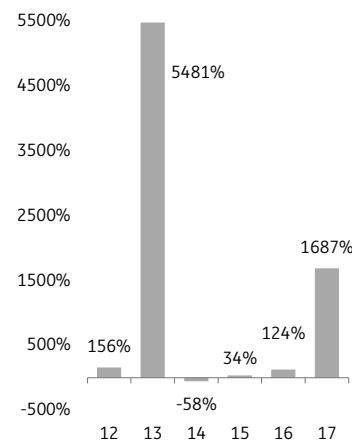


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Digital Currencies

Why Bitcoin is destined to become a niche asset

A cryptocurrency reality check

Yearly bitcoin gain versus USD 2017 year to date



Source: ING

The “true” value of Bitcoin depends on its future use case, and could be anywhere between zero and several million dollars

In the long term, Bitcoin has little to offer to a wider audience, and will likely return to being a niche product for a select group of enthusiasts. What they regard as key benefits, may actually be impediments to wider adoption. Moreover, bitcoin’s high value today is based on shaky foundations, given that the platform is open source and can, therefore, be forked and copy-pasted easily. Scope for such cryptocurrency debasement is limited only by network effects and switching costs, but those may be smaller than expected.

First, here’s just a short disclaimer: this article is not about the blockchain. Blockchain is an impressive technology that may bring progress to a variety of fields, ranging from finance to health care, and from notary to voting. Long live the blockchain.

With that out of the way, let’s talk Bitcoin. With the bitcoin exchange rate going through the roof, grandparents are helping toddlers invest in it, and the advent of Bitcoin futures further adding to its acceptance, the million Bitcoin question is: what is the “true” value of Bitcoin? What can we expect from its future?

Our current thinking is this: One day, beyond the hype, Bitcoin will return to being the niche product that it was in its initial years. Users will include tech nerds, people obsessed about their privacy, people afraid of (hyper)inflation in traditional currencies, and people wanting to circumvent central banks for ideological or criminal reasons.

What is the “true” value of bitcoin?

It is very difficult to appraise Bitcoin’s value, as it is not a normal investment asset. A bond or share has a company earning money behind it; they provide regular interest or dividend payments, and (in the case of bonds) principal repayment at some point in the future. But Bitcoin is more like money than a security, so comparing it with currencies might be more apt. Conventional currencies tend to have value because they are backed by “the full faith and credit” of governments and central banks, that have an interest in keeping the value of their currency stable. But Bitcoin has no such guardian. What “true” underlying value you attribute to Bitcoin, depends on what you think the future holds for it. If users would *en masse* lose interest in the coin, (e.g. because they are moving to a more advanced cryptocurrency, or because regulators ban it), then Bitcoin usage would plummet, which in turn could see its value go all the way to zero. After all, there is nothing and nobody backing it.

An optimistic scenario, however, could see Bitcoin grabbing substantial market share in worldwide payment markets. Let’s assume it would, over time, come to have a 1% usage share in worldwide payments. Let’s further assume that this usage-share directly translates into a value-share. As a rough approximation of the value of money used for payments, the world stock of “narrow money” (M1, meaning notes, coins and demand deposits) was [US\\$30.14tr at year end 2016](#). Then the US dollar value per Bitcoin could represent, with today’s almost 17m of Bitcoin in circulation, some US\$18,000. If this is what you think Bitcoin can achieve, then most of the rally is already behind us. If however you believe the – in our view quite unlikely – scenario that Bitcoin will in the end replace *all* narrow money in circulation, then one Bitcoin would in the end buy as much as does US\$1.7m today.

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It is possible to think of yet more scenarios producing even higher valuations. Rather than guesstimating what market share Bitcoin could grab, and deducing a valuation from that, we have a more fundamental concern: is Bitcoin a serious payment system contender at all in the medium to long run? Being a payment system was the original goal. The title of Satoshi Nakamoto's white paper says it all: "[Bitcoin: a peer-to-peer electronic cash system](#)". But cash is meant to change hands often, it is a means to the end of acquiring other stuff. Yet the motto in the Bitcoin world nowadays is "[HODL](#)", hold on for dear life. You will find people (often invested in Bitcoin themselves) arguing that buy-and-hold is the Bitcoin strategy to use. Oh and please don't sell but do hold, because otherwise you're spoiling it for everyone else. If that indeed is today's dominant Bitcoin application, then it has drifted far from the goal Nakamoto had in mind in 2008. One could even argue that as a payments system, Bitcoin is currently failing. With extreme deflation, due to fixed supply (at least on its own blockchain, which can however be cloned and forked, creating theoretically unlimited amounts of Bitcoin alternatives, as we [argue below](#)), combined with strong demand, one would be crazy to spend Bitcoin on buying pizza today, and paying [high transactions fees](#) to boot. Better to "HODL".

