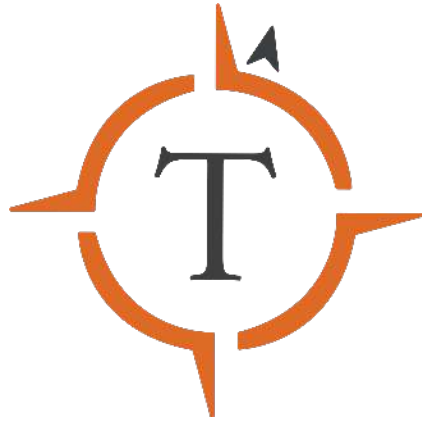Tahoe Expedition Academy

Bitcoin:

The Future of Currency

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June 1, 2020

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1. Introduction

Government printing is out of control. Inflation rates are at unprecedented levels as another $3 trillion has been printed out of thin air and injected into the US economy. Every time this happens, the value of the dollar decreases, and the people that hold the dollar pay the price. On January 3, 2009, Bitcoin entered circulation becoming the first cryptocurrency to run completely decentralized and solve the issues of government-backed money. A $1000 bitcoin investment back at the beginning of 2013 would now be worth over $655,000 as of May 26th, 2020. Millions of people hold Bitcoin because now they have an alternative to government money. Revolutionary technology utilizing blockchain has made this form of money run from a computing network where computers share data with each other without relying on a central authority to monitor or control the network. Cryptocurrencies are the future because they are inflation-proof, immune to corruption, has perfect qualities of an effective currency, improved security, many use cases, and allow individual ownership. Many people are skeptical of the technology or fail to see its value, while millions of users and developers have turned cryptocurrency into the potentially best form of currency ever created.

2. Problems With The Monetary System

2.1 The Gold Standard

Gold has been a currency and the most reliable store of value for thousands of years. It is a rare metal that holds its value because it is hard to inflate. Governments created fiat money (government-backed money) to improve trade because carrying gold coins around was not practical. A dollar bill was actually just a receipt for gold that was being held in the bank. Any person could redeem their bill for gold, giving the dollar value. If the US Dollar was not backed by something with real value, people would not have accepted the dollar because it is essentially just paper. This system was primarily used for 179 years until the US Dollar was taken off the gold standard on August 15, 1971, so that governments could increase their spending. The dollar is no longer backed by gold and people cannot redeem their dollar for anything of value. Gold has an inflation rate of about 1% because of newly mined gold entering the supply every year. Currencies backed by gold protected the currency and guaranteed the inflation rate would not be more than 1%. When a currency is not backed by a rare asset, governments have the ability to inflate their currency infinitely.

2.2 Effects of Inflation

Every government in the world prints fiat and inflates its currency at rates higher than the gold standard allowed. When they increase their money supply, it gives them more funding to spend on services or inject the economy with money. However, printing money reduces its value

and steals purchasing power from the person who owns the bill. Every year, the dollar and every other currency go down in value. This primarily hurts people with lower income and who can not afford to purchase assets like real estate and stocks. They only hold dollars while people that hold other assets generally see their purchasing power increase over time. One stock in Apple will always be worth one stock no matter how much a currency is inflated. A lot of its value is determined based on how the company is doing, but it is also based on the value compared to the dollar. If the supply of the dollar increases by 20%, an asset will likely also increase by 20% in dollar value if the stocks' original value is still the same.

The problem with fiat money is that a third party, like the US government, has the ability to print money. Even gold has an inflation rate when new gold enters the market from Gold Mining. Bitcoin is the first form of money that protects the value of the currency by capping the total supply and removing the possibility of any third party from ever-changing this. While the entire world is quantitative easing (increasing supply), Bitcoin is quantitatively hardening (decreasing supply rate). There will always be a limited supply of 21 million Bitcoin and there is approximately 18,382,862 Bitcoin in circulation as of May 21, 2020. Roughly every 4 years, the new supply that enters the market is cut in half. This event is called the halving and recently took place on May 11th, 2020. The last Bitcoin to be mined is expected to happen around the year 2140.

