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In a nutshell

- Bitcoins are a clever idea. However, competing currencies pose a real threat.
- Central banks and regulation may be major risks for all cryptocurrencies.
- As uncertain as the future of cryptocurrencies is, so is their valuation. We consider them to be highly speculative.

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Bitcoins all over the place

Brilliant as the ideas behind bitcoins might be, their future is wide open. Much will depend on the public policy response.

How to value a bitcoin? We suggest a three-stage valuation process. This includes an economic value-added method, a peer-group analysis and a dividend-discount model. Based on this, we have calculated a fair value of 18,685 dollars per bitcoin. Surprised? Rightly so. If we were writing about a share or a bond, most people would blithely continue reading. To be sure, any valuation method can only be a rough approximation with other asset classes. When it comes to the cryptocurrency bitcoin, a valuation-based approach fails completely. To get straight to the point, in our opinion, this is why we are not convinced of bitcoin as an investment at this time. We do not know what it is worth; when to buy it; or when to sell it. We can find good arguments for various price points of this financial instrument, for which in turn the definition "currency"¹ is only an approximation. To get to the point in this respect as well, the future of this brilliantly simple global payment system is entirely open, both in a positive or negative direction. Below, we attempt to explain how bitcoin works using some price indications. When attributing a factor to the price tag named "below 18,685 dollars" (market price at the time of writing) – we believe this factor to be negative for the bitcoin, even able to push it down towards zero dollars.

Of course, established market participants might find themselves dismissed as over-concerned and old-fashioned if they point out the currency's challenges. Particularly if they are not the first ones to do so. Since bitcoin is not only a technology but a means of payment, concerns expressed by other market participants also have to be looked at more closely. A currency system can only work if a sufficient number of people commonly trust in and accept the currency in question.

While we think many (mainly technical) challenges can be overcome, central banks are probably the biggest hurdle for cryptocurrencies, since none of them is likely to be interested in losing control over money supply, money creation and payment systems.

Our different price scenarios

The last traded price: 18,685 dollars

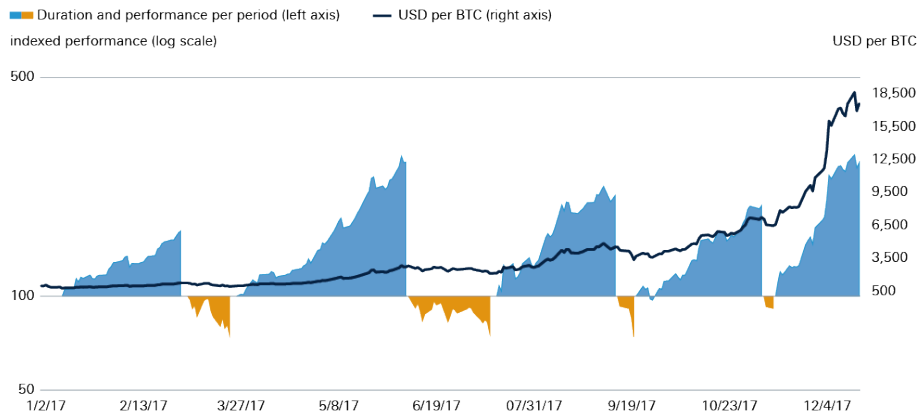
This is the amount someone paid for a bitcoin on the cryptocurrency marketplace GDax on December 19, 2017 at 11:10 a.m. UTC. But is it really worth this much? Some people consider the last transaction price as the most reliable expression of the value of an object or financial instrument. It is certainly true that an intrinsic value

¹A currency should provide three functions: medium of exchange, unit of account and store of value. In view of bitcoin's enormous price fluctuations, none of the three functions do seem to be fulfilled at present. Moreover, it does not have legal tender status anywhere. For the sake of simplicity and in the absence of plausible alternatives, we will hereinafter refer to bitcoin and other similar digital payment systems as (crypto)currencies.



only passes the reality check if a transaction is successful at this price. However, this does not hold true vice versa. The transaction price does not necessarily give any indication of the intrinsic value. For one thing, buyers and sellers may have different liquidity and risk preferences. Or they might have different perceptions of valuations. These perceptions differ particularly if calculating an intrinsic value is not that easy, because the asset involves an entirely new technology or business model.