The only justification for investing in Bitcoin today is the assumption that others are willing to buy Bitcoin at higher prices in the future

Investing in Bitcoin today is like investing in a foreign currency or gold – hoping that at some point in the future, one will be able to sell it again. This is just plain speculation – any sound business will want to hedge their foreign currency exposure. A directional bet on a single currency is an extremely risky investment strategy if it involves a substantial part of your investment portfolio. And still, that appears to be what some people are doing. The current mass interest in Bitcoin is all on the assumption that its popularity will increase further in the future, hence investors will be able to sell at a higher price. And that popularity, in turn, can be based on little else than the assumption that Bitcoin will become a major means of payment in the future (leaving aside the possibility that investors just extrapolate past price trends into the future, giving little thought as to why exactly that trend should continue).

But how likely is this? It cannot be excluded that some cryptocurrency will become successful. Betting on cryptocurrencies can be a high-risk, high-reward part of a well-diversified investment portfolio. Betting that Bitcoin, in particular, will be the winning cryptocurrency is, however, an even higher risk. Let's see why.

Why won't Bitcoin appeal to a mass audience?

A number of key characteristics may seem like great advantages to Bitcoin enthusiasts, but they appeal much less to a wider audience and may even be an impediment to mass adoption. While the cryptocurrency world moves fast, we think these impediments won't easily be removed soon.

A negative event, such as a Bitcoin price crash followed by public outcry, could trigger a regulatory crackdown

- First, [regulation](#). The decentralised nature of Bitcoin is one of its unique features. It is also its Achilles' heel. A cross-border pseudo-anonymous payment network attracts transactions that cannot bear the light of day, or do not conform to government's wishes (e.g. controlling cross-border money flows or enforcing sanctions against people or countries). Governments worldwide have taken note. For Bitcoin to mature, it needs to be brought into the centre of regulated space, instead of existing at the fringes as it currently does. This will, in turn, require exchanges and other Bitcoin service providers to conduct proper know-your-customer checks and implement other compliance functions, greatly reducing the supposed privacy advantages of using Bitcoin. Even then, it will be difficult to regulate a network that has no head office or legal entity – so governments and regulators may not ever come to like decentralised financial networks at all. A negative event, such as a price crash leading to public outcry, could trigger a regulatory crackdown on Bitcoin. Bitcoin may also incentivise governments to provide alternatives. Central banks have in fact been [flirting with the](#)

While much work is being done to improve Bitcoin scalability, a successful solution will involve painful trade-offs, and has yet to be implemented

Current level of transaction fees makes Bitcoin very unattractive for small payments

[idea of issuing digital cash](#) – on a blockchain or otherwise. Such alternatives could be perfectly acceptable to the general public and could contribute to Bitcoin remaining a niche payment system. Central bank digital currencies have various issues of their own, warranting a separate discussion we will return to in the future.

- Second, the [lack of an intermediary](#). For Bitcoin enthusiasts, this is a key advantage. They rejoice in keeping their own Bitcoin wallets, keeping their private keys secure on separate pieces of paper in a safe. The average person, however, doesn't want to go through all this trouble; they dislike having no rights, no recourse, no guarantees, no legal coverage, nothing. They just want secure, reliable and hassle-free access to their money, and if they forget their password, they want to be able to call their provider and have the password reset for them. And with reason: [recent analysis](#) suggests that up to about 20% of all Bitcoin in circulation may be lost forever, due to, for example, misdirected transactions, lost passwords and crashed hard disks. Banks are the usual providers of custodian functions preventing loss and theft. The fact that they do not (yet) provide custodian functions for Bitcoin (e.g. for regulatory reasons) does not mean that the general public would not need or want those services for cryptocurrency. In fact, many Bitcoin users choose to keep their wallets with online providers – meaning that even in today's Bitcoin universe, there is a clear role for intermediaries.
- Third, [scalability](#). Currently, Bitcoin is able to process about 7 transactions per second. For Bitcoin to play a meaningful role as a payment system, the transaction processing power needs to be a 100, maybe even 1,000 times better. The key problem is this: when I buy a sandwich and pay with my debit card, the retailer's terminal checks with the bank whether I have the funds to pay. One transaction, one data point. However, when I pay with Bitcoin, the retailer's terminal not only processes my transaction, it needs to process all other transactions going on at that time, and keep a record of them. This creates a lot of network traffic and a huge database the retailer has to store.

