The Future of Cryptocurrency: Is It Real?

by

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ABSTRACT

The purpose of this paper is to research the technology that has made Cryptocurrencies successful as well as some limitations they have at their current state. The sources used as support throughout this paper range from news articles, whitepapers, academic papers, academic studies, and previously conducted field studies. The results of these studies led to the conclusion the largest cryptocurrencies have several external oppositions to address in order to be successful.

INTRODUCTION

The world as it's known changes as new ideas are formed and put into motion. Inventions such as the telephone, the wheel, and electricity have thoroughly altered people's day-to-day lives. In the last century, two of the most important creations of all time have been developed with the advent of computers and the internet. Building on these more inventions were and continue to be created, such as the iPhone, social media, and computer-assisted driving, all of which have occurred in the last twenty years. Much like the inventions mentioned above, cryptocurrency is the most recent innovation that has garnered claims of being disruptive to our current world. However, as much popularity as it has gained, academics, journalists, and financial professionals alike are still trying to determine whether cryptocurrency has what is needed to affect the economy's payment system substantially.

The inception of cryptocurrency began in the 2008 whitepaper 'Bitcoin: A Peer-to-Peer Electronic Cash System' written by an anonymous author operating under the pseudonym Satoshi Nakamoto (Nakamoto, 2008). Satoshi introduces the paper by describing a peer-to-peer online payments system that does not require a trusted third party. This payments system would replace third parties with a distributed network and cryptography that ensures that transactions are secure. The plan would ideally increase the speed of cross-border transactions, eliminate the need for a minimum transaction size, create non-reversible transactions, allow for its' participants to remain anonymous, and change the nature of financing transactions.

The idea described in that 2008 whitepaper came to life in 2009 after the first block, known as the 'genesis block', was mined, creating 50 Bitcoin. The creation marked the start of what would be a whirlwind of headlines, many controversies, and possibly the downfall of

traditional banking. Not coincidentally, the whitepaper and the first block came in the wake of the most significant financial crisis since the Great Depression when people's trust in the banking system was at an all-time low. The writer, Satoshi, believed Bitcoin could be a better alternative and did not shy away from calling out those he was opposing. In the first version, he went as far as to embed an easter egg line of code, "sknab rof tuoliab dnoces fo knirb no rollecnahC" (Canellis, 2018). When read backwards, this says 'Chancellor on brink of second bailout for banks', which was a headline of a New York Times article from January of that year.

Following Bitcoin, many other cryptocurrencies have been developed by others in the years following. The different cryptocurrencies vary in technology and supply, among other factors. Still, users and investors alike broadly support the currencies as a singular community and are opposed by non-supporters as one (Breidbach, 2021). Many people have gained tremendous wealth from cryptocurrency growth, as have people lost large sums of money from their volatility. Wither way, with the attention it continues to gather and the change it offers, the future of cryptocurrency is undoubtedly worth exploring.

The paper aims to give a background on cryptocurrency and make an opinion on what its future holds. It begins by exploring the technology that provides aid to cryptocurrencies' growth as a payments system and the parts that still require improvement. I will then explore the external environment affecting cryptocurrencies. Next, I explain what factor I believe to be the most impeding to its future and do an analysis using quantitative and qualitative factors to examine how it has performed in the past with this factor. My conclusion gives my opinion on what I believe may happen to Bitcoin based on my analysis, asserting that it will continue to perform the same way going forward. Finally, I will open discussion as to what may happen in the larger cryptocurrency industry based on my research.

LITERATURE REVIEW

Technology

The first factor that cryptocurrency offers towards innovation is blockchain technology. Coins differ in how they reach consensus on a transaction, distribution methods for coins, and transaction speeds. However, all currencies operate through the same fundamental idea known as the blockchain. In layman's terms, a blockchain is a way to keep records digitally. A singular block within the blockchain contains a record of several transactions between users. Each block within the system connects to the previous block through a procedure known as hashing. Hashing is also irreversible so that once a new block adds on to the last block, users can no longer alter the content stored in previous blocks. Through the connection of all blocks from beginning to end, and the blocks containing the actual transactions, the blockchain has all transaction history.

Blocks are also public to the entire system so that everyone is aware of how much money has changed hands and between who. However, the who in this situation is more of a label. Instead, the transactions show which wallets have given or received coins. Each user is assigned a public key which is visible to the blockchain. The public key signifies that a user has ownership over a wallet and can spend the coins inside of it. In theory, nobody can link this key to a user's identity. Each user is also assigned a private key, otherwise known as a signature, in which they must also use when engaging in a transaction. This private key is the only thing linking their account to their identity and is not known to the public, keeping users' identities confidential. The private key must be used in tandem with the public key for a transaction to occur.

Users can see what transactions have taken place with a wallet's (accounts) entire history, making it easy to verify whether that wallet has the coins they claim to have. If they do not have the coins, the transaction will not be allowed to occur. Therefore, the blockchain does not allow anyone to spend any money they don't have. The hashing system connects the blocks so that someone trying to hack the system would need to alter all previous blocks just to change one, making it secure. Finally, using private and public keys on every transaction keeps users' identities confidential. This system essentially eliminates the need for trust between parties.

The general concept of a public ledger such as this was made famous through its use in Bitcoin; However, proponents of the technology believe it has many other valuable applications. For example, a distributed ledger can assign every individual a digital wallet and allow that wallet one transaction. Several countries could use a ledger such as this for a faster, more secure, and private voting system (Van Den Berg, 2018). Similarly, by assigning every user of an application such as Spotify a public key and adding their listening data to the entirety of a ledger, there could be a more accurate way for artists to receive royalty distribution (Van Den Berg, 2018). Advances in blockchain technology may even allow additional securities to be traded through it, making for faster and more efficient broker to broker transactions (Ryan, Donohue, 2017). While this set of ideas holds promise for the future, they are still just ideas. Developing a well-functioning blockchain for voting or music royalties is not feasible, whereas the technology has been successful in its real-world use for cryptocurrencies.

