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# Cryptocurrencies as an Alternative to Fiat Monetary Systems

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Cryptocurrencies as an Alternative to Fiat Monetary Systems

By

David A. Georgeson

An Abstract of a Thesis  
In  
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Submitted in Partial Fulfillment  
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State University of New York  
Buffalo State  
Department of Economics and Finance

## ABSTRACT OF THESIS

### Cryptocurrencies as an Alternative to Fiat Monetary Systems

The recent popularity of cryptocurrencies is largely associated with a particular application referred to as Bitcoin. Cryptocurrency has a mix of properties that make it difficult to examine. These properties consist of being infinitely divisible, durable, transferable, fungible and can be controlled to be artificially scarce. Further, cryptocurrencies can act as a means of payment, a medium of exchange, a store of value, and a unit of account. This thesis will analyze the technical features underlying cryptocurrencies and find out whether or not they can function as an alternative to fiat money. Since Bitcoin is the most commonly understood application I will examine it from two antithetical economic frameworks. Austrian monetary theory and Modern Monetary Theory have been selected to study because of their different views on the functions and origin of money. I will explore their interpretations of money to gain insight and make a general conclusion on whether or not Bitcoin could operate as an alternative to fiat money.

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Signature

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Date

Buffalo State College  
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## Chapter 1

### Introduction

Cryptocurrency is a term that has divided opinions on its usefulness and functionality as a medium of exchange. The recent rise in recognition of cryptocurrencies is largely associated with a particular application referred to as Bitcoin. It serves as a virtual currency and payment system that uses a publicly accessible, immutable, and secured ledger. Since it is a virtual currency there are no tangible units that mimic the functionality of state created currency. Bitcoin does not have any central control, repository of data, management, or single point of failure (such as a data center). Everything on the Bitcoin network is voluntarily ran by individuals with access to a computer. It is a peer-to-peer (P2P) network with no single administrator for the issuance or redemption of its units.<sup>1</sup> Those who decide to use Bitcoin place their trust and confidence into technology and cryptography. These two attributes seemingly keep the network secure and are all that is backing it. Cryptocurrency has a mix of properties that make it difficult to classify. They are divisible, durable, transferable, fungible, artificially scarce, and, they can act as a means of payment, medium of exchange, store of value, and a unit of account. It is an interesting idea to consider the consequences of replacing fiat currency with virtual currency. If cryptocurrencies displace fiat currencies new institutions will have to be created and traditional establishments will have to adapt. In

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<sup>1</sup> P2P: A network of interconnected computers for sharing information that is based on a distributed architecture

many ways, government control defines the circulatory process of fiat money and cryptocurrencies may challenge that control.

The objective of this thesis is to examine the technical features underlying cryptocurrency and find out whether they can serve as an alternative to fiat money. The former will be accomplished through an analysis on the most common cryptocurrency — Bitcoin. In order to analyze its potential as an alternative to fiat money this research delves into two divergent economic approaches. Austrian monetary theory and Modern Monetary Theory have been chosen because of their different views on the functions and origin of money. The former believes money is a market phenomena and the latter assumes money is a creation of the state. These two theoretical approaches are different enough that I believe they can offer useful insights that help highlight the nuances in the complexity of monetary systems. My goal is to explore their interpretations of money, and then examine if Bitcoin can be an alternative to fiat money. This paper will examine their monetary theories and argue in favor of cryptocurrencies as an alternative to fiat money.

Generally speaking, Bitcoin is a culmination of some already existing developments: an electronic currency system, a security protocol, and a computer application that embeds these two items.<sup>2</sup> The protocol is inherently deterministic because a set of computer algorithms decides on the time and place of issuance for its respective units. Users on the network contribute by participating in the verification of transactions and are rewarded. Whenever a user on the network provides the solution to the mathematical problem required by the process of verification they receive the reward.

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<sup>2</sup> See Satoshi Nakamoto's whitepaper for a more thorough understanding of the protocol.



Chapter 2 will indulge into further detail on the technical features of Bitcoin and the socioeconomic factors surrounding it.

