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A tale of two siblings: cryptocurrencies and CBDC

The route ahead

Contents

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Introduction

Christian Nolting
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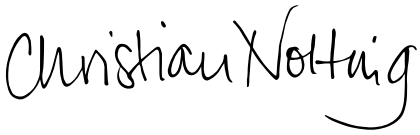
Financial innovation is a continuous process, but we appear to be at a particularly important moment in the evolution of the global financial system. Two distinct but interlinked developments – private-sector cryptocurrencies and government-driven central bank digital currencies (CBDC) – may now be approaching critical mass.

Any measured assessment of cryptocurrencies is made more difficult by continuing price volatility and perceptions (rightly or wrongly) that they are simply speculative vehicles. And, at the same time, we have yet to see a CBDC in full operation in a major economy, meaning that discussion about their potentially major policy and social impacts is at the moment based on only limited evidence.

But this is certainly the time to consider how far we have come and what could happen next. Multiple factors need to be considered in relation to cryptocurrencies – among them asset class comparisons, regulation, valuation, and the potential ESG impacts. CBDC need to be evaluated in their own right and also in terms of how they could complement, or displace, increasingly widely used private-sector cryptocurrencies. We attempt an overview on all these various issues here.

Where do I think we will go from here? I think that by now it is clear that cryptocurrencies (in some form) are here to stay, but I would argue that they are still far from a mainstream asset class. Arguments that cryptocurrencies are an important investment vehicle either in terms of portfolio diversification or inflation hedging need to be treated with caution. Likewise, while CBDC rollouts will continue over coming years, widespread adoption may take a long time: major financial and social questions need careful consideration.

Nevertheless, my belief is that governments and more digitally-aware populations may ultimately prefer to go with CBDC, at least for general use, at the possible expense of some cryptocurrencies. If this happens, then the more successful cryptocurrencies are likely to become increasingly differentiated in terms of business models and utility. As I said, financial innovation is continuous and it will not stop here.



Christian Nolting
Global CIO

In a nutshell: Cryptocurrencies and CBDC

- Cryptocurrencies are here to stay but their role in portfolios is still debated.
- CBDC rollouts will continue but widespread adoption may take time.
- Government and investor preferences for control and monitoring may ultimately favour CBDC over some cryptocurrencies.

01

Similar yet so different

As we noted in our "CIO Special: Central bank digital currencies – Money reinvented", central banks and governments around the world are doing research or experimenting with pilot projects on what forms central bank digital currencies (CBDC) could take. CBDCs are a form of digital money established by regulatory authorities (governments, central banks) and with a legal tender. This is one of the primary differentiating factors from the so-called cryptocurrencies which are not subject to such official, centralized control.

While it still sounds abstract to most people, in 2020 the Sand Dollar project in the Bahamas became the first live CBDC in the world and the DCEP (in full, digital currency electronic payment), the potential digital Chinese currency, has already been tested in several pilot projects. The Chinese DCEP represents the perhaps most interesting and powerful project at this point in time. With more than 1bn Chinese citizens as potential users, the introduction of a digital currency in China could lead to an acceleration of other projects, as other central bankers became more worried about the race for digital currency supremacy. Other digital currencies are also on their way to be tested via trial phases (e.g. the digital Euro or the Swedish Krona).

In the meantime private cryptocurrencies (also interchangeably referred to as virtual currencies) have experienced a new wave of interest after the drastic sell-off in early 2018. Prices of the most prominent cryptocurrencies have risen to all-time highs during the last few months and established payment companies and some other companies (e.g. car manufacturers) have announced that they will start to accept cryptocurrencies as payment. In our "CIO Insights: Cryptocurrencies and Blockchain – their importance in the future" we discussed different cryptocurrencies and their main characteristics. Cryptocurrencies are digital assets that use peer-to-peer networking and encryption – so in most cases the organisational structure is decentralised and broadly accessible, in contrast to the concepts underpinning central bank digital currencies (CBDC) known about so far. As opposed to the planned CBDC projects, cryptocurrencies are issued by private companies and can have diverse business models – not limited to a currency – but similar underlying technologies (e.g. Distributed Ledgers, typically Blockchain). Many of these currencies are digital tokens with no backing or intrinsic value. While the regulatory framework for these digital assets is still pending in most countries, many governments are also outright sceptical about the usage.

In February 2021, the market capitalization of the most prominent cryptocurrency, Bitcoin[1], for the first time exceeded USD1 trillion. At the same time, several other cryptocurrencies can also be counted as part of the USD1bn+ (valuation) club. While the most popular cryptocurrencies have been established for some time, new participants are also constantly entering the market and gaining prominence. At the time of writing, the social media company Facebook (with its over 2.7bn users) seems poised to introduce its own cryptocurrency and will thus represent a competitor to existing conventional money transfer systems.

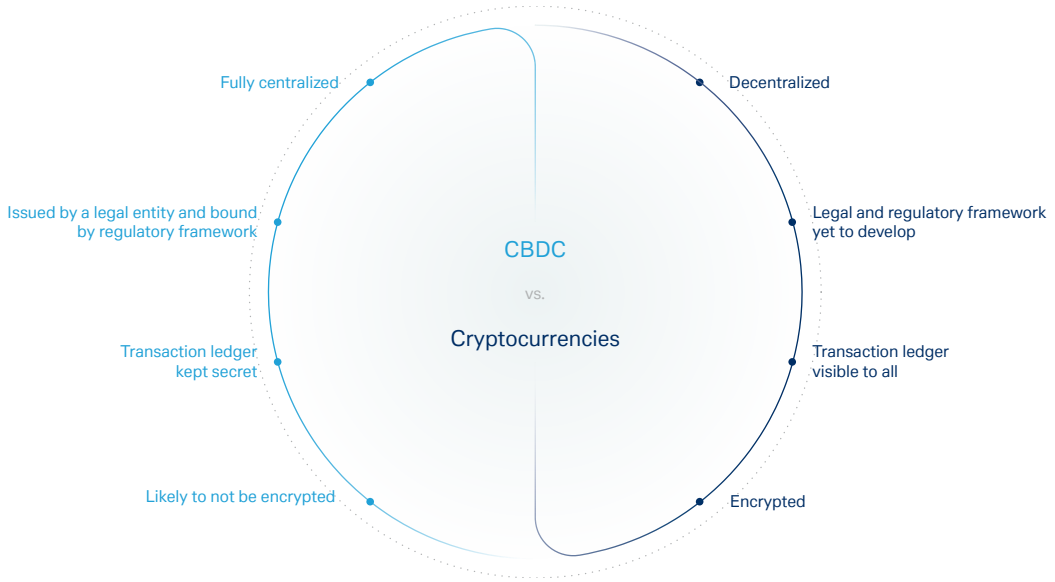
[1]According to the database coinmarketcap.com

"The introduction of a digital currency in China could lead to an acceleration of other projects as other central bankers become more worried about the race for digital currency supremacy."