History has shown people that rely on government money can lose everything when currencies are manipulated. For example, the exchange rate of the German Mark to the American Dollar was about 4.2 to one in 1914. Nine years later, it was 4.2 trillion to one (Salemi). This was caused by the German Government mass printing their currency until it was completely

worthless. Today, every government in the world prints money in forms called quantitative easing, bailouts, and buybacks. While their printing is significantly less than the German Mark printing in 1914, government money will always face the potential threat of hyperinflation.

3. Qualities of Money

3.1 Characteristics

Money has evolved over centuries to better serve the medium of exchange. Bitcoin has the characteristics to be the most successful form of money for our time. Currency is an asset that stores value with the intention of trading that asset for other goods. Seashells, gold, cattle, stones, and even cigarettes have all been used to store wealth. The best forms of money have the following characteristics: long timeframes, divisibility, lots of liquidity, low stock to flow, no risk, speed, freedom, and trust.

Any money that has the potential to deteriorate over time is a bad store of value because it may rot before it can be used. Likewise, money that cannot be cut into smaller pieces, like cattle, are useless when trying to exchange for items worth only part of the asset. It is also important for an asset to be liquidated fast (spent and transacted instantly). If a currency is not accepted or cannot be spent in many places, it has less value than currency accepted by the most amount of people. Money works best in trade when prices are stable and is more reliable when storing value. Low stock to flow means that the money is not easily copied or created, decreasing the rate of new supply. The value in a type of money can easily be destroyed if too much of that asset flows into the market.

3.2 Advantages of Different Forms of Money

Different forms of money each have their advantages in a situation. Cigarettes serve well as a form of money in prisons because they have high demand, do not deteriorate, and are rare. However, this form of money would not be successful in any other real-world situation. As technology develops, some forms of money improve and others disappear. Three thousand years ago, seashells made sense as a currency in many places, but over time as more seashells were transported and the supply was inflated, all seashells lost their value. Gold was not easily transportable and useful in day to day transactions when first used. This form of money was improved when people figured out how to mint coins out of gold (Ammous). It is important to realize the qualities of successful currencies and what gives it value to understand why Bitcoin should be an alternative to our current monetary system.

Bitcoin can be sent anywhere in the world in a matter of minutes, making it the most efficient way to transport wealth. Also, Bitcoin cannot be destroyed or counterfeited because of its security measures, which is a characteristic only cryptocurrency has. In addition, 1 Bitcoin can be divided as small as the 8th decimal point equivalent to $0.00009. People using this currency will always be able to make transactions valuing at a cent even if 1 Bitcoin becomes 100 times more expensive. Bitcoin has the perfect characteristics of currency because it is easily portable, limited in quantity, not able to be counterfeited, divisible, and durable.

4. Bitcoin Technicals

4.1 Blockchain

The fundamentals of Bitcoin make it significantly different than paper money or credit in a bank. Bitcoin is the first currency to operate without any third-party or government and cannot be manipulated because it is decentralized. Users can be certain that their Bitcoin will not lose value because of inflation and is not confiscatable. The first step in understanding how Bitcoin can function without a central authority is to know how Blockchain works.

Records are used to keep track of the legitimacy of anything. As an example, the U.S. Department of State keeps records on which passports have been issued and to whom. People rely on a central authority, like the Department of State, to verify and ensure these records are correct. But any central authority has the ability to change records or be corrupt, creating mistrust and inaccurate records. Blockchain technology removes the need for a central authority to verify records. Its records are kept by everyone. A network of computers communicate and a record is confirmed when the computers come to a consensus that the record is valid. Anyone can contribute to the network to increase security. The more computers connected to the blockchain, the harder it is for an invalid record to be recorded. Blockchain is virtually impossible to falsify because there are so many computers monitoring it.