In the blockchain used by currencies, an additional problem is how to verify a new set of transactions or add a new block to the chain. Of course, a trusted third party could verify each transaction and update the ledger accordingly. However, as Satoshi stated in the original whitepaper, this system “depends on the company running the mint, with every transaction

having to go through them, just like a bank" 21. In this original whitepaper, Satoshi then introduces his solution, Proof-of-Work. A second popular solution used by the likes of Ethereum is Proof-of-Stake. There are many others, such as Byzantine Consensus or a hybrid Proof of Work and Proof of Stake system, but this paper will only focus on the primary two (Saleh, 2021).

Proof-of-Work relies on users of its' system working to solve mathematical problems through pure computational power. The blockchain broadcasts each set of transactions or block that has occurred to all users. The Proof-of-Work system converts each of these transactions into an equation, which can be verified easily once solved, otherwise known as a 'hash function' 3. Each user trying to form the new block will use this hashing system to create a complex Proof-of-Work representative of that block; users such as these are also known as 'miners.' Once a miner develops a Proof-of-Work solution, it will broadcast it back out to all users. Once one user of the system solves for the equation, the rest of the blocks can easily verify that all transactions are valid and that the user's solution is correct. The hash function is then added to the end of each block and connects each block and its previous one. The new block is complete once miners begin trying to solve for the next block 21.

All users in the system have an equal opportunity to solve this equation if they so choose, and the chances of solving it only increase through raw computational power. One problem that arises from the Proof-of-Work system is how to incentivize users of the system to want to solve for blocks in a way that is efficient. Bitcoin does this by adding new coins into circulation each time a block gets added to the blockchain. Ownership of these coins automatically transfers to the miner who solved for that block.

However, the Proof-of-Work solution has issues with how it rewards miners and how miners solve for hash functions. For miners to continue efficiently solving for blocks, the system must reward them accordingly. The problem with the current reward method is that the supply of Bitcoin is capped at 21 million, meaning that at some point, new coins will no longer be a reward system 3. After that point, bitcoin may have to pay miners to solve for new blocks. The only way to finance this payment is through transaction fees paid by users. Fees for the use of a financial system would take away from one of the critical factors that provide Bitcoin value over traditional financial systems, which is that its' transactions are free of charge.

The second problem that Bitcoin faces is the amount of energy users expend to solve for new blocks. Since users' chances of solving for a block only increase as they expend more energy, miners continue to increase their hardware to further themselves from competition, in turn using more energy. Further, as hash functions become more complex as more blocks are added onto the blockchain, the amount of energy needed to solve for them increases. "The Cambridge Centre for Alternative Finance estimated that the Bitcoin mining industry burned through 143 terawatt-hours of electricity per year as of May 2021, or .6 percent of the world's total energy concumption." (Lo, 2021). While at its current rate, Bitcoin is not necessarily burning down the world, increases in size will most likely lead to increased energy consumption to a point that is problematic. A study on the economic cost-benefit of Bitcoin mining and its environmental footprint looked into exactly how costly the system is and how long we can sustain the current output of Bitcoin. The author used a five-year forecast based on Bitcoins energy consumption rates from 2013 to 2018. The study found that energy consumption levels needed to produce cryptocurrencies will likely reach 293 terawatt-hours by 2028, equivalent to 1% of United States energy consumption in 2018. This amount would require nearly $39 billion

in electricity. As for how this may equate to the environment, the corresponding increases in CO2 emissions would equate to $11.4 billion worth of climate damage. In other words, every $1 of Bitcoin would be responsible for $0.66 in health and climate damages (Martynov, 2020).

Even at its current rate, countries are already beginning to take notice. As of April, 2021, China, shut down all crypto currency mining in Inner Mongolia (Lo, 2021). Going forward, the climate damage Bitcoin is producing could lead other countries to follow in China's footsteps.

The Proof-of-Stake system may solve both the fixed supply and energy consumption problems Proof-of-Work poses. This system of solving for consensus that coins such as Ethereum use requires users to have some representation in the coin they are solving for. Users or groups of users can create what is called a node in which they both can solve for currencies and store coins. Firstly, they lock away a certain number of coins into this node. Once a set of transactions is ready to be verified, the system selects a random node with some consideration for how much they have at stake or how many coins they locked away. The user of this node then has the opportunity to solve the new block and be rewarded with new coins. After solving for the new node, they can either take their coins out of the node or leave them in for another opportunity to solve for a new coin. If they do not want to solve for the block, the system moves on to another node. However, for the system to be efficient, it must reward users with enough coins in a way that they would always want to solve for the new node. If users attempt to act deceivingly or verify false transactions, the system will take the coins they have stored in the node, and they lose the opportunity to solve for coins in the future (Saleh, 2021). The stake users have ensures security for transactions.

Proof-of-Stake requires substantially less energy than Proof-of-Work since miners are not using raw computational power. However, it does bring about a new problem known as the 'nothing at stake' preposition (Saleh, 2021). Proof-of-Stake systems such as Ethereum are open-sourced and have an unlimited supply. The introduction of new coins to the system decreases the value of all existing coins. If a user were to hold enough coins, even adding new coins to their portfolio through solving for new blocks may decrease the value of their net holdings. If a user's net holdings decrease in value even with additional coins, they may not be inclined to solve for a new block. Adding to this, because the system selects users based on both random variability and the number of coins they have at stake, it is likely that a number of users will decline to solve for a new block when offered the opportunity. This dilemma creates an inefficient system and slows or even halts transactions (Saleh, 2021).

