HORIZON KINETICS

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THE QUESTION OF BITCOIN TRANSACTION SPEED AND SYSTEM CAPACITY

The Way Things Are Happening Right Now

Bitcoin should qualify as a contrarian investment, since virtually the entire intellectual leadership of the investment community regards bitcoin and every other cryptocurrency as being in a valuation bubble. The financial media is even more strident in asserting that bitcoin is merely a bubble.

One of the bases of the bubble argument is that bitcoin is too slow to use as a practical mechanism for transactions. An example of this scalability problem is that the bitcoin transaction speed is now about only seven transactions per second. Visa reports that its VisaNet system is capable of handling as many as 24,000 transactions per second. On a normal day, VisaNet processes an average of 150 million transactions—6.25 million transactions per hour, 104,166 transactions per minute, or about 1,736 transactions per second.

On March 15, 2018, Lightning Labs launched a version of its Bitcoin Lightning Network in beta mode in real time. Although it is part of the bitcoin system, the number of users is restricted during the test period.

Blockstream and ACINQ are testing other versions of the Lightning Network. The Lightning Labs version in beta mode has over 4,000 channels open so that at minimum it is capable of 4,000 transactions per second. It is clearly as fast, if not faster, than VisaNet—even without the presence of other versions. Moreover, all the other versions could run simultaneously with Bitcoin Lightning. They are not mutually exclusive and would all be live and viable.

The non-technical explanation of Bitcoin Lightning is that it essentially eliminates traffic congestion on the bitcoin blockchain by permitting certain activity to take place in channels off the blockchain. With Bitcoin Lightning, the currency can change hands on a peer-to-peer basis. There is no limit to how many parties can be in a channel. For example, A can send bitcoin to B; B, in turn, can send bitcoin to C; C can send bitcoin to D; and so forth. The transfer is entirely within the control of the users and is only reflected on the blockchain when the channel is closed.

The objective is to increase speed and reduce confirmation time. The Lightning Network has been in test mode in different versions since early January 2018, and the results thus far suggest that it is a success. Another important point is that this is open source code that can be used, examined, enhanced, or tested by anyone. The code is available for download at GitHub.

Launching the Lightning Network is a seminal event because it makes cryptocurrency transaction volumes on the scale of Visa and MasterCard possible—and at even higher speeds. Incidentally, one should say cryptocurrency or consensus money—as opposed to bitcoin—since there is already a Lighting Network version for Litecoin. The cost of a transaction will be a very small fraction of a penny.

The general public is usually unaware that when a merchant accepts a credit card such as Visa, the merchant must pay separate fees for each of:

  a) the credit card association, like Visa,
  b) the bank that issued the credit card,
  c) the credit card processors that actually send and receive data,[1]
  d) merchant account providers, which could be another bank,[2] and
  e) payment gateways.

There are many levels of fees. For example, the basic interexchange fee is 2.10% of the cost plus $0.10. If one buys an $8 sandwich with a Visa card, the fee is 0.021 times $8, or 16.8 cents, plus 10 cents, which equals 26.8 cents, which is 3.35% of the transaction value.

Some merchants pay through a credit card processing company that actually pays Visa. The merchant in this case probably pays 2.5% of the cost plus $0.10. In the $8 sandwich example above, the merchant's cost would be $0.30, or 3.75% of the transaction value. None of this includes terminal license fees, payment gateway fees, or Payment Card Industry (PCI) fees. This latter item is a payment to the card industry in exchange for the favor of their setting credit card standards and establishing a variety of rules and regulations governing credit card use.

There are additional fees, including an annual basic fee, a monthly fee covering the use of call centers, and a minimum monthly fee for a merchant who does not have at least $50,000 a year in charges. In principle, a small merchant would need to have business on a U.S. or European scale. In Emerging Market nations, this might be a difficult sum to attain. There is usually a monthly statement fee of $15 and a $2 to $5 charge for reporting tax information to government agencies, such as the Internal Revenue Service or the local sales tax authority. There are online reporting fees, network fees, address verification fees, voice authorization fees, and retrieval request fees that are paid by the merchant each and every time the customer has some sort of dispute with the merchant. Banks also require chargeback fees, batch fees, and minimum balance fees, from which it can earn interest on the float if the minimum balance is not maintained.