Volatility and performance highly untypical for a currency



Source: Bloomberg Finance L.P. as of 12/20/17

If the price of a financial instrument consistently reaches new highs that cannot be explained via traditional valuation methods, the incentive to purchase is often called an example of the "greater fool theory". The buyer hopes to find a subsequent buyer who is willing to pay an even higher price, regardless of the underlying instrument. The reason may be the fear of missing out (FOMO). Investing would be the wrong term for this kind of investment behavior.

Marginal cost as minimum price: 2,200 dollars

The marginal cost of bitcoin primarily equals electricity costs. Using it as the price floor for bitcoin is problematic because it only shows the price at which it becomes profitable for miners to create new bitcoins. If the business model fails, however, no-one will be prepared to pay 2,200 dollars for a coin. This differs from a company's bankruptcy where inventory, customer data or patents can still be used.

Nevertheless, 2,200 dollars is still remarkable taking into account the fact that bitcoin is a purely virtual construct that is assumed to be free of cost in its "creation". However, one of bitcoin's greatest weaknesses is the extremely high energy consumption (more on this below).

Bitcoin as a substitution for gold: 333,000 dollars

Bitcoin supporters see it as a modern and superior alternative² to gold. Replacing all the gold that has been mined so far would make the value of bitcoin soar to 333,000 dollars. Assuming that bitcoin could replace only one tenth of the amount of gold, this would still result in a value of 33,000 dollars per bitcoin.

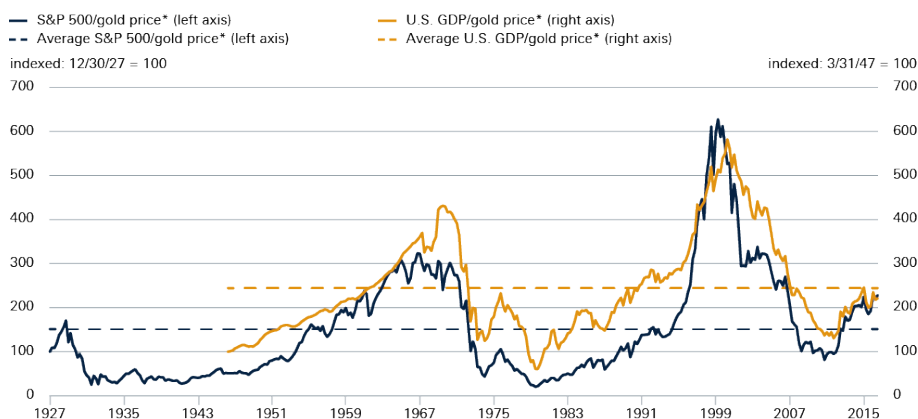
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²The Winklevoss twins, who own the digital currency exchange Gemini, called it "Gold 2.0" or "Bitcoin is disrupting gold".
All articles are available on <https://deutscheam.com/cio-view>



Bitcoin and gold have interesting parallels and differences. Both have in common the fact that their "production" is relatively expensive, they can be used to hedge against a collapse of the monetary system and they have only little correlation with other asset classes. Both instruments divide opinions and the supporters of both instruments are afraid of government intervention. However – and now we have reached the differences - such intervention has not harmed gold (the possession of which was temporarily prohibited in countries such as Germany, France, the UK, India and the United States during the 20s century) in the long term. Gold has been precious to people for thousands of years, while bitcoins are not yet ten years old and their owners' willingness to endure painful value declines remains to be seen. The gold price has even demonstrated its stability in the last 90 years, which have been marked by major ruptures. Despite major volatility, the S&P 500 and the U.S. GDP ranged around a mean value relative to the gold price. In dollar terms, however, the S&P 500 and GDP are drawing an increasingly ascending curve in the long term, manifesting the U.S.' currency's constant loss of value.

U.S. economy and stock market in gold terms



Source: Bloomberg Finance L.P. as of 12/18/17

It is questionable whether bitcoin could survive broad-ranging public policy sanctions. Those who fail with speculating in gold from an investment perspective may still use it in the form of jewelry. If investing in bitcoin does not work out, one is left with a useless combination of numbers and letters.

