Bitcoin - Dec 1, 2013

The credentials of Bitcoin (BTC) as a medium of exchange and as a store of value are growing. While BTC is unlikely to become the global currency anytime soon, it could provide a competitive medium of exchange alongside other forms of money, though this would likely entail some regulatory oversight. But the same attributes that make BTC attractive as a store of value limit its potential as a medium of exchange. In the longer run, BTC could have more of an impact on financial systems through its disruptive payment technology than through its virtual currency.

While we think it is a stretch to attribute the underperformance of Gold this year to the rise of BTC, the relationship is worth investigating.

Bitcoin's Disruptive Technology

Bitcoin is a very elegant and ingenious open source program that creates and distributes a virtual fiat currency on a peer-to-peer network.[1] Bitcoin was launched in January 2009 with 50 BTC units and 14 BTC addresses, or virtual participants. By Nov 13, it had grown to 12 million coins and 130,000 addresses (Figure 1). Bitcoins are traded on several exchanges, with MT.Gox the largest one.[2] About 1,500 businesses accept payments in BTCs, ranging from Virgin Galactic Travels to antique shops.[3] At the same time, the USD price of BTC has increased sharply, reaching parity with Gold briefly on Friday, at $1,242 (Figure 2). Bitcoin prices can be quoted in 1,000th of a unit, the Satoshis. The USD value of outstanding BTCs now represents about $13.5bn, 0.01% of total USD cash and 0.002% of the US monetary base. There are on average 30 BTC transactions per minute, with an average transaction size of about $2,000 against, for instance, Visa's 200,000 transactions per minute and an $80 average transaction size.

Bitcoins are produced as a reward to 'miners' for maintaining the network and verifying transactions, which involve complex mathematical and IT processes. In other words, the seigniorage - the difference between the cost of producing the money and its face value - goes to those who develop and maintain the network. By contrast, when money is created by a central bank, it accrues the seigniorage itself. As the number of BTCs created increases, 'mining' becomes progressively more difficult and the rewards smaller (Figure 3). The program slows BTC production

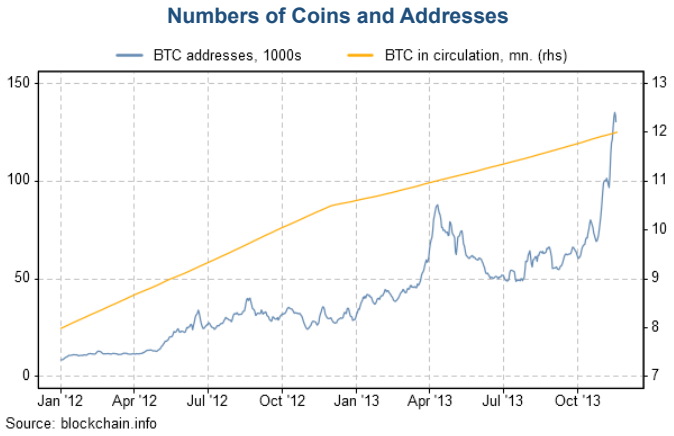

Figure 1: The growth in the BTC network really only took off after Q2 2012.

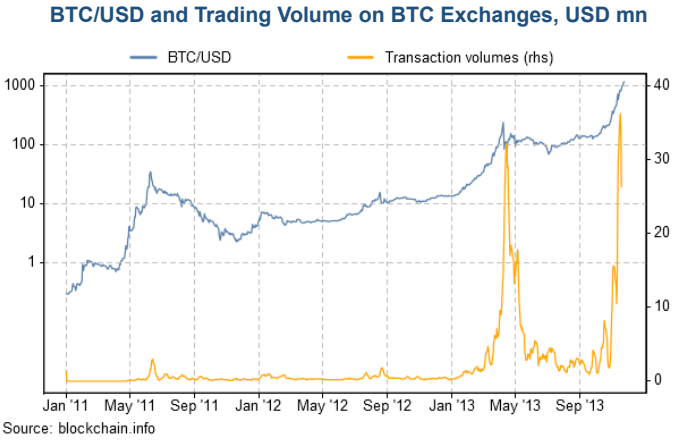

Figure 2: The BTC market is in its early stages of development which is reflected by high volatility in both prices and trading volumes.

