The economics of block chain and bitcoin systems

White paper

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**Introduction:**

During recent years, the global economy has experienced substantial hits to its system. From the 2000 tech ‘dot’ bubble burst, the 2002 Stock Market crash, and the 2007-2008 housing crisis which led to one of the worst economic recessions ever experienced in the United States since the Great Depression. These catastrophic events in our global community led to the emergence of new forms of currencies commonly referred to as bitcoins. The consensus as to whether these new forms can replace or supplement the old traditional monetary system is mixed at best. This paper will try to conceptualize and offer an alternate economic perspective regarding the rise in usage of bitcoins and the block chain technology that makes the transactions of digital currencies operational. From an economic standpoint, it is my belief that bitcoins currency would work more efficiently under a smaller operational scale as opposed to on a mass production level. Yet, the block chain technology serves as an emerging innovative system where operations and transactions among individuals, businesses and markets are economically efficient. And lastly, this paper will discuss the potential benefits bitcoins can offer to individuals, particularly people of urban communities, who can capitalize on this new development to help stimulate growth and prosperity in their local economies

**Cryptocurrency sustainability on a macroeconomic level:**

To understand the effects of bitcoins on the global economy, one must understand how they operate and how they contrast to real ‘printed’ currency. Digital currencies are often exchanged directly between private clients on a decentralized public ledger known as block chain networks. As opposed to printed currency where transactions are handled by third party financial institutions where data is stored in a centralized node, bitcoin systems are decentralized and go through a chain of hashing methods where client public and private keys are authenticated and verified based on previous transactions. It is this networking system that some professionals suggest that digital currency systems are not as highly prone to cyber theft as opposed to financial institutions. Notwithstanding, within the strengths of cryptocurrency networks and their block-chain systems resides an inherent flaw; the lack of a central regulatory authority. The network of decentralization may seem ideal at is current status but that is due to its relative small operational scale.

Hypothetically, what would happen to the system if the system was to grow larger in size and more participants entered the market. This may present a problem for miners to handle the new increase in demand with a limited supply source. In addition to this, maintaining the current arbitrary cap on the supply of bitcoins may not be maintainable if the digital currency market grows at a substantially faster pace. Supporters of cryptocurrency often state that due to the arbitrary cap and low circulation of digital coins, it is by design inflationary resistant as opposed to the U.S. dollar. Basic economic supply-demand theory would affirm that as demand increases for these currencies, and more individuals and markets begin to flood the exchange networks, price levels will eventually rise. Cryptocurrency farms will have to determine viable solutions to accommodate the increase in demand, which may drive up operation and production costs which could lead to inflation. Therefore, bitcoins are not as resistant to inflation as some may think.

Oppositely, cryptocurrencies are highly reactive to deflation. By the structure of its limited supply, once coins are spent and exit circulation, deflation can occur. Moreover, assuming a significant amount of purchased digital coins were dumped back into the market could also lower the value of its currency. Furthermore, if governments begin to worry about the effect these digital currencies may have on their own national markets, they may regulate and police the usage of digital currency which would also negatively impact the cryptocurrency system.

With respect to claim that block chain systems are difficult to hack and breach, that presumption may warrant further investigation. Theoretically, it may be sufficient to assume that large scale systems where bitcoins exchanges occur are difficult to hack, but it is not appropriate to believe that these networks are virtually impenetrable. Proponents of cryptocurrency often site the robustness of the block-chain network technology. Many of these proponents often cite that due to the decentralized ledger, anonymity of users and extensive verification nodes which make these systems difficult to counterfeit is actually what make these networks subject to cyber-attacks. The problem is not the threat of compromising the entire system but rather the hacking of the individual nodes which could break the entire chain. Hackers would not need to target the entire system but rather individuals who participate in cryptocurrency exchange network. Some say that it would require too much work for criminals to hack the entire system because it would cost hackers more money to create one bitcoin (some say it is approximate to $52 billion). Due to users being pseudonymous, it would make it difficult to track the attackers who have comprised individual accounts. A large scale cyber-attack on individuals who participate in these systems would create high uncertainty and yield low confidence of the secureness of the system which possibly would send the digital market into a panic where individuals would pull out of the market and thus cripple the entire system.