Government regulations threatening bitcoin: below 18,685 dollars

Let's return to government intervention, even going as far as a currency ban. We believe that government institutions could make things very tough for bitcoin. Intervention seen so far (China, Russia or India) only managed to push the price down briefly. We think, however, that any clear signal of a shift in U.S. public policy would have an entirely different impact. It might suffice for the United States to decree that any company and in particular any financial institution trading with (or in) bitcoins be denied access to the dollar system. A weaker form of control would be to

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regulate the bitcoin exchanges just like other regulated exchanges³. Alternatively, U.S. authorities could threaten bitcoin traders with similar sanctions as those companies doing business with countries that are on the U.S. embargoed countries list. In recent years, a lot of European companies have had to learn how far the influence of U.S. authorities reaches. We would therefore not underestimate the impact an intervention from the United States could have, despite the fact that bitcoin supporters like to consider the currency as stateless and hard to regulate. As a mere shadow currency without access to the economy, bitcoin would likely to lose its appeal. The United States has enough reasons for preventing bitcoins from spreading. These reasons certainly include preventing the financing of illegal or sanctioned counterparties and potential tax evasion. But they also extend to the economic and political interest of the United States in maintaining the dollar as the undisputed reserve currency of the world.

Bitcoin gains acceptance as means of payment: 1,500,000 dollars

The opposite of the scenario described above would be bitcoin's complete success as an international payment system. The 1.5 million dollars seem absurdly high. This calculation is based on the replacement of all the money (M1) in the world with bitcoins. With the still quite optimistic thesis that bitcoins could only replace 1% of cash and demand deposits, this would mean 15,000 dollars per coin.

Bitcoin becomes the single trading currency: 7,714 dollars

Similarly, this value is obtained when assuming that 1% of annual world trade is conducted in bitcoin.

Bitcoin's concept a blessing and curse: uncertain price impact

To reasonably assess bitcoin's opportunities and risks, it is essential to take a closer look at the technology and the processes behind it. There is no doubt that bitcoin is a brilliant concept and has an impressive success story. In 2008, Satoshi Nakamoto⁴ sent a nine-page concept paper to a cryptography mailing list⁵. At the end of 2009, the first stable software protocol for the bitcoin project was made freely available on the Internet after the global network had worked on optimizing it. The bitcoin payment system primarily combines the three components of encryption technology, decentralized, distributed ledger technology and the blockchain. Particularly the blockchain technology, which ensures data integrity, helped make bitcoin successful. There is no central administrator in the bitcoin payment system, it is market participants that make sure the entries are correct. There are no financial institutions or central banks as intermediaries or guarantors, which most people think is the main advantage of cryptocurrencies.

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³Among others, Janet Yellen (U.S. Fed chair), Randal Quarles (Fed governor) Jay Clayton (SEC chairman) and Chris Giancarlo (CTFC chairman) have already made critical comments about bitcoin. Concerns in Europe have been expressed by the UK and Italy and recently quite clearly by French Finance Minister Bruno Le Maire.

⁴It is still unclear whether Satoshi Nakamoto stands for an individual, a group of programmers or a commercially oriented enterprise right from the beginning.

⁵<https://bitcoin.org/bitcoin.pdf>



The system is based on an algorithm that allocates individual coins to individual market participants. Market participants have to solve mathematical puzzles and receive a key (or the solving hash) for creating blocks. This means new bitcoins are created by creating new blocks. The market participants creating these blocks are called miners. They have a double motivation to make available their computing power: first, they receive new bitcoins and second, they get a transaction fee. If a miner cracks a new hash, he can then complete a block of transactions⁶. On average, almost 3,000 transactions per block may be processed because the blocks are limited to the size of 1 megabyte. The more miners that work on a solution, the more difficult the mathematical problem becomes. The algorithm is set up so that it takes about ten minutes on average to solve a problem. At the moment, miners receive 12.5 bitcoins for each block they have processed. This number is frequently halved, so the last bitcoin, the 21 millionth, is set to be mined not earlier than 2140.

Despite its brilliant simplicity and self-regulation, this system leaves some questions unanswered, and it is these that we would like to address now.