From the surface, the Austrian economics tradition should find cryptocurrency as a viable alternative to fiat money because it has the power to weaken central authority. If cryptocurrency is widely adopted it could disrupt the monopolization that governments hold over the issuance of currency. The deterministic nature of the Bitcoin protocol should also be attractive to the Austrian tradition for having a level of predictability regarding the supply of its unit that central banks do not have. Despite these factors, there is some controversy on Bitcoin within the Austrian tradition, which depends on an interpretation of their theory on the origins of money. Chapter 3 will review relevant Austrian literature, their view of money, the regression theorem and their complications with cryptocurrency.

Modern Monetary Theory, a tradition within Post Keynesian economics, provides different insights into a range of theoretical and policy issues including the theory of money and monetary policy. Austrians emphasize the importance of free markets that allow voluntary individuals to exercise their willpower through capital for the production of goods or services over others. It follows that they believe exchange-values based on supply and demand will guarantee an efficient allocation of resources. This means that central planning could distort this process and misallocate resources creating more issues later down the road. On the other hand, Modern Monetary Theorists believe that a monetarily sovereign government is not budget-constrained in the same way as individuals. This is because a monetarily sovereign government produces its own currency meaning it can always pay its liabilities by creating the money. Hence, Modern

Monetary Theory proposes that fears based on insolvency do not make any sense in a fiat-system with a monopolistic issuer. In this situation, a central bank holds significant power over the allocation of resources in the economy. Their position relies on the unique abilities of money that is not constrained like a commodity. If state-issued money is not backed by a tangible good the central bank can concentrate on objectives such as inflation targeting and full employment by manipulating the supply and distribution of currency. They believe that Bitcoin is a P2P network with a unit of account that appears to resemble a commodity more than a monetary instrument. This causes a lot of issues for the Modern Monetary Theory framework since there is no issuer within the Bitcoin network that is liable for its units or control over the circulating supply. The nature of this argument will be discussed and critiqued in further detail throughout Chapter 4.

The purpose of this thesis is to investigate whether or not cryptocurrency can be a viable alternative to fiat money. The hope is that by investigating the technical attributes of Bitcoin and two unique monetary theories, I will have a scope broad enough to satisfactorily answer this question. This will be fleshed out in the concluding chapter with final remarks on the previously discussed economic approaches. Further, practical implications relating to the similarities and differences between cryptocurrency and fiat money will be presented. Along these lines, my overall argument will be summarized.

## Chapter 2

### What is Bitcoin?

Bitcoin is a virtual system that allows digital payments to be handled peer-to-peer in a decentralized manner that does not require a traditional financial intermediary. As of March 2018, there are more than 16.94 million bitcoin units in circulation with a market capitalization of \$249.54 billion (Blockchain 2018).<sup>3</sup> The first public appearance of Bitcoin was in *Bitcoin: A Peer-to-Peer Electronic Cash System*. It was published by a computer programmer under the alias Satoshi Nakamoto in October 2008 who claimed to provide a payment network and digital unit that exists as an alternative to traditional fiat money systems (Nakamoto 2008).

For convenience, Bitcoin with an uppercase ‘B’ will refer to the peer-to-peer decentralized network that is a protocol to clear transactions in a ‘trust-less’ environment. ‘BTC’ will refer to the unit of account on the network and serves, among other things, as a means for exchange. These two components cannot exist without each other. The Bitcoin network does not operate without the BTC unit and vice versa. In January 2009, the open-source client for Bitcoin was activated with an issuance of the first BTC units. Before the launch of the Bitcoin network there were other digital payment systems such as the ‘ecash’ and ‘hashcash’ protocol. The first proposal for a decentralized and scarce cryptocurrency, similar to Bitcoin, was Nick Szabo’s ‘bit gold’ in 1998. There are a growing number of retailers accepting BTC for payment, such as Microsoft.com, Overstock.com, Expedia.com, Newegg.com, and Bloomberg.com. Further, certain startup

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<sup>3</sup> Calculated by taking the price of a unit and multiplying it by its total circulating supply.

companies have developed ways for Bitcoin users to trade with retailers who do not natively accept it.