Both forms of solving for new blocks have their given issues. However, they also have advantages over the traditional banking system. The three most significant of these are the elimination of an intermediary, faster transactions across borders, and the ability of users to remain anonymous (Kucheryavenko et al., 2019). I will review each advantage in the pages following.

As for eliminating an intermediary, this inherently makes sense. No economically motivated person would want to spend extra money on something they can do for free. However, with both Proof-of-Work and Proof-of-Service, we see that transaction fees or slower transactions may be a necessary setback for the systems to work. In this case, it may become more of a toss-up between using a traditional intermediary or enduring these problems.

As for the ability for faster cross-border transactions, this has no necessary downfall. The singular integrated blockchain essentially disregards both the size of transactions and the users' locations. Traditional systems still have to worry about several requirements even when banks don't move tangible assets; their cross-border transactions can take varying amounts of time. Cryptocurrencies' underlying asset, on the other hand, is entirely digital, making transfer speed simply how fast people compute them. As systems develop, it is only logical that there will be the ability for transactions of any size to occur worldwide at high-speed rates (Kucheryavenko et al., 2019). That is, given they are operating on an efficient verification system. Additionally, because banks must go through extra loops for a cross-border transaction, they typically require a minimum transaction size. Taking this into account with the varied transaction speed of traditional banks, cryptocurrency has a clear advantage.

Finally, maybe the most significant advantage is that cryptocurrency offers its users anonymity. Users can keep their identity unknown by using private keys to authorize transactions and public addresses unknown to the system. The system verifies that each user has the coins they claim and has safety valves to keep users from getting scammed as a buyer; a transaction does not require a user to reveal any revealing information other than their public key. However, many may argue that systems such as Bitcoin are never fully anonymous but rather pseudonymous (Teomete, Yalabik, 2019). Tying a person’s identity to their private keys can be done in several ways. Most transactions require communication in some form between user and seller. If that be through an online chat forum, a person could give out personal information in reaching that transaction. If someone revealed information such as a mailing address, it could easily be tracked to that person’s key if someone were working to find it. If someone were to be purchasing goods through an online website, the IP address of the computer they are using could

link a user to their true identity. Further, if a person made an exchange from a regular currency into the cryptocurrency, their identity could be linked to their new key.

While uncovering a cryptocurrency user's identity may take significant work, to remain completely anonymous as a user, you also must undergo extra measures. Why someone would want to stay completely anonymous and why others may want to uncover their identity leads to the history of Bitcoins' use.

History

While the technology is innovative and has a bright future, it has been at the center of quite a bit of controversy while gaining popularity. Unfortunately, given its ability to remain anonymous, it also has given users the ability to evade taxes and participate in nefarious activities.

While it is somewhat inherent that people who are engaging in illegal activity would like to remain anonymous, cryptocurrency has become a clear choice to use as a means of trading. A 2019 study by Karlsen S. Foley and T.J. Putniņš aimed to address exactly how much illegal activity goes on using Bitcoin and whether or not it leads to increased criminal activity. The study builds upon the idea that users of Bitcoin are pseudonymous rather than entirely anonymous, as it identified illegal users and the people they traded with through three main methods. The primary point of finding former illicit users was the 2013 closure of the Silk Road, an illegal darknet marketplace used for drugs and sex trafficking, among other things. The FBI seized Bitcoin from the former participants through this closure and auctioned it off. The study used the addresses of these formerly auctioned off Bitcoins to find 1,016 different users. The study then built off these users' trading habits to identify other illegal market participants. Firstly,

a network cluster analysis identified common traders with formerly illegal traders, a "hot wallet" identification, essentially escrow accounts, and a scraping method, which scours the dark web for illegal activity and its corresponding addresses. Along with a set of characteristics specific to illegal users, the study found that about a quarter of all users and half of all Bitcoin transactions are associated with criminal activity (Foley et al., 2019).

This study does not conclude that Bitcoin has increased the capacity for illegal activity to occur. It also does not prove that users' main reason for wanting to remain anonymous is to conduct illegal activity. However, it does give shocking numbers as to how many Bitcoin transactions are for criminal activity. It also did not consider illicit activities such as capital evasion, which concerned government officials cite as partially leading to the one trillion dollar tax gap (Sundaravelu, 2021). Adding this type of activity to the previous study would increase the already high number of illegal users even more. Taking this into account, I believe the attraction of cryptocurrency anonymity lies in users' ability to participate in nefarious activities without the expected repercussions.

While the crime aspect of cryptocurrency has been in the eye of governmental officials for quite some time, a new, possibly more significant problem arises as it grows in size. Because they are not government-issued or regulated, central banks cannot implement any fiscal policies. As a result, in times of extreme inflation, if a large majority of people use cryptocurrency as their means of payment, the economy could go into a freefall (Lo, 2021). With these problems given, governmental agencies have been trying to develop the correct response to address cryptocurrencies adequately. Different countries have varied in the regulation of cryptocurrency in the past. For example, China has repeatedly increased restrictions on Bitcoin since 2013, leading to a possible central bank cryptocurrency release known as the ‘DCEP’ set for release in

2022 (Lo, 2021). Japan has declared the currency to be of legal tender (Ryan, Donohue, 2017). The United States has repeatedly reclassified its classification for tax purposes (TradingView, 2022). Smaller countries have even attempted to gain from it, with the Bahamas developing their own centrally issued currency known as the 'Sand Dollar' (Lo, 2021).