In this report we outline recent drivers and specific cryptocurrency and CBDC projects, so as to comment about the role of both in the future. Many market participants have increasingly started to view cryptocurrencies as a new asset class. The introduction of more ways to invest in digital assets has even interested institutional investors recently. We also explore the merits of such a categorization and the place it holds (if any) in an investor portfolio. Furthermore, since Bitcoin has attracted much of media, government and public attention, has been around for far longer and represents by far the largest cryptocurrency by market capitalization, we would interchangeably use Bitcoin as a proxy for the cryptocurrency space in our analysis. We also take into consideration the fact that it is viewed as controversial by many market participants as we describe later in the report.

Figure 1: Summary of general differences between CBDC and a cryptocurrency

Source: Ward O. & Rochemont S. (2019): Understanding Central Bank Digital Currencies (CBDC). Institute and Faculty of Actuaries. Data as of March 2019.



02

How did we get here?

Early days

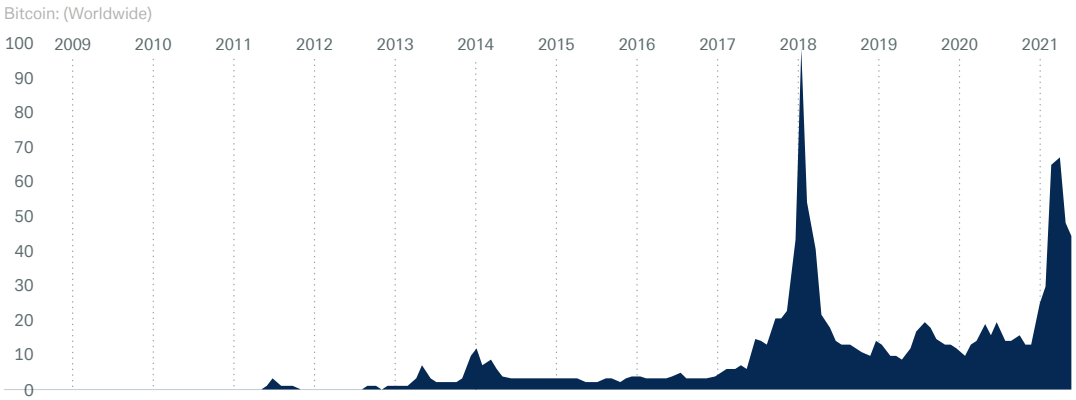
The groundwork for the eventual invention of a cryptocurrency was done in the 1980s. People such as David Chaum, Wei Dei and Nick Szabo investigated the idea of digital cash, but without garnering much attention globally. One of the first more successful digital currencies was Hashcash, proposed in 1997 by Adam Back. It had its moment in the sun before it started to face increased processing power needs (not too dissimilar from today's cryptocurrencies) and eventually became less and less effective. Nevertheless, many elements of the Hashcash system would work their way into Bitcoin's development 20 years later.

The concepts of Blockchain and cryptocurrencies moved center-stage in October 2008. An author going by the pseudonym of Satoshi Nakamoto (real identity still unknown) posted a link to a white paper titled "Bitcoin: A Peer to Peer Electronic Cash System" to a cryptography mailing list. This paper detailed how to use a peer-to-peer network to generate "a system for electronic transactions without relying on trust". In January 2009, the Bitcoin network came into existence with Satoshi mining the genesis block of Bitcoin (block number zero), which had a reward of 50 Bitcoins. Incidentally, embedded in the creation of this block along with the normal data, was the following text: *'The Times 03/Jan/2009 Chancellor on brink of second bailout for banks'.*

This was probably intended as proof that the block was created on or after January 3, 2009, as well as a comment on the perception at that time (early on in the Global Financial Crisis) that instability could be caused by fractional-reserve banking (i.e. conventional central banking), one of the factors that certainly contributed to the rising popularity of Bitcoin in the early days.

Figure 2: Interest in Bitcoin as gauged by volume of Google searches

Source: Google Trends data, Deutsche Bank AG. Data as of April 2021. Y-axis score is Google Trends calculation of topic's proportion to all searches on all topics, scored from 0 to 100.



Comparison of Bitcoin with gold

The Aztecs regarded gold as the product of Gods calling it literally "God excrement" (Teocuitlatl in Nahuatl language). The practice of using gold coins as money (along with other precious metals) was first documented around the 6th century BC. Gold coins remained important for many centuries until the mid-1800s, when many countries began shifting away from the use of actual gold currency in favour of a system known as the "gold standard" (i.e. trying to express the value of their paper currencies in terms of gold). This then made way for the post-war Bretton Woods agreement which lasted until 1971 when the gold peg for the USD was finally discarded and made way for the modern fiat currencies.

So what lent gold the status of money and value throughout history? One could argue that gold's implicitly inert nature (stocks mined thousands of years ago still exist in usable form), its limited but sufficient supply (approximately 190,000 metric tons have been mined to date with 50,000 metric tons still in reserves), its divisibility while retaining value (unlike diamonds), its purity parameters (impossible to counterfeit) and a degree of evergreen utility (decorative ornaments and jewellery and now even in electronics and dentistry), have all meant that it has earned the trust of humanity over millennia.

However, one of the major disadvantages of gold as currency (vs. fiat) has been in the mitigation of economic recessions because it hinders the ability of a government to increase its money supply (as this will depend on gold holdings in a gold-based system). Such monetary expansion has been a tool many central banks have relied upon to help boost economic growth.

In some ways, Bitcoin can be seen as the digital counterpart to gold. Like gold, Bitcoin is finite and must be obtained through mining – although, while gold is obtained through physical mining, Bitcoins must be "mined" virtually through the deciphering of special computer encryptions. Currently, around 18.5 million Bitcoin have been mined; this leaves less than 3 million that have yet to be introduced into circulation. In fact different supply characteristics (the Bitcoin mining reward rate halves every 4 years) means that Bitcoin can in some senses be regarded as "more finite" than gold whose mining speed has been increasing over centuries . It is a decentralized asset meaning no government controls supply – again similar to gold. Given such similarities and their individual market activity over the past few years, it is understandable why many believe that Bitcoin could ultimately replace gold as a store of value.

