highly volatile, which at present, it undoubtedly is. The reason for this and why it can be expected is a matter that will be addressed later. Notwithstanding, the question in investors' minds is whether the risk justifies the returns.

While there are conceivably numerous ways to quantify, most technical analysis hinges on the Sharpe Ratio which uses the asset's return, the risk-free rate of return and the standard deviation of the asset in question. In short, the ratio provides an indication of whether the returns of a given asset are acceptable in light of the risk – risk being measured by volatility or more precisely, the standard deviation of returns.

Broadly speaking, higher Sharpe Ratios are indicative of strong risk-adjusted returns. A ratio below 1 is regarded as sub-optimal and below 0 indicates that performance, on a risk-adjusted basis, is below the risk-free rate of return.

Using a "hodl" period of 4 years (to allow for a full bear and bull cycle, approximately 4 years), the chart below (Figure 18) illustrates that on a risk-adjusted basis, bitcoin remains a better performing asset relative to gold, US equities, US real estate, bonds and emerging market currencies:

Figure 18

Bitcoin's Low Correlation to Alternative Assets

Since inception, and in the absence of black swan events (i.e. once in 100 years pandemic-like shocks), bitcoin has demonstrated low levels of correlation to traditional asset classes. Given this, there is an argument to be made that bitcoin could serve as a strategic allocation within a well-diversified portfolio, notwithstanding its volatility. Given the low levels of correlation, its inclusion in a well-diversified portfolio will not only reduce the idiosyncratic risks, but it will also lower overall volatility, resulting in higher risk-adjusted returns.

Using the chart below (Figure 19), it is clear that over a period of 10 years, correlations have tended to trend towards zero, suggesting little to no correlation. Relative to the S&P 500, bitcoin's mean correlation is 0.03 and relative to gold, -0.004. For the most part, the correlations have ranged between -0.2 and 0.2, with the Covid-19 pandemic being the exception. It is worth noting that technical analysts suggest that modern portfolio theory supports bitcoin positions ranging from 0.5% to 25% within a diversified portfolio. This is of course a broad range that doesn't take into account an investor's goals, time horizon, risk appetite and current portfolio composition, all of which are relevant in determining the extent to which bitcoin could be included.

Summary

On an absolute and risk-adjusted basis, bitcoin has over the years tended to outperform all traditional asset classes across any meaningful period of time. Furthermore, over the long term, it has little to no correlation to other asset classes, suggesting that it may serve an important function in boosting risk-adjusted returns within a well-diversified portfolio.

Figure 19

Bitcoin – Future Potential and Value

In examining the future potential for bitcoin and its use cases, it naturally follows that questions will be asked about the potential size of the market. While analysts largely agree that there is no "one size fits all" valuation approach, a range of techniques including Metcalfe's Law, daily active addresses, network value-to-transactions and several others have been proposed. These techniques are deeply quantitative by nature, highly technical and beyond the scope of this paper.

Instead, a broader "top down" approach is preferred whereby the potential for bitcoin is examined at a high level within the context of the market cap of the global asset base. In the discussion below, I rely largely on the "market cap" or "addressable market" technique in assessing potential value, however where appropriate, I have also outlined other methods that are worth taking into account.

In January 2021, cryptocurrencies' market capitalisation exceeded $1 trillion for the first time. Bitcoin represents approximately 70% of that. If the reasons for investing outlined above are sound and bitcoin represents only 0.15% of global assets, the question remains how much capital bitcoin can attract away from other asset classes? This question ought to be considered in light of the chart (Figure 20) below.

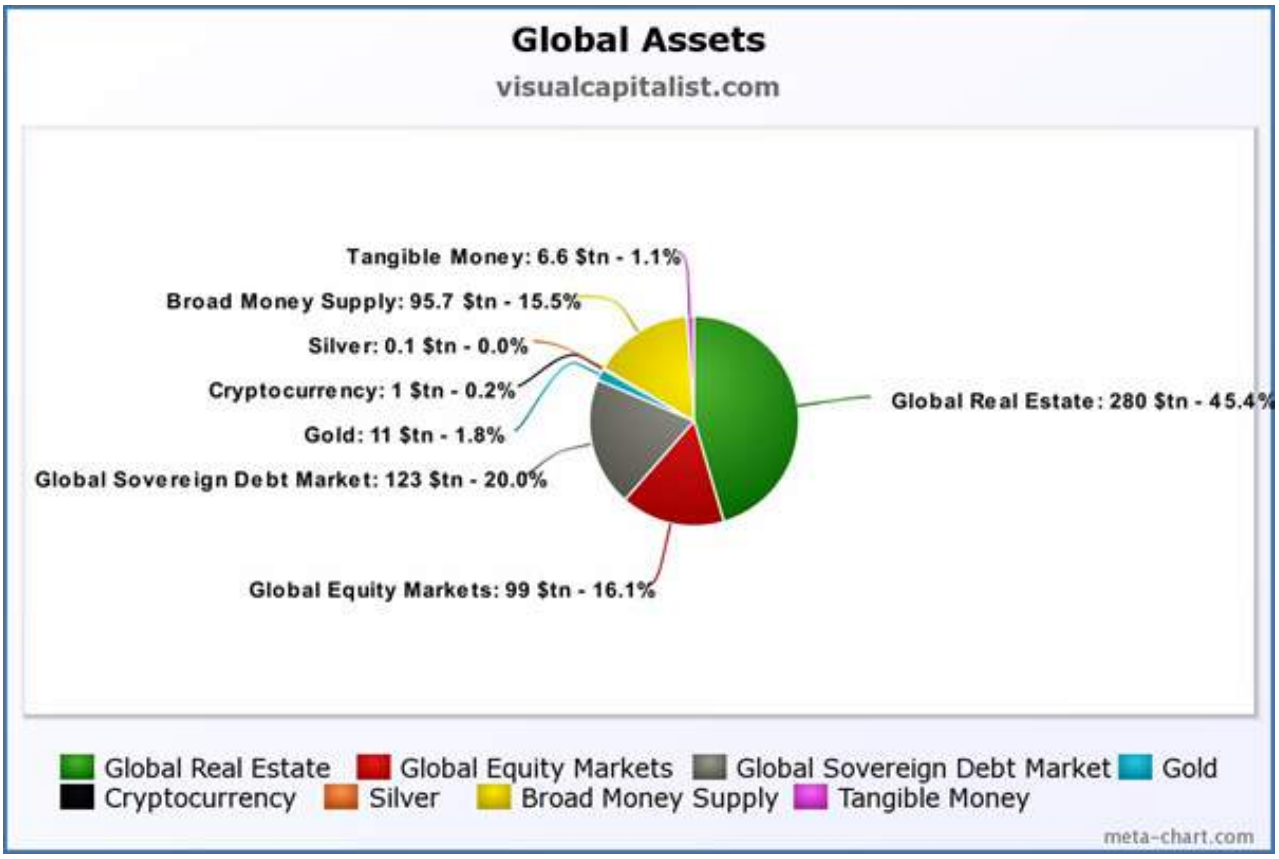


Figure 20

Primary Thesis– Bitcoin as a Store of Value or "Digital Gold"

One of the more compelling explanations offered in relation to bitcoin is that it is "Gold 2.0" or "digital gold". To be sure, bitcoin is still an emergent, rather than an established, store of value. Historically, investors and savers have been attracted to gold at times when investors and savers have lost confidence and trust in the monetary authorities. Various participants within the global economy have elected to acquire and hold gold bullion - from central banks and sovereign funds to investment funds and high net worth individuals.

While gold clearly has the advantage of history on its side, proponents of bitcoin argue that bitcoin represents a significant improvement since it is even more scarce, durable, divisible, verifiable, portable and transferable. Furthermore, it is incapable of confiscation and not subject to capital controls.

As we shift towards an increasingly digitised economy driven by the preferences of millenials and the younger generation, it seems reasonable to conclude that retail investors are likely to display a preference for bitcoin in the future. On an institutional level, bitcoin alleviates the fundamental flaws of gold, namely its storage and transferability.

Bitcoin Valuation as Digital Gold – Using the "Market Capitalisation Method"

If digitisation trends and the narrative that bitcoin is on a price discovery process is correct, it follows that investors in the future will demonstrate a distinct preference for bitcoin over gold. As JP Morgan noted in a recent report, one of the reasons for the upwards price action seen towards the end of 2020 was driven by outflows from gold ETFs into bitcoin. This has led investors to speculate as to how much of gold's market share bitcoin can capture.

As of January 2021, bitcoin's market capitalisation of $735 billion is trivial relative to gold's $11.1 trillion. Unsurprisingly, with the number of variables at play, there is no consensus as to how much market share bitcoin can take and what the potential price could be. Grayscale research suggests that at 20%, 25% and 30%, bitcoin's price would rise to $77,000, $96,000 and $115,000 respectively. Lyn Aldern and others have suggested that at a market cap of around $5 trillion, a bitcoin would be worth $250,000. Other analysis indicates that an $8 trillion market cap would result in a single bitcoin being worth as much as $440,000.

Available evidence suggests that bitcoin is taking market share away from gold. The extent to which investors, sovereign funds and central banks will do so in the future remains uncertain and a question for investors to contemplate.

Bitcoin Valuation as Digital Gold – Using the Stock to Flow Model

All commodities have a stock-to-flow ratio, which is a measurement of how much is mined or produced per annum relative to that which is stored.

