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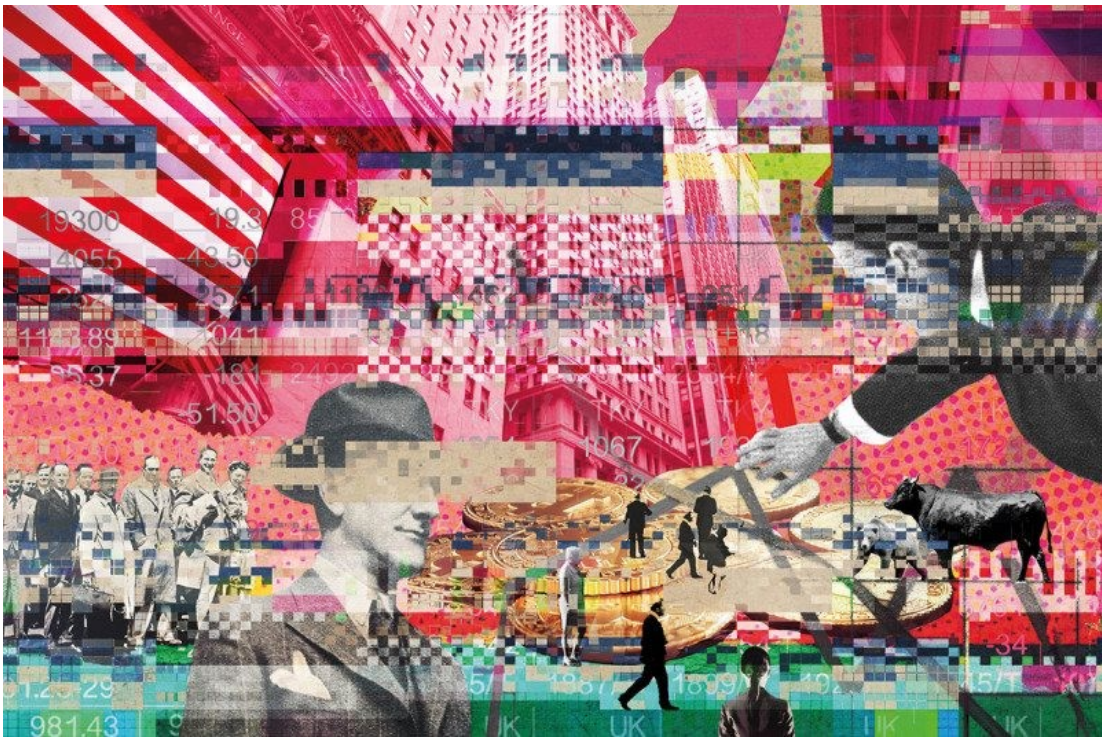
# Bitcoin in the balance: The troublesome quest to reinvent money

Cryptocurrencies are surging to record highs – but with a civil war raging inside bitcoin and the big banks muscling in, can they fulfil their promise?



Michelle Thompson

By **Douglas Heaven**

***Update: as this feature was in preparation, bitcoin was continuing its unprecedented surge, hitting a value of $10,000 on 29 November 2017***

IN SEPTEMBER, on a luxurious carpet-covered stage at a hotel in New York City, the boss of the biggest investment bank in the US launched a savage attack on a notorious upstart. Bitcoin is a "fraud", declared Jamie Dimon, CEO of JPMorgan Chase, useful only for get-rich-quick speculators and drug dealers. "Honestly, I am just shocked that anyone can't see it for what it is."

Plenty of responsible, law-abiding citizens were quick to disagree – and bitcoin's

value reached new heights in November, when it breached the $8000 mark for the first time. But whatever your view on the world's most famous cryptocurrency, Dimon's last comment inadvertently highlights something that often goes unsaid: no one really knows what bitcoin is, or what it is destined to become. The same goes for the technology on which it is based, known as the blockchain, hailed in some quarters as an engine of disruption on a par with the internet.

