

What is the Cryptocurrency? Is it a Threat to Our National Security, Domestically and Globally?

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Abstract

Since the rise of Bitcoin in 2009 and recent interest in digital currency is on an ascending trend, the question is how far will it penetrate in financial system other industries? How stable is this currency? With recent comments from CEO of Tesla Elon Musk, we saw a crash of 14% in Bitcoin stock overnight trades of any other existing crypto currency stock in open market came to a halt. Thus, one should be concern about stability of digital currency, providing no centralized banking standing behind any of these digital crypto currencies like we see in traditional banking business where currencies are being backed up and insured by Federal governments like FDIC in United States. In this short review, we have brought a high level of information from the web at a very holistic level, yet in a layman language for those readers that want to have a quick understanding of Crypto Currencies or Digital Currencies that seem a hot topic of today's market.

Keywords: FDIC (Federal Deposit Insurance Corporation), Cryptocurrency, Digital Currency, Dark Market, Cyber Attack and Cyber Ransom, Cyber Criminal, Cyber Space and Cyber Security, Credit Card and Mortgage Market Industry, Energy and Renewable Energy.

Introduction

The announcement that Tesla CEO, Elon Musk made on his May 13 tweet that his company no longer accepts Bitcoin or any other cryptocurrency for purchase of his cars, the crypto market was hit by a big shot. His logic of refusing to accept Bitcoin for purchase of his electric vehicle or e-Vehicle was that it increases the use of coal and other fossil fuels, such as oil to generate and produce power that is used for the High Power Computing (HPC) behind crypto-currency mining. (i.e., see Section below in respect to the subject of Crypton-Mining), as illustrated in Figure-1. Thus, he was showing his opposing opinion to the electricity generated from the said resources to decrease induction of carbon monoxide and dioxide for a better healthy environment and reduce the carbon footprint globally.

The falling price of Bitcoin happened overnight at the rate of 14% was a shocking wave, and still in effect, considering that Bitcoin, Ethereum, Dogecoin and other popular cryptos reached record highs this year, raising concerns about the amount of energy needed to mine the coins.

As we know from our knowledge of past in data warehousing

and data mining, Big Data (BD) requires tremendous computing power and therefore a considerable amount of electricity. Warehouses of Bitcoin and other crypto-currencies mining are no different. Bitcoin mining rigs run 24 hours a day, consuming more power than the whole country of Argentina, as illustrated and charted in Figure-2 as well.

"It is really by design that Bitcoin consumes that much electricity," Mr. Rauchs told BBC's Tech Tent podcast. "This is not something that will change in the future unless the Bitcoin price is going to significantly go down".

The online tool has ranked Bitcoin's electricity consumption above Argentina (121 TWh), the Netherlands (108.8 TWh) and the United Arab Emirates (113.20 TWh) - and it is gradually creeping up in Norway (122.20 TWh).

The energy it uses could power all kettles used in the UK for 27 years, it said. However, it also suggests that the amount of electricity consumed every year by always-on but inactive home devices in the US alone could power the entire Bitcoin

network for a year.

To better follow this short review and subject of discussion, we need to have a better understanding of Bitcoin and cryptocurrency and the concept of technology behind it. To start with, we introduce the basic concept of digital currency and what is the idea behind it.

These days, everyone pretty much has heard about cryptocurrency in the news. However many people still do not know what crypto or digital currency is, and how is it working and how did come to the market and where is it possibly going in near and long-term.

More than just a form of digital cash, cryptocurrency and the technology underlying it have the potential to transform the financial sector and many other industries. Therefore, it is worth taking our time to learn a bit about cryptocurrency the term “blockchain” attributed to such digital concept as well.

Note that: Blockchain in the world of digital currency transaction is a block of collection of transaction data on a cryptocurrency network and basically states that Person A sent certain known amount of the cryptocurrency to Person B as receiver or for that matter Person X received this much cryptocurrency from Person Y as sender, and so on.



Figure 1: Computer Energy Consumption
(Courtesy: Rost-9/Bigstock.com)

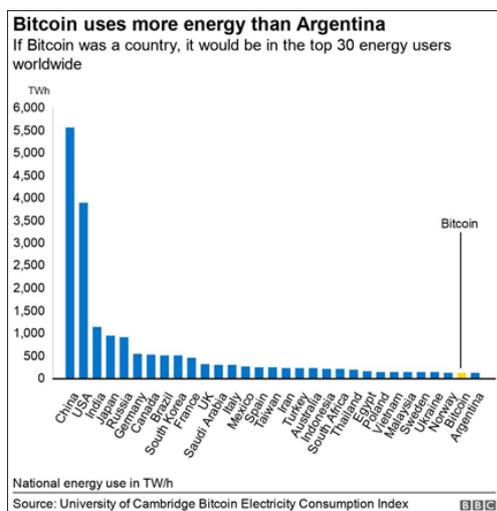


Figure2: Bitcoin Energy Consumed in Different Countries
(Courtesy: Rost-9/Bigstock.com)

Moreover, a Bitcoin is defined by a sequence of digitally signed transactions that was started with Bitcoin’s creation around 2009, as a block reward, and the best chain (i.e., Black square) consist of the longest series of transaction records from the genesis block (i.e., Green square) to the current block or records. (i.e., purple square) exist outside of the best chain as illustrated in Figure-3.

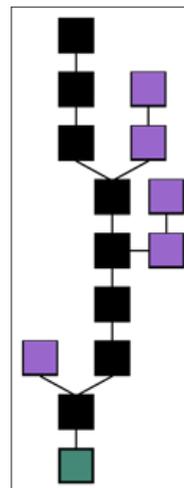


Figure 3: Transaction Block Chain
(Courtesy of Wikipedia.org)

The owner of a bitcoin transfers it by digitally signing it over to the next owner using a bitcoin transaction, much like endorsing a traditional bank check. A payee can examine each previous transaction to verify the chain of ownership. Unlike traditional check endorsements, bitcoin transactions are irreversible, which eliminates risk of Chargeback Fraud.

