

Digital Currencies

Alastair Unwin

Fund Manager & Senior Analyst



For believers, 2020 was the year when digital currencies went mainstream; for sceptics, the bitcoin boom was the latest in a long line of distortions caused by over-abundant liquidity and suppressed interest rates. The investor attention as well as the capital and talent rapidly being drawn in renders it worthy of close consideration. Things are changing fast, and the speculative nature of the assets makes fundamental analysis challenging, but it is helpful to break down the different aspects of the crypto/bitcoin/digital currencies/distributed ledger space.

- Cryptocurrencies are not backed by fiat currency (eg bitcoin)
- Stablecoins are backed by fiat currency (eg Tether, Gemini, Diem from Facebook)
- Central bank digital currencies (CBDC – eg e-renminbi)
- Distributed ledger technology (eg blockchain and the DeFi – decentralised finance – opportunity)

Cryptocurrencies not backed by fiat currency

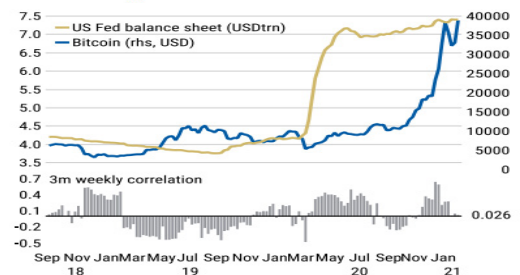
2020 was a breakout year for cryptocurrencies, especially bitcoin. Bitcoin rallied 720% from a March 2020 low to 8 January 2021, corrected 25%, then rallied another 55% by mid-February. Trading volumes in 2020 were twice 2019 – 97% of all 2020 inflows into crypto assets went into bitcoin. It was notable that the expansion of the Fed's balance sheet occurred in advance of the major increase in the bitcoin price in the final quarter of the year. Awareness of bitcoin arguably did go mainstream in 2020 – which is an important development given its inherent value is driven by the perception of bitcoin having value due to its scarcity.

Institutional investor sponsorship for bitcoin as an asset class increased meaningfully: during 2020 Paul Tudor Jones, Stanley Druckenmiller, Mass Mutual and others all allocated some portion of their assets to bitcoin and many others are likely to follow, assuming the price does not collapse. There has also been a big increase in robust custody and trading solutions (Standard Chartered will offer bitcoin custody services and JP Morgan will offer bitcoin trading if there is client demand), while CME offers bitcoin and ether futures contracts. The argument to own from an asset allocation perspective is that bitcoin is a store of value akin to 'digital gold' as an inflation and fiat currency (one issued by a government but not backed by gold or other commodity) devaluation hedge; highly uncorrelated with other asset classes, constrained supply, with 'uncapped price upside'. Bitcoin target prices tend to be based on the market valuation of gold or as a proportion of total assets. JP Morgan have argued that bitcoin could reach \$146k if it became as well-established as gold for investors.



"You have it all wrong. The pink tulips aren't trading tulips, they're investing tulips"

US Fed balance sheet expanded before the big bitcoin rally



Source: Morgan Stanley Crypto Outlook Feb 2021

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Fidelity's institutional investor survey of 800 investors suggested that a large majority (80%) find something appealing about digital assets and around one third currently invest in digital assets. The Grayscale Bitcoin Trust (GBTC US) is one of the largest buyers of bitcoin (>650k BTC or >\$27bn and 3% of BTC outstanding) and mainly buys for institutional investors. There is no US bitcoin ETF at present, but they exist in Canada and Switzerland. In short, the financial and regulatory architecture around bitcoin and other cryptocurrencies is rapidly maturing.