Many other virtual currencies have come into existence, enjoying minimal use before failing. Bitcoin has survived for nearly a decade and has caught the attention of mainstream financial institutions (Velde 2013). The destiny of Bitcoin as a globally adopted payment system is still uncertain, but the technology behind it (the blockchain and hash functions) have the potential to innovate many different sectors in the economy.<sup>4</sup> These potential applications could change the nature of any service or activity that requires a trusted third party for mediation. Bitcoin is not unique in the sense that it can operate as a digital accounting system. The novelty of Bitcoin is that there is no single entity controlling the system because it is a decentralized network. Market actors are not forced to run specific software and they still can agree on the state of the system. There can be no disagreement on matters of ownership and simultaneously there is no central authority to enforce property rights. This ability to be treating each market actor the same and remove the necessity of a middleman to ensure security has far-reaching implications that will be discussed later.

Bitcoin has been growing in the last decade and researchers have barely had the chance to examine what its growth means for society. There is a growing necessity to examine Bitcoin and the blockchain from a socioeconomic perspective to understand the underlying technology and its social implications. This requires a primer of the technical traits of cryptocurrency that could make them a useful tool for understanding and improving how contemporary monetary systems function. This paper will explore the

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<sup>4</sup> See “The Essence of Bitcoin and the Blockchain” by Michael Scott for more detail.

technology underlying Bitcoin, different economic approaches and their understanding of money, in order to gauge the potential of a cryptocurrency, such as Bitcoin, as an alternative to money.

## **2.1 A Trustless System**

Different virtual currencies have been developed for a variety of motivations, but the development of this technology is mainly associated with libertarian ideology for its supposed potential to avoid government oversight, centralized or state-backed financial, monetary and taxation methods, and thus enable more liberal markets (Karlstrom 2014). However, this is not the only ideological view associated with the use of virtual currencies, as even socialist rhetoric can find use-cases in blockchain technology (Huckle and White 2016).

Generally speaking, it is a distrust of modern governmental authorities and financial institutions that has provided motivation for the use and development of peer-to-peer systems as an alternative to government-backed fiat money systems.<sup>5</sup> The purpose of a peer-to-peer system is to permit individuals to engage in direct-exchange without the necessity of a trusted third party. Nakamoto (2008) refers to the Bitcoin protocol as a “trustless” system, but that is not necessarily true. The protocol requires trust from its users in its ability to function. If its functionality is intact and users can engage in trade without a third party it can gain more adoption. Nonetheless, the necessity of trust to establish a medium of exchange still exists for Bitcoin, but it shifts hands from a

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<sup>5</sup> See “Bitcoin: A Primer” by the Federal Reserve Bank of Chicago

centralized authority to members operating within a network. This begs the question of what is a medium of exchange? In the past, mediums of exchange ranged from cattle, barley, salt, cowrie shells, gold, silver, and even wives. A medium is the manifestation of a commodity's market exchange value expressed in a form accepted, with faith, by a collective. In this way, a medium of exchange is a social construct, an institution, in which the worth of a diverse set of commodities can be represented by a unique commodity, promise, token, or even a digital record of account. Such is the case that the US dollar has value because the US government is trusted in its capacity to broaden its power internationally and accept it as a payment for taxes. This could mean that a medium of exchange utilized by a peer-to-peer system could be valued if users trust the system.

It would not be much of a stretch to assume that certain people do not trust the government in making decisions that benefit the interest of the population. In fact, there is a case to be made that fiat systems benefit the interest of financiers and governments over other interests (Vigna & Casey 2015). Coincidentally, Bitcoin was released following the economic crisis of 2008. Based on the protocol and comments by the creator, it could be said that Bitcoin was designed with a degree of distrust in mind. Nakamoto posted a comment on a forum board that exhibits motivations for an alternative monetary system that could enable more trust from its users (2009).

The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that

trust. Banks must be trusted to hold our money and transfer it electronically, but they lend it out in waves of credit bubbles with barely a fraction in reserve. We have to trust them with our privacy, trust them to not let identity thieves drain our accounts. Their massive overhead costs make micropayments impossible.