Countries have varied in how they attempted to regulate cryptocurrency in the past. As we advance, if a country finds success through a particular regulation, others may follow suit. Regardless, one thing is clear, and that is that governments do not want cryptocurrency to remain as it is in its current state.

Investment

A thought experiment is how much money you would have if you invested $10 in Bitcoin ten or even five years ago. The exponentially high returns on Bitcoin are another, if not the main reason for its growth in popularity over the past decade. However, this type of experiment has hindsight bias. While Bitcoin attracts a majority of public attention due to its success, several cryptocurrencies have failed. Even now, it is uncertain if Bitcoin will be successful in the long run.

As a means of financial investment, Bitcoin has produced incredibly high returns in the past. For example, a study done on Bitcoins returns from 2011 to 2019 found that it had an average monthly return of 18.1% (Perz, Gemzik-Salwach, 2020). In comparison, that same study looked at both gold futures returns and the S&P 500 over that same period. They produced returns of .2% per month and .9% per month, respectively (Perz, Gemzik-Salwach, 2020). With that said, there is also extreme volatility in Bitcoins price, ranging from a high average monthly standard deviation of 131.3% in 2011 to a low of 13.9% in 2016. For comparison, gold futures'

highest average monthly standard deviation was 7.6% in 2011, and the S&P 500's highest was 4.6% in 2011, both of which followed the U.S. housing crises (Perz, Gemzik-Salwach, 2020).

Many people have gotten rich off the exponential returns of Bitcoin, while many people have indeed lost sums of money from the extreme volatility it goes through. One question people have still been trying to figure out is what factors drive Bitcoins returns. The value is not tangible; instead, how much people are willing to pay for it is what gives it worth. Since the whole purpose of a cryptocurrency is to be a payment method, one would think how well it works as a payment system would be a good measure of its' value. To represent how well it works as a payment system, the best measure would most likely be how many people are using it currently or how many transactions are going through it. However, this isn't a direct cause-and-effect relationship.

The Price of Bitcoin has sharply risen since the end of 2020. Sitting at just $7,232.25 as of December 31, 2020, it reached $33,749.74 as of July 2021 and $47,345.22 as of December 31, 2021, peaking at $65,466 in early November 28. However, the number of transactions occurring on Bitcoin has not reflected these price changes throughout this same period. From the beginning of 2020 through July of 2021, the number of transactions has not risen above 400,000 transactions per day, reaching a low of less than 150,000 transactions per day and hovering around 275,000 transactions per day throughout the period (McNamara, 2021). For comparison, the all-time transactions per day occurred in December 2017, reaching nearly 500,000 transactions per day. At this time, the price sat around $16,000.

While the transaction per day amount of Bitcoin has not increased in the same way as the price, the amount of money transacted on Bitcoin has. As of the end of 2021, Bitcoin handled

nearly $489 billion in quarterly transaction volume. Compared to other payment systems, PayPal handled only $302 billion in quarterly transaction volume during 2021 (Wind, 2021). If Bitcoin continues at the current rate, it may pass larger, even more, established payment systems such as Mastercard.

As Bitcoin prices rise and transaction amounts increase, it is still unclear whether the number of transactions occurring is a strong indicator of Bitcoins' success. Two studies investigated how transaction activity acted as a predictor for Bitcoin returns. The first of these was conducted on the basis that Bitcoins' prices were unexplainable based on economic factors so far. It then took Bitcoin prices and transaction data from January 2, 2013, to September 20, 2017, and used a bivariate vector autoregression (VAR) model to link the impact of each factor on the other (Koutmos, 2018). The study found that a one standard deviation change in transaction activity led to a .30% gain in returns on the third day following the shock. However, by the sixth day, a reversal in price followed the .30% gain (Koutmos, 2018). It concluded by finding "strong linkages between Bitcoin returns with its transaction activity."

The second study examined the same two factors using a quantile-on-quantile regression analysis for data from January 2013 to December 2018. It found that “higher transaction activity tends to predict higher/lower Bitcoin returns when the market is in a bullish/bearish state.” In times of irregularity, transaction activity is a factor in how Bitcoin will perform. Further, it concluded that “…transaction activity can still be considered as the measure of the quality of information and act as a predictor of Bitcoin returns” (Hau et al. 2021).

Both studies found the amount of activity occurring on Bitcoin to link to its returns. This makes sense as the driver of its value is how it works as a payments system. But this is not the

only factor affecting its price. One other aspect that the summation of my research led me to was how Bitcoin performed in times of regulatory increase. This question founds itself in the idea that many of the selling points for cryptocurrencies would be eliminated or diminished with increased regulation. Some of these include the amount of energy expended by Bitcoin that may need to be called out for by the EU, the necessity for fiscal policy to be implemented by each country it operates in, a crackdown on illegal activity, and increased reporting and taxation when using cryptocurrencies. While these may not eliminate the ability to be anonymous, or the ability to operate in a peer-to-peer payments system, it certainly decreases the reason for wanting them.

A prior study done on the effects of economic policy on Bitcoins returns was done by (Demir et al., 2018). This study analyzed the prediction power of the (**EPU**) Economic Policy Uncertainty Index on Bitcoin returns using both a Bayesian graphical structural vector autoregressive model as well as an ordinary least square and quantile on quantile regression estimation for Bitcoin returns from 2010 to 2017. The study results found that "while the (**EPU**) is negatively associated with Bitcoin returns, it may be useful as a tool for hedging against uncertainty during the times of bull-market." Further, while Bitcoin does have a negative correlation with increases in the (**EPU**), traditional investments have a higher correlation, providing implications that investors can use it for portfolio diversification.