Commodities that deteriorate quickly (like wheat) have stock-to-flow ratios below 1 whereas silver and gold are 20 and 50-60 respectively. This means there is approximately 50 – 60 years' worth of annual gold production stored in vaults or put differently, the amount of gold stored is equal to approximately 50-60 years' production.

In 2009, bitcoin had a very low stock-to-flow ratio, however today it is around 60. With each "halving event" every 4 years or so, production of new bitcoins is halved resulting in the stock-to-flow ratio increasing over time. Over time, this results in upwards price growth.

An influential Dutch institutional investor, "Plan B", has created a now revised model (Figure 21) that to date, has proved remarkably accurate.

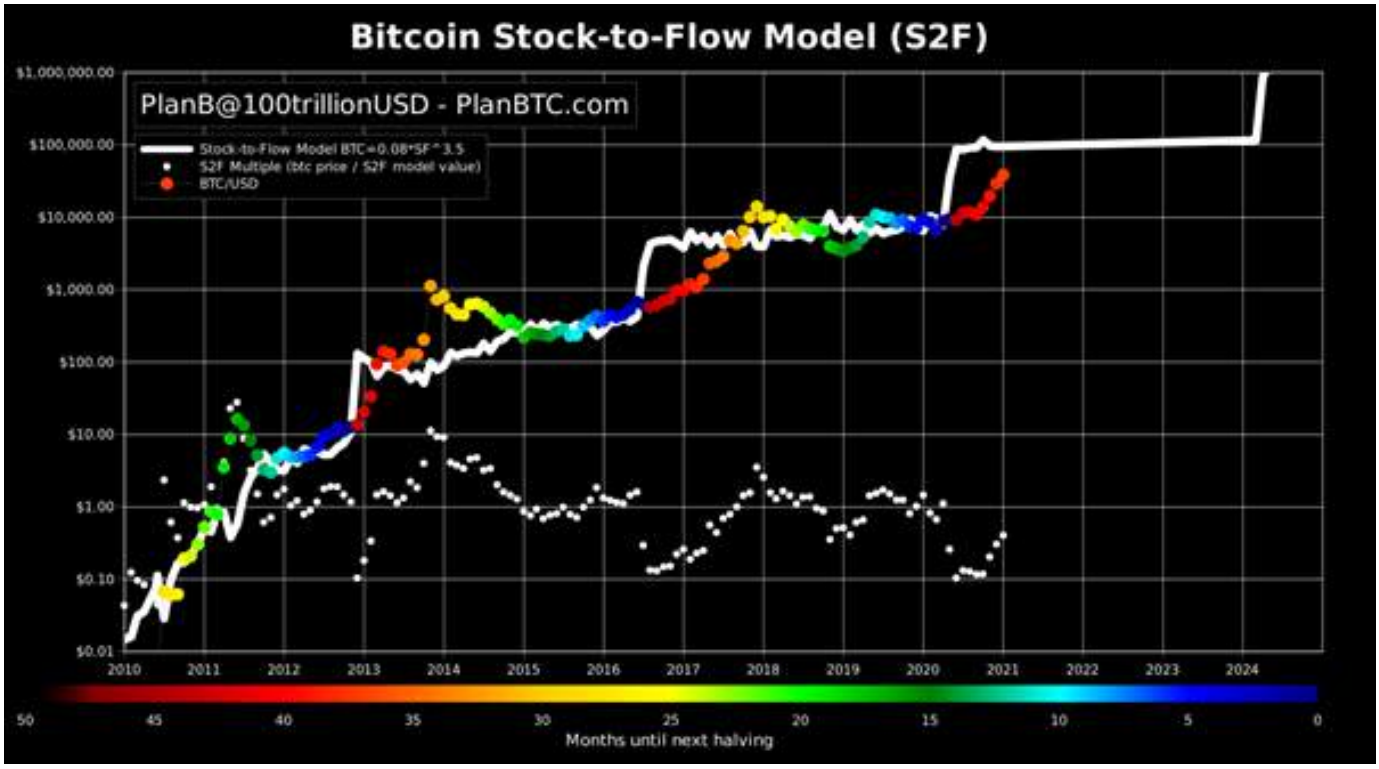
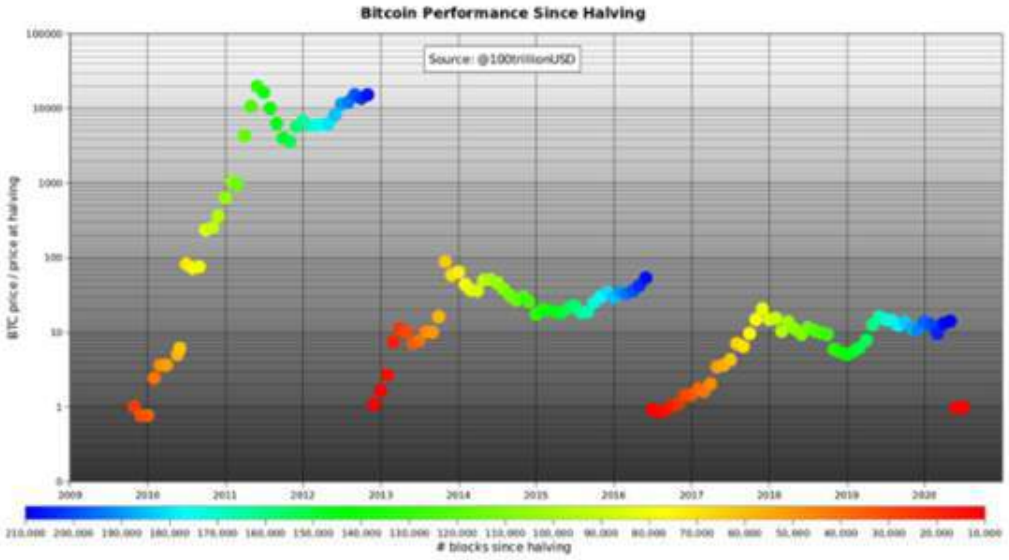


Figure 21

Figure 22



As the chart above (Figure 22) illustrates, each halving cycle has tended to result in upwards price action less explosive than the previous, however only after the protocol has grown in adoption and market cap. Based on the model above and taking into account the halving event in May 2020, various forecasts have been made.

"Plan B" previously suggested that a 6-figure bitcoin price will be reached in 2021 and has offered a bullish prediction that it will reach $288,000 by October 2021. Given the amount of variables at play, it is far from self-evident that this will necessarily take place. However, given the accuracy of the model to date, investors would be advised to take a closer look.

Bitcoin Valuation as Digital Gold – Using the "Bitcoin Priced in Gold" Model

Another way to consider the potential value of bitcoin is to examine it in relation to the price of gold, priced in grams. Based on the chart below (Figure 23) and assuming a relatively static gold price, a 10x increase (implying a 6-figure bitcoin price) may lie ahead. Interestingly, Charles Vollum's analysis also demonstrated that each halving cycle is less explosive than the last:

Figure 23

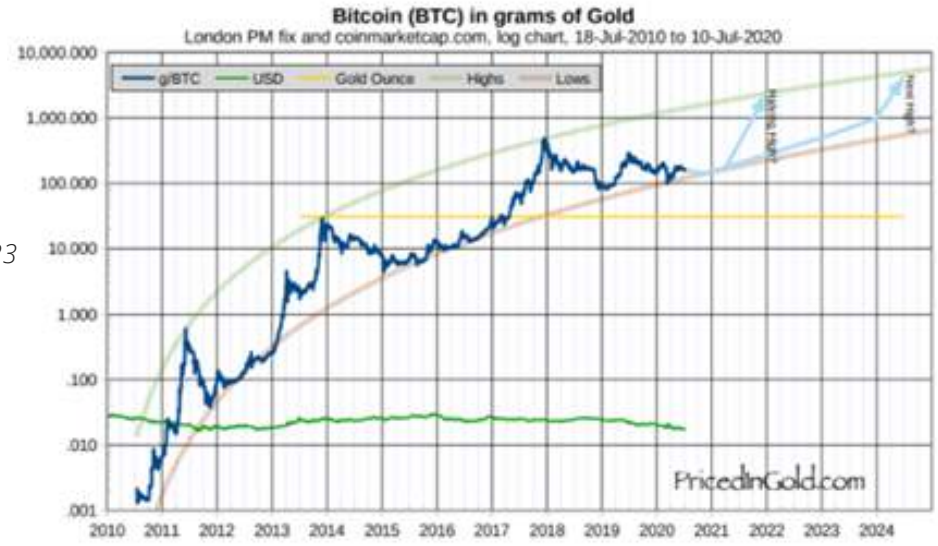


Chart Source: Charles Vollum, PricedinGold.com

He notes:

"My analysis starts by noticing the relative heights and timings of the highs in mid-2011, late-2013 and late 2017. The second peak is about 48 times higher than the first, while the third peak is about 17x the second. So the rate of growth in the peaks seems to be slowing."

His analysis also established that bitcoin's volatility, priced in gold, declines over time as adoption grows. This aligns neatly with the thesis that bitcoin's volatility is a feature not a bug:

"In 2011, the upper bound was about 84x the lower bound. A year later, the ratio was 47x. By 2015 it was 22x, and at the start of 2020 it had fallen to 12x. This is a good thing, demonstrating a decline in overall peak-to-trough volatility. If this pattern holds up, the ratio will be about 9x in mid 2024, and about 6.5x by the end of the decade. Still high by forex and bond standards, but less than 10% of the 2011 volatility!"

Summary

The digital gold thesis is probably the most prevalent and compelling framework through which to assess and evaluate bitcoin. Bitcoin would appear to be better at being gold than gold but it remains unclear if or how this translates into increased inflows into bitcoin.