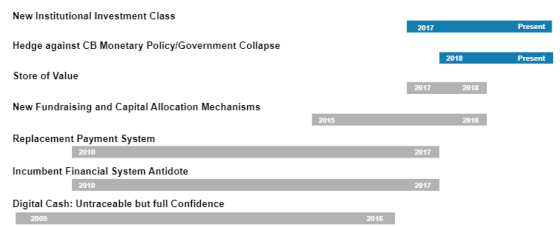
A handful of companies are starting to hold bitcoin on their balance sheets. Square and MicroStrategy are purchasing substantial quantities of bitcoin to hold on their corporate balance sheets. MSTR has even gone so far as to issue convertible debt for the purpose. Coinbase noted that a number of companies are talking to them about having cash sitting in treasury yielding nothing and investigating whether they can put some into crypto; Coinbase's prime brokerage business (Tagomi) is reportedly in discussion with several other Fortune 500 companies. Coinbase itself filed to go public via a direct listing in late February 2021 and its S-1 (SEC registration required of US companies for registering on a national stock exchange) showed that it generated \$1.28bn revenue from 2.8 million monthly transacting users, growing 140% y/y. There is some speculation that the new breed of institutional and corporate bitcoin holders might bring more stability to the price – if you are committed to owning bitcoin on your balance sheet or in your portfolio then are you more likely to buy extreme selloffs versus, historically, a wholly speculative asset class? We shall see.

Why has this happened?

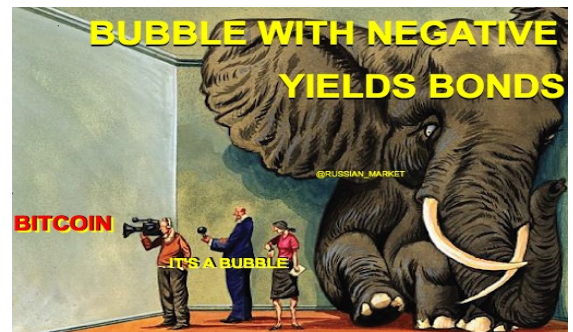
Robert Shiller's book *Narrative Economics* demonstrates how certain ideas achieve a narrative and become true because large numbers of people believe them. This narrative effect is not modelled but can have a real impact on real events. In bitcoin's original investment case, real world use cases would supposedly drive demand, but this has not been true: no one pays using bitcoins, no one uses it for FX. Some bulls argue that bitcoin will eventually become a medium of exchange if central bank actions driver-accelerating inflation and bitcoin can replace fiat currencies' global real-time payments, but this seems hard to justify given bitcoin is now held by a smaller number of people/IP addresses.

The best framework to think about the meteoric rise of bitcoin is to consider the value of its inherent scarcity (by virtue of its deliberately constrained supply) in a world of abundant capital and zero marginal costs. The creation of digital scarcity can be worth something. Gold is worth something because there is a physical scarcity to it and society collectively decided it is worth something. Others believe scarcity and decentralised governance alone is sufficient, given the monetary and political backdrop. With bitcoin, some are betting the protocol is useful for something (like you are betting people will value gold jewellery), while others see the growth in the perceived value of bitcoin is the growth in the awareness and trust that bitcoin will remain valued as a scarce asset. More prosaically, the extraordinary rally has likely been underpinned by some combination of low rates, the c\$8trn increase in G-4 central bank balance sheets, a dramatic increase in retail investor-available capital (US savings rate hit a 34% record) and market participation (retail represented 30% of US stock and ETF volume in June/July 2020), and feedback loops accelerated by social media.

Bitcoin/Crypto: Rapidly Evolving Thesis



Source: Morgan Stanley Crypto Outlook Feb 2021



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Bitcoin risks: the FCA issued a notice arguing bitcoin investors could lose all their money, but there are a range of bear cases inherent to bitcoin more specifically.