RESEARCH METHODOLOGY AND RESULTS

All the positive and negative factors affecting Bitcoin led me to conclude that regulatory changes are the most significant looming threat over cryptocurrencies. With prior research done on how Bitcoin has performed regarding economic policy uncertainty, I wanted to know how Bitcoin has performed in past events specific to regulatory increases on cryptocurrency. To do

this, I used Bitcoins historical closing price data from 2013 through 2022, pulled from coinindex.com, and built out return percentages. I then looked at five significant regulatory events and Bitcoins performance following the event. For the performance of each event, I took the day-over-day return from that day compared to the average day-over-day return in that week (three days prior and three days following). I then compared it to the average day-over-day return for the current, prior, and following months. Finally, I used the exact same performance measurement for monthly returns, looking at the month over month return for that calendar month compared to the month over month return for the month prior and following, as well as the average month over month return for the year. By doing this, I am attempting to predict that Bitcoins return will be lower in more than half of the events selected. While not setting an exact metric for what I consider 'lower,' I make a qualitative analysis to explain my rationale for each event based on a few different metrics.

1

Going through these five regulatory changes historically, China's banning of retailers and financial institutions from accepting new Bitcoin comes first. On December 05, 2013, the Chinese government banned financial institutions and payment companies from using cryptocurrency (TradingView, 2022). As they stated, Bitcoins are a "virtual good" with no legal status, and citizens shouldn't use them as a currency (Fox, 2013).

December 05, 2013 DOD		
Date	Close	% Change DoD
Dec-05-2013	$1,045.11	-9.21%

Week DoD		
Date	Close	% Change DoD
Dec-02-2013	$1,043.33	9.15%
Dec-03-2013	$1,078.28	3.35%
Dec-04-2013	$1,151.17	6.76%
Dec-05-2013	$1,045.11	-9.21%
Dec-06-2013	$829.45	-20.64%
Dec-07-2013	$698.23	-15.82%
Dec-08-2013	$795.87	13.98%

January 2014 DoD Avg.			Average	Total
Date	Close	% Change DoD	0.45%	13.84%

December 2013 DoD Avg.			Average	Total
Date	Close	% Change DoD	-0.64%	-19.70%

November 2013 DoD Avg.			Average	Total
Date	Close	% Change DoD	6.30%	188.86%

2013 MoM Avg.			Average	Total
Date	Close	% Change MoM	35.68%	428.14%

2013 MoM		
Date	Close	% Change MoM
Oct-01-2013	$ 132.18	
Oct-31-2013	$ 204.00	54.33%
Nov-30-2013	$ 1,129.43	453.64%
Dec-30-2013	$ 756.13	-33.05%
Jan-29-2014	$ 826.00	9.24%
Feb-28-2014	$ 549.26	-33.50%
Mar-30-2014	$ 460.27	-16.20%
Apr-29-2014	$ 447.21	-2.84%
May-29-2014	$ 568.18	27.05%
Jun-28-2014	$ 596.55	4.99%
Jul-28-2014	$ 585.76	-1.81%
Aug-27-2014	$ 510.92	-12.78%
Sep-26-2014	$ 403.95	-20.94%

Directly following China's ban on the retail use and acceptance of Bitcoin, day-over-day returns dropped significantly in the latter half of the week, dipping to -20.64% and -15.82% in the two days following the announcement. Further, the December day over day average posed a slightly negative return of -.64%, while January and November had an overall positive day over day averages. Finally, the month-over-month average at the end of December is significantly lower than November, January, and the years' month-over-month returns. While this significant drop could attribute to the spike seen in November, Bitcoin also showed a rebound in the following month of November.

Altogether, this event resulted in a significant dip in Bitcoins price during the week and the month. This was irregular compared to the time period surrounding the event. In this case, Bitcoin reacted negatively to increased regulation.

2

On March 26, 2014, the IRS declared that Bitcoin is now treated as property in the United States (IRS Tax Forms, 2018). Previously in the U.S., Bitcoin was treated as a currency for all tax filing purposes. This announcement marked one of the U.S.'s first steps to decrease capital

evasion from Bitcoin users. From here on out, cryptocurrency was now open to capital gains tax, which meant lower true returns for its holders (TradingView, 2022).

March 26, 2014 DoD		
Date	Close	% Change DoD
Mar-26-2014	$580.83	-0.53%

Week DoD		
Date	Close	% Change DoD
Mar-23-2014	$561.27	-0.67%
Mar-24-2014	$583.41	3.94%
Mar-25-2014	$583.92	0.09%
Mar-26-2014	$580.83	-0.53%
Mar-27-2014	$471.24	-18.87%
Mar-28-2014	$495.67	5.18%
Mar-29-2014	$491.17	-0.91%

February 2014 DoD Avg.			Average	Total
Date	Close	% Change DoD	-1.35%	-37.90%

March 2014 DoD Avg.			Average	Total
Date	Close	% Change DoD	-0.45%	-13.84%

April 2014 DoD Avg.			Average	Total
Date	Close	% Change DoD	0.12%	3.49%

2014 MoM Avg.			Average	Total
Date	Close	% Change MoM	-5.68%	-68.18%

2014 MoM		
Date	Close	% Change MoM
Jan-29-2014	$ 826.00	9.24%
Feb-28-2014	$ 549.26	-33.50%
Mar-30-2014	$ 460.27	-16.20%
Apr-29-2014	$ 447.21	-2.84%
May-29-2014	$ 568.18	27.05%
Jun-28-2014	$ 596.55	4.99%
Jul-28-2014	$ 585.76	-1.81%
Aug-27-2014	$ 510.92	-12.78%
Sep-26-2014	$ 403.95	-20.94%
Oct-26-2014	$ 354.68	-12.20%
Nov-25-2014	$ 375.00	5.73%
Dec-25-2014	$ 319.00	-14.93%

On the day the announcement itself was made, there was no significant decrease in price. However, on March 27, the day following, there was a substantial decrease in the price of -18.87% versus the day before. As for the month, the day-over-day average of -.45% was not significantly lower than April's day-over-day average of .12% and is higher than February's day-over-day average of -1.35%. The month over month average, taken a few days after the event, is not unlike the month prior or the month after, with there being consistent negative returns both in the period and the year as a whole.