Nakamoto's reasons can be seen as expressing beliefs of many groups, such as, libertarians, open-source communities, and crypto-anarchists (Wallace 2011). The term 'trustless' is misleading because even though no trust in a centralized institution to perform the role of verification is needed, users are required to trust the protocol and other actors in the network. In this way, trust is not eliminated but transferred from one component of the system to other parts.

The US dollar is universally accepted internationally due to the political prowess of the US government and the trust of its users in the Federal Reserve to maintain the integrity of its money tokens. Inappropriate decision-making, such as excessive creation of currency without concern for inflation or the practice of debasement, erodes the trust placed in the system by the users. Proponents of cryptocurrencies claim that blockchain based protocols could handle the role of the state more effectively (Grinberg 2011). The way in which Bitcoin handles the issuance of BTC will be discussed in the following section.

It is not only libertarian communities that are critical of the issues arising from the power-relations between government, central banks and financial institutions. The case can be made that more effective and trustworthy institutions could solve these issues.

Intermediary institutions requiring trust such as banks and lenders spend a lot of effort in conflict resolution and fraud, which appear in transaction costs for users (Nakamoto 2008). Most merchants are charged around 2% every time they process a transaction and transferring money internationally can incur even higher costs (Freund 2008). Even in an era of increasing globalization many individuals are excluded from modern banking. A recent report found that 75% of the global population below the poverty line cannot access a banking institution but have access to mobile network services (World Bank 2012a, 2012b). A cryptocurrency system that reduces the cost of transactions and can integrate those who are denied access to modern financial institutions could attract a lot of demand (Alstynne 2014).

## **2.2 How Bitcoin Works**

The reasons for the creation of a virtual currency system and the philosophy for how to govern it are at best ambiguous. However, all cryptocurrency protocols rely upon encryption for the sake of security. Hence, these types of virtual currencies and their network are referred to as '*cryptocurrencies*.' There were many issues regarding the security of predecessors of Bitcoin, but a unique issue was the prevention of "double spending" (Dwyer 2015). This was a major problem because it allowed users to create counterfeit units. A double-spending attack happens when a user manages to spend their unit, receive service or goods, and then manipulate the transaction ledger to revert the transaction. Accordingly, the user maintains their balance while being able to continuously exploit services. Before Bitcoin, cryptocurrency systems solved the issue in



a familiar way, by using a centralized clearing mechanism to verify and prevent counterfeiting. Traditional financial institutions use a method requiring trusted intermediation to authenticate transactions and mediate conflict when a user tries to commit fraud.

Nakamoto (2008) provides a set of arguments as to how the Bitcoin system is resistant to double-spending attacks without a third party institution. This was achieved with the development of the blockchain. A blockchain can be defined as an immutable public ledger that logs the necessary amount of work — performed by a computer but initiated and maintained by the labor of a person — to prove that a virtual item, such as BTC, is inimitable and authentic (Tapscott 2016). Specifically, Nakamoto designed Bitcoin so that when a user waits a certain number of blocks for a transaction to appear on the blockchain, by nodes (or miners), then the probability of an attack that modifies the public blockchain decreases. The larger the amount of blocks the user waits the more resources the attacker would have to expend. In the Bitcoin white-paper Nakamoto models an attacker and a group of honest players taking probabilistic steps towards a similar direction. Nakamoto indicates that the number of blocks the user waits before placing their transaction on the blockchain is sufficient to make certain that the probability an attacker can catch up with the honest users is negligible.

Nakamoto created a protocol that requires the participating community to be responsible for doing the work necessary to verify that each transaction is genuine and public. The work performed by a node rather than a traditional intermediary verifies the exchanges between buyers and sellers. The argument is that the network removes the necessity of third parties and therefore reduces the cost of transactions. The incentive for

users on the network to complete the work required to verify exchanges is receiving newly minted currency and transaction fees.