- Bitcoin has not acted as a hedge for major equity drawdowns, despite claims it is an uncorrelated asset class. Correlations with cyclical assets are increasing as ownership becomes broader. It may turn out that bitcoin exposure acts more like leverage than insurance for investors.
- Bitcoin only exists because the Chinese government allows it to. The reality is not quite the supranational decentralised system that believers assume given the means of production are so concentrated. If the Chinese government decides it wants to end bitcoin mining for some reason, or displace it with a digital renminbi (RMB), then the party is over.
- Distributed ledgers (DL) work well in systems where trust levels are near zero, but capitalism brings efficiency through trust and the ability to delegate it to someone else. A centralised, trusted system is far more efficient in most cases. For lower frequency, higher value, lower trust transactions then DL can add value, but these transactions are in the minority.
- Bitcoin's environmental impact is already material and growing. At its current level, bitcoin is using around 120 terawatt hours per year in power, which is about the same as Argentina. If bitcoin doubles, power consumption will double.

Why has bitcoin not taken off as a payment mechanism (compared to an asset class)?

Non-asset-backed digital currencies are today better viewed as an asset class rather than a payment vehicle. In almost all cases where consumers can pay with bitcoin, the mechanism is the use of bitcoin as a funding source for payment (eg PayPal, Square) in fiat currencies over traditional payment rails (a platform that allows the movement of money from a payer to a payee). Bitcoin as a quasi-payment method leverages the existing payment method of, for example, Visa and Mastercard, to allow people to use it as a funding instrument at the point of sale. To use decentralised bitcoin today for payments at scale, 7-8 transactions per second is not good enough when Visa can operate at 2,000-20,000 transactions per second. Ultimately, payment networks can only optimize for two of the three things bitcoin offers: **speed**, **security** and **decentralisation**: ultimately, you can only have two of these three attributes. US Treasury Secretary Janet Yellen recently dismissed bitcoin as an "extremely inefficient way of conducting transactions".

Stablecoins

Stablecoins are pegged to relatively stable assets (typically 1:1 with the dollar) such as Tether (USDT) which is a centralised coin which (supposedly) maintains \$1 of a US dollar for every \$1 of Tether coin. Effectively, this turns a dollar in a bank account into a token which can move on a blockchain. The token represents a claim you can redeem.

The ultimate vision for stablecoins is a financial system that never needs to come back outside the crypto world (contrast this with having to convert and de-convert crypto to fiat to actually use it to transact today). The vision would be to transact in stablecoins without excess volatility or requiring you to cash it out into actual fiat currency. The debate is whether stablecoins (which are already being used) are eclipsed by CBDCs (central bank digital currency). Different stablecoins like Gemini, Coinbase's Circle and Tether all have different features in the same way that WhatsApp, Signal and SMS all send messages. These stablecoins can be a payment method and Mastercard and Visa will enable them across networks, which means they will take delivery of stablecoins and allow merchants to settle in them if they wish. In this sense, stablecoins are another settlement currency offered to merchants like euro or sterling.

There are two important impacts of stablecoins. First, the reality of stablecoins being used by consumers and businesses will act as a catalyst for central banks to accelerate their CBDC initiatives. Stablecoins are to some degree competitive with fiat currency, and their increasing use would in time reduce the control central banks have over currency and the flow of money around the economy. Second, stablecoins are likely to have a greater impact in emerging markets, particularly those with capital controls. It is very difficult to prevent emerging market consumers and businesses transacting in dollar-linked tokens that are available to anyone with an internet connection, and this poses a real threat to the use of volatile and depreciating emerging market currencies. This is a further reason why global central banks are co-ordinating their CBDC initiatives.

Central Bank Digital Currencies (CBDCs)

The Bank for International Settlements (BIS) defines a CBDC as "a digital payment instrument that is a direct liability of the central bank". Central banks issue two types of money today: physical cash (to everyone) and reserves – electronic central bank deposits – to qualifying and regulated financial institutions. A third type is private money which people and companies alike access via electronic private bank deposits. This private money is not a claim on the central bank but on the regulated financial institutions (eg banks). CBDCs are a sort of hybrid between central bank reserves (as they are an electronic, fiat liability of the central bank) and bank notes (accessible by the public rather than just by qualifying institutions). In short, CBDCs are central bank money that the public can access electronically with the central bank (not a private institution) as counterparty. The purpose of a central bank historically has been in part to provide trusted money which can be used as a unit of account, a store of value, a medium of exchange and settlement for financial transactions. The CBDC effort is best seen as part of the modernisation of this goal.