To further explain how blockchain and its security works, the Rai Stone Monetary System of Yap Island can be used as an example. 200 years ago, Yap Islanders used Rai Stones as a currency. These were huge stones and up until its collapse, it was impossible to increase the supply of stones and inflate their currency. They had a similar way of verifying who had

ownership of stones as the blockchain network operates. The stones were impossible to move, so when ownership of the stone changed, all the Islanders would come to a consensus and everyone knew who now owned the stone. It was the agreement of multiple people that kept the record of transactions. This can be extremely confusing and hard for people to remember when many transactions are executed. Computers can work the same system, but significantly more efficiently. An owner of Bitcoin can use the network without ever having to contribute to the blockchain. So even though Bitcoin transactions verify through consensus with multiple miners, the person that makes the transaction is never responsible to verify transactions themselves. People that choose to contribute to the blockchain are rewarded with Bitcoin and network fees. Blockchain allows Bitcoin to run from a peer to peer system, removing any third party involvement.

4.2 Bitcoin Operations

Bitcoin utilizes blockchain technology to make secure transactions. "Miners" all over the world connect to the blockchain to add to the security. Miners can be any person that sets up equipment to confirm Bitcoin transactions. When someone sends Bitcoin from one wallet to another over the blockchain network, six different Miners confirm the transaction (Nakamoto). This system is fraud-proof and Bitcoin's blockchain has never been successfully hacked. Every transaction is put on a public ledger. For example, any person can see that wallet 1 sent 10 Bitcoins to wallet 2 at 10:00 pm. If this transaction is verified through the blockchain network, it is confirmed and sent to the wallet. However, these transactions are recorded under a private

wallet address, comprising of 26-35 alphanumeric characters. A person only knows who made

the transaction if they know the address. A user can create an infinite amount of wallet addresses.

Miners get incentivized to use their costly energy and equipment by getting paid with

transaction fees and generating 12.5 Bitcoin per block. The mining process requires machines to

solve math problems and randomly mine a block. Miners with higher computational power are

more likely to find the block. Many people join mining pools which collectively use their power

to mine blocks to increase the likelihood that they find blocks, but when a block is found it is

shared between the whole group. About 144 blocks are mined per day. Roughly every 4 years,

the reward for mining a block is cut in half. This makes Bitcoin an existing supply compared to

its new supply significantly rarer and drives the price up. There is also a max supply of only 21

million Bitcoin to ever be produced and the last Bitcoin to be mined is expected to happen

around the year 2140. After the last Bitcoin is mined, the network will be held together by small

transaction fees. Many people worry that if a majority of miners turn off their machines when

Bitcoin is no longer profitable because of a huge price drop, Bitcoin will become overloaded and

collapse. However, Bitcoin's difficulty in mining adjusts depending on how many miners are on

the network. We have seen Bitcoin's hashrate crash when miners capitulate making transactions

three times as long to process. This is quickly fixed because Bitcoin will automatically adjust the

difficulty to mine. Alternatively, if Bitcoins hashrate goes up and more miners are active, the

difficulty to mine increases to keep the average time to mine a block at around ten minutes. It is

important for the difficulty to adjust because this would increase Bitcoin's new supply entering

the market and inflation rate.

Bitcoin's price has extreme changes, but that is not caused by inflation like other currencies. Instead, it comes from the uncertainty of people who own Bitcoin because Bitcoin is still a very speculative market. People invested in Bitcoin are assuming that it will eventually become a currency. Price changes when supply or demand changes. There are many day traders who trade the market because of its volatility which only makes the markets more volatile. If people hold their Bitcoin and use it to exchange for goods, the price will become stable. Over Bitcoin's ten years of existence, the volatility has decreased and will likely continue to decrease.