The premise of these networks suggest that individual nodes will work efficiently and that due to the system of rewards, individuals will simply ‘play by the rules’. This hypothesis is optimistic in its view; however, this claim may not be as assuring. If a crypto farm were to exploit resources to garner enough CPU power to control and access the collection of bitcoins it would create an unfair advantage within the market and would constitute an oligopoly system where only a few minors have the access and control of the allocation of bitcoins. And any of the net benefits or profits received would be disproportionately shared to those who are comprised in an oligopoly.

Comparatively, the impacts of cyber-attacks on traditional financial markets vs cryptocurrencies markets are also significantly different. “Thefts related to Coin base hacks, rose 61% last year to $2.3 billion, according to Javelin Strategy & Research. But hacking losses are a blip relative to the trillions of dollars kept in banks. Hackers are stealing a much larger proportion of the crypto­currency pie, whose total market value is only about $135 billion. In the past 12 months, for example, criminals have absconded with 1% of Ethereum’s total market value, or $225 million, according to cybersecurity firm Chainalysis; the Bitcoin toll is estimated to be even higher” (Wieczner 2017).

**A further analysis on Block Chain Technology:**

As mentioned earlier, block chain systems work as distributed databases of records or public ledgers for all transactions of digitalized events that have been executed and shared among participating parties. Each transaction is then verified by the majority of participants of the system where information is stored on an open verifiable record of every single transaction that can never be erased. In cooperation with smart contracts, transactions and payments are more easily verified and enforced under block chain technology. The process can be defined simply into the following tasks (Block Chain Technology, pg. 6, 2015):

1. Validate Entries
2. Safeguard Entries
3. Preserve Historic Records

Block-chain technology organizes transactions in chronological order and place them into groups called blocks. Those blocks are then linked to an already continuous established block chains of previous verified transactions. Miners then use their resources and skills to make the network operational by distinguishing legitimate block chain transactions from being re-spent by utilizing a ‘proof-of-work’ function. Miners are then rewarded for their work by the transactional fees paid by users sending transactions or they may reward themselves a certain number of bitcoins, which is authorized and determined by the consensus of the entire network.

The block-chain technology is one of the main factors that have contributed to the steady increase in market value of bitcoin currency. The graph below illustrates the rise in value of bitcoins over the past 10 years during the implementation of the block chain technology.

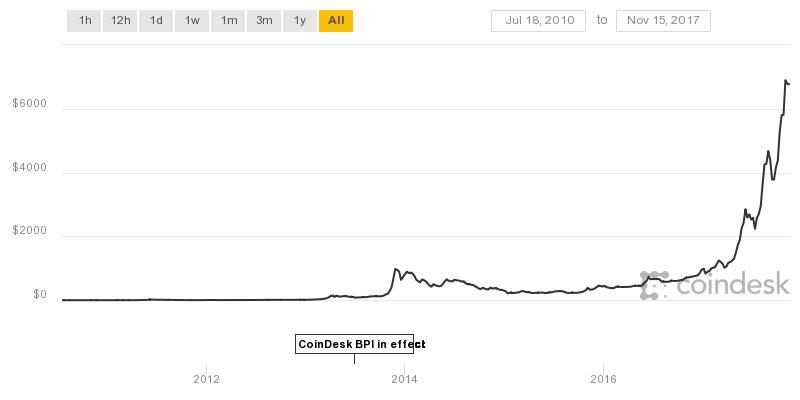


Photo Credit: [Source](http://www.coindesk.com/)

As depicted in the above illustration, the bitcoin has experienced a dramatic increase in its value during the recent years. Majority of the upward trend in price value could be attributed to the utilization of block chain technology. Based on the most recent data regarding block chain, it can be determined that block-chain technology and its methods have had a very significant impact on the market price value of its cryptocurrency market. In the scatter plot below, I performed a linear regression association on hash rate (independent variable) and the market price value (dependent variable) of the bitcoin. Block-chain’s official website defines hash rate as the speed at which a compute is completing an operation in the Bitcoin code. Higher **hash rates** would indicate the higher probability of the miner to have the opportunity of finding the next block and receiving the reward. I transformed the numerical hash rate into logarithmic values and regressed it against the fluctuation of the market price using an exponential model function.

Data used in this analysis was retrieved from the following [https://blockchain.info/stats](https://blockchain.info/stats" \o "Source)

As the graph above depicts, there is a very strong relationship between the hash rate and market price of bitcoins. As the percent of hash rates increases, the value of the cryptocurrency increases exponentially, thus implying a positive correlation. This illustrates how block chain technology and mining plays a significant role in the value of the bitcoin currency market.