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Why do it?

There are many reasons for this: financial inclusion; strategic assets (the payments system is a national asset that should not rely on Visa/Mastercard/private corporations); helps market contestability to keep pricing lower to the private sector; reduce costs and crime associated with cash; threat of privately issued digital currencies usurping central banks' role or bringing with them financial instability. In time, it will also be possible to use CBDCs as an instrument to better calibrate both monetary and fiscal policy, especially in a low/negative rate world where other measures are seeing diminishing effectiveness. More radical CBDCs could offer the ability to change tax or interest rates automatically in response to economic data (which could itself be richer given much higher visibility into CBDC activity versus a cash economy).

Risks

Banking sector disintermediation could see deposits taken from banks and put in the central bank which would defund private banks and hurt credit growth; at times of crisis it would make runs on banks much worse (but some banks are saying deposit insurance has already dealt with this threat). 'Dollarisation' where anyone can hold digital dollars (or RMB?) cheaply could destabilise emerging market currency stability/undermine capital controls.

How might it work?

It might work through a public-private sector partnership. Central banks could license players to issue tokens which would be backed by central bank reserves. This is called a 'hybrid' or 'synthetic' CBDC. You could manage CBDC issue and settlement under licence, just like we have under the current system. Central banks are generally not in favour of disintermediating private banks or doing anything which could undermine financial stability, although it is possible to see how more centralised economic systems might find widespread CBDC adoption a tempting policy tool.

COVID-19 impact

The rise of bitcoin and Facebook's Libra efforts reignited interest in the CBDC movement but two important things happened during the pandemic to accelerate things: central banks struggled to provide direct support to underbanked or unbanked individuals and money laundering rates declined precipitously as cash use fell. The focus today is mainly on providing a CBDC for payments, which would enable broader access to central bank money as cash is in decline today. In this sense, CBDC would function as a digital banknote and could be used to distribute funds more quickly in the event of natural disasters (compared to relying on archaic cheques and cash).

A strong element of central banks' acceleration of digital currency initiatives is increasing competition. The move from public fiat money to private electronic money (eg bitcoin) undermines the definition of money, the reality of legal tender, the financial intermediation model (ie the modern banking system) and the role of central banks themselves – not least in the transmission of monetary policy.

The base case assumption is that these CBDCs will happen, but that the exact form and use cases are still ill-defined. China and Uruguay are already running pilot studies in the field and the BIS published a report on CBDCs written by seven of the largest central banks (including the Fed, BoJ, BoE, PBoC and ECB) which explored the founding principles needed to operate CBDCs.

“A strong element of central banks' acceleration of digital currency initiatives is increasing competition. The move from public fiat money to private electronic money undermines the definition of money...”

	CBDC	Reserves	Central Bank Notes	Deposits	Bitcoin	Ether ^a
Liability of the central bank	✓	✓	✓	x	x	x
Electronic	✓	✓	x	✓	✓	✓
Universally accessible	?	x	✓	✓	✓	✓
Interest bearing	?	?	x	?	x	x
Trades at par ^b	?	✓	✓	✓	x	x
Cryptocurrency	?	x	x	x	✓	✓
Token or account based	?	A	T	A	T	A

^aWe have taken Bitcoin and Ether as the best known examples of privately-issued cryptocurrency. The characteristics shown are also accurate for the majority of cryptocurrencies, although the economic and technological design of different cryptocurrencies can vary significantly.