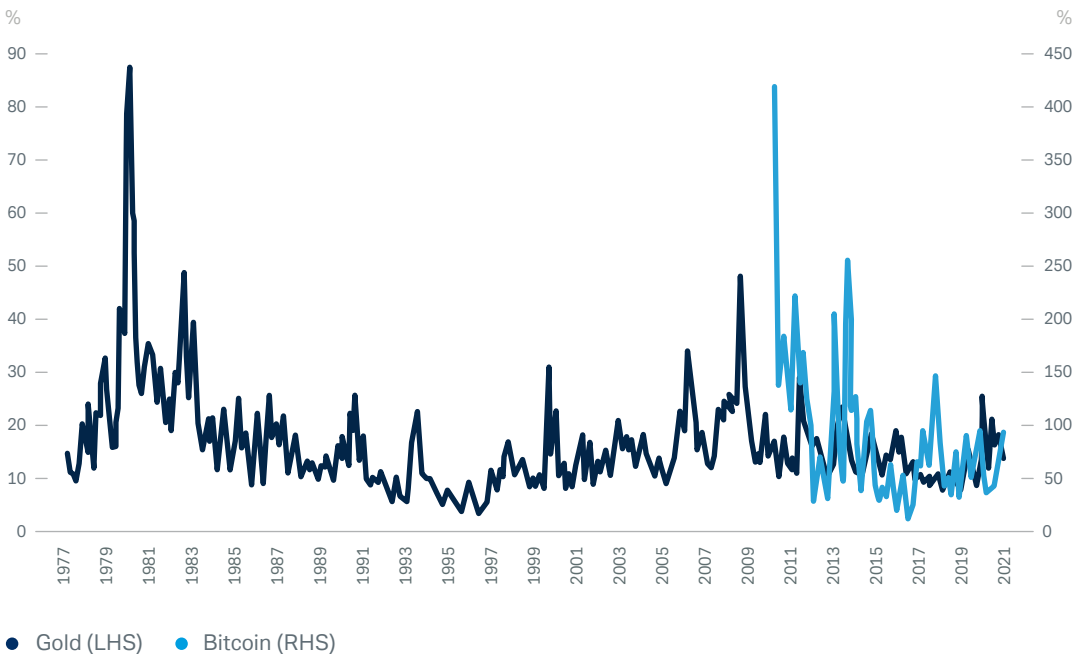
However, in spite of the above similarities, there are a number of reasons why it might be inappropriate to compare the two. Bitcoin has indeed grown more robust with the passage of time and given it behaves essentially as a communication protocol thus benefitting from network effects (the more people use it, the more valuable it becomes). Nevertheless, the greatest risk remains that of security and store of value. While the limited supply does ensure that its decentralized nature and utility lends Bitcoin some value, who is to say that – even as the underlying need for decentralized currency remains – a newer more advanced technology won't simply replace it?

In addition, while gold has long been a well-accepted reserve asset, will regulators and governments similarly tolerate a parallel currency such as Bitcoin which they cannot control, risking macroeconomic instability and potentially facilitating financial crimes (money laundering, terrorist financing etc.)? Many sovereign governments already have cryptocurrencies on their regulatory agenda as a key priority and are in the process of coming up with own versions of digital currencies.

Another argument against Bitcoin is that, despite its recent peaks in market value, it continues to experience significant price fluctuations that may challenge its claim to be a reliable store of value. Of course, nothing is perfect: gold showed a similar level of volatility for a period when it was freely traded after the abolition of the Bretton Woods system. However, until its volatility truly subsides, it's difficult to say if Bitcoin will indeed go the same way.

Figure 3: Bitcoin is not the only volatile asset class: remember gold in the 1970s?

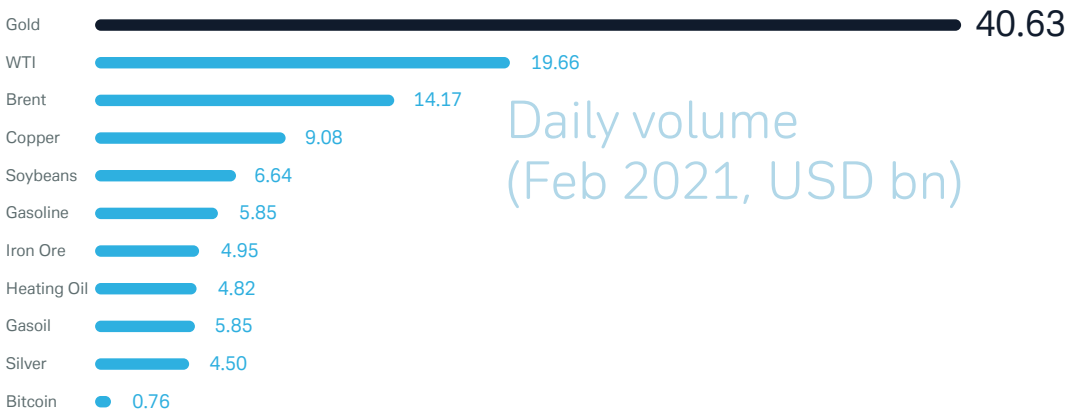
Historical 60 days rolling volatility (annualized) for gold (LHS) and Bitcoin (RHS).
Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of April 2021.



Past performance is not indicative of future returns. Forecasts are not a reliable indicator of future performance. Your capital may be at risk. Readers should refer to disclosures and risk warnings at the end of this document. Produced in April 2021.

Figure 4: Bitcoin daily transaction volumes are still much lower than for gold and many commodities

Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of February 2021.



What fuelled the cryptocurrency and CBDC wave?

The forces behind the development of cryptocurrencies can be seen from various angles. Investments in cryptocurrencies can be interpreted as a way of investing in assets that are widely un-regulated and cannot be controlled by central bankers or politicians. In many cases these cryptocurrencies are finite, i.e. have a limited number of coins to be issued in the future, which make them not randomly expandable (unlike fiat currency), so they are perceived to have some form of intrinsic inflation protection. As central banks around the world have massively expanded their balance sheets in the aftermaths of the global financial crisis (GFC) and the coronavirus crisis, worries (rightly or wrongly) about a possible surge in consumer price inflation have risen significantly – making traditional money less attractive to some. Storage of these cryptocurrencies may also be a driver of some investors' interest: storing money in unregulated wallets consisting of digital assets can be interpreted as one way of expressing scepticism about local authorities.