Fig 1 Bitcoin transaction costs



Average fee per bitcoin transaction in USD, daily average
 Source: <https://charts.bitcoin.com>, ING

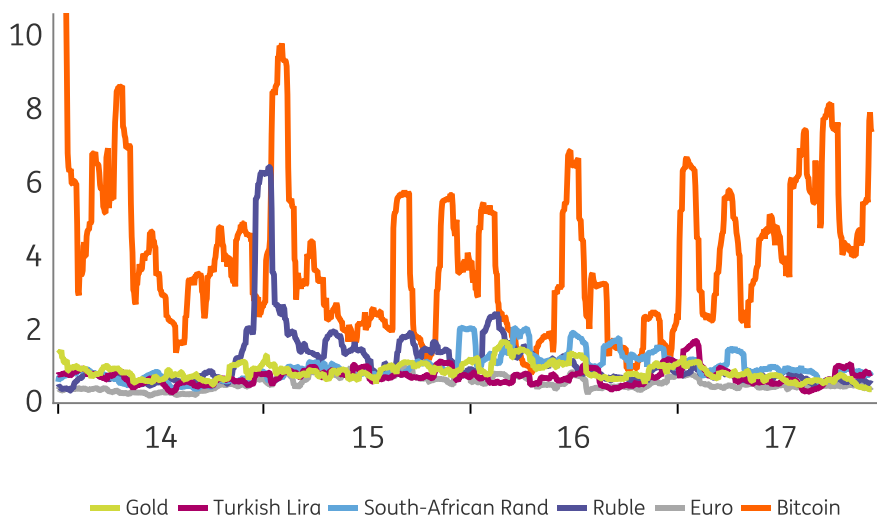
This is, of course, a simplification, and the retailer could choose to use intermediary services, but that takes us back to the previous point. As it stands, the transaction speed limit is already causing network congestion (with [well over 100k transactions waiting to be confirmed](#) and delays reaching several hours) and transaction costs (the price users are willing to pay to get their transaction at the front of the queue) to increase. The average fee per transaction in November was US\$8, which is not really helpful if you want to pay for a US\$10 pizza (see Figure 1).

- Fourth, volatility. For Bitcoin to function as a means of payment, it needs to be stable. A world in which your money buys you a large latte today, but only a small espresso tomorrow, is hardly convenient. The problem is even bigger for businesses, which have to plan ahead and work with thin margins. A currency that sometimes has 10%+ daily price swings could turn a nice profit into a big loss in the blink of an eye. Businesses working with Bitcoin would need to hedge their exposures. As Figure 2 shows, Bitcoin volatility until today far outstrips volatility observed in various currencies that have seen a fair share of volatility themselves. It is also more volatile than gold.

Bitcoin proponents argue that volatility will fall as Bitcoin adoption increases. That may be the case. Yet Bitcoin remains a form of money with fixed supply on its own blockchain, lacking a central bank to manage price (and exchange rate) stability. That makes it inherently prone to instability, if not volatility, as we have argued [elsewhere](#).

Fig 2 Volatility of selected (crypto)currencies and gold against US\$

Standard deviation of daily % changes, rolling 1-month average (trading days only)



Source: Macrobond, ING

- Fifth, energy use. Bitcoin mining currently already consumes as much electricity as a small country, translating into one transaction taking as much energy as [over 200 washing cycles](#). Rising Bitcoin adoption paired with increasing prices would provide incentive for further mining capacity to be added, boosting electricity use further. This is undesirable and unsustainable, diverting electricity away from other, more useful applications.