5. Other Cryptocurrencies

There are over 2,000 cryptocurrencies. Bitcoin controls about 63% of the total crypto market cap. Many people do not realize that all cryptocurrencies are different, some are better than others, and have completely different uses and technology. Bitcoin has the strongest hashrate by far meaning it is the most secure because more people are on the network. Other popular cryptocurrencies include Ethereum, XRP, Bitcoin Cash, Litecoin, Monero, and Raven Coin (CoinMarketCap).

Ethereum is not only a cryptocurrency but also a decentralized computing platform. This platform can be used by developers to create and run decentralized applications. Bitcoin is only one use of blockchain. Some applications of the decentralized network include voting, social networking, finance, and document transfers. Bitcoin has its own platform to operate, but other applications will also need a platform to be decentralized and Ethereum gives developers the opportunity to use a platform without having to create their own platform. The internet can be

used as an example of a platform that runs programs like the Ethereum network (Martin).

Decentralized applications are important because it removes the need for people to trust central

authorities. For example, people rely on a central authority to count votes. With decentralized

voting, it is impossible for counting errors or fraudulent votes. Also, social networking platforms

collect our data. Decentralized social networking makes communication, data, and files remain

private between users. Messages are scrambled when sent and no third party can read the

messages. Today, these decentralized social networking platforms exist, such as Keybase, but are

not widely used (Keybase).

XRP was built for enterprise and is primarily intended for commodities and currencies to

be transferred over the Ripple Network. This offers banks a reliable settlement process. When

transfers occur, fees are paid with XRP. Exchanging assets can be a very expensive process. For

example, when banks want to exchange the Japanese Yen for the Mexican Peso, banks have to

first exchange the Yen for US Dollars, and then US Dollars to Mexican Pesos. With the Ripple

Network, XRP can be used as a cheap intermediate allowing banks to exchange currency without

the traditionally expensive process. Fees when transferring XRP cost an average of 0.00026

cents and transaction process usually within a few seconds. XRP cannot be mined like Bitcoin

because all of its supply is either in circulation or locked by Ripple, waiting to be released. There

is a max supply of 100 billion XRP and approximately 44 billion are currently in circulation

(CoinMarketCap). Some people argue that XRP is not decentralized because the main company

behind the currency operates and controls a large amount of XRP.

Monero is a currency very similar to Bitcoin, except it is more private. Bitcoin is

traceable because anyone can view the hashes on the Bitcoin blockchain. People can send

Monero using the public ledger, but the destination, users, and amount spent cannot be viewed on the public blockchain (Alonso). In addition, every transaction requires a new address where Bitcoin gives users the option to generate a new address or use a pre-existing address. Monero uses a different security measure called Cryptonight and has no maximum block size (Seth).

Litecoin is a currency that has a faster payment confirmation system because its cryptographic algorithm differs from Bitcoin. One of Bitcoin's major issues is that it takes ten minutes for the first confirmation of a transaction to process. Litecoin can take as little as two minutes to confirm, making it useful in day to day life. However, the lightning network is in development to make Bitcoin significantly faster with a second-layer solution. The lightning network makes 1 million transactions per second. Bitcoin's blockchain would be used for a final settlement while transactions on the lightning network use off-chain payment channels. Currently, the lightning network is available to use in some wallets but has not been adopted because of issues including the 150GB of space on a device requirement, needing nodes to remain online 24-7 to receive payments, and payment regularly fails because routes are not found (Cointelegraph). If the lightning network is successful, then Litecoin's main advantages over Bitcoin will no longer be relevant.

Bitcoin Cash is a popular fork of Bitcoin that aims to make use easier for day to day transactions. The block size is 8mb compared to Bitcoin's 1mb block size. This adds more transaction capacity, speeds up confirmation times, and reduces miner fees (Blockchain). However, the larger block sizes decrease security compared to Bitcoin.

