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POINT of VIEW
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Our Perspective on Issues Affecting Global Financial Markets

Bitcoin: The Future of Money

Bitcoin, the fledgling digital currency, may not unseat the US dollar as the world's currency of choice, but we think its rise provides a glimpse into the future of money and financial markets.

Bitcoin: The Future of Money

Money need not be paper in the pocket. Money needs neither government nor regulatory approval. Money is more an adjective than a noun, a way to make trade easier, and holds no intrinsic value.

From the "electrum lumps of Lydia" which passed from bag to bag (circa 650 BCE), shells, gold, and specially-inked paper have all functioned as money.[1] The latest innovation is the digital currency, Bitcoin. Critics howl that a privately-issued digital money could never replace the mighty US dollar (or any other government-issued currency backed by an aircraft carrier fleet). But a quick tour through Bitcoin's place in a theory of money offers investors a glimpse into the future.

SCROOGE AND MEDIA OF EXCHANGE

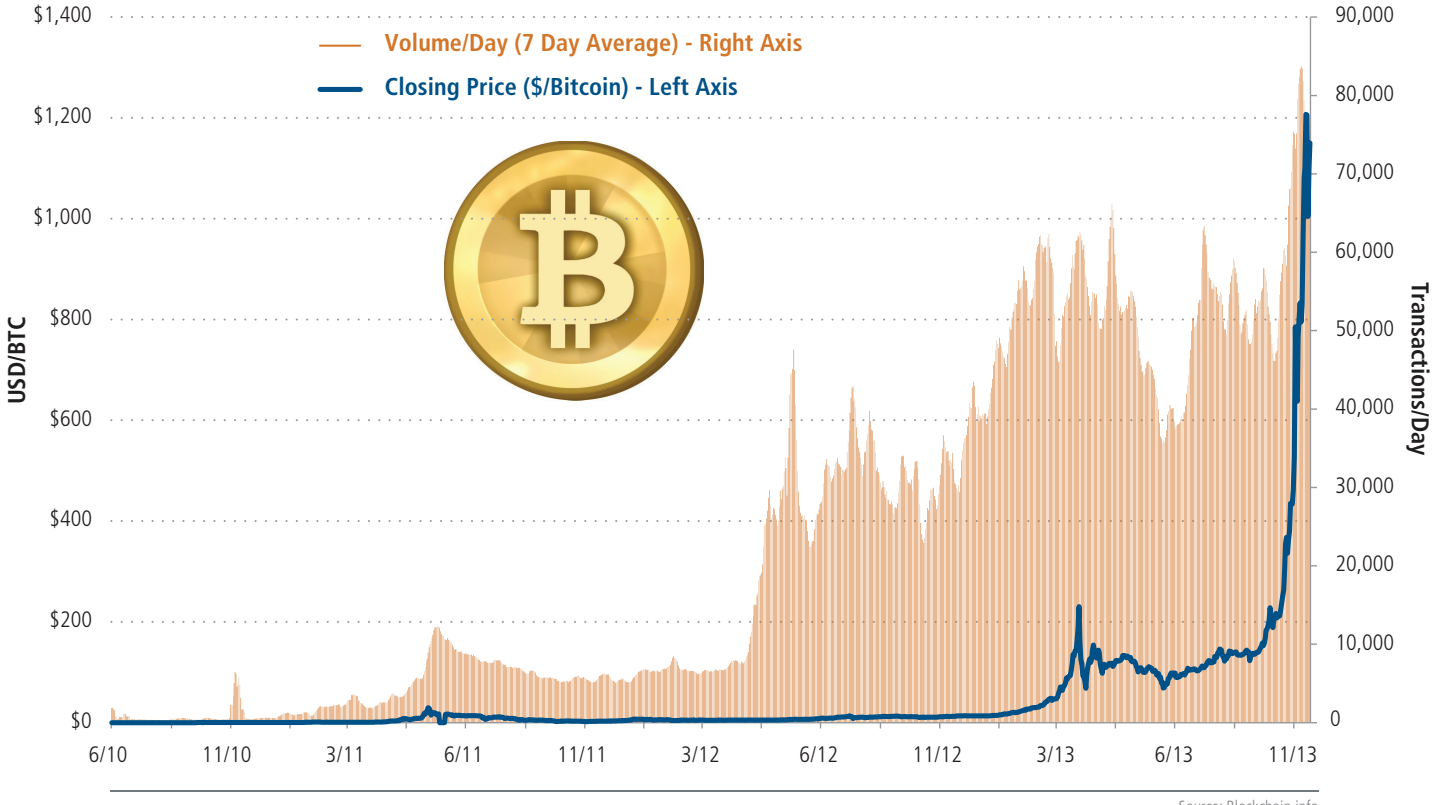
What counts as currency, if not the government stamp of approval? Three features distinguish those things which count as currencies: they trade easily, hold value, and can be used to price a wide array of goods and services.