Bitcoin has a more convincing business case in countries with less advanced monetary and financial systems

Scalability and volatility are practical impediments that could be overcome. However, Bitcoin governance (or rather, lack thereof) make implementing the needed changes a slow and painful process

These are a number of serious impediments that are likely to prevent Bitcoin from becoming a serious mainstream contender to existing payment systems in the short to medium term – at least in developed economies which have highly efficient and low-cost systems in place. In economies where payment systems are less well developed, Bitcoin has more potential.

Also note that impediments like scalability and energy use are of a practical nature. They might be overcome, either by reform of Bitcoin itself or, perhaps more likely, by other cryptocurrencies. In fact, innovations are being developed and tested to, for example, improve transaction processing speed and reduce energy use. Some other cryptocurrencies already implement innovations in this field. Yet these ideas generally involve a trade-off. Some of them reduce the security of the network. Others mean that more attention and actions are required from the user. Without discussing all the initiatives in detail, and while acknowledging that more innovations are to be expected in this area, we have yet to see killer innovations that really address scalability and

energy use without a major sacrifice in another area. But even if promising innovations are available, they won't make it easily or quickly onto the Bitcoin blockchain, because of the final issue:

- Bitcoin's governance (or rather, lack thereof). A general problem of public blockchains is that they are great at decentralised rule *enforcement*, but they lack any procedure for rule *setting*. Bitcoin is no exception. Community disputes and lack of established procedures to solve them, make it very difficult to implement innovations in the Bitcoin blockchain. The August 2017 fork and the November 2017 Segwit2x-failure are testimony to that. So while innovations and improvements may be expected in the blockchain and cryptocurrency spaces, it is far from guaranteed that they make their way into Bitcoin easily.

This difficulty to adapt will also be a problem for Bitcoin when quantum computers become capable of breaking Bitcoin cryptography. That day may still be far away but, given a long-term perspective on payment systems, it cannot be ignored.

Could alternative cryptocurrencies break Bitcoin's dominance?

Payment platforms such as cryptocurrencies have what economists call "network effects". The value of being on the platform increases with the number of users (see Figure 3). A retailer may choose to accept Bitcoin because many buyers use it; and the other way round, buyers may want to use Bitcoin because many stores accept it. This creates a winner-takes-all dynamic: having a big user base is an advantage for a platform and will attract more users, at the expense of competing platforms, even if competitors offer better quality services. Social media is an excellent example of such dynamics. Earlier instances include, for example, video cassette systems in the 1970s and 1980s: Betamax arguably offered a better picture than VHS, but lost out anyway because of wider user and supplier adoption.

Like many internet platforms, cryptocurrency is subject to network effects and switching costs...

Fig 3 Typology of goods and services

Type of good/service	Access	Availability and user value	Examples
Private ownership	Pay and own	Value for buyer only	Food, clothing
Single-use rental/sharing	Pay per use	Value for one user at a time only	Parking spaces, taxis
Club rental/sharing	Pay per use	Value for user not diminished by other people's use	Satellite TV
Public	Freely available	Value for user not diminished by other people's use	FM radio, national defence, clean air
Private network	Pay per use possible	Value for user <i>increases</i> with number of users ("network effects")	Telephony, social media, walled marketplaces, permissioned blockchains
Public network	Freely available	Value for user <i>increases</i> with number of users	Open (source) platforms, public blockchains

Source: ING

Apart from "network effects", cryptocurrency may be subject to "switching costs". These typically occur when switching to a rival product or service involves buying new gear or apps, losing loyalty points, re-building contact lists or learning new skills. The QWERTY keyboard layout is an example. Up to this day, it is claimed that other layouts enable higher typing speeds. Yet because we all learned to type on QWERTY, this layout remains dominant. Switching involves learning to type all over again, and we are not prepared to make that investment.

Network effects and switching costs explain the dominance of many of today's internet giants, including social media, marketplaces and smartphone operating systems. In fact, companies operating these platforms typically try to increase switching costs to keep their customers on their own platform. Network effects and switching costs may also explain Bitcoin's current dominance in cryptocurrency space. It was the first cryptocurrency around, and it has proved sufficiently compelling to easily remain dominant to this day.