The Way They Are About to Happen
Listing the various types of fees affords a clear understanding of how much the incumbent payment system has to lose from cryptocurrency. By the same token, the merchants have much to gain. One can assume that at the moment Amazon is approaching the $200 billion annual revenue level. If the cost of credit card transactions is 3%—although judging from the price list, the fee is actually higher—then Amazon can, in principle, pay $6 billion to its providers. In the case of WalMart, the sum would comfortably exceed $12 billion annually.

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[1] In fact, several of these might be part of a single transaction. For example, one card processor produces monthly statements and another might issue money to the bank.
[2] If this is the case, there is more than one bank involved in a transaction.

Now that Bitcoin Lightning Network is a reality, one can easily see how the financial sector might become disintermediated. Maintaining balances in cryptocurrency is not even necessary for customers of a given merchant. For instance, suppose that Amazon wishes to side-step the credit card companies. It could simply purchase cryptocurrency itself, on behalf of its customers and then virtually instantaneously accept the cryptocurrency as payment for the merchandise that customers wish to purchase. Amazon would effectively take title to the cryptocurrency as soon as the transactions occur, so that the customers never accept price risk.

Nor would Amazon, for its part, have to accept price risk since, if bitcoin were accepted as payment, since it could always hedge that exposure with futures on the Chicago Merchantile Exchange (CME) and the Chicago Board Options Exchange (CBOE). In fact, at about the same time in December 2017, when the CME and the CBOE self-certified their bitcoin futures, the Cantor Exchange—an innovation of Cantor Fitzgerald—also established a swap contract for bitcoin. Coinfloor, the U.K. cryptocurrency exchange, will launch the first physically-delivered bitcoin future on April 18, 2018. The North American Derivatives Exchange (Nadex) launched a bitcoin difference contract or spread-based contract on December 18, 2017.

The launching of four contracts at roughly the same time by four different entities on one commodity is completely without precedent in the commodities world. Despite the price decline in bitcoin as well as other cryptocurrencies, even more contracts are being launched. Such activity is absolutely incomprehensible unless one understands the enormous potential to disintermediate the incumbent financial and banking systems that are tied to credit card transactions, and the likewise enormous scale of futures volumes that would be required to accommodate the price hedging requirements of that market.

According to Visa in its 2017 Form 10-K, there are 3.2 billion Visa cards worldwide. The total payment volume for Visa is $10.2 trillion, derived from over 46 million merchants in 160 different currencies. The MasterCard Network is almost as large. Payment is accepted in over 200 countries and jurisdictions.

This raises another important point. Daily foreign exchange trading can be measured in the trillions of dollars. The substantial spreads received on these transactions are an important source of profit in the banking system. Cryptocurrency payments—faster (i.e., virtually instantaneous), error-free, and cheaper—open this field to an unlimited number of new providers. Even if the banks ultimately accept cryptocurrency, they will not necessarily retain their current level of dominance.

As serious as this problem may be, it is relatively insignificant in relation to the hedging business of anticipated cash flows and foreign exchange positions of many firms. This hedging is usually done through the swap or derivatives market. The outstanding notional amount of FX derivatives can be measured in the hundreds of trillions of dollars. The mere existence of cryptocurrency is a significant threat to this business.

The threat of cryptocurrency is not only a threat to the field of financial services, it is also a threat to the field of corporate content aggregators and distributors. Until recently, a novelist, songwriter,

or musician needed to partner with a large corporation simply to sell content to the general public. The overwhelming part of the revenue generated from content is generally paid to the sponsoring corporation rather than to the artist. Micropayments can change this relationship.

The blockchain is much more than a storage mechanism for cryptocurrency. Any digital asset, including a song, can be stored on a blockchain. In principle, an artist could charge 1/10 of a penny to anyone interested in listening to a song. Payment would be made instantaneously via the Bitcoin Lightning protocol. The artist could theoretically keep hundreds or even thousands of channels open for an indefinite time and only write to, or record the transaction on, the blockchain when the amount becomes sufficiently large to make this worthwhile.

Use of the blockchain would disintermediate not only the banking system and the content companies, but also Google and YouTube, since there would be no need and no mechanism to pay these companies. In principle, a movie is a digital asset that can be stored on the blockchain. The movie could be watched on demand without an intermediary such as Netflix. A content producer need not sell its content rights to Netflix. In principle, a popular movie could collect revenue directly from the viewers at the time of viewing. There could be a micropayment policy in which the first five minutes, or perhaps the movie's trailer, would be free. The producer might actually pay someone a very modest sum to watch the trailer and then charge 1/10 of a penny for the first five minutes—perhaps 50 cents for the next 15 minutes and then $4 to view the movie in its entirety. The range of creative stratagems that might be arrived at would be limited only by the human imagination.