Electricity consumption as an Achilles' heel? If so: below 18,685 dollars

Electricity consumption is a major subject of discussion regarding cryptocurrencies. In the table below, we have set out an example of how electricity consumption in the bitcoin community could be estimated. This issue is important for internal and external reasons: internal, because it is a main cost driver for miners. If the price per bitcoin falls below the marginal cost, which consists primarily of electricity costs, it is no longer worth mining any further. External, because the environmental aspect is a much-discussed point of criticism for cryptocurrencies.

A cautious approach to electricity usage by the bitcoin system

	Units	Measure
Global hash rate*:	16,946,489	tera hash per second
S9 chip performance**:	14,000	giga hash per second
Number of S9 chips required for global hash rate:	1,210,464	
S9 chip power:	1.38	kilowatts
Resulting electricity usage:	1,664,387	kilowatt hours
(Global usage:)	14.60	tera watt per year
Bitcoin-block production rate:	6	Bitcoin blocks per hour
Electricity usage per Bitcoin block:	277,398	kilowatt hours
Number of Bitcoins per block:	12.50	
Electricity usage per Bitcoin:	22,192	kilowatt hours
Price for one kilowatt hour of electricity:	0.10	U.S. dollar
Electricity costs per Bitcoin:	2,219	U.S. dollar

Sources: Blockchain Luxembourg S.A., Gregory Trubetskoy (grisha.org), Bitcoin.it Wiki, CIA World Factbook, Bitcoin Project, Digiconomist as of 12/18/17

*A hash is a calculation step in the so-called "mining" process of bitcoins

**The Antminer S9 is an ordinary computer chip, commonly used for solving the bitcoin algorithm

The amount of 2,200 dollars per bitcoin is only a rough estimate because there are numerous unknowns in the equation: 1) The average electricity price the entire bitcoin community has to pay.

⁶After being verified by other participants, this block can be added to the end of the blockchain. However, it may happen that several miners compute a solution at the same time and separately add their blocks to the chain. It can happen that the system, which only acknowledges the chain with the largest number of blocks (the longest blockchain), cannot identify this chain for some time. In this case, it is the one that the first block is added to again afterwards. A block is therefore regarded as verified if it is followed by three to six other blocks.

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10 cents/kWh is already quite low in an international comparison of electricity prices (China and India have comparable prices, Europe is distinctly more expensive). 2) It is unknown what type of computers and chips are used in what quantities and how efficient these chips are in real-time operation. 3) It is unknown how many users have to cool waste heat at high costs and how many are able to sell the waste heat, thereby generating income. When trying not only to calculate the marginal cost but also the average production cost per bitcoin, personnel, building, computer acquisition and other costs have to be added as well. It is therefore not surprising that there are sources that state a global consumption twice or three times as high as the 14.6 terawatts (TW) per year calculated above (which would correspond to North Korea's or Cuba's consumption. A consumption of 33 TW/y would correspond to Denmark's electricity demand). However, electricity consumption is not a one-way street. Mining when the incentive is declining (in case the bitcoin price falls because there are fewer bitcoins than remuneration) means electricity consumption decreases as well.

Degree of difficulty – set in stone? Then below 18,685 dollars

The biggest cost driver is the bitcoin algorithm's degree of difficulty. It always depends on the computing power that is used for mining and adapts in such a way that no more than six blocks per hour can be solved. If marginal costs came closer to the current bitcoin price, the most energy-intensive miners would leave the market, and this would lessen the degree of difficulty. Like the issues of block size, the degree of difficulty is a parameter that could easily be changed in theory. But this would mean moving away from the original specifications and creating bitcoin spin-offs. This is exactly what happened in summer 2017 and resulted in 6 spin-offs such as bitcoin gold, bitcoin cash and bitcoin diamond (more on this below).