Note that: Chargeback fraud, also known as friendly fraud, occurs when a consumer makes an online shopping purchase with their own credit card, and then requests a chargeback from the issuing bank after receiving the purchased goods or services. Once approved, the chargeback cancels the financial transaction, and the consumer receives a refund of the money they spent. Depending on the payment method used, the merchant can be accountable when a chargeback occurs.

Furthermore, A block includes a reference to the block that immediately precedes it. The blocks create a chain, linking one to another through references to prior blocks. Cryptographic hash functions create the references to the preceding blocks by mapping sets of data to strings of letters and numbers called hash digests. Changing the data automatically changes the hash digest. To change a block in the ledger, a hacker would have to reproduce the entire chain of blocks following it since not doing so would create a chain of invalid hash values that would not be accepted by the cryptocurrency network as illustrated in Figure-4 here.



Figure 4: A Blockchain Transaction
(Courtesy of Wikipedia.org)

As illustrated in Figure-3, blocks contain additional information of transaction that is just taken place, which further enables the cryptocurrency network to verify the validity of the block. This verification and validation is a proof-of-work method of establishing distributed consensus that is absolutely relying on cryptocurrency mining as described in next section, by utilizing High Power Computing (HPC) to add blocks to the blockchain. Proof of stake is another conceptual methodology added to blockchain where it can establish distributed consensus as well. In this case rather than requiring vast amounts of computing power, the proof-of-stake method enables the cryptocurrency holders with the most wealth or oldest stakes to create blocks by verifying transactions.

Under these circumstances, the stakeholders are selected semi-randomly and with some more mechanism in place to prevent or void the wealthiest individual as consumer from creating fake transactions or otherwise exerting too much power over the blockchain (fool.com).

In summary, according to definition by Wikipedia, The validity of each cryptocurrency's coin is provided by a blockchain. A blockchain is a continuously growing list of records, called blocks, which are linked and secured using cryptography (The Economist, 2015; Narayanan, 2016) Each block typically contains a hash pointer as a link to a previous block,[6] a timestamp and transaction data (Investopedia, 2016).

By design, blockchains are inherently resistant to modification of the data. It is "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way" (Iansiti, 2017). For use as a distributed ledger, a blockchain is typically managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks, which requires collusion of the network majority.

Blockchains are secure by design and are an example of a distributed computing system with high Byzantine fault tolerance. Decentralized consensus has therefore been achieved with a blockchain (Raval, 2016).

By nature of its characteristic, cryptocurrency is an electronic digital currency or an electronic cash system that is not depending or relying on traditional commercial or central

banks or third parties trust to verify transactions and create new currency units. In most cases, such transactions world-wide and in particular do not require any regulatory and monitoring government agencies such as commerce department or treasury through the Office of Foreign Assets Control (OFAC).

Note that: The Office of Foreign Assets Control (OFAC) of the US Department of the Treasury administers and enforces economic and trade sanctions based on US foreign policy and national security goals against targeted foreign countries and regimes, terrorists, international narcotics traffickers, those engaged in activities related to the proliferation of weapons of mass destruction, and other threats to the national security, foreign policy, or economy of the United States.

With such characteristic associated with cryptocurrency, it is obvious from its name "CRYPTO-CURRENCY", that it uses some type of Cryptography to confirm transactions on a publicly distributed ledger called the "Blockchain", which enables direct peer-to-peer payments, with any identification from source of sender to destination or receiver.

In other words, by Wikipedia's description of this currency, we can state that "A cryptocurrency, crypto-currency, or crypto is a digital asset designed to work as a medium of exchange wherein individual coin ownership records are stored in a ledger existing in a form of a computerized database using strong cryptography to secure transaction records, to control the creation of additional coins, and to verify the transfer of coin ownership (Holmes-Andy Greenberg, 2011; Polansek, 2016). It typically does not exist in physical form (like paper money) and is typically not issued by a central authority. Cryptocurrencies typically use decentralized control as opposed to centralized digital currency and central banking systems (Ian, 2015). When a cryptocurrency is minted or created prior to issuance or issued by a single issuer, it is generally considered centralized. When implemented

Bitcoin and Digital Coin Mining and How does it Work?

For the trade and exchange of digital currency known as cryptocurrency such as Bitcoin, one need a series of very powerful and high-performance computers and in a local area network (LAN) trading with each other, which is considered as bitcoin mining and it is validating the transactions between senders and receivers as miners as illustrated in Figure-5 as Hashcoin mine depiction.

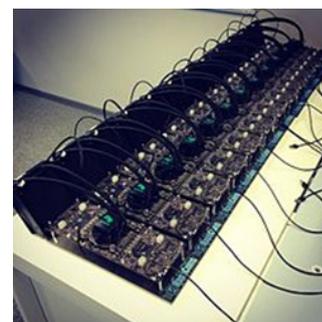


Figure 5: Hashcoin Mine
(Courtesy of Wikipedia.org)

For this effort, successful miners obtain new cryptocurrency as a reward. The reward decreases transaction fees by creating a complementary incentive to contribute to the processing power of the network.

Be aware of the fact that Common transactions will have either a single input from a larger previous transaction or multiple inputs combining smaller amounts, and one or two outputs: one for the payment, and one returning the change, if any, to the sender. Any difference between the total input and output amounts of a transaction goes to miners as a transaction fee.

The mining process involves identifying a block that, when hashed twice with SHA-256, yields a number smaller than the given difficulty target. While the average work required increases in inverse proportion to the difficulty target, a hash can always be verified by executing a single round of double SHA-256.

Figure-6 here, shows a photograph of a Bitfury BlockBox AC mining datacenter at Hut 8 in Medicine Hat, Alberta



Figure 6: A Bitcoin Mining Farm, 2018
(Courtesy of Curtis Huisman – www.curtis.media)

For the bitcoin timestamp network, a valid proof of work is found by incrementing a nonce until a value is found that gives the block’s hash the required number of leading zero bits. Once the hashing has produced a valid result, the block cannot be changed without redoing the work. As later blocks are chained after it, the work to change the block would include redoing the work for each subsequent block. If there is a deviation in consensus then a blockchain fork can occur.