In addition to the gold thesis, there are conceivably others worth considering, the most persuasive of which are outlined below.

Other Use Cases for Bitcoin Considered

Bitcoin as a Store of Value - Treasury Reserve Asset for Central Banks and Companies

Within the current financial system, companies tend to hold fiat currency as their reserve asset whereas central banks hold mostly fiat (86%) and gold (11%). In the case of companies, 2020 represented an inflection point where several high profile companies elected to shift a significant portion of their cash reserves into bitcoin. In the case of countries, while changes can be expected, it will be far slower.

Companies Holding Bitcoin as a Reserve Asset

As noted earlier in the discussion of bitcoin and the growing rates of adoption amongst institutions, several high profile companies elected to swap their cash for bitcoin as a long-term store of value. To illustrate the point, consider the charts (Figure 24 and 25) below:

Figure 24

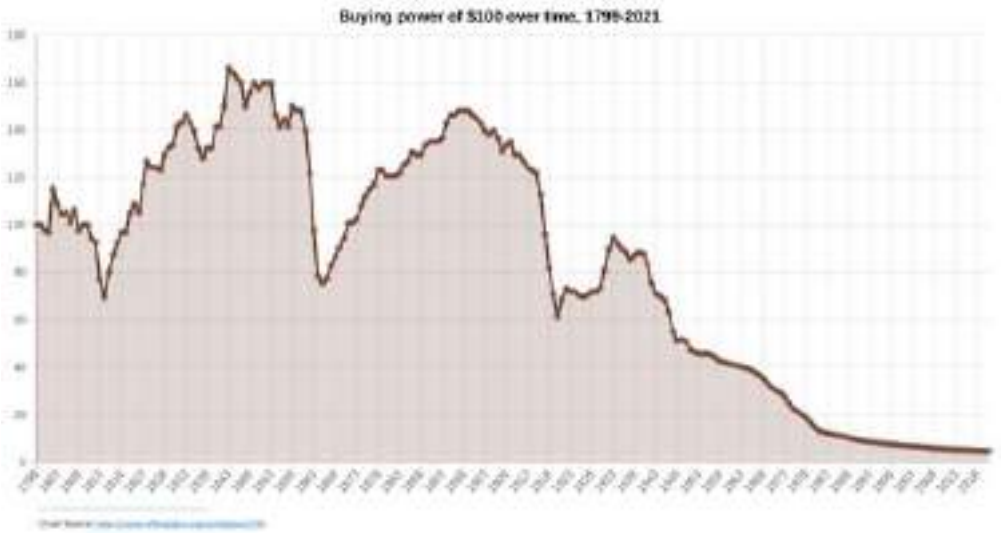


Figure 25

Since fiat currency tends to erode over any meaningful period of time, companies such as MicroStrategy, Square and most recently asset manager Stone Ridge Holdings, have elected to hold some of their cash reserves in bitcoin. As noted earlier, MicroStrategy will be hbsting a seminar in February 2021 to thousands of executives and corporate treasurers about how to go about converting their reserves to bitcoin. It is likely that later in the year we will witness a range of companies following MicroStrategy's lead. Given the macro environment of persistent fiscal stimulus, the conversion of cash into bitcoin is likely to continue, drawing more institutions in and pushing bitcoin's market cap in an upward trajectory.

Governments Using Bitcoin as a Treasury Reserve Asset

As of yet, no major nation has officially adopted bitcoin as a treasury reserve asset, although some are involved in mining which is of course a means of acquiring bitcoins. The slow uptake is unsurprising since bitcoin represents a fundamental challenge to a central bank's monetary monopoly. However, an interesting game is playing out in real-time as those with the least to lose in the current global system have the greatest incentive to adopt its alternative.

As the global currency reserve, the US dollar reigns supreme. With most exports priced in US dollars, many countries find themselves perpetually short on dollars. Furthermore, this system necessarily relies on the mechanics of the global banking system underpinned by SWIFT. Aside from capital shortages, these nations also find themselves vulnerable to sanctions. Economic rivals of the US and other developed nations, including Russia and China, therefore have an incentive to adopt bitcoin. To highlight the point, in 2020 Iran implemented measures that required newly minted bitcoins by its miners to only be used to finance trade. This example may signal the beginning of a trend leading to an interesting question.

How do western developed nations respond? Do they sit complacently on the sidelines while their ideological opponents acquire vast sums of wealth in a nascent store of value that threatens the legacy financial system and their monetary policy monopoly? Or do they compete and start acquiring bitcoin themselves, protecting themselves from inevitable monetary debasement? Perhaps government will act quicker on a local, rather than on a federal level. As recently as 15 January 2020, the city of Miami's mayor announced that they were exploring holding a percentage of investments in bitcoin.

It is difficult to estimate what portion of global fiat reserves bitcoin could capture. All efforts to do so are likely to be spectacularly wrong. Either way, it is becoming increasingly likely that governments of the future, nefarious or otherwise, will hold bitcoin as a non-sovereign treasury reserve asset.

Bitcoin as a Store of Value – Currency Demonetisation in Emerging Markets

For those who have lived through hyperinflation in countries like Argentina, Venezuela and Zimbabwe, the loss of confidence in the monetary authorities tends to result in investors and savers resorting to inflation hedges. In response, governments impose capital controls to prevent capital flight.

In those conditions, it is easy to contemplate the potential role that bitcoin can play. Aside from being incapable of debasement or confiscation, it can also serve as a cost effective cross-border remittance technology.

Some experts have estimated that if bitcoin captures only 5% of the global monetary base outside of the US dollar, Yen, Yuan and Euro, its market cap would increase by over $1 trillion.

Bitcoin as a Medium of Exchange – Global Settlement Network

Finally, bitcoin has potential as a medium of exchange within the global settlement network for large, low volume, high value transactions between financial institutions. Within the US, most dollar-based payments settle through the Federal Reserve's Real Time Gross Settlement (RTGS), or Fedwire. This is a relatively slow and costly system with intermediaries and counterparty risk.

Bitcoin offers the ability to settle 2,000 high-value global transactions every 10 minutes. In the US alone, deposits totalling $14.7 trillion generate $1.3 quadrillion in settlement volumes between and amongst banks each year. If bitcoin captured 10% of that volume, its market cap would increase by $1.3 trillion, providing an indicative bitcoin price of $75,000.

Final Thoughts on Use Cases and Value

Bitcoin has conceivably a number of useful applications as a store of value and medium of exchange, the former undoubtedly most pertinent at this point in time.

It also has the capacity to extract enormous sums of capital from all asset classes, the timing and extent is what remains to be seen.If one considers that the government bond market alone is $123 trillion with a vast segment being negative yielding (in real terms), the size of the opportunity is potentially enormous.

For many, bitcoin's growth trajectory isn't as much a question of "if" as much as it is of "when and by how much". Price targets for the next 5 -10 years range between $100,000 and $1 million. Some technical indicators also point to a 6-figure bitcoin within the next 24 months.

While these estimates are often well-reasoned and plausible, the reality is that there are innumerable variables, some expected and other not, that impact bitcoin's price in a non-linear fashion.

Clearly no-one really has the perfect framework for evaluating bitcoin and its potential and perhaps, that is what makes it a compelling proposition

The Risks and Criticisms

Having outlined what bitcoin is, how it is best conceived and why an investor may wish to take a position, it has now become appropriate to highlight the most salient risks and criticisms. As noted from the outset, bitcoin is certainly not short of detractors. Some criticisms are valid and legitimate, whilst others are misguided and easily rebuked. It is worth noting that many responses to common critiques are technical and unfortunately, this can alienate detractors who may otherwise be receptive to counter-arguments.

The discussion that follows aims to provide a balanced overview of the most common, relevant and legitimate risks and criticisms. The lack of consensus relating to these risks is to be expected of an untested, nascent and highly volatile asset that challenges the orthodoxy. The opportunity for investors is to properly understand these risks and take a position (if at all) accordingly.

Criticisms

Bitcoin is a Bubble

Initially, there are 2 distinct arguments to be addressed.

The first argument is that bitcoin is experiencing a classic asset price bubble, driven by speculation and greed. Much like the 1630's "Tulipmania" in Amsterdam, bitcoin's growth is unsustainable and will ultimately result in a total collapse of asset prices. This line of reasoning recognises that bitcoin is worth something, but not at current prices. The second argument is that bitcoin has absolutely no value at any price.

Within this section, I will address the first aspect of the argument, namely that bitcoin has value but not at current prices.