While there are drops in the price, none of them are extremely large. Further, because the rest of the time frame surrounding the event displayed similar behavior, I would not say this event had a negative impact on Bitcoins prices. Rather, this event remained neutral.

3

On April 01, 2017, Japan officially recognized Bitcoin as a legal tender. This recognition marked the first country to create a law for cryptocurrency and is especially important due to the size of Japan's crypto-economy (Arora, 2020). Although this may seem like a loosening of

regulation as it addresses an otherwise free for all in terms of legal status, the intentions were quite the opposite. Japan's act to recognize Bitcoin is known today as the first step in increasing reporting requirements and creating agencies to govern crypto exchanges. The well-informed cryptocurrency community also knew what the underlying motivations of this announcement were (TradingView, 2022). However, the price of Bitcoin in the following periods showed that this move was still shed a favorable light by many.

April 01, 2017 DoD		
Date	Close	% Change DoD
Apr-01-2017	$1,080.28	0.82%

Week DoD Avg.		
Date	Close	% Change DoD
Mar-29-2017	$1,039.68	-0.75%
Mar-30-2017	$1,026.28	-1.29%
Mar-31-2017	$1,071.45	4.40%
Apr-01-2017	$1,080.28	0.82%
Apr-02-2017	$1,102.04	2.01%
Apr-03-2017	$1,142.26	3.65%
Apr-04-2017	$1,132.80	-0.83%

March 2017 DoD Avg.			Average	Total
Date	Close	% Change DoD	-0.19%	-5.96%

April 2017 DoD Avg.			Average	Total
Date	Close	% Change DoD	0.78%	23.44%

May 2017 DoD Avg.			Average	Total
Date	Close	% Change DoD	1.81%	56.16%

2017 MoM Avg.			Average	Total
Date	Close	% Change MoM	31.59%	379.03%

2017 MoM		
Date	Close	% Change MoM
Jan-13-2017	$ 822.84	5.33%
Feb-12-2017	$ 999.10	21.42%
Mar-14-2017	$ 1,240.06	24.12%
Apr-13-2017	$ 1,169.01	-5.73%
May-13-2017	$ 1,796.03	53.64%
Jun-12-2017	$ 2,672.34	48.79%
Jul-12-2017	$ 2,399.01	-10.23%
Aug-11-2017	$ 3,654.33	52.33%
Sep-10-2017	$ 4,122.58	12.81%
Oct-10-2017	$ 4,770.68	15.72%
Nov-09-2017	$ 7,149.00	49.85%
Dec-09-2017	$ 15,082.85	110.98%

Following the announcement, the day-over-day returns of Bitcoin showed moderate gains, but nothing too significant, as the highest day-over-day increase of 3.65% on April third was followed by a -.83% decrease the next day. As for the day-over-day returns for the month, both April and May saw positive averages and substantially high totals at both 23.44% and 56.16%. The month over month, respectively return for April saw one of the only decreases of the year at -5.73% but was followed by two significant increases in May and June.

Most notably, the price of Bitcoin increased in the period following the announcement. There was also only one decreasing statistic with Aprils month over month decrease. Through these factors, the announcement to accept Bitcoin as legal tender did not have a negative impact on the price of Bitcoin; if anything, I would say this event may even have had a positive effect on the price of Bitcoin.

4

On February 01, 2018, China officially banned access to all domestic and foreign exchanges of currency (TradingView, 2022). This move came following the closure of all cryptocurrency exchanges in the country in late 2017. While closing the exchanges furthered China's stance against the use of cryptocurrency in addition to the move in 2013, trading continued in the country at a high level. According to the South China Morning Post, "ICOs and virtual currency trading did not completely withdraw from China following the official ban." The people of China were using foreign exchanges to continue investments in and transactions of cryptocurrency (Yu, 2018).

February 01 2018 DoD		
Date	Close	% Change DoD
Feb-01-2018	$9,171.25	-10.41%

Week DoD Avg.		
Date	Close	% Change DoD
Jan-29-2018	$11,348.08	-4.36%
Jan-30-2018	$10,084.50	-11.13%
Jan-31-2018	$10,236.68	1.51%
Feb-01-2018	$9,171.25	-10.41%
Feb-02-2018	$8,768.33	-4.39%
Feb-03-2018	$9,191.27	4.82%
Feb-04-2018	$8,256.58	-10.17%

January 2018 DoD Avg.			Average	Total
Date	Close	% Change DoD	-0.80%	-24.81%

Feruary DoD Avg.			Average	Total
Date	Close	% Change DoD	0.32%	8.83%

March DoD Avg.			Average	Total
Date	Close	% Change DoD	-1.20%	8.83%

2018 MoM Avg.			Average	Total
Date	Close	% Change MoM	-7.59%	-91.10%

2018 MoM Avg.		
Date	Close	% Change MoM
Jan-08-2018	$ 15,218.63	0.90%
Feb-07-2018	$ 7,587.93	-50.14%
Mar-09-2018	$ 9,345.52	23.16%
Apr-08-2018	$ 7,000.92	-25.09%
May-08-2018	$ 9,233.69	31.89%
Jun-07-2018	$ 7,654.79	-17.10%
Jul-07-2018	$ 6,718.70	-12.23%
Aug-06-2018	$ 6,935.71	3.23%
Sep-05-2018	$ 6,714.91	-3.18%
Oct-05-2018	$ 6,626.55	-1.32%
Nov-04-2018	$ 6,456.24	-2.57%
Dec-04-2018	$ 3,960.00	-38.66%