There may be many cryptocurrencies that can succeed because each of them has different use cases. Many phone companies exist and each person has their own preference. The best

phones are the most popular, but some people still purchase less popular phones if that is what they prefer. Likewise, there are thousands of cryptocurrencies and people choose different cryptocurrencies depending on the different characteristics that they prefer. Even if Bitcoin is rejected as a currency, Ethereum can still thrive because of its platform that runs decentralized applications and XRP design for enterprise use. Cryptocurrency may not be used for day to day transactions if it does not gain further popularity, but there are plenty of other uses for cryptocurrencies to thrive at.

6. Potential Threats

Bitcoin has a 10-year track record and on-chain metrics show the fundamentals of working at an all-time high. There has never been a successful attack to hack or destroy Bitcoin, but there are a few threats that Bitcoin still faces including quantum computing, regulation and unacquainted technology users.

6.1 Quantum Technology

Quantum computing is the process of a computer guessing every possible private and public key combination until they find a possible match. These computers could theoretically make many calculations until they guess a public and private key associated with bitcoin stored on that wallet. BCB Group explains the difficulty of guessing private key:

Each Bitcoin private key is a randomly generated number 256 bits long giving

1,597,920,937,330,902,918,203,684,832,716,283,019,655,932,542,976 possible

keys. To put that in perspective, there are only an estimated 2^63 grains of sand

on all the beaches on Earth. If each grain of sand was itself a tiny planet

containing all the grains of sand on earth, there would still be more possible

Bitcoin addresses than grains of sand by a gigantic number (BCB Group).

Based on quantum computing power today, it is impossible to guess a generated key used on the blockchain. However, by 2028, researchers estimate that computers may have the power to guess these addresses. Quantum computing does not work if an address is only used once. Therefore, the Bitcoin blockchain is not vulnerable to quantum computing as long as an address is only used once, but many people currently use addresses repeatedly because of convenience. Other cryptocurrencies have longer addresses which would require more computational power to hack. This means that addresses need to have more combinations than are possible to find with quantum computing. A bitcoin softfork could implicate modifications to the Bitcoin protocol and protect against quantum computing (Royal Society). There have been 17 softforks of Bitcoin all tightening protocol rules and 45 currently-operating hard forks (Bitmex).

6.2 Regulation

Governments are unsure how to regulate cryptocurrency because of its anonymous nature and it is a completely new type of currency. Every government has different approaches to

regulating cryptocurrency and governments have recently made tighter regulations to prevent

crime and track the currency. In the U.S., any person is allowed to own Bitcoin, spend it, and

earn it, but they are required to pay tax on any gains. This makes it difficult for people to spend

Bitcoin because every transaction needs to be reported to the IRS (IRS). Some legislatures have

been attempting to pass a bill that removes the requirement to pay tax on any transaction under

the cost of $200 (Cointelegraph). If this bill passes, it will become much easier for Bitcoin

owners to spend it. Also, every time a US citizen buys or sells cryptocurrency, the exchange

notifies the IRS using a social security number. Illegal activity has been hard to monitor, but the

U.S. government has been developing software that tracks all transactions users make by

viewing the public blockchain, and criminals have been caught. A cryptocurrency like Monero is

impossible for governments to track since Bitcoin operates without a third party.

6.3 Education

One of the biggest possible threats comes from user error or lack of education on how to

protect a person's Bitcoin. An exchange is a third party and a place where people trade

cryptocurrencies for fiat money. Millions of dollars in Bitcoin have been stolen from exchanges

that are hacked. Just like a bank, money or Bitcoin can be robbed if it is not protected. It is

important people use trusted or insured exchanges. People also have the option of storing their