^bTrades at par with other central bank liabilities

Source: <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/broadening-narrow-money-monetary-policy-with-a-central-bank-digital-currency.pdf?la=en&hash=26851CF9F5C49C9CD-BA95561581EF8B4A8AFFA52>

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Janet Yellen has suggested the idea “makes sense” and could bring “faster, safer and cheaper payments”. There is a wide range of potential consequences which will be debated over the next 5-10 years but we believe the direction of travel looks fairly clear and it has become a question of when not if.

The most significant point is that we are very early in the evolution of what a CBDC should look like and what the purpose of it should be. Should it pay interest? Should it be anonymised? Who should operate it? Should it be token-based or account-based?

China leading

It is clear that China is the furthest down the road in the development and testing of a CBDC. China’s official digital currency, DCEP (Digital Currency Electronic Payment), is issued by the PBoC to reduce the cost and friction of bank transfers and mitigate traditional cash risks around counterfeiting and money laundering. Regulators will also be able to monitor digital currency transactions and believe DCEP will in time be able to improve financial and monetary supervision, and will not allow it to be used for speculation. A successful CBDC would also likely promote the use of the renminbi as part of a new (renminbi-denominated) international currency clearing network. There have been pilot tests in several cities and efforts are expected to ramp up into the 2022 Winter Olympics (in Beijing).

It appears the model that the Chinese look like opting for is a version of the traditional financial intermediation model but with more of a technology skew. That is, they will issue the e-currency to both traditional banks (China Construction Bank) and directly to non-financial digital wallet providers (Ant, Tencent). Digital wallets would take the place of bank accounts in the current system. Merchants will be required to accept DCEP as legal tender. It is this opportunity that fintech companies are particularly interested in long term, as it would allow them to compete on a level playing field with banks in terms of access to central bank funding lines – as we have already seen happening de facto with initiatives like PPP in the US and coronavouchers in Brazil. In January 2021, the PBoC announced a joint venture with SWIFT, which could be seen as the first step in the process of making a digital renminbi part of the broader belt-and-road infrastructure initiative and position the renminbi as a reserve currency in time.

Investment implications

While still at the idea or pilot stage, there are no direct ways to gain exposure to CBDCs, but it is worth noting that several companies repeatedly refer to their interactions with central banks and regulators, most notably PayPal who are positioning themselves as a default wallet provider for CBDCs (should they be token-based or otherwise) given distribution scale, strong compliance and regulatory footprint. PAGS played an important role in the distribution of Brazilian coronavouchers to the lower income demographic. Visa and Mastercard are also heavily involved with regulators globally. Facebook is probably the wild card, with Diem, which has been somewhat forgotten after the Libra fiasco.

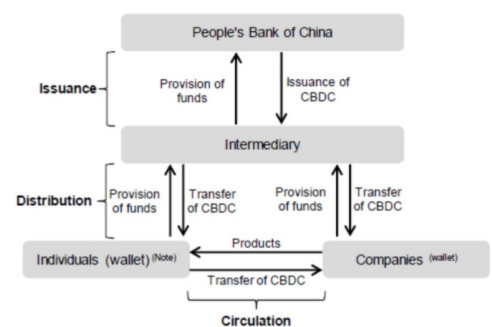
Distributed ledger technology

Bulls argue that DL technology is set to become the network for transferring value/payments in the same way the internet became the network for transferring information, and the best analogy for the blockchain itself is TCP/IP (the internet’s communication protocols).

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Figure 2. System of CBDC Issuance, Distribution and Circulation



DCEP would operate on a two-tiered system (Image credit: <https://www.nietl-gg.jp/en/china/19122701.html>)
Source: <https://boxmining.com/dcep/>

The digitisation of value is the next phase of the internet revolution which began with the digitisation of information, and the cryptoeconomy will augment the traditional economy just as the online retail world augmented the offline world (before displacing it). Ultimately, DL technology allows economic activity to take place in a cheaper, quicker, more decentralised way that is native to the internet.