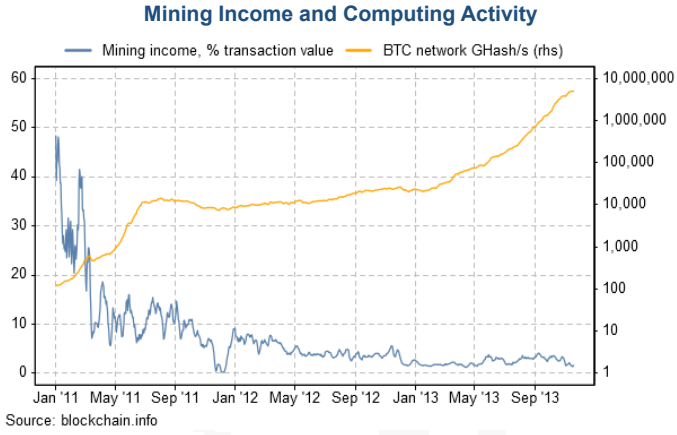

Figure 3: A 'hash' is the application of the BTC algorithm to the data. As the network has matured, mining income has fallen to less than 2% of the value of transactions. At the same time, the computing power required to maintain and expand the network is increasing exponentially.

[1] At: http://www.chicagofed.org/digital_assets/publications/chicago_fed_letter/2013/cfldecember2013_317.pdf

[2] At: http://markets.blockchain.info/

[3] At: https://www.spendbitcoins.com/places/

as their outstanding number increases in such a way as to cap the number of BTCs issued at 21 million.

Bitcoin's main innovation is its peer-to-peer settlement system. Before Bitcoin, settlement of transactions between two parties, even electronic settlement, involved a central ledger held by a third party, for example a commercial bank, to authenticate the transaction and ensure that funds are available. By contrast, BTC allows peer-to-peer settlement by building a public, distributed ledger of all transactions, known as the block chain. The block chain contains the transaction history of every BTC ever created. A transaction can only be added to the block chain after it has been authenticated by the 'miners', in a decentralized manner. A system of public and private keys, or Bitcoin addresses, allows participants to the BTC network to remain anonymous.

BTC removes settlement risk since a BTC transaction can only take place if the payer has the BTC in his or her account. At the same time, BTC transactions in principle have lower transaction costs and are faster than traditional payment networks since they do not involve a third party. BTC combines the convenience of cash payment, anonymity, speed and no settlement risk, with traditional payment systems' capacity to handle large transactions.

What has turned BTC into a currency? Essentially the willingness of BTC network participants to accept it as such. Historically, monies have emerged when states have become strong enough to impose them.[4] By contrast, BTC's viability as a form of money has emerged by mutual consent of the network participants, and fostered by trust, shared values and a sense of community among the original programmers. The need to build up this social capital could explain why, while BTC was launched in January 09, it really only took off after Q2 2012. Network effects are also likely to have played an important role.

A Competitive Currency?

Most economies rely on multiple money issuers such as central bank, commercial banks and non bank institutions such as money market funds (Table 4). Settlements between various currency issuers however, take place in central bank money, typically bank reserves. This helps ensure demand for central bank money and facilitates the implementation of monetary policy. Compared with the established players, as mentioned above, BTC's advantages are its lack of settlement risk, low transaction costs, speed of transaction and anonymity. However, BTC has two disadvantages in its current form:

1. Its lack of guaranteed convertibility into central bank money. It is this convertibility that allows the public to ignore the distinction between money issued by the central bank and by commercial banks. The central bank would be unlikely to grant convertibility unless BTC network members would agree to some form of regulatory oversight. The anonymity of transactions could be one of the more objectionable BTC features, from the perspective of a regulator. Indeed BTC's decentralized nature, peer-to-peer features and independence from the regulator make it an ideal payment system for the black economy and for illicit ends. As BTC trading volumes grow, it will very likely become subject to some form of regulation.

The Properties of Monies

	Supplier	Medium of Exchange	Value, % US GDP	P2P Payment	Settlement Risk	Transaction Costs	Anonymity	Guaranteed Convertibility
Gold	Physical	No	2% (world GDP)	Usually no	Yes	High	Limited	No
Cash	Central Bank	Yes	8%	Yes	No	High for large transactions	Yes	Yes
Bank Reserves	Central Bank	Interbank market only	16%	No	Yes	Low	No	Yes
Commercial Bank Debt	Commercial banks	Yes	70% (M2)	No	Yes	High for small transactions	No	Yes
Bitcoin	Algorithm	Growing	0.0006%	Yes	No	Low	Yes	No

Table 4: The main advantage of BTCs over other forms of money is their low transaction costs. Regulators could object to the anonymity.