> « NONE, EXCEPT SCROOGE, HOLD MONEY FOR MONEY'S SAKE; WE HOLD DOLLARS, GOLD, OR BITCOIN BECAUSE WE PLAN TO EXCHANGE SUCH CURRENCY IN THE FUTURE FOR THE OTHER GOODS AND SERVICES WE DESIRE. »

First, money is a liquid media of exchange. None, except Scrooge, hold money for money's sake; we hold dollars, gold, or Bitcoin because we plan to exchange such currency in the future for the other goods and services we desire. Throughout history, humans used the most marketable commodity available as money. Marketability arose from demand for use, divisibility without loss of value and transportability over large distances.[2] In short, consumers prefer to exchange commodities that make trade easier.

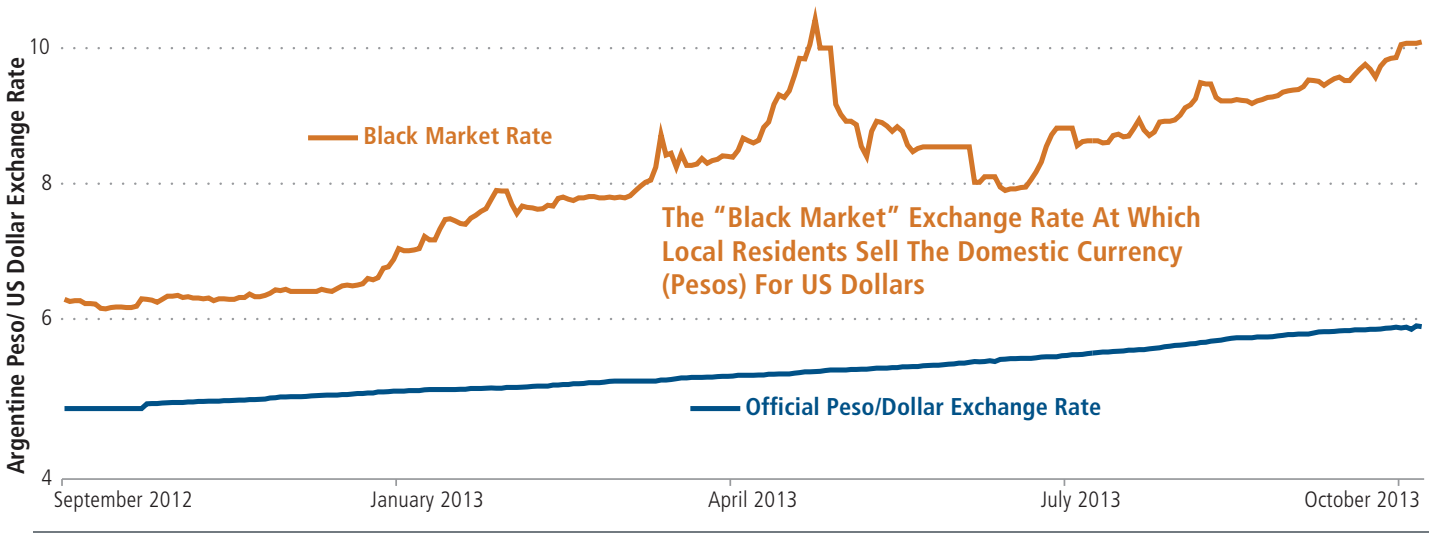
Oxen, for example, make worse money than coined gold, for the simple reason that they are not easily exchanged (and oxen tend to expire). In the case of metal money, the advent of coinage improved liquidity and facilitated

fig. 1 TURN UP THE VOLUME AND THE PRICE OF BITCOIN



Source: Blockchain.info

fig. 2 OUTSIDE THE CIRCLE OF TRUST: WHEN PEOPLE NO LONGER WANT TO HOLD A CURRENCY, THEY'LL SEEK ALTERNATIVES ELSEWHERE



Source: La Nación

its wide adoption. In turn, paper banknotes followed by check clearing, further reduced transaction costs and facilitated more exchange.