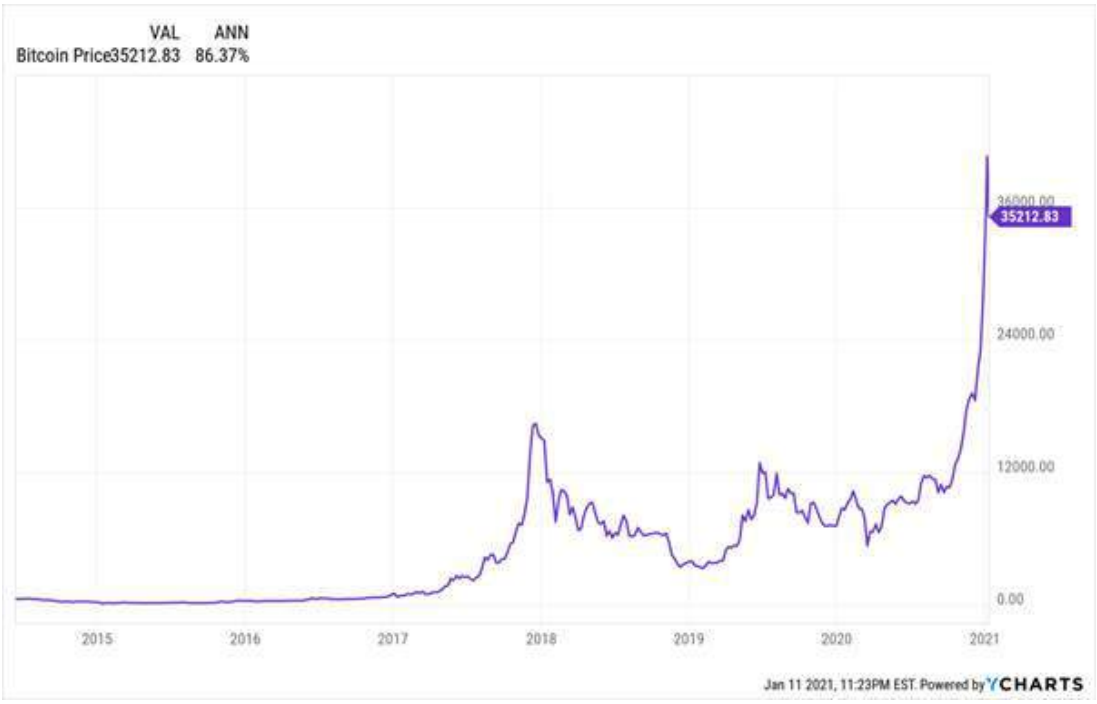


Figure 26

Looking at the linear bitcoin price chart above (Figure 26), at face value there may be an argument that bitcoin is in a bubble, particularly after the parabolic rise experienced in January 2021.

The logarithmic chart (Figure 27 below) however paints a more rational picture, particularly if you consider the impact of the second halving cycle in July 2016 and the third in May 2020.

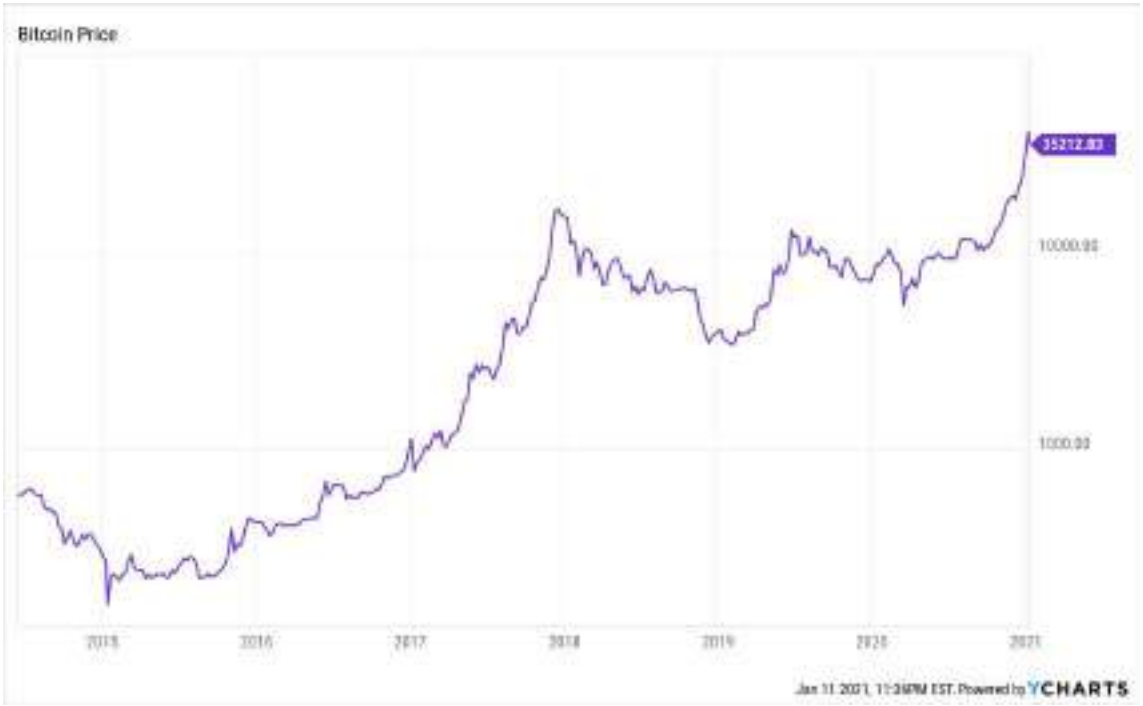


Figure 27

Looking closely at the logarithmic chart (Figure 28) and the halving cycles, some interesting points can be made.

Figure 28

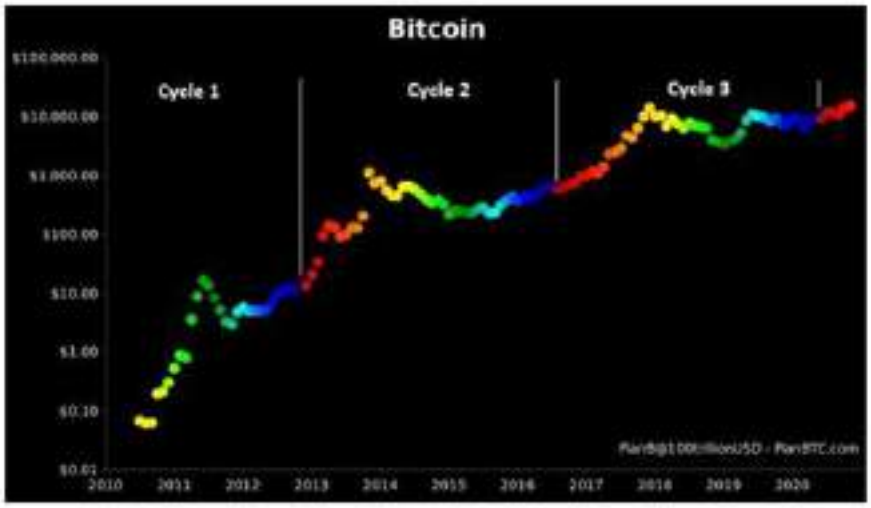


Chart Source: Chart Source: PlanB @100trillionUSD, with annotations added by Lyn Alden

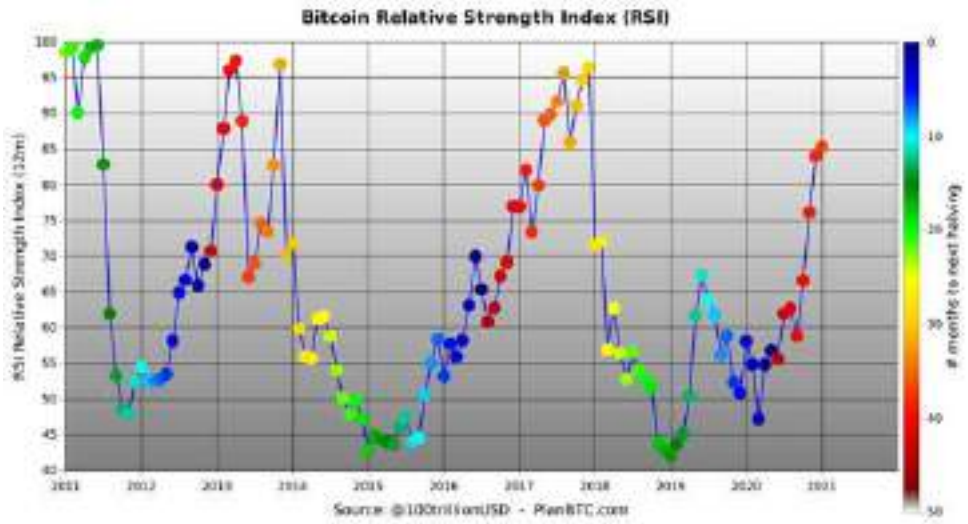
As Lyn Aldern notes:

"The first cycle (the launch cycle) had a massive gain in percent terms from zero to over $20 per bitcoin at its peak. The second cycle, from the peak price in cycle 1 to the peak price in cycle 2, had an increase of over 50x, where Bitcoin first reached over $1,000. The third cycle from peak-to-peak had an increase of about 20x, where Bitcoin briefly touched about $20,000."

Is a 10x peak-to-peak plausible in this cycle? One would tend to think so, particularly in light of the institutional flows, but that remains to be seen. Either way, the evidence tends towards a historically bullish phase for bitcoin with the strong possibility of further gains to be had.

In further considering whether bitcoin is a bubble, consider Plan B's "Bitcoin's Relative Strength Index" ("RSI"), (Figure 29) indicating levels of when bitcoin is likely to be overbought and undersold. Notice the RSI in December 2017 when bitcoin fell quickly by 60% from its all-time high. Historically speaking, despite recent parabolic price action, we appear as if we are not in overbought territory as of January 2021.

Figure 29



Given our current place within the halving cycle, the RSI index and the tendency for there to be strong gains for around 2 years following a halving event (most recently May 2020), there are good reasons to believe that bitcoin is presently not in bubble territory. This of course could change in a few years when indicators suggest otherwise.