The customer might not wish to take the risk of an entire pay-per-view movie payment but might be willing to make a micropayment to view part of the movie. A certain subset of customers might watch the film in its entirety and pay accordingly. The same principle might apply to books or any other type of content.

Theoretically, universities could offer online minicourses. Schools might offer micro-accreditation or microdegrees in very narrow subjects that do not require a four-year degree. University graduates could retrain for other professions by using the existing degree as a basis to take minicourses and thereby qualify for another profession.

The 'Takeaway'
None of this is science fiction; it is already happening. For example, a company known as Wirex offers a cryptocurrency debit card that currently has over $1 billion of annual transaction volume. It plans to offer a debit card in Asia in the second quarter of 2018.

The most important points are that an instantaneous transaction with cryptocurrency is now possible and that an intermediary now has mechanisms to hedge the price risk of the cryptocurrency asset. The bitcoin bubble argument is no longer an impediment to much larger segments of the population using bitcoin. The process of disintermediation has already begun. The first-ever security transaction was settled on the Ethereum blockchain on March 16, 2017. This is

not good news for the Depository Trust Company (DTC), Euroclear, or Clearstream. It is also not a welcome development for custodian banks and other entities.

Society is well past the point at which one can reasonably debate whether cryptocurrency will be a real asset class. One can debate the valuations of some cryptocurrencies and reasonably take the position that some will fail, and others will succeed. The debate should now center around what might be the socially useful applications—not whether it is a bubble and will one day vanish. It is unlikely to vanish. This failure to discuss the recent advances and applications is nothing more than obscurantism.

Four months ago, the mempool—the pool of unconfirmed transactions on the bitcoin network, before they can be added to the blockchain—had a backlog of approximately 120 megabytes. That's relative to the 1 megabyte block size on the bitcoin blockchain. The current mempool backlog is less than 1 megabyte (MB). It is passing blocks with half a megabyte, basically eliminating the backlog.

Q: Is there data showing the types of transactions that are being processed on the Lightning Network?

A: The Lightning Network processes payments for goods and services and, for the time being, limits transactions to those that amount to no more than about $40 in value. The limit is to protect participants from the risk of there being an undiscovered bug in the network.

Q: Would you discuss the nature of the scaling limitation in bitcoin?

A: The scaling limitation is completely misunderstood by the financial media, because it is not a technical matter, but the media treats it that way. Both the idea behind bitcoin and its design elements are philosophical and sociological in nature. The scaling limitation stems from the fact that the size of a block on the conventional bitcoin blockchain is fixed at 1 MB. Since many people have files on their computers that are considerably larger than 1 MB, you might ask why it is fixed at such a relatively small size. It is not due to any technological limitation, because the file could be anywhere from 2 to 1,000 MB.

It is fixed at 1 MB because the creators of bitcoin did not want the blockchain to end up like the internet, in that the internet is dominated by a handful of big corporations that have the resources to store enormous amounts of data. The creators of bitcoin and blockchain did not want that centralization to happen again—the whole point was to decentralize, to democratize. They wanted it to be an efficient system that would never be dominated by huge corporations.

Part of the solution to prevent such domination is not allowing any entity to control 51% of the mining power, because theoretically it could then engage in a 51% attack that would alter a blockchain. The idea was to make data handling easy and inexpensive enough that anybody could take part in validating the blockchain.

When someone proposes a solution like SegWit2X and makes a 2 MB block, it is not a technical debate; it is a philosophical debate. In philosophy, it is called the "slippery slope" argument. It is not that 2 MB is so much more expensive to process than 1 MB. It's a question of where you draw that line. Will it be at 4, 32, 64 MB? Where does it end? If you accept that the solution is to make the roadway bigger, so to speak, eventually the roadway will be so big that only a handful of large corporations will have the resources to participate, and they will eventually control everything.

The problem was not in finding a technological solution, because all the elements already existed. The challenge was to develop a technological solution consistent with the idea of a permission-less, distributed ledger. The bitcoin blockchain appears to be the best solution to date.