Note that: Proof of Work (PoW) is a form of cryptographic zero-knowledge proof in which one party (the prover) proves to others (the verifiers) that a certain amount of a specific computational effort has been expended. Verifiers can subsequently confirm this expenditure with minimal effort on their part. The concept was invented by Cynthia Dwork and Moni Naor in 1993 as a way to deter denial-of-service attacks and other service abuses such as spam on a network by requiring some work from a service requester, usually meaning processing time by a computer. The term “proof of work” was first coined and formalized in a 1999 paper by Markus Jakobsson and Ari Juels (Matteo D’Agnolo, 2015; Markus, 1999; Cynthia, 1993).

Proof of work was later popularized by Bitcoin as a

foundation for consensus in permissionless blockchains and cryptocurrencies, in which miners compete to append blocks and mint new currency, each miner experiencing a success probability proportional to their computational effort expended (European Parliament, 2018).

There are two classes of Proof-of-Work protocols, namely:

1. Challenge-Response.
2. Solution-Verification.

And they both part of variants process and are depicted in Figure-7 and Figure -8

PoW and PoS (Proof of Stake) are the two best known Sybil deterrence mechanisms. In the context of cryptocurrencies, they are the most common mechanisms.

According to Wikipedia.org the following description for Challenge-Response and Solution-Verification are given as:

1. **Challenge–response** protocols assume a direct interactive link between the requester (client) and the provider (server). The provider chooses a challenge, say an item in a set with a property, the requester finds the relevant response in the set, which is sent back and checked by the provider. As the challenge is chosen on the spot by the provider, its difficulty can be adapted to its current load. The work on the requester side may be bounded if the challenge-response protocol has a known solution (chosen by the provider) or is known to exist within a bounded search space.

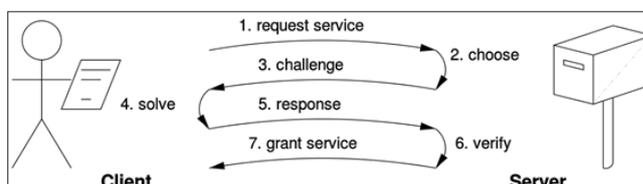


Figure 7: Challenge-Response Protocols Illustration
(Courtesy of www.wikipedia.org)

2. **Solution–verification** protocols do not assume such a link: as a result, the problem must be self-imposed before a solution is sought by the requester, and the provider must check both the problem choice and the found solution. Most such schemes are unbounded probabilistic iterative procedures such as Hashcash.

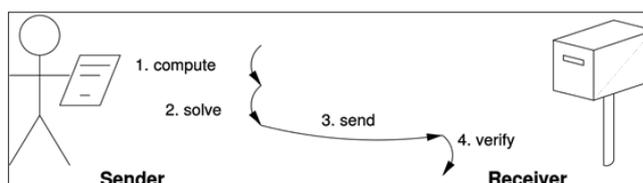


Figure 8: Solution-Verification Protocols Illustration
(Courtesy of www.wikipedia.org)

Known-solution protocols tend to have slightly lower variance than unbounded probabilistic protocols because the variance

of a rectangular distribution is lower than the variance of a Poisson distribution (with the same mean).[further explanation needed] A generic technique for reducing variance is to use multiple independent sub-challenges, as the average of multiple samples will have a lower variance.

There are also fixed-cost functions such as the time-lock puzzle.

“Moreover, the underlying functions used by these schemes may be: (i.e., Figure-9 and Figure-10)

- **CPU-bound** where the computation runs at the speed of the processor, which greatly varies in time, as well as from high-end server to low-end portable devices. [15]
- **Memory-bound**, where the computation speed is bound by main memory accesses (either latency or bandwidth), the performance of which is expected to be less sensitive to hardware evolution (Martín, 2005; Cynthia, 2003; Fabien, 2005; John, 2015)
- **Network-bound** if the client must perform few computations but must collect some tokens from remote servers before querying the final service provider. In this sense, the work is not actually performed by the requester, but it incurs delays anyway because of the latency to get the required tokens (Mehmud, 2009).

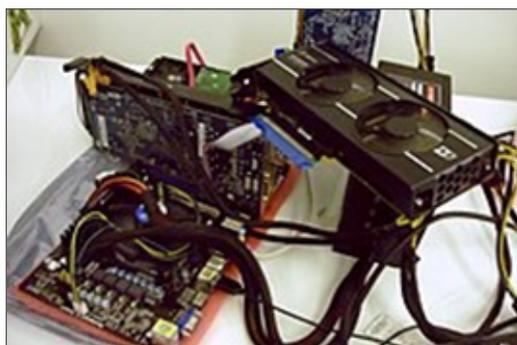


Figure 9: GPU Based Mining Rig, 2012
(Courtesy of Wikipedia.org)

Finally, some PoW systems offer shortcut computations that allow participants who know a secret, typically a private key, to generate cheap PoWs. The rationale is that mailing-list holders may generate stamps for every recipient without incurring a high cost. Whether such a feature is desirable depends on the usage scenario”.

A rough overview of the process to mine bitcoins involves (Narayanan, 2016).

1. New transactions are broadcast to all nodes.
2. Each miner node collects new transactions into a block.
3. Each miner node works on finding a proof-of-work code for its block.
4. When a node finds a proof-of-work, it broadcasts the block to all nodes.
5. Receiving nodes validate the transactions it holds and accept only if all are valid.

Nodes express their acceptance by moving to work on the next block, incorporating the hash of the accepted block.

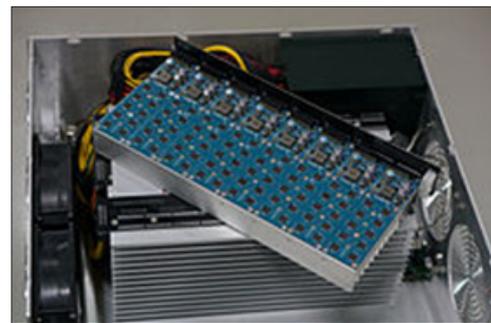


Figure 10: Avalon ASIC Based Mining
(Courtesy of Wikipedia.org)

According to Wikipedia definition and as illustrated in Figure-4, the majority consensus in bitcoin is represented by the longest chain, which required the greatest amount of effort to produce. If a majority of computing power is controlled by honest nodes, the honest chain will grow faster and outpaces any competing chains. To modify a past block, an attacker would have to redo the proof-of-work of that block and all blocks after it and then surpass the work of the honest nodes. The probability of a slower attacker catching up diminishes exponentially as subsequent blocks are added.