To be sure, the arguments above in response to the "Bitcoin is a Bubble" argument are not intended to demonstrate that an investment in bitcoin is without risk. Nor is it intended to demonstrate that an investment in bitcoin makes sense at any time or at any price – clearly, bitcoin has demonstrated cyclical tendencies and investors would be advised to take into account. Ultimately, risk is inherent in all asset classes and needs to be managed according to each individual investor's preferences. As Lyn Aldern rightly points out:

*"Each investor has their own risk tolerance, conviction, knowledge, and financial goals. A key way to manage Bitcoin's volatility is to manage your position size, rather than try to trade it too frequently. If Bitcoin's price volatility keeps you up at night, your position is probably too big. If you have an appropriately-sized position, it's the type of asset to let run for a while, rather than to take profits as soon as it's slightly popular and doing well. When it's at *extreme* sentiment, and/or its position has grown to a disproportionately large portion of your portfolio, it's likely time to consider rebalancing."*

Bitcoin has no Intrinsic Value and is not Backed by Anything

Numerous economists, foremost amongst them being Peter Schiff, claim that bitcoin has no intrinsic value. In fact, as recently as May 2020 he suggested that it is "impossible for bitcoin's price to ever be too low, as any positive price is not low enough". Charlie Munger claims it is based on "thin air" and his partner, Warren Buffet said that it reminded him of Oscar Wilde's definition of fox hunting "The pursuit of the uneatable by the unspeakable."

Recently, Goldman Sachs invoked the "greater fool theory":

"We believe that a security whose appreciation is primarily dependent on whether someone else is willing to pay a higher price for it is not a suitable investment for our clients."

In short, the argument is that bitcoin is backed by nothing, has no intrinsic value and that the only thing driving price growth is the willingness of others to buy it and drive it higher. Implicit within this line of argument is that since bitcoin is not backed by cash flows or government decree, it needs to be backed by some industrial utility like other stores of value, which it isn't.

If gold with a market cap of $11.1 trillion is widely recognised as a store of value, why is bitcoin not? The argument is that at least gold has utility. However, that paints a misleading picture as only 7% of gold is used in industrial applications such as electronics and dentistry. The remaining 93% is driven by sentiment and perceptions. Of course, gold has the advantage of thousands of years of international history as money so the perceived risk of it losing value is low. To avoid replicating earlier arguments, the simple point to be made is that bitcoin may be an even better store of value than gold because it is more easily verifiable, easier to transport and more scarce.

In principle, the notion that digital assets cannot have value outside of industrial use is also misguided and simply incorrect. In the online gaming ecosystem for example, rare tokens, characters or powers can be bought and sold and are highly prized by participants. The same can be said for digital art.

Bitcoin's utility is that it permits for the storage and transmission of value in the form of demonstrably scarce units outside of an existing currency system. Unlike gold or fiat currency, one could easily carry $500,000 on your person across international borders.

In addition, bitcoin's utility can be considered in light of its network effect or put differently, the total sum of the value derived by participants in the network. Given the nature of bitcoin addresses, it is difficult to estimate the precise number of users but estimates suggest it is around 137 million. Over time, bitcoin has repeatedly demonstrated that it is by far the strongest, most secure, decentralised and robust cryptocurrency.

The pricing of the utility of the network is therefore best conceived as the value it brings to the individual participants. Whether viewed as an emergent store of value (by participants such as institutions) or as a medium of exchange (by those in emerging markets), the value of the protocol increases as adoption grows. Another way of considering bitcoin's utility is that it provides trust in a monetary policy and a commitment to scarcity that other assets do not.

While the extent of value can be debated, it is difficult to argue that bitcoin has no value when participants in the network clearly ascribe some value to it.

It is too Volatile to be a Store of Value

Since bitcoin is promoted as a store of value, critics often highlight its volatility as being a fatal flaw in fulfilling precisely that role. Former Bank of England Governor, Mark Carney commented that bitcoin is not a store of value because "it is all over the map". This argument while seemingly valid at face value, ultimately falls short for reasons outlined below.

In principle, volatility and store of value are not mutually exclusive. Fiat currency for example is not volatile by most measures, but is generally considered to be a poor store of value over any meaningful period of time.

In 2021, it is undoubtedly true that investors with short time horizons are well-advised to seek other less volatile stores of value, such as fiat currency and gold. Bitcoin is simply not the asset of choice for those wanting to save for a deposit on a home or towards an overseas holiday. However, the key point that this criticism misses is why bitcoin is volatile and why its volatility is likely to diminish into the future.

Why is Bitcoin Volatile?

One of the reasons that bitcoin is volatile is that it is an emergent store of value on the path to monetisation. As a 12-year old asset, it is not widely recognised as a store of value and as adoption grows, so does its market cap. This process necessarily entails taking market share from other stores of value and asset classes. Upwards and downwards volatility is therefore a natural function of the price discovery process of a nascent store of value. As bitcoin ownership becomes more widespread, its price should stabilise as net new participants have less of an ability to move the market.

Fidelity Digital Assets provides an alternative explanation as to how one can consider bitcoin's volatility:

"…bitcoin's volatility is that it is a consequence of the asset's perfectly inelastic supply. A rise in demand cannot result in the increase in supply of bitcoin or increase the speed at which bitcoin is issued (thanks to the difficulty adjustment, which ensures that blocks are produced every ten minutes on average). Notably, this supply inelasticity is also what makes bitcoin scarce and valuable. Thus, bitcoin investors accept volatility as the cost or premium of getting access to a rising store of value asset that they believe has a significant untapped addressable market."

Going further they say that:

"...bitcoin as an intervention resistant market –no central bank or government can step in to support or prop up markets and artificially subdue volatility. Bitcoin's volatility is a trade-off for a distortion-free market. True price discovery accompanied by volatility might be preferable to artificial stability if it results in distorted markets that may break down without intervention."

Putting bitcoin's volatility into perspective, consider gold in the 1970's when the US abandoned the gold standard. In 1973 for example, the gold price changed by more than 3% in one out of ten days. As Paul Tudor Jones noted in his May 2020 letter to investors:

"In the case of gold, it was a tremendous buying opportunity as gold went on to more than quadruple past the prior highs."

Either way, bitcoin's volatility is to be expected in the short term – it is a feature of a new intervention-proof digital store of value, not a fatal flaw. Additionally, the fact that it is volatile does not in itself lend support to the argument that it is an inappropriate store of value. At best, it suggests that while bitcoin is as volatile as it is, investors can mitigate the risk by having an appropriate position size and time horizon.

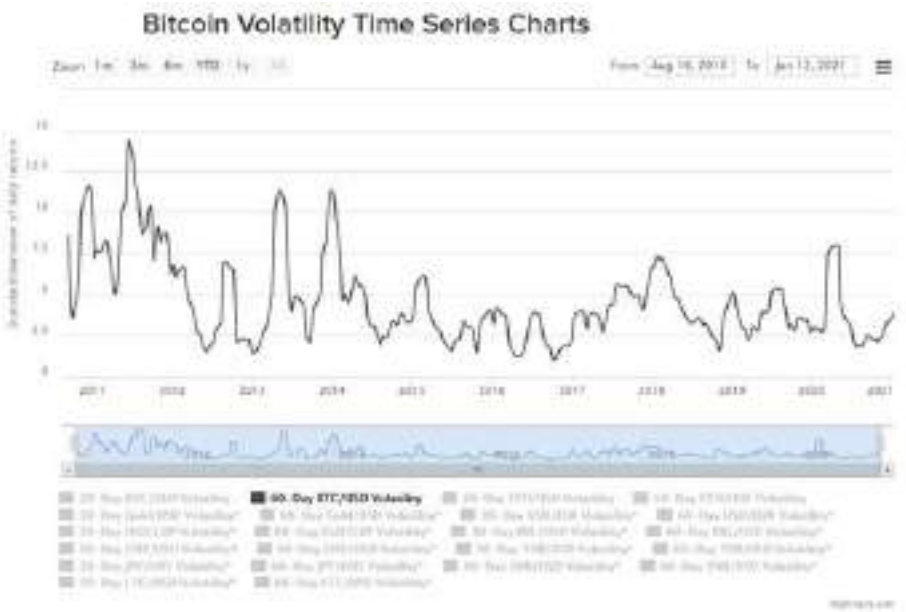
Is Bitcoin's Volatility Diminishing?

Referring to the earlier discussion on the evolution of stores of value, a new store of value with growing levels of adoption and recognition will over time have reduced levels of volatility. In the interim, holders of such store of value are compensated in the long term in the form of price appreciation until such time as the asset becomes widely accepted. Upon reaching that point, price appreciation and volatility diminish dramatically. As Yassine Elmandjra of Ark Invest suggests:

"As its adoption increases, the marginal demand for bitcoin should become a smaller percentage of its total network value, diminishing the magnitude of price swings".