...however, Bitcoin's open-source, forkable, clonable nature sharply reduces its value compared to closed-source platforms

The open source nature of Bitcoin, however, makes a big difference. Internet giants have huge market capitalisation because they own their platform and are thus able to reap its benefits by charging customers or by monetising the data generated by their users, for example. Yet all data on the Bitcoin blockchain are out in the open and not owned by anyone. Moreover, the Bitcoin infrastructure itself, the blockchain, can be forked, creating a Bitcoin derivative (like Bitcoin Cash, forked from Bitcoin in August 2017), or copy-pasted to a new cryptocurrency.

So while cryptocurrencies do compete with each other for users, and can create value for their users by providing an extensive network of other users, they are *not* able to create unique value for their users by being a distinctive platform with special features not found elsewhere. Any innovation a cryptocurrency implements, can, in theory at least, be incorporated by other cryptocurrencies as well, by adapting and applying the corresponding source code. The lead of Bitcoin over other cryptocurrencies is therefore based only on the assumption that the advantage it currently has in terms of user adoption will last. And this is questionable. Unlike with keyboard layouts, the learning costs of switching to another cryptocurrency are limited. Their use as a means of payment (or investment asset) is the same, and mainstream users will make little to no effort to understand what is going on under the hood. – they don't tend to do that with established forms of money either. And unlike with video cassette systems, switching does not require buying new computer hardware. Software is readily available, and the principles underlying cryptocurrencies are generally similar. Network effects and switching costs may play a much smaller role for cryptocurrencies than is (implicitly) assumed by investors expecting huge Bitcoin value gains.

Bitcoin may be scarce on its own blockchain, but its blockchain is in infinite supply

Let's put this another way. Value is sometimes attributed to Bitcoin because of its scarcity. Indeed, Bitcoin is scarce *on the Bitcoin blockchain*. However, that blockchain can be forked, cloned and its technology copy-pasted. Cryptocurrency is *anything but scarce*, instead, it is in unlimited supply (as witnessed by the many Initial Coin Offerings). The technology is public property.

Importantly, it need not be a rival decentralised or privately-administered cryptocurrency that outmanoeuvres Bitcoin in the future. It could also be a Central Bank Digital Currency (based on blockchain technology or otherwise) that takes over from Bitcoin. As argued earlier, Bitcoin's elusive regulatory nature could, in fact, incentivise authorities to create attractive Digital Currency alternatives that, contrary to Bitcoin, are more easily regulated.

So... is Bitcoin the 21st century tulip bulb?

We are enthusiastic about blockchain technology, and the current attention for Bitcoin could boost blockchain and digital currencies' development. But as we have argued above, we doubt whether Bitcoin itself has what it takes to become a serious mainstream payment systems contender. Instead, we think it is more likely for Bitcoin to return to its roots as a niche payment system. A niche asset adopted worldwide could still have a substantial user base and hence value. It is therefore impossible to say whether the current Bitcoin market price is "too high" for a niche asset. Then again, we join the crowd of analysts observing typical bubble characteristics: the idea of an asset that is new, revolutionary, almost magic – hard to understand, but let's invest anyway because it will become huge. This idea is a form of "this time it's different"-thinking. "Yes we know about all those previous bubbles that popped, but Bitcoin is really, really different." We are not so sure.

If bitcoin is "digital gold", then forking and copy-pasting are successful forms of "digital alchemy"

Also, it is clear that original Bitcoin investors, who bought into the currency for its decentralised approach to payments and its privacy ideals, are now a marginal group of owners and buyers. Most investors nowadays are in it for the price gains, as illustrated

by the motto “HODL”. Probably many of them don’t really understand the basics and original goals and ideals of cryptocurrencies and don’t care much either.

But as we argued above, the value of Bitcoin is based on *perceived* scarcity only, because in reality, cryptocurrency is in endless supply. While there is no government or central bank that can debase cryptocurrency, forking and cloning can have very similar effects. Bitcoin is therefore not a sort of digital gold, as is sometimes put. Gold is in truly limited supply. Bitcoin has several actual and a theoretically unlimited number of clones and close substitutes. To stay with the gold metaphor, it is as if alchemy can successfully clone gold and create very close substitutes, some of which have even more attractive properties than gold itself. What would that imply for the value of gold? To be fair, Bitcoin’s relatively large user base puts it at an advantage over other cryptocurrencies. But things move fast in cryptocurrency-land, so it’s a bold assumption to take this lead as a given.

It will probably take some time for this reality to sink in with Bitcoin investors.

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