Bitcoin off of an exchange onto a private hardware ledger such as a Nano Ledger. These ledgers

store private keys to Bitcoin. Bitcoin is never physically present anywhere, but only a person that

has access to a private key has access to the Bitcoin. So, there is no way to steal Bitcoin if you

choose to protect your own private keys (Ledger). No Bitcoin has been stolen over the blockchain or when someone is making a transaction. Managing Bitcoin can be very complicated for some people and it may be safer to store Bitcoin in a wallet or exchange that is managed by a third party that is insured in case they mismanage the Bitcoin. Also, when a transaction is made, a person needs to enter the correct address of the recipient for the Bitcoin to be sent there. If it is mistyped, the Bitcoin is gone forever since there is no customer support. There are programs that prevent that can be used to eliminate human error or QR codes can be generated and used so a person never has to physically type an address themselves. Cryptocurrency has proven to be secure if used properly and there are solutions to eradicate existing threats like quantum computing. It is impossible for governments around the world to control cryptocurrency, but how they choose to regulate it will greatly affect the success of cryptocurrency.

7. Adopting Cryptocurrency

Currently, Bitcoin is critically needed in countries with the most extreme inflation rates. There are 22 countries with a reported inflation rate of over 10%. Venezuela has an inflation rate of 2431% yearly, Zimbabwe with 676%, and Argentina with 44% (Trading Economics). Their citizens work hard to earn money and by the time they decide to spend it, everything else is much more expensive. These countries are in drastic situations and people have started to adopt cryptocurrency for day to day transactions. Bitcoin is designed to be used as a cash alternative and is not only for people who can afford investments. Many people in less-developed countries are forced to use their country's currencies because they do not have access to other more stable

government currencies. Also, these countries can seize government money in a bank whereas Bitcoin will always remain private and protected. Anyone can buy Bitcoin if they are connected to the internet with a computer or phone on an exchange website like Coinbase.

The same threat of inflation that collapsed the German Mark and many other currencies also threatens all government money people hold. Cryptocurrency is the only currency that can never be inflated past its max supply. It is written in Bitcoin's code that only 21 million Bitcoin will ever exist in circulation. Because Bitcoin is decentralized, no one is able to change this rule.

People who own cryptocurrency can send it to anyone with a free digital cryptocurrency wallet like Coinomi that can be downloaded on a device. These take minutes to set up and the user fully controls their currency. No complicated equipment is needed to make a cryptocurrency transaction. The process is similar to how venmo or apple pay connects users to merchants. Some businesses, ATMs, and online services already accept Bitcoin. The amount of people with devices connected to the internet is increasing and Bitcoin is available to these people who prefer to use an alternative currency. Bitcoin is especially needed in those countries with governments that seize money or inflate their currency at extreme levels and exchanges are continuously making their products more user friendly.

8. Conclusion

Bitcoin is the best form of money because it is impossible to inflate, extremely secure, and immune to corruption. People are insured their money is non-confiscatable, will not lose value from unpredictable inflation, and will remain secure.

Bitcoin faces some potential threats and has its drawbacks. The technology is confusing for many people, there are few places that accept Bitcoin as payment, the price is unstable, it takes ten minutes to confirm transactions, and there is no customer support. However, there are solutions to these problems and Bitcoin's usefulness has been improving over time. The lightning network is being implemented as a second layer solution that will make transactions happen in seconds rather than taking ten minutes. Developers are continuously making cryptocurrency easier to use and more practical for day to day use. Exchanges are creating apps that make buying, spending, and protecting cryptocurrency simpler so people understand how to use it. More people are being educated on how cryptocurrency works and understanding the importance of Bitcoin which will continue to increase adoption. The amount of Bitcoin ATMs have increased from to 4,600 machines to over 7,700 machines worldwide over the past year (Rudden). Companies like Microsoft, Overstock, KFC Canada, Burger King Venezuela. Dallas Mavericks sports team, AT&T, and CheapAir now accept Bitcoin and the other merchants are following. In order for Bitcoin to properly function as a currency, adoption needs to increase.

Cryptocurrencies are the future because of their many use cases like Ethereum for decentralized applications and XRP for enterprise exchange. It took many years for the internet to develop into what it is today. All of these things will take time, but are the steps needed to make Bitcoin the most successful currency ever.

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