There was a significant decrease in the day-over-day percentage change after the ban at -10.41% as of February 1st. However, this decrease was not uncharacteristic of the week as a whole. There was significant volatility on days such as January 30th and February 4th, with day-over-day changes of -11.13% and -10.17%, respectively. February's day-over-day average sat at a positive .32%, which is higher than both January and March's, but not significantly. Finally, February's month-over-month average saw a steep decrease as of February 7th, sitting at -50.14%. Prior to February, there was a positive .90% month-over-month change. A 23.16% increase then followed it as of March 9th. This 23.16% increase indicates that there was a steep

decrease in price directly following the ban for a few weeks and then a rebound, leading to the march increase.

The most significant price change was the month-over-month percentage increase from February to March. Therefore, I would say China's banning of Bitcoin exchanges had an overall negative impact on Bitcoin price.

5

On May 28, 2021, the US Treasury released the 'Green Book' calling for an overarching increase in reporting in all facets of cryptocurrency. Specifically, there are three main facets to the proposal:

1. It calls for American exchanges to increase transaction data and dissemination to its' users, allowing them to better report their own earnings and losses.
2. People need to report any exchange of 10,000 or more to the IRS.
3. The accounting done by banks and institutions must be extended to cash reporting for crypto-asset exchanges and require any broker-to-broker transactions or significant foreign beneficial owners to be reported (Sundaravelu, 2021).

While the proposal had still yet to go through congress, it made it clear the US was taking the direction of increasing regulation.

May 28 2021 DoD		
Date	Close	% Change DoD
May-28-2021	$35,670.70	-7.30%

Week DoD		
Date	Close	% Change DoD
May-25-2021	$38,165.79	-1.17%
May-26-2021	$39,184.76	2.67%
May-27-2021	$38,479.69	-1.80%
May-28-2021	$35,670.70	-7.30%
May-29-2021	$34,523.41	-3.22%
May-30-2021	$35,618.16	3.17%
May-31-2021	$37,303.75	4.73%

April DoD Avg.			Average	Total
Date	Close	% Change DoD	0.00%	0.12%

May DoD Avg.			Average	Total
Date	Close	% Change DoD	-1.25%	-38.76%

June DoD Avg.			Average	Total
Date	Close	% Change DoD	-0.08%	-2.32%

2021 MoM Avg.			Average	Total
Date	Close	% Change MoM	10.03%	120.39%

2021 MoM		
Date	Close	% Change MoM
Jan-22-2021	$ 32,836.14	41.16%
Feb-21-2021	$ 57,367.95	74.71%
Mar-23-2021	$ 54,599.96	-4.82%
Apr-22-2021	$ 51,843.68	-5.05%
May-22-2021	$ 37,555.00	-27.56%
Jun-21-2021	$ 31,606.39	-15.84%
Jul-21-2021	$ 32,142.94	1.70%
Aug-20-2021	$ 49,270.61	53.29%
Sep-19-2021	$ 47,201.50	-4.20%
Oct-19-2021	$ 64,217.08	36.05%
Nov-18-2021	$ 56,749.27	-11.63%
Dec-18-2021	$ 46,871.02	-17.41%

Following the release of the Green book, there was a drop of -7.30% on the day; however, this drop did not last throughout the week as the latter half showed positive day-over-day increases in price. When looking at the day-over-day changes for the month, the average of -1.25% was lower than both April and June, and the total percentage change of -38.76% was significantly lower than either April or June, indicating a price decline. Further, the month-over-month percentage change for May hit a yearly low of -27.53%. This decrease was ushered by an April decrease of -5.05%, followed by Junes decrease of -15.84%. This three-month period marked the only three-time consecutive decline in month over month average for the year. While this may indicate that it was already going into a declining state, this event was not a sudden change but rather a shift in outlook helps the argument that the decrease sustained itself for a period rather than a sharp one-time fall.

The most significant statistic here was the decrease in the months surrounding the event. This decrease occurred in an otherwise positively trending year for Bitcoin. Because of the overall decline of the period, I would argue that the release of the Greenbook resulted in a decrease in Bitcoins price and an adverse reaction to increased regulation.

Results

The indications of my study cannot provide an all-inclusive statement as to whether increased regulation decreases the Bitcoin price. This fault resulted from my research not considering many other factors that may have played into the change in Bitcoins price throughout these periods. Some of those limitations include that I did not consider the volatility of Bitcoins prices, the different time frames that went into each event, and changes in the overall economic outlook, among others. Further, I did not investigate currencies other than Bitcoin, as they may have performed differently. I also did not set a quantitate range for a 'negative' effect or conduct a correlation analysis between the two factors. Instead, I relied on a qualitative analysis of what I viewed as trends in the price of Bitcoin in the periods surrounding these specific events.

Through the study of these five events, there were different results. On one occasion, there was no effect on Bitcoins' price. In another event, there was a positive effect. In three of the five events, there was what I considered to be a negative effect on Bitcoins price.

While all the events were what I considered increased regulation, not all had necessarily negative connotations. As in the case of Japan electing to regard cryptocurrency as legal tender, this was more of an act of acceptance than denial of the currency. This declaration was opposite to the actions of China, which has repeatedly tried to deny the ability of its citizens to trade in the money.