To compensate for increasing hardware speed and varying interest in running nodes over time, the difficulty of finding a valid hash is adjusted roughly every two weeks. If blocks are generated too quickly, the difficulty increases, and more hashes are required to make a block and to generate new bitcoins (Simon, 2012).

Note that: Hashing or Hash Function is any function that can be used to map data of arbitrary size to fixed-size values as illustrated in Figure-11.

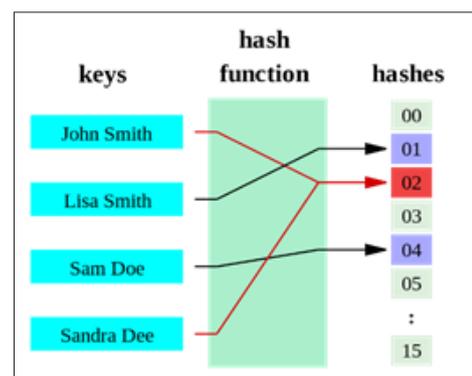


Figure 11: Hash Function Configuration
(Courtesy of Wikipedia.org)

As it can be seen in Figure-6, a hash function that maps names to integers from 0 to 15. There exists, a collision between keys “John Smith” and “Sandra Dee”

Furthermore, the values returned by a hash function are called hash values, hash codes, digests, or simply hashes. The values

are usually used to index a fixed-size table called a hash table. Use of a hash function to index a hash table is called hashing or scatters storage addressing.

In summary, Bitcoin is not innocuous. Transactions are processed by “miners” using massive amounts of computing power in return for rewards in the form of Bitcoin. By some estimates, the Bitcoin network consumes as much energy as entire countries like Argentina and Norway, not to mention the mountains of electronic waste from specialized machines used for such mining operations that burn out rapidly (economictimes.indiatimes.com)

Whatever Bitcoin’s eventual fate, its blockchain technology is truly ingenious and groundbreaking. Bitcoin has shown how programs running on networks of computers can be harnessed to securely conduct payments, within and between countries, without relying on avaricious financial institutions that charge high fees. For migrant workers sending remittances back to their home countries, for instance, such fees are a major burden. Technologies that make payments cheaper, quicker, and easier to track would benefit consumers and businesses, facilitating both domestic and international commerce.

Moreover, Bitcoin and its encryption driven by Coin Mining to insure some degree of anonymity to its users is becoming heavenly financial path for criminals and black market known as “DarkSide”, and is a rat race between them and FBI, as we saw in past few months when cyber attackers also known as cyber criminals with their ransomware attacked our pipelines and the meat industry. The threat by hackers caused price hike of gasoline at pumps and meat in grocery stores nationwide.

Anonymity

We have learned by now that most of cryptocurrency within a transaction between sender and receiver (i.e., Person A to Person B) or per se within a wallet is not tied to people, but rather to one or more specific keys (or “addresses”) (Justina , 2018).

Thus, through the crypto-mining and blockchain, digital currency such as Bitcoin is pseudonymous rather than totally anonymous. This was based on recent cyber-attack of a ransomware, where FBI managed to trace-down the DarkSide (See next Section) market and was able to refund back the ransom money.

Thereby, bitcoin owners are not identifiable, but all transactions are publicly available in the blockchain. Still, cryptocurrency exchanges are often required by law to collect the personal information of their users, like traditional banking transaction between point A and point B as a peer-to-peer transaction (TechCrunch, 2018; Andy, 2017).

Additions such as Monero, Zerocoin, Zerocash and CryptoNote have been suggested, which would allow for additional anonymity and fungibility.

DarkSide

DarkSide also known as Darknet Market, is a commercial website on the dark web that operates via darknets such as Tor (i.e., Tor is free and open-source software for enabling anonymous communication) or I2P i.e., The Invisible Internet Project (I2P) is an anonymous network layer that allows for censorship resistant, peer-to-peer communication) (Bennett, 2015; DeepDotWeb, 2013).

They function primarily as black markets, is selling or brokering transactions involving drugs, cyber-arms, weapons, counterfeit currency, stolen credit card details, forged documents, unlicensed pharmaceuticals, Marco (2017) steroids, Siraj (2016) and other illicit goods as well as the sale of legal products. In December 2014, a study by Gareth Owen from the University of Portsmouth suggested the second most popular sites on Tor were darknet markets.

Properties of cryptocurrencies gave them popularity in applications such as a safe haven in banking crises and means of payment, which also led to the cryptocurrency use in controversial settings in the form of online black markets, such as Silk Road.[88]

The original Silk Road was shut down in October 2013 and there have been two more versions in use since then. In the year following the initial shutdown of Silk Road (as illustrated in Figure-12, where payment system, produced as evidence in the trial of its owner), the number of prominent dark markets increased from four to twelve, while the amount of drug listings increased from 18,000 to 32,000 (ALI, 2015).

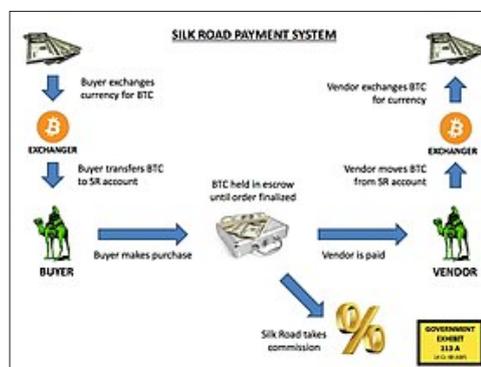


Figure 12: Flowchart of The Silk Road (Courtesy of Wikipedia.org)

Darknet markets present challenges in regard to legality. Cryptocurrency used in dark markets are not clearly or legally classified in almost all parts of the world. In the U.S., bitcoins are labelled as “virtual assets”. This type of ambiguous classification puts pressure on law enforcement agencies around the world to adapt to the shifting drug trade of dark markets (Reza, 2015).