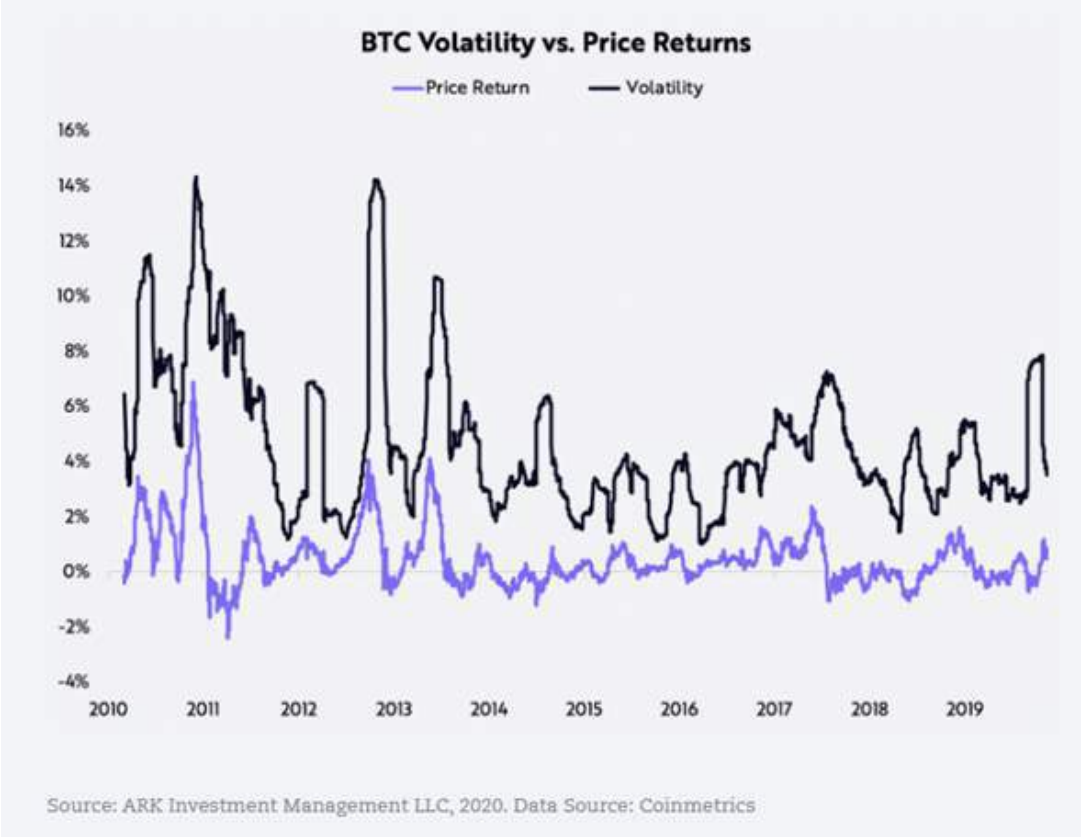
Since inception, bitcoin's volatility has been steadily declining as its user base increases, shown in the chart (Figure 30) below.

Figure 30



In the chart below (Figure 31), Ark Invest provides an additional perspective, overlaying the returns with lowered volatility over time.

Figure 31



To be sure, bitcoin is still significantly more volatile than gold or fiat currency. The latest Bitcoin Volatility Index 60-Day Estimate is 3.92%, relative to the average of around 0.5% for fiat currency and 1.5% for gold. Notwithstanding, volatility is reducing in the long term, lending support to the claim that bitcoin is an emergent store of value.

Summary

To summarise the points made in response to the argument that bitcoin is too volatile to be a store of value:

- A lack of volatility is not sufficient condition for a good store of value since fiat currency has low levels of volatility but is a poor store of value;
- Bitcoin's volatility is a function of the price discovery process for an emergent store of value;
- Bitcoin's volatility is reducing over time and will plateau once bitcoin is widely adopted and recognised as a store of value;
- At present, due to its volatility, bitcoin is not suitable as a store of value in the short term; and
- The risk posed by current volatility can be mitigated by having an appropriate position size and more importantly, time horizon.

Bitcoin isn't Scaleable as a Means of Payment

This criticism focuses specifically on bitcoin's future as a potential medium of exchange and less as a store of value. The argument suggests that Bitcoin isn't scaleable since the number of transactions the network can handle per 10 minutes is very low relative to existing payment networks such as Visa who have enormous data centres processing millions of transactions in real-time.

This implies that for many low value day to day transactions, Bitcoin is wholly unsuitable. This was of course the basis for the "hard fork" in 2017 discussed earlier, when proponents of the alternative, Bitcoin Cash, wanted to increase block size to speed up transactions

.

All payment networks necessarily entail trade-offs, as Lyn Aldern notes:

"... with any payment protocol, there is a trade-off between security, decentralization, and speed. Which variables to maximize is a design choice; it's currently impossible to maximize all three."

Bitcoin maximises security and decentralisation at the expense of speed, unlike a payment processor such as Visa, who maximises speed and centralisation at the expense of security.However, even that comparison is inappropriate since Bitcoin is the settlement layer compared to Visa which is the transactional layer built on top of the merchant banks settlement layer.

It is well-known that the global banking system is poor at scaling since it can take days for transactions to settle and at great cost.This explains why it is inappropriate for the majority of transactions to run directly through the global banking system, save for transactions of sufficient size. To improve scaleability, the banking system has an additional transactional layer built on top to make smaller transactions viable to the consumer.

These include payment rails such as PayPal, credit cards and other third party payment applications.

Similarly with Bitcoin, there are protocols such as the Lightning Network and smart contracts that have been built on top of Bitcoin to improve the scaleability, speed and costs of transacting. The Lightning Network is best conceived as a decentralised system for high-volume instant micropayments that removes the risk of delegating custody of funds to trusted third parties. In time, this may prove to be the preferred transaction layer on top of Bitcoin, but that remains to be seen as several others are in development. In either case, it is likely that in the not-too-distant future, bitcoin payments will be as instant and seamless as current third party payment processors.

The argument that Bitcoin doesn't scale is therefore weak since there are viable existing protocols that effectively eliminate such concern with the added benefit of having no counterparty risk.

Bitcoin is used by Criminals

Many critics of bitcoin accuse it of enabling criminal and nefarious activities. This perhaps stems largely from its early days when the cryptocurrency financed the operations of Silk Road, an online black market that amongst other things, enabled the sale and distribution of illegal narcotics. This criticism is arguably a criticism of bitcoin's properties of censorship-resistance and pseudoanonymity. As recent commentary by Ark Invest suggests:

"As a neutral technology, Bitcoin allows anyone to transact and cannot identify "criminals". Instead of relying on a centralized authority to identify participants by name or IP address, it distinguishes them by cryptographic digital keys and addresses, conferring upon Bitcoin strong censorship-resistance. As long as participants pay fees to miners, anyone can transact anywhere at any time. Once secured, the transaction cannot be easily reversed...

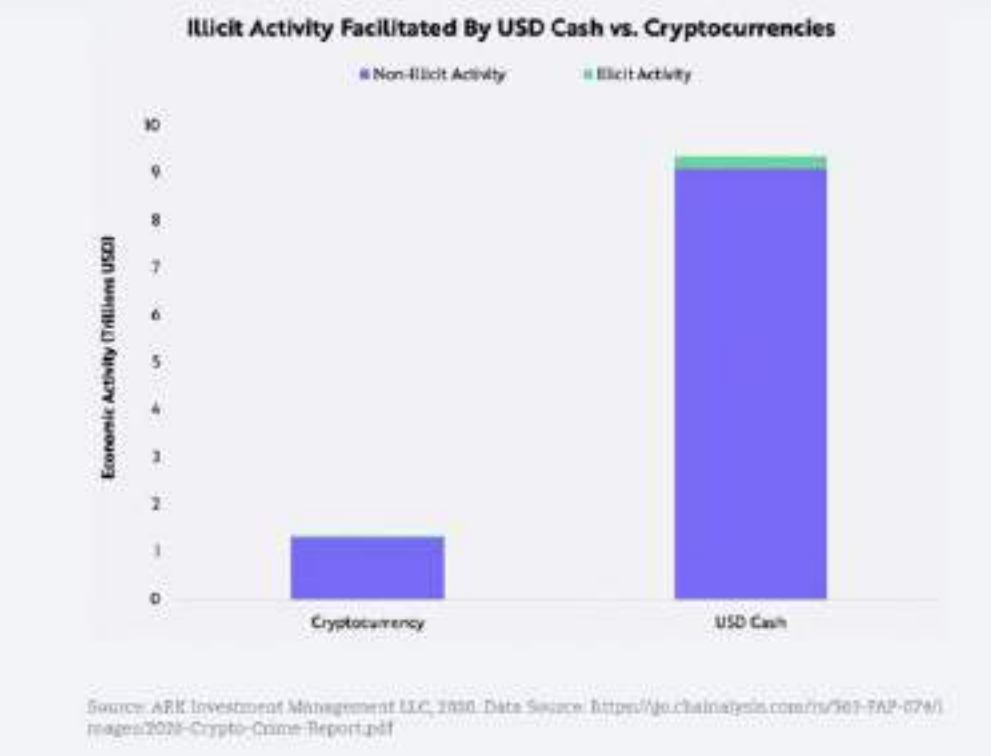
Bitcoin enables anyone to exchange value globally and permissionlessly. This does not make it an inherently criminal tool. Phones, cars, and the Internet are no less bannable for facilitating criminal activity than Bitcoin is."

Undoubtedly, bitcoin is used by criminals however it would be irrational to ban it on that basis, just as it would be irrational to ban phones, cars or even the US dollar which are all used by criminals. Importantly, it is important to consider bitcoin's use within context. Blockchain analytics firm, Elliptic, tracked bitcoin's use in illicit activities and established that it has been trending downwards for some time and today, it makes up less than 1% of total bitcoin transactions. In fact, for every dollar spent illegally in bitcoin, $800 is laundered via cash. Even the US Department of Treasury has acknowledged this:

"Although virtual currencies are used for illicit transactions, the volume is small compared to the volume of illicit activity through traditional financial services." - Jennifer Fowler, US Department of the Treasury

On a relative and absolute level, the chart below (Figure 32) suggests that bitcoin is used for significantly less illegal activities compared to cash:

Figure 32



The other aspect to consider is that Bitcoin is pseudoanonymous, not anonymous. Blockchain forensics specialists together with law enforcement have successfully detected and punished criminal activities (using fiat exchange "on-ramps" and "know your client" regulations). Anyone is able to view a complete history of transactions on the network, suggesting that fiat currency may be a far better tool for illicit activity.