[4] At: http://www.sciencedirect.com/science/article/pii/S0176268098000159

2. Limits on issuance. By design, BTC issuance cannot exceeds 21 million. Spread over the next 30 years, this would result in real BTC annual growth of 1.9% and zero thereafter. By contrast, over the past five years the world's real growth has been 2.9% on average. This suggests a global economy with BTCs as its only form of cash would be deeply unstable. Even a fractional reserve banking system requires a growth in cash commensurate with the growth in the economy. For instance, since Aug 10 the US CPI measured in BTC has fallen by 97% due to steep BTC appreciation (Figure 4). BTCs provide a small scale, real life experiment of what a return to the gold standard would feel like, but appear unlikely to ever turn into a full scale experiment.

Nevertheless, central banks could actually support the expansion of BTC, subject as mentioned above to regulatory oversight as the peer-to-peer settlement system could reduce counterparty risks and lower transaction costs in the interbank market. Meanwhile, BTC could reduce the demand for central bank money since commercial banks would transact directly and bypass the central bank. This could make monetary policy implementation more difficult. However, demand for central bank money would not disappear altogether since it would be required for transactions such as tax payments or required reserves holdings. Indeed Bernanke has recently expressed some support for virtual currencies, which he believes 'may hold long-term promise, particularly if the innovations promote a faster, more secure and more efficient payment system.'[5]

The incumbents that may put up the strongest resistance to BTC expansion may be established payment networks such as Visa or Amex. Under the current technological paradigm, these networks enjoy strong economies of scale, natural monopolies and high profits. For them, BTC could prove a very disruptive technology. Interestingly, both Visa and Amex have recently purchased virtual currency providers.[6]

Gold 2.0

While BTC has great long term potential as a medium of exchange, its short term potential is likely more as a store of value. BTCs are likely to appeal to 'gold bugs' because:

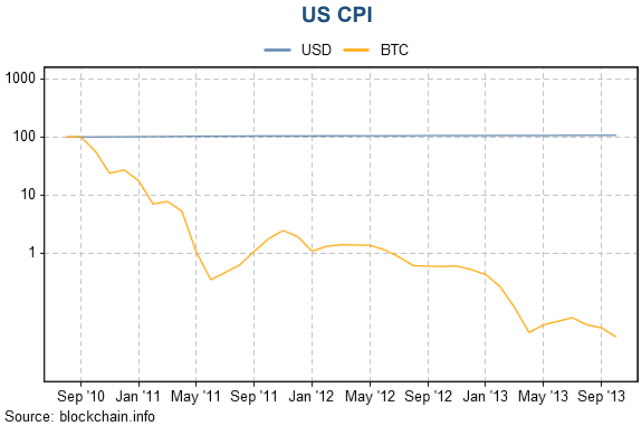

Figure 4: BTC provides a small scale, real life experiment of what a return to the gold standard could be like.

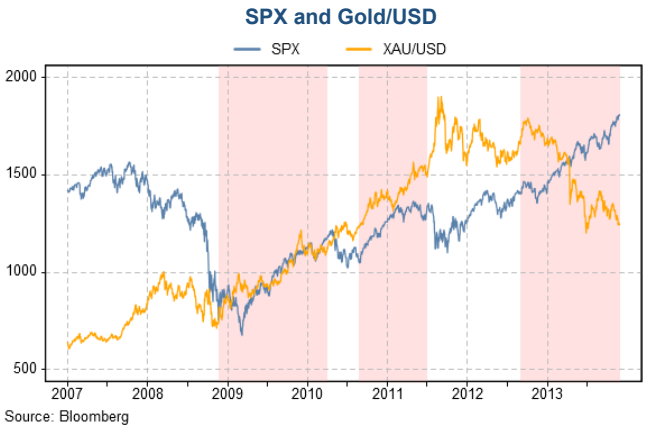

Figure 5: Equities seem to have been a key beneficiary of QEIII and appear highly exposed at this point. Next year could see some correlation of equity and gold prices, which could stand to benefit BTC.