Are Cryptocurrencies a Threat to National Security?

Treasury Secretary of Trump administration, Mr. Steven Mnuchin on July 15, 2019, raised concerns that, these types of currencies can “Pose National Threat”, including Facebook’s

Libra that is developed by Facebook and begin to use it as a new digital payment system, and it is a good and latest indication that U.S. Government is preparing to exert its power over digital currencies (nytimes.com, 2019).

Even Ex-President Trump through series of Twitter posts in similar comment, who said that he was “not a fan” of cryptocurrencies and their value is volatile and “based on thin air” as well.

President Trump even went as far as warning Facebook that it must seek and follow a protocol of a banking charter and follow all bank regulations if it wants to be in the digital currency business. Of course, by nature of business, any new and innovative technology is not without risks as we have learned from knowledge of past history. Facebook with its Libra plans to issue its own digital currency that is called Diem that intends to make digital payments easier for its own social media members. The company claims that unlike Bitcoin, their cryptocurrency Diem would be fully backed up by reserves of U.S. dollars or other major currencies, ensuring its value stabilities, thus it would not be vulnerable to drastic market value variants and changes such as Bitcoin.

However, one needs to bear in mind that when it comes to the nature of Facebook business, your personal profile and information as a member of this social media is not safe and is up for grab, thus Facebook can hardly be trusted to put the public’s welfare above its own, as we saw during 2016 presidential election.

As we know, most of traditional banking organization are backed up by central banking of its own geographical location, where they are doing business. For example, in United States of America, Federal Reserve Bank covers all the banking institutions under FDIC policy, so it assures that the bank customers are secured for their deposits up to certain amounts. Thus, question arises with decentralization of cryptocurrencies in most cases, are they a threat to the global banking system and naturally economy of the nation such as ours or for that matter, what will happen in a financial crash if cryptocurrency rules the day-to-day banking operations? What happens when there is a serious crash that requires emergency money, of any sort, to be magicked up and spent?

“If they become truly mainstream, bitcoin and other cryptocurrencies represent a systemic threat to the entire banking system”.

“During the Global Financial Crisis, central banks and Governments could act together to defend economies, but if a decentralized cryptocurrency becomes the norm then economies globally are arguably sitting ducks.

“In the event of a major collapse, central banks would be redundant, and the damage could be not just economic but impact the very fabric of society as we know it”.

“All the tools that central banks traditionally use will be redundant. It will be like turning up to a gun fight with a knife.”

Crypto currency has cyberpunk roots. At its inception, it was designed as an alternative to the banking system – and a way to bypass the power of central banks to control the money supply.

When Bitcoin came to exist, they claimed that “it is the first decentralized peer-to-peer payment network that is powered by its users with no central authority or middlemen”.

Decentralization is part of technology offered by “*Digital Currency*” or “*Crypto Currency*”, which is driving “*Blockchain Transaction*” and sounds like electronic or digital record-keeping of all transaction in the newly born world of digital and crypto currency. As of now at least so far, any purchase or shopping you do from front store or online is involved with either cash money or your credit card, where all the details of cash transaction can be verified by the front store cashier or in case of credit card by credit card company or the bank has issued the credit card to you, where they confirm you are the person of that issuing credit card. These verification include authentication of credit card that is not stolen, and you are the one as user of the card and you have enough credit limit to for that transaction as well as you have the power to pay it off based on your past historical performance of paying your credit usage of the card, before it gets approved.

This is where the difference between blockchain and traditional ledgers in accounting coming to play and is the key feature that sets them apart as well as becoming the fundamental infrastructure for decentralization.

Most other databases and ledgers operate around a centralized hub, such as a bank or credit card company. The bank acts as the central node and has the responsibility of approving and verifying each record or transaction.

“With blockchain, there is no central node. Every computer or node in the blockchain network has a copy of the blockchain ledger and can add to the ledger. Anytime the ledger gets changed — for example, if someone adds a new piece of information — every node in the network needs to add the transaction to their copy of the ledger. Additionally, every node has agreed in advance to the rules of the blockchain” (Assurance Financial, na)

Note that: All the records in the blockchain are publicly available, even if the particular identities of the people involved in each transaction are not.

In summary, blockchain can simply be defined as a means of decentralized and immutable digital ledger that is driven by digital or crypto currency. However, recent move by high tech companies such as Facebook, Apple or Tesla to create their own digital currency for their future transaction between them and their consumer, there is no differences between them and high-tech companies in the mortgage space seeking to

revolutionize and disrupt this old fashion and judicial market that most existing bank and credit unions see it as means of revenue source for their financial institutions.

Decentralization of traditional currency driven by influence and impact of any digital currency at the given rate into market and becoming more popular to extend that some small Caribbean countries central government are trending to make cryptocurrency as their official day-to-day currency of trade, would have an adverse and devastating effects on their mortgages and credit card industry, if their local banking system using this traditional revenue avenue to compensate for their income, in particular in case of credit union type banks.

As we know, most credit unions existence is infrastructure based upon their members to borrow from them either in form of primary or secondary mortgage market for these unions to make money on the collecting interests and be able to survive as a many bank. Home loan and saving also survive on the same principle, although 2007 and 2008 banking crash forced a lot of these small banks fold up and Federal Reserve under direction from secretary of treasury during President George Bush the second, managed a path for these banks to be bought by bigger and financially powerful commercial banks take them over.

As we can see here, and in the next section of this article, there is a direct correlation between mortgage and issuing credit cards and digital currency with a very adverse and devastating effect on any bank existence in long run, if this currency becomes more and more popular and demand goes up for day-to-day trading among industrial market and population. In next section we are extending our point of view with more granular details.