As things stand, bitcoin is all things to all people. But the community of software developers and "miners" that maintain it are engaged in a civil war, a clash of ideologies that will go a long way to deciding its fate. Meanwhile, the banks it was designed to sidestep seem to be toying with the idea that its underlying technology could be useful. Given the extent to which we are all at the mercy of the financial system, how it plays out has consequences for everyone. Can bitcoin rebuild the very idea of money? Will the blockchain make finance fairer? And what could possibly go wrong?

Bitcoin was born out of the embers of the global financial meltdown of 2008. Its mysterious inventor, or inventors, known only as Satoshi Nakamoto, saw the role of the big banks in that fiasco and decided enough was enough. They would create a truly peer-to-peer electronic currency – a way for people to store and exchange digital coins without the need for banks or any other central authority.

The money most of us use every day has value because it is backed by a government. Take that away and the £10 note in your pocket is only worth the paper it is printed on – pretty much zilch. Its value is based entirely on faith in the institutions that back it. But as the 2008 crash demonstrated, the institutions in which we place our faith are liable to let us down.

Nakamoto spelled out the problem with these so-called fiat currencies in a short post online when bitcoin launched in 2009: "The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust."

## "If we can use blockchains to create binding contracts, we could bypass estate agents"

Take quantitative easing, where central banks try to kick-start the economy by creating more money and handing it to the banks so they can lend it. "There is no worse thing you could do to exacerbate the gap between the rich and the poor than pump a bunch of free money into the system that only wealthy people could get their hands on," says Nolan Bauerle, director of research at cryptocurrency news website Coindesk. This currency manipulation is exactly the sort of thing bitcoin was invented to avoid.

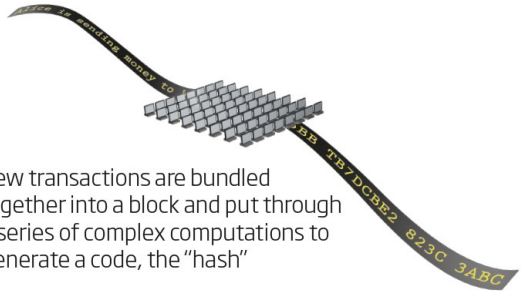
Nakamoto's solution was to derive trust not from banks but from a new piece of software called the blockchain (see "Inside the trust machine"). This public ledger records every bitcoin transaction and is shared between everyone who uses the

currency. Thanks to some nifty cryptography techniques, any new transaction added to the ledger is practically impossible to tamper with, and since it is public it can be viewed by anyone at any time. The result is a currency that is trustworthy without being backed by any one organisation.

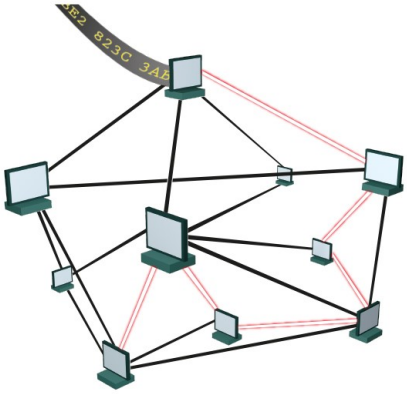
Since 2009, bitcoin has boomed, bombed, then boomed again. In its early days, its use in dark-web drug markets gave it an image problem. But that is changing, partly due to its soaring value and partly because its potential uses for law-abiding people have become apparent. It has also inspired a menagerie of other cryptocurrencies, each building on blockchain technology in different ways. These days, there are more than 1000 of them, says Garrick Hileman at the University of Cambridge, who studies digital money.