In addition to growing scrutiny from regulators and the integration of bitcoin into the traditional financial ecosystem, the tools are in place for the role of bitcoin in illegal activities to be increasingly less over time. For these reasons, the argument that bitcoin is used by criminals is simply not supported by the data and can therefore be dismissed.

Bitcoin Wastes Energy

The massive computing power of miners leads critics to argue that the Bitcoin network poses serious environmental concerns since it consumes as much energy as a small country. Bitcoin proponents such as Nick Szabo however highlight that heavy energy consumption is a fair trade-off for the security of the network: *"…prolific resource consumption and poor computational scalability unlock the security necessary for independent, seamlessly global, and automated integrity."*

Others such as Hugo Nguyen similarly argue that the energy consumption is justified by the value the network offers: *"Under the hood, proof-of-work mining converts kinetic energy (electricity) into a ledger block. By attaching energy to a block, one gives it 'form', allowing it to have real weight and consequences in the physical world."*

In short, the response is that high energy consumption is a justified as a trade-off against the enormous value established by the Bitcoin network. In addition, consider the nature of gold mining which uses enormous amounts of energy – from exploration, to developing a mine, to processing tons of rock, to extracting the gold, to purifying and minting it into bars and coins and then transporting it. Coupled with its scarcity, gold's value is partially derived from the amount of concentrated energy that goes into a small unit of gold. Few however argue that the energy consumption for gold mining is unjustified.

Even if one accepts that the Bitcoin network has a high energy footprint, research has shown that it is far more efficient than banking or gold mining on a global scale. Bitcoin's mining cost per gigajoule expended is estimated to be up to 40 times more efficient than traditional banking and 10 times more efficient than gold (see Figure 33 below).

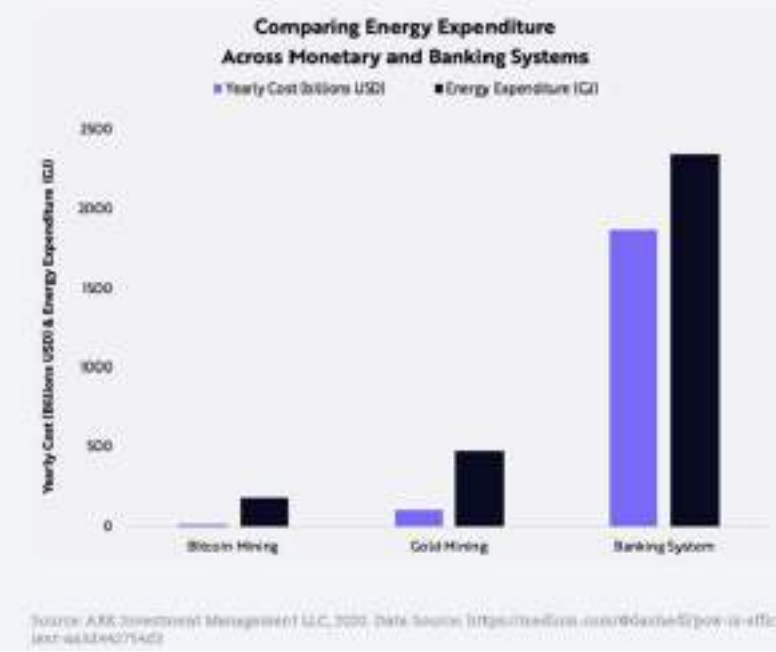


Figure 33

Finally, the last point to note is that there isn't consensus amongst analysts that the environmental impact of Bitcoin is serious. Research indicated that renewables, particularly hydroelectric power, accounts for a large percentage of Bitcoin's energy mix. Castle Island Ventures' Nic Carter noted that as miners search for the cheapest form of electricity, they tend to flock to regions offering a glut of renewable electricity, unlocking stranded energy assets as "electricity buyers of last resort".

Whether Bitcoin poses serious environmental problems is disputed. However, even if accepted, relative to the alternatives and the value it necessarily creates, the evidence suggests that the trade-off is ultimately justified.

Risks

Government will Shut Down the Bitcoin Network and/or Ban it

The notion that any government is capable of shutting down the Bitcoin network is factually incorrect and can be summarily dismissed. As a decentralised network, there is no single point of failure, attack vector or entity that can be targeted. Much like no government has the ability to shut down the internet (they can however restrict its citizens' access to it), no single government has the capacity to shut down the Bitcoin network.

The legitimate argument and risk however is that governments will ban bitcoin, particularly if it is successful in providing an alternative store of value that is incapable of monetary debasement and is confiscation-proof.

Given that bitcoin uses encryption and is capable of self-custody, in practical terms, there isn't a serious risk that government can literally confiscate bitcoin through legal demand. This is quite unlike gold which was illegal to hold in the US from 1933 to 1975, despite there being relatively few prosecutions. Governments certainly can ban ownership as well as exchanges that facilitate the buying and selling of bitcoins. Naturally, this would drive out all institutional investment and push bitcoin into the black market. However, the risk of that in most developed countries appears to be quite small, at least for now.

With a market cap of $735 billion and with major public companies, investment funds, exchanges, well-known investors, institutional-grade custodians and payment processors like PayPal involved, it is difficult to envision a situation where it is banned outright. In addition, consider that since 2020, US banks are now also permitted to provide custody for crypto assets.

Across most of the developed world, tax authorities have also classified it as a digital asset or commodity, making it subject to capital gains tax. Since the "on-ramps" and "off-ramps" are inherently tied to the existing financial system (such as "know your client" and anti-money laundering regulations), tax authorities are thus far satisfied in their ability to collect gains upon the sale of digital assets.

On a practical level, given the mainstream momentum across most of the world, it is becoming increasingly less likely that it will be widely banned. As Lyn Aldern poignantly notes:

"Once the political donor class owns it as well, which they increasingly do, the game is basically over for banning it. Trying to ban it would be an attack on the balance sheets of corporations, funds, banks, and investors that own it, and would not be popular among millions of voters that own it."

Historically speaking, governments have banned everything from the consumption of alcohol, use of drugs, purchase of firearms and the ownership of gold. While they have been successful at restricting access in some cases, governments have not been able to change its value. Gold for example, despite being banned between 1933 to 1975, did not lose value and in fact increased in relative terms against the US dollar. Bitcoin would be exponentially more difficult to ban than gold due to its global, decentralised and encrypted nature.

As Bitcoin has matured, it has become more decentralised and immune to attack. The more jurisdictions that have mining operations, the less risk any single jurisdiction represents to Bitcoin's security. Even if all of the G-20 nations decided in unison to ban bitcoin, it is unlikely to represent a threat to Bitcoin as it would merely reinforce its participants' conviction in its monetary qualities.

Of course, bitcoin's momentum would be significantly slowed, but its antifragile properties tend to suggest that it will recover and continue forward.

As discussed earlier, any effort to ban in one jurisdiction would directly benefit competing jurisdictions. In fact, evidence suggests that countries that create reasonable regulatory frameworks benefit from significant capital inflows. Parker Lewis of Unchained Capital argues that:

"*…each time a country takes an action to restrict the use of bitcoin, it actually has the unintended effect of promoting bitcoin adoption. Attempts to ban bitcoin are an extremely effective marketing tool for bitcoin. Bitcoin exists as a non-sovereign, censorship-resistant form of money. It is designed to exist beyond the state. Attempts to ban bitcoin merely serve to reinforce bitcoin's reason for existence and ultimately, its value proposition."*

None of this is to say that there won't be regulatory hostility to bitcoin in the coming years. No doubt, bitcoin-specific policies will become more prevalent in the coming years. Since Bbitcoin and blockchain technology are here to stay, governments are however probably more likely to deploy them to their advantage.

While the market cap is small, regulation and potential banning remains a risk to be watched carefully and managed with an appropriate position size. The data and trends however indicate that the risk of government bans is likely to decline in proportion to the growth of the asset.

Exchange Shut Downs

Building on the risk above, one of the more real threats to bitcoin is the shut down of exchanges, since they are centralised in design and subject to government and banking regulations. Whether on its own accord or by government decree, if the banking system were to halt business with exchanges it would severely stunt bitcoin's growth. Even though there are over-the-counter brokers and other sources, exchanges provide the bulk of liquidity into the bitcoin market.

However, as an exchange is banned in one country it is likely to open up in another, as was the case with market leader Binance who shifted from China to Japan. It is only with a coordinated global shut down of cryptocurrency exchanges that the monetisation process would be completely halted.

As bitcoin grows in adoption, this sort of shut down becomes increasingly less politically feasible. While the market remains relatively small there is still a window of opportunity for governments to act and to that extent, the risk is not infinitesimal.

Competition

It has been claimed that one of the potential risks facing bitcoin is that a competing cryptocurrency, currently in existence or not, dethrones it as the most dominant. If successful, it would drain value from the Bitcoin network and ultimately result in a significant or total price collapse.

Since Bitcoin is free and open source code, individuals can and have copied the software and created their own cryptocurrencies. This explains the "hard fork" of 2017 and the proliferation of cryptocurrencies available since 2011. Over the years, many have claimed to improve on Bitcoin's deficiencies, but none have come close to displacing Bitcoin for the simple reason that they deviated from the core properties that led to Bitcoin's success – namely its scarcity, decentralisation and immutability.

Investors may rightly ask why bitcoin is valuable if a host of identical copies emerged. The answer is the network effect, discussed earlier. The value of bitcoin is therefore not simply a function of its properties or existence, but rather, its network effects.