Cryptocurrency and its Economic impact on Mortgage and Credit Cards Market

As cryptocurrencies and digital payments starting to take more share in daily financial transactions, one could foresee the potential economic impact that they hold. Distinguishing itself from traditional payment method, cryptocurrency pivots around the idea of decentralization which eliminates altogether the existence of intermediaries such as banks. Most financial activities currently involve cash and credit cards that are controlled and governed by cooperate banks, federal banks, and credit institutions. If the future sees cryptocurrency become the new norm, an entire industry to be removed and economic reformation is expected. Thus, this article takes a look at the butterfly effect cryptocurrency might hold once it is utilized on a big scale. Is this change a financial revolution or a serious security threat? That is one essential question that needed to be addressed.

Now given that the trend of demand for cryptocurrency is upward, the question we need to ask is, “are cryptocurrencies the future of the mortgage industry?” “Is it a threat to revenue generating income driven by interest collection on credit card issuing banks and companies or even interest collecting from

mortgage either primary or secondary market, in particular for credit union type banks where these interest revenue is the mainstream of their income?”

Shawn Allen the founder and principal owner of “Community Trust, A flexibility alternative”, thinks and predicts that digital and crypto currency that is driving decentralization through its blockchain technology as a digital ledger, will represent the future of the mortgage industry and for one, he is determined that Matrix Mortgage will be at the forefront of it (Fergal McAlinden, 2021).

He even further went to say that by telling “the Mortgage Broker News that blockchain and decentralized finance were set to “take the whole industry by storm” as Matrix announced last week that it would accept cryptocurrency for payments of goods and services”.

Further quote from him stated that, “If you’re not prepared for what’s to come [in terms of] automation and Smart Contracts, then you’re really going to get sideswiped with the amount of technology that’s coming down the pipeline,” he said. “I’m more confident now than ever with the market and the crypto space. I figured: it’s time to really put my foot forward and say, ‘We’re here to stay, let’s get this thing going”.

Allen even stated that, “CMHC [the Canadian Mortgage and Housing Corporation] is kind of spearheading that whole revolution as well, with blockchain as the public ledger,” he said. “It’s very transparent and secure, and CMHC’s blockchain initiatives [are] right in line with what we’re seeing in regard to utilizing cryptocurrency, Smart Contracts and the blockchain to transact and improve the mortgage process.

“We’re not trying to make a blockchain mortgage; what we’re trying to do is originate a qualified mortgage using blockchain. We’re using the technology to try to improve the process and shorten the sales cycle” (Fergal McAlinden, 2021).

Folks like him believe that embracing digital or cryptocurrency as means of payment is an inevitable mortgage market of near future, given the intermediaries such as blockchain technology initiative resulting decentralization of its feature and that is where the threat is going to glow and force small financial institute that particularly are making money in secondary mortgage market.

He even says, “It’s just like accepting Visa or Mastercard through a regular merchant services account,” he said. “But this way, it is received in crypto and settled into Canadian dollars in the bank account (Fergal McAlinden, 2021).

One of the main factors as a variable force behind adaption of currency such as Bitcoin or any other digital currency is the benefits offered by blockchain as a digital ledger.

The claim is that all the records in blockchain such as account payable or account receiver are publicly available, even if the

particular identities of parties involved in each transaction taking place via cryptocurrency. However, this a claim needs to be seen and proven, given the nature of recent ransomwares and by newly grown cyberattacks by recent cyber-criminals against our oil pipelines and meat industry that caused price rises in these two commodities as recent as few months back and keep on rising.

Some benefit aspects of Blockchain that makes attractive in the market of particularly, smart, and digital mortgage industry are listed here among the most notable factors as follows. Note that, all the following by direct and verbatim quoting from website by Assurance Financial reference (Assurance Financial, na).

Whether for cryptocurrency or in the mortgage industry, blockchain technology has several benefits to offer.

Lower Cost.

Blockchain technology often costs considerably less than more traditional methods. For example, in the case of mortgages, many parties need to become involved during the conventional process. The presence of many parties means everyone involved needs to get a cut of the mortgage or get paid in some way. Since using blockchain technology gets rid of third parties or intermediaries, it also eliminates the extra costs of using them.

Another way that blockchain technology can help lower costs is by eliminating the double-spend problem. The easiest way to describe this issue is when someone will spend money twice, usually in a digital form. It takes a considerable amount of computing power to change a block in the blockchain, making it challenging for someone to try and duplicate a transaction. The elimination of the double-spend problem means there are fewer counterfeit transactions.

Finally, blockchain helps lower costs by minimizing the amount of documentation required during a transaction. Those involved in a mortgage or sale won't have to sift through piles of paperwork, as all the required information will be in the record on the block, and everyone involved will have access to the same file.

Increased Transparency.

The beauty of blockchain is that it is entirely transparent, including all transaction histories and sales records that use blockchain. Instead of each person involved in a particular transaction having a separate copy of everything that went on, they all have access to the same documentation. If someone wants to make a change to the transaction or ledger, they need to alert everyone else connected to it, and everyone else must agree to the change.

With blockchain, a devious participant cannot alter a clause on a mortgage document and fail to tell anyone else. Pieces of information cannot go missing or get lost in the shuffle.

Increased Speed.

Although it might sound as if blockchain technology would

be a slow-moving process, the opposite is true. Even though every copy of the ledger needs to change anytime there is an alteration, the process happens quickly, usually in just a few seconds.

In comparison, traditional processes that rely on a lot of hard-copy documentation and back-and-forth between different parties often take days, if not weeks. Plus, traditional methods can be more prone to errors. A single typo in one document or a misprint can alter the terms of a mortgage, for example, and can also delay the process of getting a loan.

Better Security.

Blockchain technology is more secure than other methods of keeping records and storing data. Before a record ends up in a block, all parties involved need to agree upon it. It also requires verification and approval. Once approved, the record joins the block and connects to the previous block. All records in the block get encrypted.

If someone wants to change the records in a block, they need to alter the hashes connected to the block, and the ones connected to the blocks before and after it, as well as all the blocks in the chain. That can take a considerable amount of computing power, which is beyond the reach of most hackers.

Although it's not impossible for hackers or cyber thieves to get access to information stored in a blockchain, it is considerably more challenging to do without detection.