Practicability in everyday life and market structure: below 18,865 dollars

Transaction fees, minimum transaction volumes and the risk of market concentration are some of bitcoin's hotly debated issues. To prevail as a practical currency, the bitcoin payment system not only has to ensure security and low price volatility, but also low transaction costs for millions of payments, including micro-payments. There are several reasons why bitcoin has not yet demonstrated this: 1) The current maximum size of 1 megabyte per block while solving six blocks (2,000-3,000 transactions per block) per hour means the amount of transactions is capped. As mentioned above, the block size could be increased but this would result in a new bitcoin generation⁷. Different solutions to the well-known scalability problem are being worked on at the moment. One of them is the Lightning Network, which would use a less complex off-chain transaction mechanism. 2) At present, miners are encouraged to carry out transactions because this way they receive new bitcoins. However, this percentage is shrinking, and according to www.blockchain.info miners already get one-fifth of their revenues from transaction fees. What happens if this figure climbs to more than 50%? How consistent will miners be

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⁷For the bitcoin spin-off (so-called "hard fork") bitcoin cash, which occurred on August 1, 2017 the block size was increased from 1 to 8 megabytes.



in organizing their transactions according to the fees offered and granting advantages to those paying higher fees? Particularly if 3) the structure of the bitcoin market creates economies of scale and benefits big miners in areas with low electricity costs. Will there one day be a market power of the most efficient miners who can dictate the fees? Some bitcoin owners that are actually using bitcoin for real transactions and not speculations have already vented their anger about skyrocketing fees since November. At present, the five biggest miners⁸ account for a remarkable 75% of mining activity, but market shares still shift quite frequently.

One note on bitcoin's scalability: Even though the number of bitcoins is limited to 21 million, it can be traded in significantly smaller units. The smallest unit is the satoshi and is one hundred millionth of a single bitcoin. This means even if the price of bitcoin rose to 1 million dollars, the smallest unit, one satoshi, would only cost one cent.

The system is secure, what about the access? Below 18,685 dollars

Discussions about the security of cryptocurrencies are abundant, which is not surprising considering this instrument is entirely virtual. There is broad consensus that the system will remain secure for the next ten years at least, including against the possibilities quantum computers have. They would not be able to attack the blockchain, but "only" the private keys⁹. Particularly in terms of the capability and incentives for fraudsters to hack the system, its decentralized structure, the asymmetric cryptographic process and the high degree of difficulty in solving the algorithm present major hurdles. This means the main security loopholes can almost exclusively be found between the blockchain and the outside world. Almost every bitcoin user¹⁰ eventually has to use a third-party provider, and this raises the questions of trustworthiness, viability and reliability again. Users also ask themselves if their access code (their private key) is stored securely. When imagining former Swiss military bunkers being transformed to bitcoin key storage facilities using tightened security measures, one could definitely question the system's practicability. Finally, some of the users are likely to be deterred in the medium term by what is considered a main selling point for the system: the absence of a central arbitration board. Lost bitcoins (more precisely: the private keys for them) will be lost forever (similar to cash or gold). It does not matter if users lost them or they were stolen. This is a major difference between bitcoin and credit/EC cards. However, the fact that the bitcoin idea survives disasters like Mt. Gox shows its resilience. Mt. Gox was the dominating bitcoin exchange for a while but was attacked in 2013. As a consequence, customers lost 850,000 bitcoins, almost 7% of all coins issued at that time. Even this crash did not stop the technology from being successful.

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⁸According to blockchain.info, in the four days leading up to December 19, 2017, the five miners BTC.COM, AntPool, ViaBTC, BTC.TOP and SlushPool placed 74.8% of all new blocks in the network. As some of the names indicate, some miners also serve as an umbrella for free third-party miners. However, they are responsible for administration.

⁹See also: <https://www.technologyreview.com/s/609408/quantum-computers-pose-imminent-threat-to-bitcoin-security/>

¹⁰Theoretically, anyone can directly access the bitcoin network, but this requires technical skills to an extent that most bitcoin users are not expected to have.



Economies of scale and systemic relevance: above 18,685 dollars...

Bitcoin is a prime example for the advantages of a network, and for generating value through size. Starting as a small circle of programmers in 2009, the bitcoin community has grown rapidly in the past few years. Price and interest have almost exploded in the second half of 2017. Skepticism among investors is expected to wane gradually as the market size grows. The number and reputation of ever new market participants is also likely to contribute to the legitimacy of bitcoin among many investors. The approval of futures contracts for trading on the Chicago Board Options Exchange and Chicago Mercantile Exchange is another milestone in the process of accepting bitcoin as a financial instrument. It is much easier now to bet on bitcoin's price performance and particularly to sell short. For many wealthy private individuals, hedge funds or other institutional investors, the bitcoin has only now grown into a realistic investment alternative, and, with other conditions remaining the same, this would indicate that the current price momentum could continue.