One other driving factor behind interest in cryptocurrencies is the perceived payment advantage of transactions which are settled digitally. While in many countries cross-border transactions are expensive and take time, cryptocurrencies are associated with a faster and cheaper way of transferring money from one account to another, especially when it comes to transnational transactions. The Single Euro Payments Area (SEPA) initiative is one example of an approach to improve the efficiency of cross border Euro payments within Europe.

In that sense cryptocurrencies would greatly benefit from network effects. The more people use it, the more valuable it becomes. This is especially true for emerging market and developing countries where payment systems may not be that efficient and a significant part of the population has no broad access to traditional financial services.

From a portfolio construction point of view, the continued demand for cryptocurrencies may also be explained from a valuation of other assets standpoint. After decades of falling fixed income rates and record high valuations for equity markets from many metrics, there are questions around how long this can all be sustained. As investors look for profitable future investments, shifting towards these digital assets could be seen as a way of diversifying return sources. Recent research papers suggest that an allocation towards cryptocurrencies could offer benefits in that returns are low correlated to other asset classes. In that sense an investment in cryptocurrencies could diversify a portfolio's risk-return profile. The fact that entry barriers for unexperienced investors to invest in cryptocurrencies because of lower regulation compared to traditional financial assets are rather low has contributed to the general surge in interest. In the past five years, the number of Blockchain wallets has multiplied by nearly six, growing from 11 million in 2016 to 63 million in 2020.

Technological progress has enabled multiple digital payment possibilities through smartphones and computers during the last decade and has acted as another driving force behind the rise of digital cryptocurrencies. In some countries, the big tech companies have taken advantage of their powerful positions and have created ways of transferring money through their own channels. One of the most prominent examples is the planned initiative from Facebook which we describe below.

However, the ongoing evolution of private cryptocurrencies still has its limits. One specific factor behind rapid recent price gains has been illiquidity. Price jumps have occurred after announcements by some big companies that they either want to invest in cryptocurrencies or start cooperating in their development and uses. In that sense, cryptocurrency prices may, at least in the short term, be largely determined by the actions or statements of a few asset managers and ultra-high net worth individuals.

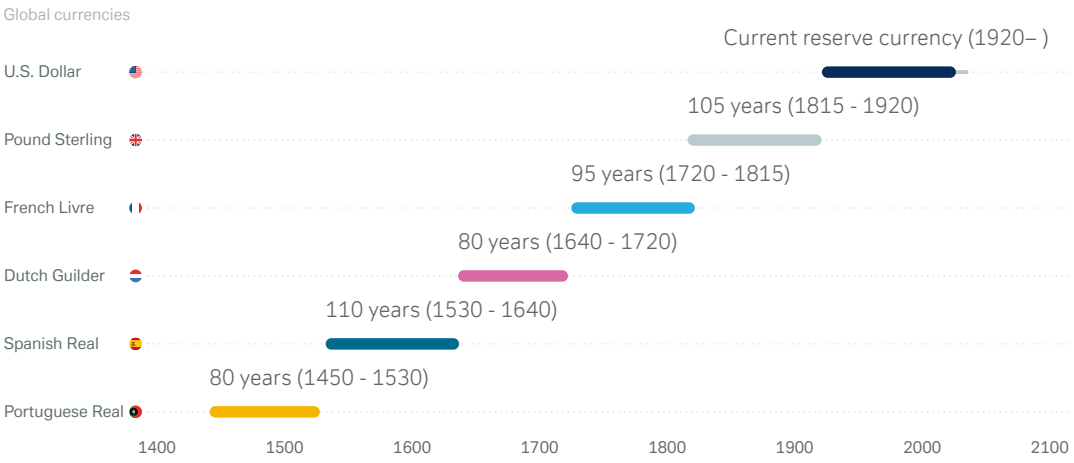
At the same time, central banks have not stood idly by. The monopoly of money creation and management has traditionally laid in the hands of central banks (or monetary authorities) in most countries. Naturally, they are interested in keeping a control on what constitutes money in order to effectively manage economy. In that sense accelerated central bank research and experimenting activity around CBDC can be interpreted as a reaction on the development and evolution of private cryptocurrencies and the various private payment providers. Central banks want to establish an alternative state-of-the-art payment solution.

Central banks and governments also want to address the problem of expensive cross-border transactions. With issuance of CBDCs, money transfers could be improved in terms of efficacy and cost (within and between countries) thereby facilitating access to financial services for all citizens. Furthermore, in a world of declining cash use, the demand for digital payment solutions has anyway grown steadily. In addition, the coronavirus pandemic has shown, that even cash-loyal populations, like Germany's, have dramatically shifted their payment behaviour from cash to digital variants, which may help pave the way for a broad acceptance throughout the population of a truly digital currency.

The development of central bank digital currencies could also play an important role in a global context which is especially true for the Chinese DCEP initiative. Given its population and economic size, China has the potential to supersede the U.S. in providing the global reserve currency in the future. A powerful motivation to lead the race in the wide spread issuance of a CBDC.

Figure 5: Approximate dates for Global Reserve Currencies in the last 500 years

Source: Opdyke J., (2020). The IMF has a message for investors in Forbes. Data as of October 2020.



03

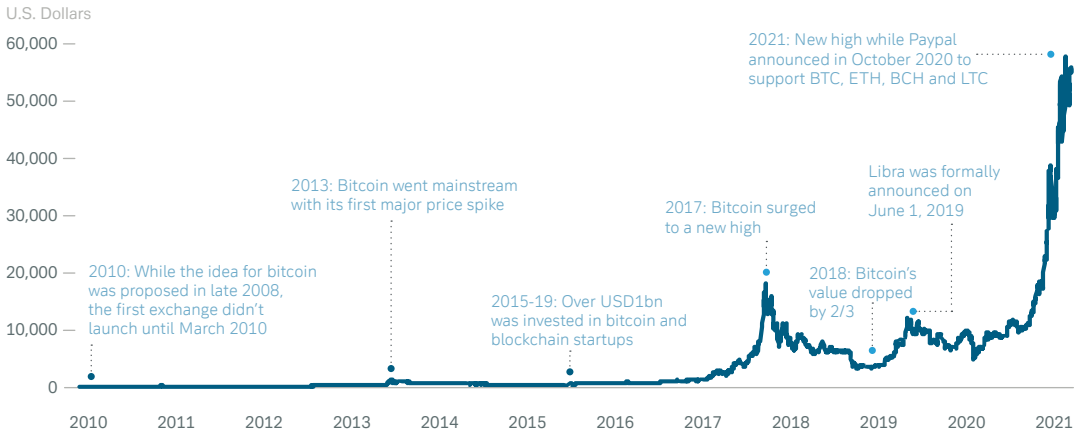
Investing in cryptocurrencies

After the price collapse seen in early 2018, 2020 may have marked a turning point for cryptocurrencies. Several reached new all-time highs and kept rising in price during the first months in 2021. As cryptocurrencies' total market capitalisation has increased over the past months, it has been attracting more interest from an investment, valuation or regulation standpoint. Rapid price movements are not uncommon for new asset classes that are entering the financial system. Since cryptocurrencies have a comparably short history, it cannot be said with certainty that they represent a new asset class. By definition, asset classes are not highly correlated with others, and the evidence at this point in time is simply too weak to make such a statement.