No Middleman.

Since blockchain technology is decentralized, there is no third party to slow down the process, or to take a cut of any proceeds. In traditional methods, it is usually the middleman who contributes to the extra cost or to delays in finalizing arrangements.

For example, if you pay someone using a check, they do not get the money from the check right away, even after depositing it into their bank account. The bank must first verify the check by confirming your account has enough money in it to draw against. The bank also needs to verify the check is legitimate, and that you wrote it and not an imposter. Usually, the bank's role in the process adds several days to the transaction.

In contrast, if you make a payment using blockchain technology, the recipient gets it immediately. It doesn't go through a bank for verification, nor does the bank take a portion of the transaction.

Clearer Supply Chain.

With blockchain, it is often much easier to see where things are coming from and what has happened along the way. It is much more challenging to conceal information with blockchain — except for hiding people's identities, in the case of Bitcoin and cryptocurrency — as every piece of the transaction enters the record and gets added to the block.

In conclusion, although the use of blockchain technology and blockchain accelerators are not yet standard in the mortgage industry, they show promise. To understand the benefits of blockchain mortgages, it helps to have a full appreciation of what takes place during the traditional mortgage process and how long the process takes overall.

Cryptocurrency and Energy Consumption Association

In the introductory of this paper as we mentioned in section one, we stated that utilization of cryptocurrency such as Bitcoin is affiliating with a process that is known as Mining for a transaction to take place between two entity. Plot in Figure-2 also is indication of Bitcoin Energy Consumed in Different Countries, where in some cases is way beyond the capability and production of electricity energy of a country that Digital Currency in full force utilization among its citizen can bring its power grid down to halt.

As the practice of bitcoin mining has gained popularity across the world, with countries such as China, Iceland, and Georgia leading the way, so has it drawn criticism. What are the common concerns associated with its consumption of energy? Presently China is one of top tier countries that Bitcoin as a digital currency has drawn their attraction and the attention of cryptocurrency investors, climate campaigners, and energy experts alike, due to crypto mining driven by usage of such currency involved in day-to-day world-wide economical trades. The mining power of the currency has been reported to use an ample and awful lot of energy, which recent reports coming out of that country indicates consumption of nearly around 110 TW hours per year, placing it at 0.55% of global electricity production or roughly equivalent to the annual energy draw of small countries like Malaysia or Sweden.

“In general, more than half of the bitcoin mining power consumption globally is in China now. And the Chinese Government, as well as others, have recently been catching up with miners to limit that by using industrial tariffs, which might be consuming lots of energy from the grid and increasing overall demand,” says Zula Luvsandorj, project finance advisor to the UK Cabinet Office (Yoana Cholteeva, 2021).

One area of concern as we said in, association of cryptocurrency with climate is coming from demand for ample energy to power the crypto mining process as well as generating tremendous amount of heat by its energy web that is integrating so much computer power as shown in Figure-13. So we need to working on making cryptocurrency possibly greener.



Figure 13: Computer Farm Network Drive Crypto Mining Power
(Source: Courtesy of Shutterstock)

With the computer farm network like above, just imagine the heat generated by all the computers involved in this farm for mining all around the globe.

According to Cambridge University, Bitcoin has gotten a bit of bad reputation and estimated annual amount of electricity consumption for Bitcoin alone as we stated is around as much as Sweden produces in a year, but not as much as all of the televisions in the U.S. consume, while operating on even standby power.

Besides, Bitcoin and other digital currencies are so hot in demand that the heat from this demand can melt all the ice caps in both poles. There is also a rise of demand at 19% for electricity that is driven by growth of population at the rate of 17% annually (Zohuri, 2018; Zohuri, 2018).

In order to compensate for such demand for electricity and consequently source of energy for production, we are not only in quest of renewable energies such as solar, wind and hydro (i.e. Ocean or Rivers with their dam wall), but we are turning to non-renewable source of energy if we consider nuclear fission or fusion energy as a non-renewable source, although there exist a debate among nuclear engineers expert that we can consider nuclear energy as a source of renewable one (Zohuri, 2017).

There is a group that is existing in a private sector initiative aimed at making the cryptocurrency industry’s energy consumption 100% renewable by 2030. The group is a partnership of Energy Web, RMI, and the Alliance for Innovative Regulation (AIR). The group brings together parties such as CoinShares, ConsenSys, Web 3, Ripple, and the United Nations who want sustainable blockchain and crypto technology. It’s getting support from the United Nations Framework Convention on Climate Change (UNFCCC) Climate Champions (Dean Takahashi, 2021).

As we can see, arguably, the Blockchain is the Next Big Thing For Renewable Energy according to Forbes magazine (James Ellsmoor, 2019).

Now the question is what association blockchain has with renewable energy?

Blockchain, which is new digital ledger that is virtue of replacing the traditional Account Payable and Receivable process, is also impacting everything from online transactions to e-government on renewable energy as well.

As we have discussed in this article, blockchain task is decentralization process of banking general ledgers.

“Essentially an online register that securely stores information, blockchain serves as a repertoire of knowledge accessible to everyone. Rather than being controlled by one entity, blockchain is spread across multiple computers and uses a form of data logging to ensure that the information cannot be changed or corrupted by anyone else. By decentralizing data

and protecting the way it is manipulated, blockchain promotes transparency and the sharing of information” (James Ellsmoor, 2019).

Augmentation Artificial Intelligence System along with Machine Learning and Deep Learning (DL) sub-system assisting consumer driven smart grid that are using blockchain as a tool to make energy grids more accessible and sustainable by promoting data-sharing in real time. The idea behind creating energy grids linked to blockchain is fairly simple: by giving consumers total control over where they source their energy as well as the information behind the production itself it drives competition and promotes sustainable energy (James Ellsmoor, 2019).

Consumers using a smart-grid that relies on blockchain will be able to compare their energy providers and buy directly from them as part of national energy grid, at least in USA.

As illustrated in Figure-14 by cryptocurrency going green and that is the force behind crypto climate.