Even in the act of acceptance, this was an attempt for their government to increase the visibility of Bitcoin trading among their people to themselves. Because addressing

cryptocurrencies is necessary regardless of their stance, this seems to be the most favorable form of acknowledgment. Based on this case alone, it looks like the price of Bitcoin has positive connotations with governments taking this stance.

On the other side, the Chinese government's actions followed what I considered adverse effects on Bitcoins' price. This policy is the other side that regulators may take towards Bitcoin and cryptocurrencies, blocking their use altogether. If this is a stance many governments are bringing forward, this may not be good for the future of cryptocurrencies.

Taking these mixed results and the factors that did not get considered during this study, no conclusions are made on the effects of increased regulation on Bitcoin prices. Further research taking into account these variables and setting quantitative measures for what is considered an adverse reaction may prove to have more significant results.

CONCLUSION

Many other cryptocurrencies and plenty of attention have followed the advent of Bitcoin. Blockchain technology is widely accepted as revolutionary and may have several industries it can be of use in the future. However, currently, many problems remain with the technologies in use in the most significant currencies. These problems are both inherent in the fundamentals of the system and external to the environment in which they operate.

As for the inherent problems, the fixed supply of Proof of Work leads to a questionable future as to how it will incentivize users to solve for new blocks without returning to the old ways of transaction fees used by banks. The unlimited supply of Proof of Service leads to the possibility of inefficiencies when conducting a transaction.

While it does have advantages over the traditional banking system, these advantages are currently giving rise to their own problems. For example, the energy consumption of proof of work, the anonymity leading to criminal activity, and being nonregulated all are problems to that must be addressed.

Through the need to implement fiscal policy, decrease energy consumption, properly tax users, and a crackdown on illegal activity, I propose that increasing regulation will meet cryptocurrency. However, this increase in law occurs, albeit through central bank-issued currencies, denial of any trading of cryptocurrencies, or acceptance of a currency as legal tender. It will result in increased visibility into the currency. My own studies do not provide enough evidence to support the conclusion that increases in regulation will decrease the value of cryptocurrency. However, if they are to decrease illegal activity, this would reduce the number of transactions that occur through Bitcoin. From a strictly logical standpoint, increases in regulation will diminish the value of using a currency like Bitcoin to at least a portion of users.

However, my paper focused more on the external environmental factors that may affect Bitcoin, namely external regulations. Some of the points I highlighted throughout the technology section still have quite a bit of potential. Capabilities such as the ability to transact across borders at rapid speeds and not needing trust between two parties for a transaction to occur, show a lot of promise. Moving forward, how developers and users solve for the problems and use of the advantages will play into how successful cryptocurrencies truly can become.

DISCUSSION

While my studies relied on mainly Bitcoin, the first and largest currency as of April 2022, many other coins have developed since Bitcoin. They are still increasing in number today. While

Proof-of-Work and Proof-of-Service have their faults, that is not to say another currency cannot or does not already exist that doesn't contain these same flaws.

While doing my research, an interesting study looked into the formation of cryptocurrency markets through a field study in Australia. It detailed experiences at grassroots experiences in Australia, such as workshops and networking events. The study produced four different types of participants at these workshops, the roles of each, and the behavior in which they engaged. The four characters are freshmen, trailblazers, fortune hunters, and idealists. Freshmen were brand new and just trying to gain an understanding of how currencies worked and how they could get in on it. Fortune hunters were knowledgeable through experience and typically took the next step after being a freshman. Idealists wanted to increase the number of resources available to their said currency or their said community of currencies using freshman and fortune hunters. Finally, trailblazers were those attempting to create their own currency, aimed at creating wealth and using Idealists as their capital raisers.

These field studies examined two actions passed on from the different levels. Firstly, an exchange action is the passing down of knowledge from one group to the next. So, for example, through one party giving the party below it knowledge, they were then able to gain potential new customers or investors for their currency.

They labeled the second action a 'normalizing action.' A normalizing action is where users within one group must adhere to the new group's set of social rules. These include actions such as only trading in the currency they are a part of, "to hold a cryptocurrency for some time", and participating in initial coin offerings when offered. Further, these communities acted by

these standards in a way as to create ‘insiders’ and ‘outsiders’ both within and outside of their group (Breidbach, 2021).

I found this study interesting not for how it identified key market shapers in the cryptocurrency industry but for how the developers of these more minor currencies create them and gain followers. There is decreased information at each level within these smaller currencies, with only the top person or the trailblazer to be the one who surely knows everything. That’s not to say they are deceiving the other participants, but it does give them the ability to.

However, the participants may also be on the ‘inside.’ Through using terms such as ‘insider’ and ‘outsider,’ actions such as trading in only that cryptocurrency for some time and holding that cryptocurrency for some time, the group was able to divide people into the two groups. With these participants on the inside, it seems like whoever ends up buying into the currency last will end up being the one on the outside. With the currency proven to be well functioning with multiple users, it seems logical that another person not in this group may buy in thinking it is a quality currency. After an outsider buys in, insiders then decide to stop ‘holding for some time’ and sell it off, leaving the newest purchaser with a non-active currency with no other users.

Alternatively, it could be proven to be a functional currency and introduced to a group that needs a new currency. Such a group may have been participating in activities on another system, such as Bitcoin, that became too mainstream and is now being regulated to the point that they can no longer do the same things without facing repercussions. With this new, minor currency, it is likely to be unregulated and will allow them to use it for some time before regulators notice it. In which case, they simply move on to another.

Altogether, larger coins such as Bitcoin may decrease in value as regulation goes up or lose users as governments crackdown on criminal activity. However, the smaller currencies that are becoming developed so rapidly may give way to being used by those old users. Rather than the ones with the largest markets, these currencies could be the future of the cryptocurrency industry.

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