We elaborate in the following sections on how we see cryptocurrencies in the context of investing and what kind of metrics can be used to value cryptocurrencies. Rising investor interest also makes regulators keener on building a regulatory framework for digital assets. In the last section, we provide an overview about the recent developments regarding these national regulations. After that, we give an overview over the planned stable coin initiative by Facebook in an extra box, which is about to be issued in the near future.

Figure 6: Price evolution of Bitcoin

Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of April 2021.



Cryptocurrencies as an asset class

As cryptocurrency prices have increased during the last months, some institutional investors have begun to consider investing in these digital assets. A few recent major inflows into institutional funds may support the argument that more than retail enthusiasm lies behind recent price movements.

As the previous section has discussed, some investors see in cryptocurrencies possible similarities to gold. From a portfolio diversification standpoint there is some evidence that, especially during recent bull markets, the performance of some cryptocurrencies (Bitcoin as a prominent example here) has been broadly de-correlated to that of risky assets (e.g. equities) and this has led some investors to believe that they could provide portfolio diversification benefits.

However, such a thesis should be treated with great caution. The realized volatility of e.g. Bitcoin remains very high (more than five times that of gold). Note also that in tail-risk events, like the start of the coronavirus pandemic, cryptocurrency prices plummeted and their correlation to risky assets rose significantly.

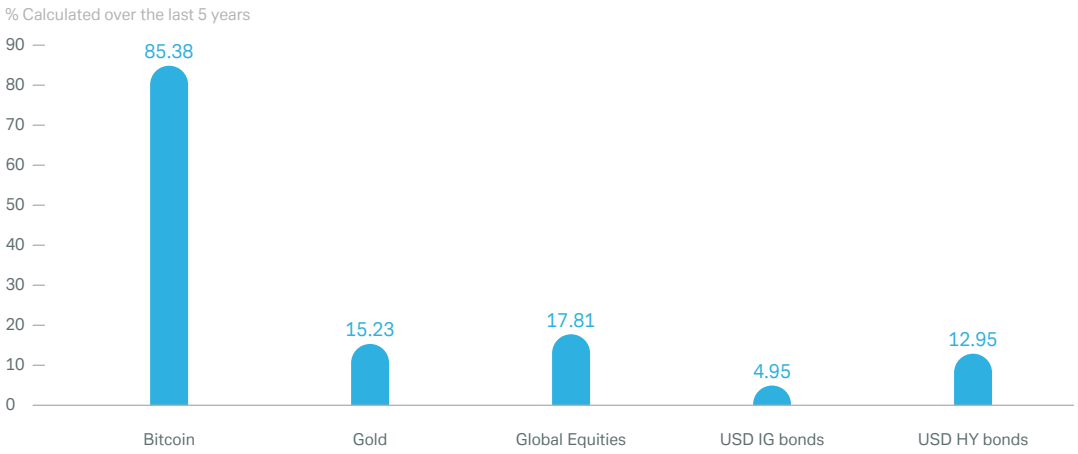
One reason behind this high volatility is the low liquidity of cryptocurrencies: limited amounts are available to buy or sell. Some institutional investors' accumulation of Bitcoin has become a problem in itself, exacerbating problems associated with matching fixed supply with demand, especially in times of crisis, making large price fluctuations more probable. And with more capital from institutional investors flowing into cryptocurrencies, high volatility will likely remain a risk in future.

So, compared to gold which has demonstrated "safe haven" characteristics during periods of market turbulence, cryptocurrencies have behaved differently. From a portfolio construction perspective any allocation towards cryptocurrencies would therefore take more of the risk budget than gold.

Set against this, with the growing supply of investment vehicles (from wallets to futures to large scale ETFs and funds) cryptocurrencies will likely attract more money from both institutional and retail investors, which could diversify the market. Even traditional financial institutions are now providing custody services for digital assets. The easier the access to digital assets gets, the more investors will allocate some portion of their funds into cryptocurrencies.

Figure 7: Bitcoin is more volatile than all other traditional assets (based on rolling weekly returns)

Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of April 2021.



Valuation perspective

Despite all the excitement around new price highs and the news flow around corporate interest, significant challenges remain for the investors approaching the cryptocurrency market. For starters, the quality of information is poor. Even basic data such as accurate trading volume is hard to come by, valuations measures are largely untested and are rarely published in peer-reviewed journals.

While several economists have widely regarded the present cryptocurrencies bull-run as a bubble – there are many on the other side who regard it more as a fragile equilibrium with supply/demand determining fair value – albeit in a volatile fashion. So is it really a bubble? An economic or asset bubble as per Nasdaq is defined as: "Bubble: A market phenomenon characterized by surges in asset prices to levels significantly above the fundamental value of that asset."

Clearly without knowing their fundamental intrinsic value (if any) there is no way (at least on this definition) to ascertain if this is in fact a bubble. At the same time there is still a great debate on whether cryptocurrencies are even worthy of being called a currency or are in fact more similar to a commodity – or perhaps they classify merely as a network, and nothing else. Given all the ambiguity, valuation techniques are also still untested and evolving, but below we summarize the five most widely-used cryptoasset valuation attempts:

1. Total addressable market: This valuation is based on the assumption that cryptocurrencies are competing with another assets like USD or gold for total addressable market.
2. Equation of exchange (MV = PQ): The equation is borrowed from traditional models of valuing currencies and is based on the assumption that a currency's value is related to the size of the market (M) it supports and to its velocity (V) as it moves through that market. (P represents prices and Q an index of real expenditure on newly-produced goods and services.)
3. Valuing as a network (Metcalfe's law): Borrowed from "Metcalfe's law," it values the cryptocurrency as a network with this value increasing by more than the linear increase in the number of users.
4. Cost of production valuation: This theory holds that crypto, just like any commodity, is subject to traditional pricing challenges on the supply side. As a result, the value can be estimated by examining the marginal cost of mining (specifically, the electricity burned in running the computations as part of mining).
5. Stock-to-flow model: The stock-to-flow model states that prices are a reflection of their scarcity and that scarcity can be measured by the stock-to-flow ratio—i.e. in this case, the relationship between the extant value of old cryptocurrencies and the amount of new cryptocurrencies being produced each year.