Figure 14: A Wind Turbine Replacing and Old Coal Power Plant
(Source: GETTY)

Crypto Climate Accord will shift cryptocurrency industry to 100% renewable energy by 2030.

“Blockchain could be the future of renewable energy and the next chapter in smart technology, as the online platform is helping develop consumer-driven power generation. The technology is providing a new level of sophistication to our energy supplies which have previously been reliant on highly centralized systems. The potential opportunities are endless, and by increasing efficiency blockchain could also allow for a substantial reduction of carbon emissions” (James Ellsmoor, 2019).

However, still there is a very technical debate among engineers and scientists that either wind or solar or even hydro-dam or ocean as renewable source of energy can produce enough electricity to meet the blockchain and crypto mining for demand.

Conclusion

Although the average person has heard of Bitcoin, most people do not have a good grasp and understanding of how

cryptocurrency works and what impacts it may have in our daily life as well the economy of today that we are dealing with from one day to another and we are bound with it.

About 83% of people say they are slightly familiar with or not at all familiar with cryptocurrency. Bitcoin and other alternative currencies depend on a technology called blockchain. Although people often assume blockchain and cryptocurrency are the same, the reality is that blockchain has additional applications beyond money.

Cryptocurrency presents major strides in economic growth and freedom to individuals such as in developing nations as well as those under economic sanctions. The crypto market is known to be easier to access than traditional banks due to less regulations and allows citizens to bypass governments and regulations to mine for cryptocurrency rewards to utilize, trade, and convert for common goods to survive.[118] In countries with high inflation where fiat currency is no longer available to easily utilize to survive, many have turned to cryptocurrency working through online job boards to bypass strict regulations and achieve economic freedom.

However, going forward with this currency and being decentralized from centralized banking rules poses a threat to our economy and operation of judicial banking system in particular during a nationwide banking crises, such as the one we saw during 2007 to 2009 time frame, where Federal Reserve had to bail out a lot of savings and loans and other small banks and protect the interest of their customer deposit under FDIC policy.

Environmental impact of these currencies cannot be ignored either. Cryptocurrency mining consumes significant quantities of electricity and has a large associated carbon footprint (Spyros, 2018). In 2017, bitcoin mining was estimated to consume 948MW, equivalent to countries the scale of Angola or Panama, respectively ranked 102nd and 103rd in the world. Bitcoin, Ethereum, Litecoin, and Monero were estimated to have added 3 to 15 million tons of carbon dioxide emissions to the atmosphere in the period from 1 January 2016 to 30 June 2017 (Max J, 2018). By November 2018, Bitcoin was estimated to have an annual energy consumption of 45.8TWh, generating 22.0 to 22.9 million tons of carbon dioxide, rivalling nations like Jordan and Sri Lanka.

Today, some of the big cryptocurrency players are named here as:

1. Bitcoin
2. Ethereum
3. Binance Coin
4. Tether
5. Cardano

Since start of Bitcoin in 2009 as a first original digital currency in the market has been on a wild ride (i.e., Figure-14), Bitcoin is, by far, the most valuable cryptocurrency. As the original

cryptocurrency, it has the strongest adoption rate and a large network of miners. Those factors ensure it remains at the top of this list.

The list of the most valuable cryptocurrencies is always changing, just like the list of the most valuable publicly traded companies. But, since cryptocurrencies tend to be more volatile than blue chip stocks, how cryptocurrencies rank in value can change quickly. There are a few consistencies at the top of the list, though.

However, determining the “best” cryptocurrency is practically impossible. People use different cryptocurrencies for different purposes. Some use it for transacting, while others hold it as an investment asset. Some consider investing in cryptocurrency as an alternative to buying gold. Companies can require you to buy their cryptocurrencies in order to use their services.



Figure 14: Digital Currency
(Courtesy of Wikipedia.org)

Furthermore, decision of making investment into cryptocurrency is an individual decision and there is nothing these authors can suggest as an advice and it is totally up to you as reader. However bear in your mind the lack of historical data notwithstanding, many investors -- including institutional investors, banks, and company CEOs -- assert that cryptocurrency should be part of everyone's portfolio.

But, understanding what cryptocurrency is, how it works, and what value it can provide over fiat currency is an important first step before investing money in cryptocurrency. See the writeup by Adam Levy (TMFnCaffeine) (Adam Levy, 2021).

Furthermore, earlier this year (e.g., 2021), the price of one Bitcoin surged to over \$60,000, which is an eightfold increase in 12 months. Then it fell to half that value in just a few weeks after Tesla's CEO comments in mid May 2021.

Values of other cryptocurrencies such as Dogecoin have risen and fallen even more sharply, often based just on Elon Musk's tweets. Even after the recent fall in their prices, the total market value of all cryptocurrencies now exceeds \$1.5 trillion, a staggering amount for virtual objects that are nothing more than computer code.

Naturally, comments or denouncing of digital currency such as the one by Elon Musk has a tremendous impact on their day-to-day value of their stock value for trading.

However, the following questions should always be asked:

Are cryptocurrencies the wave of the future and should you be using and investing in them?

And due to the massive swings in their prices — nearly \$1 trillion was wiped off their total value in May — portend trouble for the financial system?

But one thing is obvious that Bitcoin or any other cryptocurrency, do not offer true anonymity and it became a clear fact after the United States government successfully tracked and retrieved part of the Bitcoin ransom paid transaction to the hacking collective of “DarkSide” in the Colonial Pipeline ransomware attack, and thus should vulnerability and penetration into security and non-traceability of Bitcoin transaction by way of prevention and intervention (Prasad, 2021).

Furthermore, as our conclusion and quoting guys like Shawn Allen who said that:

“The whole industry is changing,” he said. “It's going to be interesting to see, especially with CMHC coming out and saying that they're interested in learning more about blockchain and how to implement that.

“If people are thinking that crypto is a fad, or blockchain is not real, they're in for a rude awakening – because it's here to stay”.

Unless the federal governments around the globe among the countries with high GDP are going to stop trade in Digital Currency and prevent desterilization of their banking system that is driven by technology of blockchain, then we should listen to the gentleman like Shawn Allen and accept what he says as the fact of the matter.

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