## Inside the trust machine

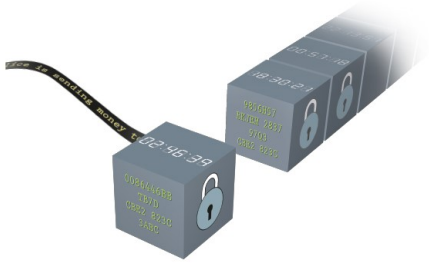
The blockchain is a digital ledger that uses cryptography and distributed computing to maintain an unalterable record of transactions




New transactions are bundled together into a block and put through a series of complex computations to generate a code, the "hash"




This hash is broadcast to all the computers on the blockchain network. Any attempts to alter transaction data would produce a completely different hash, which would be obvious to the network




Only when the hash is verified can it be added to the chain – a shared database that is practically tamper-proof

But for all that, it still isn't clear what bitcoin is. Many see it as something more akin to gold than money: an asset that may be tricky to exchange for goods but has intrinsic value. Like gold, bitcoin takes time and energy to extract by mining (see "How bitcoins are made"), and scarcity is guaranteed because the system is designed so there can never be more than 21 million bitcoins.

One thing is clear: it isn't yet a currency that most of us can spend. True, you can use it to buy pizzas, cars and holidays from a select few online vendors. But take it into your local grocery store or pub and the best you can hope for is a blank stare. The truth is that "it won't become [a form of currency] until people are paid in it", says Hileman. And that means governments will probably need to recognise it

first. For the time being then, the most likely way for bitcoin to go mainstream is to compete with the likes of Visa and PayPal as an electronic payment system in which bitcoins, rather than fiat currency, are exchanged.

That is certainly the view of one faction in the bitcoin community. To make this happen, they want to change the underlying software so it can support more transactions. Other members see things differently. They insist that such changes would raise barriers to entry, concentrate power in the hands of a few mining groups – and thus betray the very aims on which the whole venture was founded.

In August, the dispute escalated into a civil war and led to a split. The end result was a new version of bitcoin, called Bitcoin Cash, that supports more concurrent transactions. Which version wins will go a long way to deciding whether bitcoin will ever be more than a niche phenomenon.

Then again, there is another scenario in which it could affect everyone – and perhaps not in a good way. As the infighting continues, the banks that bitcoin was set up to subvert are sniffing around. This July, the US Commodity Future Trading Commission granted a bitcoin trading platform called Ledger X the first licence to operate as a clearing house for derivative contracts – in which value is derived from the price of an underlying financial product – that are settled with bitcoin. The respectability associated with a licensed platform should attract more investors, who would hold on to their bitcoins and thereby take more of them out of circulation, which could in turn dampen volatility. Or it could just inflate a bubble that is already fit to burst.

**Bitcoins are "mined" in warehouses where computers run 24/7**
Gilles Sabrie/*The New York Times*/Redux/eyevine

What really has some observers' alarm bells ringing, however, is the notion that

bitcoin might quietly get woven into the intricate web that links different parts of the financial system. In an interview with US news channel CNBC in October, Joe Saluzzi at Themis Trading said that the trading of bitcoin-linked products reminds him of the financial crisis. "I have a problem that on Wall Street the innovators are trying to package something up and put a derivative label on it when they really don't know what's underneath."

In the run-up to the 2008 crash, traders were passing around newfangled financial products that masked the collapsing value of the risky mortgages at their heart. Similarly, the value of financial products packaged around bitcoin would be hard to determine if the cryptocurrency at their core, prone to wild fluctuations, were hidden.

One thing that made the collapse of the "sub-prime" mortgage market so devastating was that so many parts of the financial system were interconnected, with loans and debts stacked and bundled together in ever more complicated ways. As financial journalist Matt Lynn has pointed out, we don't really know how banks are experimenting with blockchains or which derivatives have been hitched to what cryptocurrency. If one bubble bursts, the shock waves could again spread far and wide.

But the promises and perils of cryptocurrencies go way beyond money. Many believe that the underlying blockchain technology will be even more disruptive.

The first initiative to demonstrate the blockchain's versatility was Ethereum, which allows for all sorts of things to be exchanged. Blockchains have since been used to trade solar power, track food products' provenance and enable a new form of voting.

Blockchains could make things better – and cheaper – for all of us. If we can use them to draw up binding contracts, we could do away with lawyers and legal fees, or bypass estate agents. Indeed, the first international property sale on a blockchain was carried out via Ethereum in September. What's more, by making complex legal or financial services available to anyone with an internet connection, the technology could boost economies in poorer parts of the world.