Regulation

While global demand has been soaring, governments and the related authorities around the world have been working on a regulatory framework for crypto assets. For example, in the EU, following comprehensive market consultation in early 2020, the EU proposed a single regulation for all crypto-assets not falling under existing regulations (e.g. MiFID II). The so-called Markets in Crypto-Assets Regulation (MiCAR) is expected to come into effect by the end of this year. In the U.S., the government has issued much regulatory guidance since early 2019 (e.g. the Framework for Digital Assets). The new administration is expected to establish a collaborative and unified strategy to adjust the existing comprehensive regulatory framework and establish new regulations as needed to provide legal certainty. The UK has just started the consultation process and the government is to follow a staggered consultation approach with individual focus on the different categories and purposes of crypto-assets.

The Chinese government has a high level of commitment to establish and strengthen the digital Yuan (DCEP) and targeted regulatory actions are supporting this. For example in 2017, in response to the peaks in cryptocurrency prices, the government increased already strict scrutiny over cryptocurrencies as the People's Bank of China (PBoC) prepared to launch its own digital currency. In October 2020, the PBoC outlawed the issuance of private digital currencies. In India, cryptocurrencies are no longer banned but regulation remains prohibitive – so, for example, while exchanges are legal, the government has made it very difficult for them to operate. In Japan, regulatory activity in 2020 was mainly focused on the adoption of a payment services act and financial services and exchange act relating crypto-assets.

Libra – Diem

In June 2019, Facebook announced a plan to launch its Libra cryptocurrency in early 2020, which has since been postponed and renamed Diem in late 2020. With more than 2.7 bn Facebook users, the planned cryptocurrency has the potential to compete with traditional online payment platforms and also bring digital currencies into the mainstream.

Facebook's announcement about Libra prompted a swift central bank response. Jerome Powell, the U.S. Federal Reserve chairman, in Congressional testimony less than a month after Libra's introduction, said the possibility of Libra raised "many serious concerns regarding privacy, money laundering, consumer protection, and financial stability".

The initial problems with Libra were associated with (a) creating a competing global currency via pegging Libra to a basket and (b) as a result risking governments losing control of the money supply and regulatory control and (c) money laundering and data privacy concerns which were raised by regulators. Initially, when the Libra project was unveiled in June 2019, Facebook described it as a futuristic global money that could serve the foundation for a new kind of financial system. But in January 2020, the project was scaled back. Libra dropped the idea of a mixed currency basket in favour of individual stable coins pegged to individual currencies.

The revised version of Libra is less audacious and less controversial than the original project presented in June 2019. Facebook has made a shift in its strategy with the aim of addressing some of the main objections of regulators and central bankers. As a result, the implications of Libra are different with more emphasis on just reducing the cost of payments, rather than competing with governments and central banks on creating a parallel payments system but some criticisms regarding data privacy and consumer protection still remain.

The revised plan includes, as noted above, multiple Libra cryptocurrencies (Libra EUR, Libra GBP, etc.), most of which will be backed one-for-one by individual fiat currencies. This decision could help Libra achieve a high adoption rate.

04

CBDC – where are we right now?

Meanwhile, while cryptocurrencies have seen a surge in interest, central banks have increasingly been working on developing the issuance of their own digital currencies. The motivations to issue a general purpose central bank digital currency (CBDC) are numerous: financial stability, monetary policy implementation, financial inclusion, payments efficiency (domestic and cross-border), and payment security. Among advanced economies, the primary motivation for developing a CBDC is to improve payment security. Emerging economies generally may have wider array of motivations, especially when a CBDC is designed to complement or substitute cash (for further details please see our CIO Special: CBDC – money reinvented).

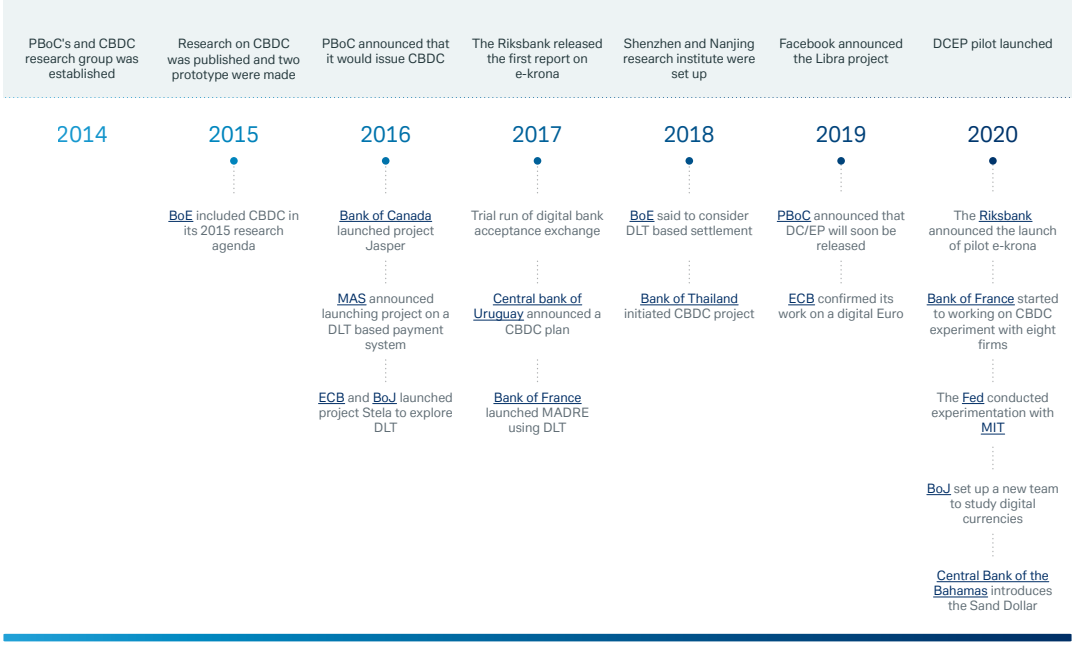
While most of the CBDC projects are still in their research phase, some governments have already made further progress – e.g. the Bahamas launched its Sand Dollar (the first digital currency in the world) in 2020. According to a recently published survey from the Bank for International Settlements (BIS) more than 60% of central banks are engaged in practical experimental work. The BIS predicts that central banks representing a fifth of the world's population will issue general-purpose CBDCs in the next three years.