Competitors have come and gone and many still exist. None however have managed to attract adoption like bitcoin.

Much like a developer could build a better Facebook, it would be a near impossible task to lure its 2.6 billion users to a new platform. Bitcoin's dominant market share, evidenced by the Bitcoin Dominance Ratio, offers such proof.

Based on bitcoin's network effects and persistent dominance, the risk of a competing cryptocurrency supplanting bitcoin is marginal.

Bitcoin gets Hacked

Much publicised hacks suggest that bitcoin is not a secure asset to hold. Most often however, this criticism is confused about what has been hacked and how.

The Bitcoin network has never been hacked and is resistant to efforts by bad actors due to its blockchain technology and decentralised nature. If for example, a hacker wishes to change a specific block of transactions in the past, he would necessarily need to alter that and all others up until the most recent block before the most recent block is completed by all miners competing to process it. This requires processing speed that makes it practically impossible.

By contrast, centralised exchanges and individuals that use bitcoin have been hacked, not the network itself. This is similar to a bank or stockbroking platform being hacked. This is possible because hackers are able to focus on a single attack vector, namely the centralised platform. Even though Bitcoin has not been hacked, since transactions are irreversible it is critical for bitcoins to be securely stored. Once private keys are in the hands of a bad actor, there is nothing one can do to stop or reverse that.

In the early days, many bitcoins were lost due to a lack of technical knowledge and availability of consumer storage solutions. Today,there are a host of ways to store bitcoins securely from regulated custodians such as Fidelity to taking full control yourself with a hot or cold wallet solution.

On this basis, the argument that Bitcoin gets hacked does not hold up to scrutiny.

Concentration Risk of Mining

Since bitcoin mining became industrialised in 2015, concerns have been raised in relation to the concentration of "hashpower" in China. Specifically, this refers to the concentration risk of having Chinese mining pools providing upwards of 65% of computational power used to validate bitcoin transactions. The risk of this is a so-called "51% attack", a situation where a group of miners with 51% or more of the hashpower use their collective power to disrupt the consensus mechanism of the blockchain. Given the Chinese government's propensity to intervene in the affairs of private companies deemed to be of national or strategic interest, this is a risk worth properly understanding.

Implications of a "51% Attack"

Once a group of miners has sufficient mining power to control 51% of the "hash rate", they have the ability to do a number of things:

- Exclude or modify the ordering of
- transactions;
- Reverse transactions, leading to a double-spending problem (i.e. bitcoins being spent twice);
- Prevent some or all transactions from being confirmed; and
- Prevent some or all other miners from mining resulting in what is known as mining monopoly.

Importantly, there are limitations, as they couldn't:

- Steal people's bitcoin arbitrarily;
- Create false transactions that never occurred;
- Change the block reward;
- Create coins out of thin air;
- Double spend any bitcoins other than the ones they have mined;
- Change the consensus rules; and
- Invalidate valid transactions.

Without going into any further technical details, the most relevant implication for investors is not that their bitcoins would be under threat of being stolen. Instead, the actual threat is that the attack would result in a significant loss of confidence in the network, potentially leading to dramatic declines in bitcoin prices, the extent of which is unclear.

Mining in China

Despite the use of bitcoins and cryptocurrency exchanges being banned in China, its hashpower dominance is largely due to the fact that it produces the mining equipment, has access to cheap labour and further, enjoys cheap electricity.

Within China, some local governments support mining pools (miners who aggregate their resources), while others don't. Beijing, known for its anti-bitcoin stance, recently asked local governments to move away from mining citing dissident activity and energy usage as reasons to cut down power supplies to the miners. Government has been known to arbitrarily seize mining equipment when it detects so-called "power theft". In response to the central government's actions, some miners have sought refuge in less restrictive jurisdictions. An argument has therefore been made that Chinese mining pools are in fact acting largely as dissidents – their loyalty lies not to the nation state but rather to the Bitcoin network and incentives that have enriched them.

From around 73% some years ago, the hashpower in China has since decreased to 65%. This trend seems to be gaining momentum as investment in US, Canadian and Nordic mining operations have enjoyed strong levels in recent years. In 2020, Nasdaq-listed Marathon Patent Group spent $50 million building out a facility in Montana while Peter Thiel, co-founder of PayPal, invested $50 million in a wind-powered mining rig in west Texas.

The best defence against a 51% attack is undoubtedly decentralisation and the evidence tends to suggest that this is occurring.

In addition, some specialists have highlighted the Bitcoin network's ability to detect the actions of bad actors and respond accordingly by amending the code, hence limiting the damage – this is however a technical question best left to the experts.

How likely is a 51% attack from China?

Based on available knowledge, unlikely, particularly if one considers the ideological stance of miners, the amount of coordination and resources that would be required, the difficulty level of mining and the growing decentralisation of mining operations.

To be sure, the risk is not zero, particularly in the current unstable economic and political environment. A prudent approach would be to revisit this issue periodically and adjust one's position accordingly.

Fungibility

The open source nature of the Bitcoin code makes it possible for nation states to mark certain bitcoins as being "tainted" as a result of their use in certain prohibited activities. If regulations banned the use of these bitcoins by exchanges or merchants they would be rendered largely worthless since the bitcoins would lose one of their key monetary properties, namely fungibility.

In response, the Bitcoin protocol will need to be adapted to improve the privacy of transactions but these would necessarily entail trade-offs between efficiency, privacy and complexity. At present, it isn't clear whether there are ways to enhance Bitcoin's privacy without compromising its use as money.

While this isn't viewed as a material risk at present, it is one to be aware of.

Protocol Risk

The Bitcoin network's integrity and security may be compromised if advances in quantum computing become sufficiently powerful. In such event, Bitcoin will be severely compromised as quantum computing will enable bad actors to detect flaws within the protocol and break the underlying cryptographic code. Importantly, if quantum computing does reach those levels, it wouldn't just be Bitcoin at risk but all things digital that have a security, from online banking to email.

Quantum computing aside (which is an existential threat to all forms of digital security), the protocol risk was highest in its earlier days and over time, it has reduced to outlier status.

Other Risks

In closing, I seek to outline a few remaining potential risks that vary in nature, severity and likelihood.

There are also conceivably other risks that are not yet apparent (so-called "unknown unknowns"). Either way, in assessing bitcoin, investors may elect to investigate these risks further and their potential impact on their investment case:

- Large bitcoin holders, known as "whales", have the ability to move markets and arguably, have the capacity to slow down the trend of declining volatility in the asset;
- Bitcoin transactions are irreversible and uninsured;
- China nationalises the miners before the mining pool is sufficiently diversified;
- Additional "hard forks" drain value from bitcoin's market cap;
- In adopting an IMF-backed digital currency, members are required to ban bitcoin as a condition of its adoption; and
- Volatility remains a long term feature and the potential upside is dampened as institutional investors are required to do month-end and quarterly rebalances of their holdings.

Closing Thoughts

As a long-term investor, my goal is to be exposed to a basket of diverse, uncorrelated assets that have a tendency to appreciate over significant periods of time. 2020 represented a point in time when my thinking shifted. I found it difficult to reconcile what I saw playing out on the global stage and the traditional frameworks used for assessing asset classes. I found myself asking questions such as:

- What is the long-term impact of negative interest rates?
- How should we think about negative (in real terms) sovereign bonds?
- Is the 60-40 portfolio allocation still relevant?
- What are the long-term implications of increased fiscal stimulus?
- Will the high levels of sovereign debt ever be repaid?
- Why are equity markets so detached from the current and future economic reality?

While exploring these complex macroeconomic themes (that I don't necessarily have answers to), bitcoin returned on my radar. Admittedly, the learning curve was fairly steep, however over time my conviction grew. My current view is that an investment in bitcoin in 2021 is significantly de-risked within the context of an ideal macro environment and growing institutional adoption. I'm therefore persuaded that bitcoin offers one of the more attractive risk-reward profiles relative to other assets over the coming 5, 10, 15 years.

As bitcoin's market cap grows, more and larger institutions will feel that the path has been set for them to gain exposure to a new, growing asset. As its market cap grows, its volatility will dampen and more investors will be drawn into the asset. Counter-intuitively, the higher the price grows the less the perceived risk by potential investors. While most investment managers may presently regard it as a career risk to take a position, my sense is that in time, it may become a career risk not to.

I also tend to agree with those who suggest that investing today in the dominant monetary network that is Bitcoin, is akin to investing in Facebook, Alphabet or Amazon 12 years ago. In the mid-to-late '90s, many questioned the longevity and potential of the internet. Of course today, the internet is as pervasive as ever. At risk of being hyperbolic, bitcoin could ultimately prove to be as omnipresent as the internet, but whether it comes anywhere close to that remains to be seen. My analysis of bitcoin has however led me to conclude that it represents a compelling opportunity for asymmetric returns in the medium to long term.

This is not to say that there choppy waters aren't ahead – there most certainly are, foremost amongst them being regulation. This necessarily translates into short-term volatility which is a feature of bitcoin that will remain for the time being, but which is likely to decline materially over time.

Within uncertainty lies opportunity. The key however is to manage risk by using an appropriate position size relative to your knowledge, conviction, time horizon, investment goals and personal financial situation.

Whether I have succeeded in providing an adequately strong case for a non-zero position in bitcoin remains an open question. At the very least, I hope to have covered enough ground to persuade sceptical investors to do what I did, and investigate this unique asset further.

In the interim, I will be "hodling".

Dale Warburton

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