At the macro level everything digital is preferred to analogue counterparts and payment/value transfer networks will be no exception. The early 1990s' internet was pornography and bank scams, but 10 years later we had Google and Amazon, and then in another 10 years its impact reached every sector. In crypto, it was Silk Road, Mount Gox, no proper custody, lots of scams, money laundering and terror finance, but this has changed and some estimate that only 1-2% of crypto activity today relates to these areas.

Decentralised finance (DeFi)

This is an umbrella term for financial applications which make use of DL technologies to provide financial services in a decentralised way. The main aim is to disrupt traditional financial intermediaries across a broader range of financial activities including lending/borrowing, exchanges, derivatives, prediction markets (ie well beyond P2P and C2B payments). These 'Dapps' aim to reduce costs by cutting out financial intermediaries, transact more quickly and transparently on a public ledger, and automate more ancillary financial and regulatory processes via self-executing smart contracts. Ethereum (the second largest crypto platform by value) is typically the building block for DeFi applications such as smart contracts which do not rely on financial intermediaries like brokers, banks and exchanges. DeFi expanded in 2020 when the total value locked (TVL) in smart contracts increased from a few hundred million dollars to >\$20bn by the end of the year (compared to Bitcoin's market cap of c\$700bn). The speculative nature of crypto at the moment has driven a mania in valuation of DeFi tokens and this does not appear to be grounded in anything concrete. DeFi is more interesting. 2017 was all about the ICO (initial coin offering) white papers raising money and there are billions of dollars flowing through these, but it is not really clear how much of the DeFi demand comes from outside the immediate ecosystem.

What is DeFi used for?

The principle is to recreate blocks of the current financial system in a decentralised way, to the point that the terminology of Lego blocks is often used. Today, the largest use appears to be in lending and borrowing (Compound is the most popular protocol). Currently, a large proportion of the lending exists to enable further speculation in crypto markets, but in essence Compound is a pool of liquidity where any lender with an internet connection provides assets and receives interest, while any borrower with an internet connection can take loans and pay interest. Supply and demand drives the interest rate, embedded within the protocol. Users are incentivised to lend on Compound through governance token rewards (COMPs). For borrowers, collateralisation is typically well over 100% to reduce counterparty risk (eg put up \$150 of crypto to get a \$100 loan). It is more like a brokerage margin account.

What does DeFi mean for the financial system?

Bulls argue that in a blockchain-enabled crypto economy eventually many of the things done by people today will be done by algorithms. Credit committees will be replaced by protocols which makes things cheaper, but you will squeeze

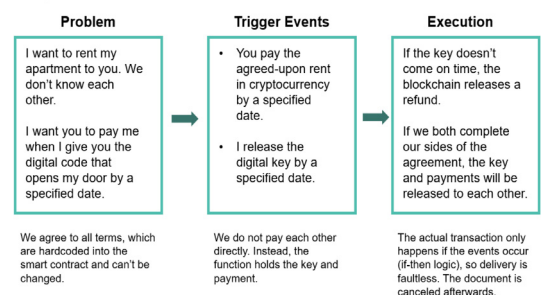
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Total Value Locked (USD) in DeFi



Source: Bernstein DeFi Report (Feb 2021)

Sample smart contract



Source: Bernstein DeFi Report (Feb 2021)

out inefficiency, fair lending etc. Banks may not exist as buildings but rather as a set of activities and regulations that will regulate these protocols rather than people who run banks (which is how banks are regulated today).

We believe technology is always part of creative destruction in finance. If we go back to the move to asset-backed securities in the 1970s, banks were not the only way to get credit and companies could issue debt in the market. Then the euro/dollar trade changed everything. Banking is lending, deposit-taking and payments and there is nothing to say this has to be done by people in a building – this is the end promise of DeFi, but that looks a long journey from where we are today.

Ali Unwin

21 June 2021

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Client Services

E investor-relations@polarcapital.co.uk

T +44 (0) 20 7227 2721

F +44 (0) 20 7227 2799

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