After the Bahamas, Sweden could follow with its e-Krona which is already in a pilot project. The Swedish government could implement its digital currency throughout the country in 2022 or 2023. China's plans to issue a truly digital currency are also advanced. The DCEP (Digital Currency Electronic Payment) which has been trialled in several areas could act as a game changer if widely introduced given the size of the Chinese economy, prompting others to follow suit. In the Eurozone, the ECB will decide by about mid-2021 whether to launch a digital euro. ECB president Lagarde has stated it will take time (approximate five years) but the probability of an introduction of a digital euro in the future is high.

In the U.S., the Federal Reserve Chairman, Jerome Powell, stated the need for further work and "extensive" public consultation with stakeholders before deciding to issue a CBDC. Fed Chair Powell has said that the central bank is not concerned with not being first in the CBDC race while adding that the U.S. dollar's status as the world reserve currency already gave it a "first-mover advantage".

Figure 8: Timeline of CBDC research and experiments in various countries

Source: Deutsche Bank AG, various websites, Goldman Sachs. Data as of April 2021.



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ESG perspectives

Another dimension which needs to be considered is the ESG (environmental, social and governance) implications of cryptocurrencies and CBDC. The energy consumption associated with cryptocurrencies has been particularly contentious, but social and governance aspects need to be considered too, either by investors or by official authorities considering issuing a central bank digital currency. We discuss some relevant ESG points below.

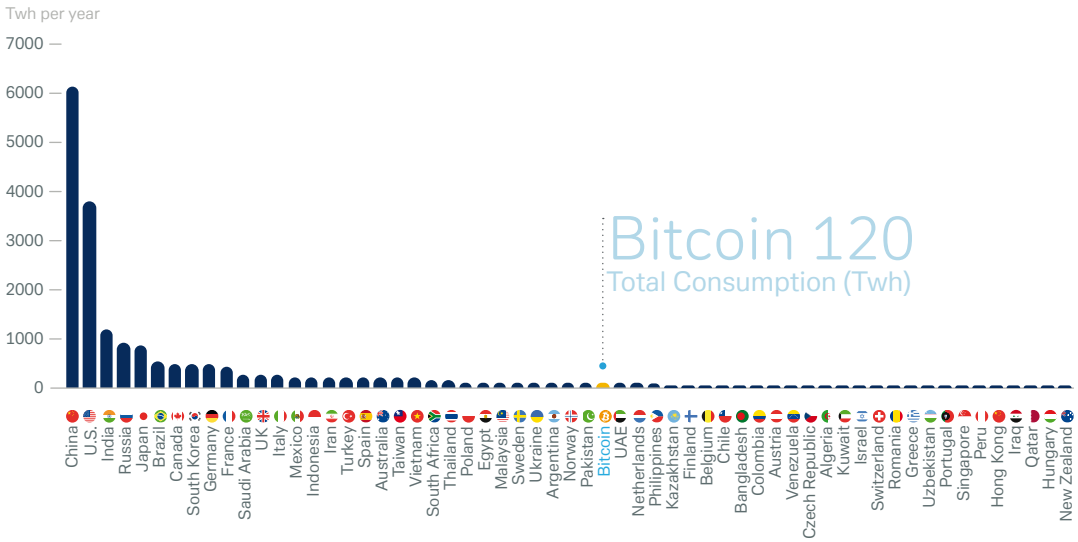
Environmental: The environmental implications of private cryptocurrencies are complex. The underlying design architecture underpinning the most prominent private cryptocurrencies, the Blockchain, is computation-intensive and requires large energy input. There is research evidence that the mining process consumes more energy than mineral mining of copper, aluminium or gold to produce an equivalent market value. In the case of Bitcoin, the energy consumption has risen dramatically throughout the years and is now as large as the annual electricity consumption of whole countries (figure 9). With increases in the cryptocurrency market valuation the energy use increases proportionally – a problem that has only accelerated with the most recent price jumps.

On the other hand it is important to understand that energy consumption, per se, is not an issue in the context of climate change. Clean energy production such as wind and solar produce energy without emitting greenhouse gases and are therefore carbon-neutral. In addition, many new crypto projects have been incorporating these concerns by implementing a different concept in building their specific Blockchain (moving from the so called proof-of-work to a proof-of-stake approach). The proof-of-stake concept makes transactions much faster, thereby consuming less energy and making the use of cryptocurrencies more scalable.

For most CBDC projects the eventual underlying technology is still under review, hence it may be premature right now to draw conclusions about them from an environmental perspective. But many central banks (e.g. the ECB) are increasingly concerned about their environmental impact too and would therefore likely weigh their decisions cautiously in this regard.

Figure 9: Country ranking, annual electricity consumption

Source: University of Cambridge (https://cbeci.org/mining_map). Data as of February 2021.



Social: The social aspects of cryptocurrencies are also ambiguous. The implications of high price volatility and the accompanying potential for major investor losses should not be underestimated. As the transactions proceed in grey areas that are not properly regulated, the risk of price manipulation is also high. Another issue for cryptocurrency users arises from the identification of their digital asset accounts (the so called "wallets"). The advantage of removing a settlement institution in terms of reducing transaction costs can easily turn into a disadvantage if accounts are hacked or passwords are forgotten, with possible consequences for the individual's wealth. There are lots of existing examples from the past where a significant number of crypto assets have been stolen or "lost".

For CBDC, the social perspectives – especially in emerging economies – are associated with the potential benefit of financial inclusion of unbanked people who have no or only limited access to financial services. The global spread of smartphones and the associated access to online services would make it easier to set up a digital currency account, which could be provided either by a central bank or by private organizations. This argument is particularly true in emerging and developing countries, where the financial infrastructure is not as advanced as in developed countries and setting up a bank account could require a regular stream of income. But it is possible to make this argument the other way around too: the widespread use of digital money would put that part of a society without any electronic device and cash-dependent at an even greater disadvantage if digital money were to replace cash, either explicitly or implicitly.