Some believe that by making transactions more open to scrutiny, blockchain technology could even ward off another financial crash – or at least warn of its coming. If a record was made in a public ledger every time money changed hands, the day-to-day health of an economy could be monitored and the effects of monetary policy assessed. The amount of risk that large banks were exposed to could be made more visible as well.

Much of that may be wishful thinking, however. Such a vision assumes that the shared ledger is public, or at least accessib le to governments. But most banks are already experimenting with blockchains that exist behind closed doors. "The original cryptocurrency systems were open for anyone to use," says Brett Scott, author of *The Heretic's Guide to Global Finance*. "But large banks are creating closed

systems that are really just glorified central databases to do the private business they've always done."

By adapting blockchains to their own ends, bankers are taking the tech far from its roots. Take Blythe Masters, former executive at JPMorgan. She helped to invent the credit-default swap, which allows lenders to sell on the risk that their loans won't be repaid. When the markets crashed a year later, many critics blamed these financial products for making the crisis worse.

Now she is one of the most vocal advocates for blockchains. Her start-up, Digital Asset Holdings, is making software that will allow banks and investors to use blockchain technology to trade financial products such as loans and bonds. No one from the company was available to comment, but the basic idea is to accelerate these transactions, which can still take weeks. By speeding things up and cutting out the intermediaries, the tech could save lenders a lot of money – up to $20 billion a year, according to Santander InnoVentures. No wonder most financial institutions are rushing to find ways to profit from the technology. Even Dimon, a renowned bitcoin basher, is betting big on the blockchain.

## "As the banks rush in, the founding promise of bitcoin could be turned on its head"

But as with bitcoin speculation, there are risks. Rebuilding the world of finance on top of blockchains could usher in a new wave of financial products that are developed without a central authority and hard to police. Then there are the more dystopian possibilities.

As government authorities, banks and other big businesses rush to embrace blockchain technology, the founding promise of bitcoin and the blockchain could be turned on its head. Instead of a technology run collectively by the people who use it, these institutions could use entirely private versions of the blockchain to exert ever more control over the public. As technology critic Adam Greenfield writes in his new book *Radical Technologies*: "Despite the insurgent glamour that clings to it still, blockchain technology enables the realisation of some very long-standing desires on the part of very powerful institutions."

It is already clear that blockchains can support any number of arbitrary transactions, from buying a house to voting. But if those blockchains are run by governments or big corporations, those institutions become the gatekeepers to such activities, warns Greenfield. What will we be willing to give for access? Permission to link our medical records with the blockchain ID we used to buy a house? Permission to link our financial history with our voting records?

"What we're seeing now is the largest deployment of cryptography for civilian use in the history of the world," says Bauerle. It is hard to predict how it will pan out, but this is a grand experiment we can no longer ignore.

## How bitcoins are made

One feature bitcoin shares with a precious metal such as gold is the fact that it takes energy to extract, because the "miners" who generate each new bitcoin do so by carrying out tricky computations that gobble huge amounts of power.

Bitcoins are digital tokens, cryptographic code that gets passed between owners. Every time a bitcoin changes hands, the transaction is recorded in a shared public ledger, known as the bitcoin blockchain. But before each block can be added, its contents – a long list of numbers encoding the latest transactions as well as all those from previous blocks – must be used to solve a series of fiendishly complex cryptographic computations. It is a competitive business: the first miner to solve the problems and add the latest block to the chain is duly rewarded with newly minted bitcoins.

Originally, anyone with a computer could mine. With thousands of people contributing, it was a truly decentralised system. But it wasn't long before the only miners that could really compete were the big groups with the most expensive hardware. Today, bitcoin miners are almost exclusively large companies that have vast warehouses of computers working day and night. Most mining is done in China, where electricity is cheaper.

Some worry that this gives China a new way to flex its geopolitical muscles. "There were rumours recently that the Chinese government might nationalise bitcoin mining," says Garrick Hileman at the University of Cambridge. "If they then shut it down, the network would grind to a halt."

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