So this poses the question: which would be more valuable for companies and individuals to invest in, block chain technology or bitcoin currencies? I would offer that it would be more advantageous to invest and implement block-chain networks rather than invest solely in digital currencies. It is the block chain technology which manages the flow of transactions using digital money like Ethereum, Bitcoin, and Crypterium, that has made the cryptocurrency market flourish. But considering infancy stage of the cryptocurrency market, and uncontrollable and unforeseen factors such as potential increases in energy usage to mine bitcoins, public perception, personal economic utility, economies of scale and scope may make the reality of digital currencies becoming viable alternative sources of monetary currency difficult to actualize.

Alternatively, the utilization of block chain technology can extend beyond the application of digital currency. Block-chain technology can be implemented to streamline inefficiencies in business fields such as Finance Accounting and Human Resource management in order to offer companies more robust protocols that could help to minimize cost and maximize productivity and profit. An applicable version of a block-chain network could be used to manage a company’s payroll operations. Instead of having an overstaffed HR department to manage personnel sick and vacation balances, and employee bonuses and raises, companies could use block-chain technology to efficiently execute these operations with lower overhead and administrative costs. Let’s review the following scenario: A company needs to allocate bonuses and raises, and personal time amongst their employees. Ideally, a company could create a block chain system that could automatically update these transactions and allocate proper balances to employees and deploy smart contracts that would systematically report to governmental agencies for tax purposes without the consistent oversight or management of another agent or contractor. Additionally, companies could invest in creating vendor apps that employ block chain technology to create systems of contract bids where clients have access to the database of contractor services and transactions that are verified and rated based on quality of service so that the most efficient and effective contractors are chosen based on pre-determined conditions.

**The benefits of establishing block-chain systems in urban communities and third world countries:**

Albeit on a mass scale, I would caution investing significantly on bitcoins as primary sources of currency, but I would encourage investment on a micro level among urban U.S. communities and developing nations. The investment of cryptocurrencies may serve more to benefit urban communities and third world nations. If these communities begin to invest in bitcoin exchange markets and engage in crypto farms, it may provide more economic opportunities than from other traditional financial markets. If urban communities decided to participate and use these digital currency systems to conduct day to day business and transactions, this could open more freedom for them to attain higher levels of social and economic status. In these communities, bitcoins could be used to trade, sell, and purchase actual products and services. For instance, instead of individuals selling aluminum cans or buying used mechanical parts as they would at a scrap yard, individuals could create in-network barter systems using bitcoins. Stores that accept Electronic Benefit Transaction (EBT) cards, could also accept bitcoin currency for their products or services that they render.

The establishment of internet cafes where users could trade bitcoins within their own communities could help facilitate these exchanges. And because these markets are untapped and often underdeveloped, the economic growth using digital currencies would produce significant profits to first potential investors. Investors would need to establish firms to help operate the exchange systems and teach basic market literacy to people of urban communities and third world nations. These firms will serve as educational institutions which purpose would be to inform their clients on how to invest their bitcoins and exchange them in the open market.

**Potential Benefits to U.S. urban communities and third-world nations:**

1. Urban communities can gain easier access to markets and be given more flexibility and autonomy than they would normally receive from traditional financial systems.
2. Easier and flexible access to alternative currencies could help stimulate and increase economic growth and promote entrepreneurialiship.
3. Early investors of cryptocurrencies in American urban communities and developing nations could receive huge rate of returns in the subsequent future due to being early participants
4. The need for facilities to assist with the management of cryptocurrency network systems would create more jobs both within and outside of the local communities.
5. Creating other investment or earning sources would help these individuals sustain when global markets are unstable during times of business cycle contractions and/or economic recessions
6. Cryptocurrencies could also encourage micro lending among urban communities

Although this may seem ideal, getting business or firms to invest in this strategy and even more importantly, to get people of urban communities to buy into investing in bitcoin currency present a real challenge. Historically, blacks of urban communities have been disenfranchised and discriminated by financial institutions. It is this experience that has made blacks in general have a distrusting view towards the financial markets. Therefore, even with some of the potential benefits in these communities to invest in digital currencies may not be formally realized due to the lack of trust. Based on a recent [Study](https://morningconsult.com/4106-2/), blacks typically do not engage in internet commerce, and are less likely to be aware of digital currency and less likely participate in the cryptocurrency market in comparison to other races. Therefore, it becomes more important for companies to begin teaching and informing people in urban communities of these new forms of currency and the potential benefits that they could present to their local economies.

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