Indeed, history teaches that government approval needn't always guarantee properly working money. Consider that in 1830s, before the advent of Federal Reserve Notes (today's dollars), there were "approximately 1,500 different banks' notes traded in the US economy."[3] These banknotes were currencies issued by different banks, which the public chose to hold. In Scotland, too, during the eighteenth and part of the nineteenth century, the country "had no monetary policy, no central bank, and very few legal restrictions on the banking industry. Entry was open and the right of note issue universal."[4]

In the internet landscape, will experiments like Bitcoin ascend to the status of currency? Unlike present digital payment systems (e.g., Paypal), which require a third party to authenticate and track transactions, Bitcoin is a direct, peer-to-peer exchange network: "Bitcoin users buy and sell the currency among themselves without any kind of intermediation."[5] Not only does this mean that third parties need not be involved, it also drives down the cost of transacting in Bitcoin (**see Did You Know? on page 4**).

Rather than paying fees to Visa or Mastercard for a merchant account, small enterprising businesses might accept Bitcoin, on account of lower transaction costs. In fact, the Bitcoin Store, a consumer electronics e-tailer, sells the newest technology at lower prices due partially to cost savings on exchanges.[6]

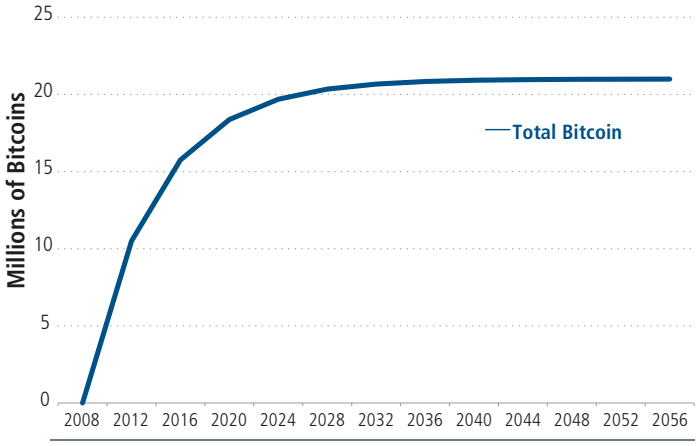
Bitcoin is durable, divisible, portable and secure: a medium of exchange par excellence. The more that paired parties mutually consent to using a cheaper medium of exchange, the more liquid such a medium becomes. Even if Bitcoin doesn't ultimately unseat the US dollar, lower transaction costs incentivize use.

WHAT MONEY MUST HOLD

The second feature of money is as a store of value. In other words, collective agreement on the fact that this "thing" will hold its value over time is a prerequisite for any "money." On this point governmental action bears directly on currency. If a political authority requires payment of taxes in a certain form of money, the officially preferred store of value, those acting under such conditions typically prefer to transact in the publicly approved store of value. However, as witnessed in cases where public trust in official currencies erodes (**see Figure 2**), people prefer to use other forms of currency even if they are not officially accepted.

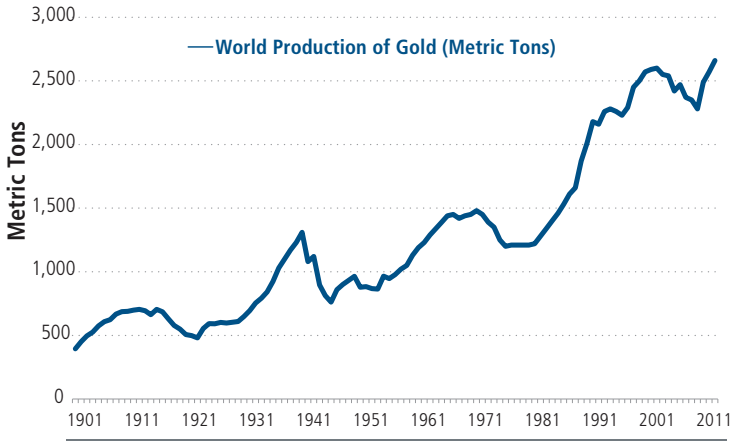
« MONEY IS MORE AN ADJECTIVE THAN A NOUN, A WAY TO MAKE TRADE EASIER, AND HOLDS NO INTRINSIC VALUE. »