This development raises the question as to how long government bodies can wait if they want to ban cryptocurrencies entirely. The market value of all cryptos corresponds to almost one-fifth of M1 money supply in the United States. On the one hand, a size has been reached that U.S. authorities can no longer ignore it if they want to defend the status of the dollar. On the other hand, the size is also no longer negligible if the entire market were to collapse.

...or competition resulting from adaptive imitators? Below 18,685 dollars

Bitcoin is facing competition from an increasing number of alternative cryptocurrencies (Altcoins). According to coinmarketcap.com, bitcoin remains the dominant cryptocurrency, though how long that dominance will last is unclear. As recently as two weeks ago, it accounted (along with the spin-offs bitcoin cash and bitcoin gold) for 57% of the market value of 610 billion dollars for all 1,370 digital currencies included on coinmarketcap.com. Bitcoin is about four times as big as the second biggest cryptocurrency, Ethereum. About a year ago, these figures were 85% and 15 times higher. Within two weeks December alone, bitcoin (without any spin-offs) lost almost 17% of market share (44% on December 21 2107)).

This situation can be compared to the beginnings of the Internet. The technology of blockchain/cryptography/decentralized ledger has parallels with the Internet. And the individual currencies can be compared to the first search engines or sales platforms. The technology persists but applications change. Network effects, however, could contribute to dominant solutions emerging following a selection phase. Cryptocurrencies are not expected to have reached this stage yet. The night from December 19 to 20 also demonstrated how immature the entire market still is. After one of the leading crypto exchanges admitted bitcoin cash for trading, its price jumped by more than 50%. Bitcoin cash has grown to one-fifth of bitcoin – less than 5 months after the spin-off.

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This shows how powerful competition is, even within the bitcoin group. This does not affect those who had held bitcoin before the spin-off, because they received a proportionate amount of bitcoin cash. Now, however, investors have to decide whether they want to invest in bitcoin or in one of the six subsidiaries. The latter have successfully worked on bitcoin's original weakness and are therefore a serious competitor for the "parent" currency. This does not really make things easier for investors.

The ten most important cryptocurrencies. At least on 12/19/2017

Name	Market capitalization (in bn. USD)	Price (in USD)	Trading volume (over 24 hours, in bn. USD)
Bitcoin	313.0	18,685	15.96
Ethereum	83.2	863	4.26
Bitcoin Cash	41.0	2,434	3.33
Ripple	31.6	0.81	1.64
Litecoin	19.4	356	2.42
Cardano	14.6	0.56	0.35
IOTA	11.9	4.27	0.48
Dash	9.4	1,214	0.32
NEM	8.3	0.93	0.22
Monero	6.1	394	0.28

Source: CoinMarketCap; as of 12/19/2017

Conclusion. Bitcoin is exciting. Maybe too exciting for an investment.

Former Fed chairman Paul Volcker criticized U.S. banks in 2009 for the ATM cash machine being their only successful financial innovation in the past 20 years. Therefore, it is only logical that the technology, which is very likely to shake up the financial sector as only the Internet has done before, was developed and has grown outside this industry. The majority of financial experts and financial institutions are convinced that a similar technology to bitcoin will significantly influence payment systems in the coming decade. At the moment, however, bitcoin is still struggling so much with major volatility and speculative interest that its acceptance as a means of payment for transactions from retailers is actually decreasing.

It is difficult to say what this will mean for investors. Based on this technology, almost 1,500 "currencies" are currently fighting for attention. It is entirely unclear as to who will be the winner and whether these new instruments can ever fulfill the functions a currency should provide. From a valuation perspective, however, it will be important whether these instruments are only an object of speculation, a store of value or in fact a practicable means of payment in everyday life. In our view, the latter would also require public acceptance. However, we think central banks and other government institutions are no longer able to ignore this issue since the market value of all cryptocurrencies has grown considerably in 2017 and the first futures contracts have been approved for trading. If they want to maintain their control of money creation, the most important cash flows and payment systems, we believe the introduction of regulatory frameworks will only be a matter of time.