- Like gold, the supply of BTC is constrained. Peer-to-peer settlement may also preclude the creation of 'paper BTC';
- Competition from new virtual currencies does not appear to be strong at this stage as powerful network effects suggest that BTC prime mover advantage is substantial. While one exchange trades 60 virtual currencies, very few have passed the 100 million mark, against BTC's $13.5bn market capitalization.[7] As mentioned above, developing the social capital required by a new currency takes time;
- BTC's scarcity and novelty factor leave it less exposed to 'peak liquidity' than gold. We continue to expect the US

[5] At: http://online.wsj.com/news/articles/SB10001424052702304439804579205740125297358

[6] At: http://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf

[7] At: https://www.cryptsy.com/

to reach a point of 'peak liquidity' in 1H next year, with negative consequences for gold (*Tapering and Asset Prices - Nov 24, 2013*). At the same time, equities seem to have been a key beneficiary of QEIII and also appear highly exposed (Figure 5). Hence next year may see some correlation of equity and gold prices. By contrast, as a new asset, BTC has been much less influenced by past monetary trends than existing assets and therefore may be less affected by policy normalization;

- BTC holding costs are lower than gold and anonymity is more easily maintained than with gold ownership.

In addition, BTC has a number of soft features that may add to its appeal:

- To some it fulfils a notional libertarian ideal of a privately issued currency free of government influence and boundaries;
- It is somewhat esoteric: it is not known whether Satoshi Nakamoto, the putative author of the algorithm, is an individual or a collective of hackers;
- It is 'cool': it makes generational appeal, and leverages an elegant intellectual construct via new-age social technologies.

For choice we think the BTC rally has (much) further to run. The recent surge has done much to raise awareness and to create Giffen-like demand conditions. The sharp sell-off which occurred in April, and which correlated with Gold prices, seems like a distant memory. While empirical evidence is scant, we think it is entirely plausible that some early stage substitution between BTC and Gold is taking place (Figures 6 and 7).

At the same time, BTC is a new asset with limited market infrastructure, liquidity and no oversight, which suggests substantial market volatility. For instance theft of BTCs by hackers or software issues tend to happen with regularity and contribute to market volatility.[8] On the other hand, BTC could be in a sweet spot where there is enough traded volume to make it a real market but not so much that regulators start imposing restrictions.

Figure 6: The growth in BTC market capitalization reflects both network growth and price appreciation. Meanwhile, the market capitalization of paper Gold (measured as ETF issuance in USD) has halved this year (yellow line, scale inverted).

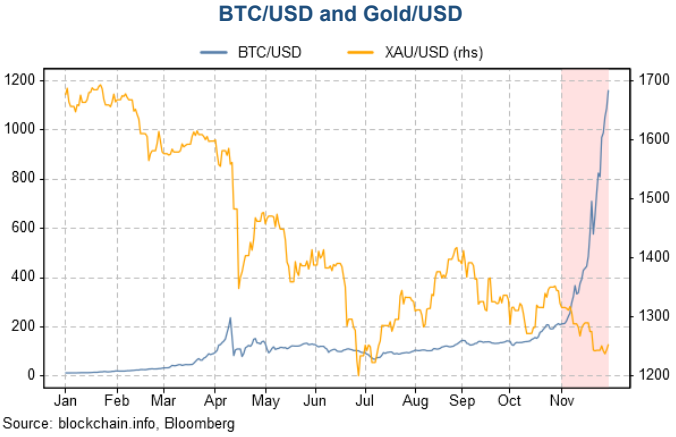

Figure 7: The sharp increase in BTC/USD likely reflects network effects as well as a perceived reliance of BTCs as a store of value: BTCs tick many of the gold bugs' boxes.

In Summary

The features that make BTC attractive as a store of value - limited supply and anonymity - also limit its potential as a medium of exchange. In the short run, BTC's potential is probably greater as a store of value than as a means of exchange. Over the medium term, BTC could grow to represent an alternative currency provided it accepts some regulatory oversight. In the very long run, BTC's greatest impact on financial markets may well be through its disruptive payments technology, rather than through the creation of an alternative currency.

[8] At: http://www.businessinsider.com/the-history-of-bitcoin-theft-2013-11