fig. 3 TOTAL BITCOIN OVER TIME: PRODUCTION IS CONSISTENT, LIMITED, AND **KNOWN**



Source: en.bitcoin.it

TOTAL QUANTITY OF GOLD OVER TIME: PRODUCTION IS INCONSISTENT, LIMITED, **UNKNOWN**



Source: USGS

Take Bitcoin, for example. No embargo or dictum forces those holders of Bitcoin to continue holding the asset. Indeed they do so only under the assumption that others value Bitcoins enough to trade other goods and services. Or, take gift cards as another example. A grocery store that issues a gift card effectively issues a liability (or a promise to pay upon redemption) which people must freely want and hold.

Critics object, "Unlike gold, there is nothing of substance backing Bitcoin to assure its value." And certainly the prima facie value of the argument appears true: after all, who wouldn't want gold? Upon closer inspection, faith that one could exchange gold for other goods and services desired gives gold its value. When one hears nostalgic "goldbugs" wax apocalyptic about how gold retains its value in the face of change, the assumption is not so much that there is something intrinsically valuable about gold, but rather a belief that gold may be exchanged in the future more readily than other currencies for the goods and services desired.

« EMBEDDED WITHIN THE NEW DIGITAL CURRENCY LAY IMPORTANT TECHNICAL AND MONETARY INVENTIONS. THE PUBLIC LEDGER USED BY BITCOIN TO AUTHENTICATE TRANSACTIONS, FOR EXAMPLE, MAY HAVE USE ELSEWHERE FOR DEPOSIT TRANSACTIONS, FOR ESCROW PROCESSES, AND EVEN STOCK TRADING. »

To function as a store of value, the creator(s) of Bitcoin wrote open source (available to the public) code that determines the amount of "mineable" units over time (**see Figure 3 and Did You Know? on page 3**). As depicted, the "number of Bitcoins generated per block is set to decrease geometrically, with a 50% reduction every four years. The result is that the number of Bitcoins in existence will reach 21 million in around 2040," up from roughly 10 million Bitcoins today.[7] Hence, the supply of Bitcoin is both limited and known.

Some worry the limited quantity of Bitcoin may hinder its acceptance as a transactional currency (medium of exchange). Why? With the supply limited, the purchasing power of Bitcoin may rise and market participants may want to "hoard" Bitcoin more as a store of value rather than a form of currency. This occurred historically under paper money schemes. The unique feature of Bitcoin is that it is divisible to the eighth decimal place (called a "Satoshi" after the anonymous Bitcoin creator, thought to be a composite for a group of software developers). So, unlike discrete units of paper notes that can be hoarded, Bitcoin transactions occur just in smaller units, electronically. Deflation, then, does not necessarily thwart the progress of Bitcoin.

"THAT'LL BE TWO BITCOINS, PLEASE"

Finally, to be a bonafide currency, a given commodity (or internet good) must qualify as the unit of account: actors in the economy will want to quote commodities in terms of the currency. In theory, the better a currency's ability to store value, and the more liquid it is as a medium of exchange, the more likely it will be the unit of account.

DID YOU KNOW?

What is Bitcoin?

"Bitcoins" are not actual coins at all. They consist of bits and bytes rather than gold and silver. But they solve a similar problem. Indeed, history's merchants (think 18th century Britain) once fretted over the authenticity of metallic currency they received as payment. Reflection on the evolution of metallic money is instructive in revealing the ways monetary systems spontaneously organize to resolve transactional hangups.

Uniquely stamped banknotes or serialized coins achieved a great step on the way to authenticating payments. Recognizing that customers would willingly accept notes promising to pay gold, serialized banknotes issued by financial institutions made trading easier and safer. A merchant could always take the coins and banknotes to a bank to verify "authenticity."

In payments today, when we instruct our bank to send money, it verifies that we have sufficient digital credits in an account and clears the payment. In the US, this process may take up to 3 business days—a terribly slow and archaic system considering the ease of email. Other services like Western Union can be used to wire money around the world. But it's still expensive. And there is still a third-party (namely the banking system) involved--and often times that third party is closed on weekends. Is there an alternative solution?

It turns out cryptology, the art and science of sending secret messages, has an answer. In actual fact, Bitcoin is a way to send encrypted messages ("coins") on a person-to-person basis. Put another way, Bitcoin is a technology that allows you to send an encrypted message with money attached!