We do not feel capable of determining a reasonable valuation for bitcoin, especially against the backdrop of the price explosions seen in the past few months. Who knows, bitcoins might even still be

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undervalued. This would mean, however, that many developments would have to take place for the benefit of bitcoin and competitors. At the same time, public authorities would need to remain largely inactive.

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Glossary

Cryptocurrency

Cryptocurrencies are a new generation of digital currencies and payment systems that rely on cryptotechnology and distributed data management. They are privately organised and not bound to oversight by central banks or other official institutions. The pioneer and still most traded cryptocurrency is the bitcoin.

Futures contract

A futures contract is a standardized, contractual agreement to trade a financial instrument or commodity at a pre-determined price in the future.

Gross domestic product (GDP)

The **gross domestic product (GDP)** is the monetary value of all the finished goods and services produced within a country's borders in a specific time period.

Intrinsic value

The **intrinsic value** is the one that comes closest to the value that an objective fundamental analysis would ascribe to an asset.

S&P 500

The **S&P 500** is an index that includes 500 leading U.S. companies capturing approximately 80% coverage of available U.S. market capitalization.

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Risk warning

Investments are subject to investment risk, including market fluctuations, regulatory change, possible delays in repayment and loss of income and principal invested. The value of investments can fall as well as rise and you might not get back the amount originally invested at any point in time.

Investments in Foreign Countries – Such investments may be in countries that prove to be politically or economically unstable. Furthermore, in the case of investments in foreign securities or other assets, any fluctuations in currency exchange rates will affect the value of the investments and any restrictions imposed to prevent capital flight may make it difficult or impossible to exchange or repatriate foreign currency. Foreign Exchange/Currency – Such transactions involve multiple risks, including currency risk and settlement risk. Economic or financial instability, lack of timely or reliable financial information or unfavorable political or legal developments may substantially and permanently alter the conditions, terms, marketability or price of a foreign currency. Profits and losses in transactions in foreign exchange will also be affected by fluctuations in currency where there is a need to convert the product's denomination(s) to another currency. Time zone differences may cause several hours to elapse between a payment being made in one currency and an offsetting payment in another currency. Relevant movements in currencies during the settlement period may seriously erode potential profits or significantly increase any losses.

High Yield Fixed Income Securities – Investing in high yield bonds, which tend to be more volatile than investment grade fixed income securities, is speculative. These bonds are affected by interest rate changes and the creditworthiness of the issuers, and investing in high yield bonds poses additional credit risk, as well as greater risk of default.

Hedge Funds – An investment in hedge funds is speculative and involves a high degree of risk, and is suitable only for “Qualified Purchasers” as defined by the US Investment Company Act of 1940 and “Accredited Investors” as defined in Regulation D of the 1933 Securities Act. No assurance can be given that a hedge fund's investment objective will be achieved, or that investors will receive a return of all or part of their investment. Commodities – The risk of loss in trading commodities can be substantial. The price of commodities (e.g., raw industrial materials such as gold, copper and aluminium) may be subject to substantial fluctuations over short periods of time and may be affected by unpredicted international monetary and political policies. Additionally, valuations of commodities may be susceptible to such adverse global economic, political or regulatory developments. Prospective investors must independently assess the appropriateness of an investment in commodities in light of their own financial condition and objectives. Not all affiliates or subsidiaries of Deutsche Bank Group offer commodities or commodities-related products and services.

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Investment in private equity funds is speculative and involves significant risks including illiquidity, heightened potential for loss and lack of transparency. The environment for private equity investments is increasingly volatile and competitive, and an investor should only invest in the fund if the investor can withstand a total loss. In light of the fact that there are restrictions on withdrawals, transfers and redemptions, and the Funds are not registered under the securities laws of any jurisdictions, an investment in the funds will be illiquid. Investors should be prepared to bear the financial risks of their investments for an indefinite period of time.

Investment in real estate may be or become nonperforming after acquisition for a wide variety of reasons. Nonperforming real estate investment may require substantial workout negotiations and/ or restructuring. Environmental liabilities may pose a risk such that the owner or operator of real property may become liable for the costs of removal or remediation of certain hazardous substances released on, about, under, or in its property. Additionally, to the extent real estate investments are made in foreign countries, such countries may prove to be politically or economically unstable. Finally, exposure to fluctuations in currency exchange rates may affect the value of a real estate investment.

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