Governance: There are several governance concerns associated with the use of private cryptocurrencies. As cryptocurrencies were in the past used for criminal activity including tax evasion, their further rise and spread could also indicate that illegal activity in the dark web will increase. Possibly, with further increases in the relative importance of cryptocurrencies in some areas a shadow banking system could evolve where the government loses control over the monopoly of money and regulation. This would be a development that central banks would want to avoid, as this situation would imply that their policy decisions would have less influence on the economy.

From a governance perspective the introduction of CBDCs (as opposed to cryptocurrencies) in combination with the use of the Blockchain technology would bring several benefits: the existing risks of governance deficits could be reduced by the better transparency and traceability of CBDC transactions. These characteristics could also help governments or central banks to have greater control over money transfers to citizens and companies. Money transfers could be combined with a certain purpose or linked with so-called "smart contracts" (self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code). In other words monetary and fiscal policy could be much more targeted and thereby efficient. Tax evasion, criminal activity or the financing of terrorism would also be made more difficult.

The Blockchain technology could also be used for purpose-oriented financing for example in the context of ESG bonds. First trials in Canada worked as an example how the Blockchain can be set up to offer unprecedented levels of transparency and trust allowing public records to be searched, verified and audited. The introduction of CBDC could mean that public and corporate bonds can be linked easier to specific purposes and thereby enhancing accountability. But as noted above decisions regarding the underlying technology of many CBDC projects have not been made yet and therefore, these associated governance benefits should only be treated as theoretical for the moment.

06

Conclusion: Sustainable development or short term experiment?

We think it is highly likely that private cryptocurrencies (in some form or the other) will stay with us for the foreseeable future. Many economists and governments have predicted the demise of cryptocurrencies numerous times in the past decade, only to be proved wrong. The longer cryptocurrencies survive, the more robust and credible they become due to network effects (Metcalfe's law). Once we see some stability in terms of price fluctuations, the use of cryptocurrencies for the exchange of goods and services goods could increase as long as central banks have not introduced their own digital currencies. However, a lot of progress still needs to be made when it comes to allaying concerns regarding energy efficiency, transaction speed, identification issues and regulation before private sector cryptocurrencies can have mainstream acceptance.

While it would be inappropriate to compare cryptocurrencies like Bitcoin to gold, for the reasons discussed above, they do exhibit some similarities making the popular label "digital gold" not completely wide of the mark. However, from a robustness and store of value standpoint, while gold has proven itself over thousands of years, it's far too early in the day for cryptocurrencies to merit such a comparison. Cryptocurrencies are also far from a mainstream asset class as of now. Nevertheless, with major players like PayPal and Facebook likely to jump onto the cryptocurrency bandwagon they are increasingly being discussed in an investment context. Given cryptocurrencies' correlation characteristics, they are often touted as an important investment vehicle especially in terms of portfolio diversification or as an inflation or tail-risk hedge – although these arguments need to be treated with caution. For cryptocurrencies to attain true mainstream acceptance in traditional portfolios, markets for them would need to become much more liquid than they are currently.

At the same time, the widespread introduction of CBDC is expected to follow with a lot of major countries like China and the Bahamas taking the lead already. But the roadmap to CBDC execution is expected to be a long drawn-out one. Governments would need to consider all the socioeconomic, technological and regulatory aspects of such a move before an issuance can take place for the fear of generating an unwanted financial disruption and social backlash. The adoption rate of a truly digital currency within societies could ultimately be dependent on the preference between privacy vs. convenience. Banknotes and coins greatly reduce digital footprints because a cash transaction does not generate digital data. By contrast, digital currency transactions, albeit convenient, can be traced by CBDC. Countries which are used to digital payment methods might therefore show higher acceptance rates for a central bank digital currency, compared to countries where the majority of daily transactions are settled in cash. From an architectural standpoint of CBDCs it is still unclear if central banks would prefer a decentralised over a centralised governance system. Despite all the advantages a decentralised Blockchain-based CBDC would offer, there are serious governance concerns if the responsibility for maintenance and supervision were not centrally-determined. Central bank officials argue that to remain credible as a central bank there must be one institution which guarantees the stability of value, ensuring the elasticity of the money supply and oversees the security of the system. As we pointed out above, central banks are interested in keeping the control of circulating money flows and to respond appropriately to economic shocks in accordance with their price stability mandate. In addition, from a governance point of view, the ability to trace transactions and thus the improved ability to combat (for example) terrorist financing and money laundering would be a strong motivation to issue a centralized CBDC.

"The roadmap to CBDC execution is expected to be a long one. But, looking further into the future, a widespread introduction of CBDCs accompanied by higher regulation of cryptocurrencies could create a more challenging environment for crypto assets."

Looking further into the future, a widespread introduction of CBDCs accompanied by higher regulation of cryptocurrencies could create a more challenging environment for crypto assets as some (but not all) of their advantages compared to traditional financial assets would fade in the longer term. Cryptocurrencies could still survive, but the increasingly differentiation based on individual business models and utility could emerge as the key parameter for sustainability. The underlying technology of many cryptocurrencies and planned CBDC initiatives, the Blockchain (or DLT in general), certainly carries an interest that goes far beyond the use of these two as a means of payment. The aforementioned technologies are expected to remain a fast-growing area of growth for companies across a wide range of industries, as we stated in a previous report, "CIO Insights: Cryptocurrencies and Blockchain – their importance in the future". The fact that investments can be linked to specific actions with the help of the Blockchain-technology and investors such as states or individuals can easily retrace where their money has been flowing could play a crucial role especially in the context of ESG investments too. In that sense, the dynamics around these developments should be followed closely.

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Glossary

Bitcoin refers to a cryptocurrency where units of currency are generated by computers solving mathematical problems.

Central bank digital currencies (CBDC) are digital currencies issued and regulated by a monetary authority of a country.

Correlation is a statistical measure of how two securities (or other variables) move in relation to each other.

Cryptocurrencies are digital currencies with transactions verified by a decentralised system.

Distributed ledger technology allows shared and synchronised digital data across multiple sites without a central administrator.

The European Central Bank (ECB) is the central bank for the Eurozone.

ESG investing pursues environmental, social and corporate governance goals.

A reserve currency is a currency held in large amounts by many central banks as part of their foreign exchange reserves.

Valuation attempts to quantify the attractiveness of an asset, for example through looking at a firm's stock price in relation to its earnings. Multiple valuations methods exist for different types of asset.

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