Here's how it works. The Bitcoin network consists of a publicly distributed ledger that documents ownership of all Bitcoins in existence. The ledger is called a block chain. A copy of this block chain is publicly available on every computer in the Bitcoin network.

When someone sends a Bitcoin to another person as payment, the recipient broadcasts a message to the global network. Bitcoin "miners" verify that each transaction is the transfer of an actual Bitcoin from one person to the other by checking their copy of the block chain. The term "mining" is both unfortunate and misleading as those "miners" are not miners at all but verifiers or auditors of the public ledger.

But not just anyone can be a miner (verify transactions). Miners compete with each other by solving a complex mathematical equation to prove that they did the work to verify the transaction. However, in return for performing the verification task, they receive newly-minted Bitcoins or a transaction fee (paid in Bitcoin). The computing resources required to conduct verification become higher as the Bitcoin network grows, slowing the growth in the supply of Bitcoins and keeping them relatively scarce.

In short, Bitcoin is less a currency and more a system for verifying person-to-person payments without the need for a third-party (other than the block chain "miners").

With that brief introduction, critics of Bitcoin who chalk up the digital currency's rise to elicit internet transactions should take note: the block chain ledger means that a public record of every Bitcoin exchange is available—hardly the ideal situation for "black market" transactors seeking anonymity. More importantly, transactions are verified by the community, rather than relying on an expensive third-party, like a bank, clearing house or government entity. Such auditing helps prevent fraud, counterfeiting and currency debasement better and more cheaply than any previous method of payment settlement.

Conceptually, we can take the Bitcoin idea one step further: imagine an online accountant's ledger sheet available to all for viewing. The ledger could be used for tracking ownership of anything: property titles, futures, equity shares, royalties, etc. The ledger would leave a public trail of ownership, tracked in real-time and verified by a distributed network.

In the end, whether or not Bitcoin becomes a currency that rivals the dollar may not matter. The technology behind it solves important problems faced by currency and payment systems. The Bitcoin platform could therefore serve as a wonderful springboard for future monetary innovations.

Why is this such a hurdle? With the US dollar as the reserve currency of the world, it is the final unit of account for most international transactions.[8] In a telling example, "if a bank wants to convert [Venezuelan] bolivars into [Polish] zlotys, it will generally trade the bolivars for dollars, then the dollars for zlotys, rather than try to find someone wanting to make the reverse trade. [The dollar] is the currency many though by no means all international transactions are invoiced in. And to some extent people hold dollars or dollar-denominated assets because the dollar is more liquid than other currencies."[9]

To move more seamlessly between less liquid currencies, banks transact in dollars: the prices of the original and final currencies in the transaction (here the Venezuelan bolivars and the Polish zlotys) are quoted in dollars.

Final arrival for Bitcoin would take the shape of brokers

quoting the price of dollars in Bitcoin—unlikely in the near future, but not impossible. After all, before World War I, international prices were quoted in British pounds. Don't be surprised if in the near future the inquiry arises at a local coffee shop, "Do you accept Bitcoin?"

BITCOIN: ON THE ROAD TO FUTURE MONEY

In judging any prospective currency, the foregoing three characteristics—medium of exchange, store of value, and unit of account—make a good litmus test. Applied to Bitcoin, we see today's leading internet-based, digital currency fall short as a store of value (given its large price fluctuations) and as a unit of account (Bitcoin is quoted in dollars, never dollars in Bitcoin).

Yet even if Bitcoin fails, embedded within the new digital currency lay important technical and monetary inventions. The public ledger used by Bitcoin to authenticate transactions, for example, may have use well beyond Bitcoin (**see Did You Know?**). Just as in the early days of the Internet many failed to see all the uses for the underlying Internet protocol, a focus on Bitcoin's prospects as a "currency" may cause investors to miss a flourishing architecture built on the Bitcoin technology. Advances such as these, which make trading safer and more secure, make the prospects of digital currencies more socially valuable than simple stores for illegally-won money.

Issues remain for Bitcoin, but it exemplifies the movement of currency in the 21st century. We might bid farewell to the exclusivity of issuance characteristic of the 20th century and welcome a freer and looser regime of money where users and vendors exchange whichever currency most conveniences them. Certainly not a locus of decline, there is hope to be had in monetary innovation.

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