In this fashion, Bitcoin can be viewed as a self-governing system for securely transferring digital objects between users. Bitcoin is a network of nodes (which are users voluntarily running the software), that collectively perform the functions of a clearinghouse, using a virtual unit (BTC), while also recording every transaction occurring on the network and publicly broadcasting them. It may be helpful to think of it as an instrument akin to the widely used Transmission Control Protocol (TCP). TCP is used to deliver information between applications running on different computers that are communicating through an Internet Protocol (IP) network. Common applications that require the use of TCP are email, file transfers, remote access, and virtually everything on the web. In the same way that TCP/IP is at the bottom of our Internet the Bitcoin blockchain is the lower layer of the cryptosphere.<sup>6</sup> As the Internet has become more developers apps and protocols have been built on top of it adding layers with more functionality. Protocols such as HTTP allow users to build websites, which has changed the way people share information. Developers taking advantage of the open-source nature of Bitcoin can build atop of the Bitcoin blockchain, creating layers of functionality for the convenience of users. These extra layers will derive their value and be dependent on the capabilities of the Bitcoin network.

Ultimately, blockchain technology can be seen as an accounting mechanism. Blockchain based systems, such as Bitcoin, exist as a piece of software that runs on user's computers and communicates with each other over the internet to reach consensus

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<sup>6</sup> I use 'cryptosphere' to refer to the whole cryptocurrency ecosystem

on the integrity of an accounting ledger. The software has copies of every transaction that has been completed within the system since its beginning and are updated approximately every ten minutes. If a users ledger differs from other users on the network it is replaced with a copy by the general consensus. To corrupt the system, one would need to control more resources than over half the network and to modify it in precisely the same way across the majority. Arguably, if a corrupt actor had access to that many resources the incentive to verify transactions could prevent malicious behavior (Nakamoto 2008).

A fundamental component to validating transactions is for users to provide 'proof.' This is done through a mechanism referred to as the 'proof-of-work' method. Nakamoto suggests that this is a form of representation in decision-making on verification. The proof-of-work is established by users solving a cryptographic puzzle. Each user contributes their computing power to compete in verifying transactions. Nakamoto (2008) refers to this as "one-CPU-one-vote," because the block that "has the greatest proof-of-work effort invested in it" represents the decision of the majority in verification. In order to alter a block of transactions, an attacker has to change not only the block their transaction occurs in, but also every single block preceding it. In the future, technology may improve, increasing the speed of computer hardware, which may change the demand for nodes (miners) or create security issues. This is why Nakamoto (2008) designed the protocol to change the difficulty of mining by a "moving average targeting an average number of blocks per hour." This means that if BTC is being created too quickly the cryptographic puzzle becomes harder to solve. Nakamoto defines the process of creating BTC in the following order (2008):

1. New transactions are broadcast to all nodes (users running the software).
2. Each node collects new transactions into a block.
3. Each node works on finding a difficult proof-of-work for its block.
4. When a node finds a proof-of-work, it broadcasts the blocks to all nodes.
5. Nodes accept the block only if all transactions in it are valid and not already spent.
6. Nodes express their acceptance of the block by working on creating the next block in the chain, using the hash of the accepting block as the previous hash.

Basically pseudo-anonymous participants commonly called miners maintain the ledger. The term miner, to describe nodes, is seemingly used because it is a familiar word and a way to describe something new in an easy way. The miners use computing power to maintain the integrity of the network and extend the blockchain (the immutable public ledger of transactions). Anyone with a computer and access to the Internet can become a miner and take part in the network as a *node*. The protocol requires nodes to solve cryptographic puzzles, which is a process similar to brute-forcing (a cryptographic hash algorithm), in order to organize new blocks on the blockchain (Nakamoto 2008).<sup>7</sup> Blocks represent groupings of voluntary transactions. Buyers publicly broadcast transactions for nodes to place into the blocks they create. Nodes create a type of final demand for BTC

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<sup>7</sup> Brute forcing refers to a method of trial and error used by agents to access otherwise inaccessible data.

by being forced to receive it for maintaining the blockchain. The miners that work on verifying a block of transactions compete with other nodes and whoever solves the cryptographic puzzle faster is rewarded.

Each node repeats the competitive process of truncating every transaction into a block that occurs about every ten minutes (Nakamoto 2008). Only the first transaction of a unique user can be integrated within a particular block by a node hence users who try to double spend their BTC within a single block are rejected. The first node to integrate recent transactions into a new block on the chain must complete an arbitrarily determined criterion of finding a specific hash that satisfies the requirement to be verified. BTC does not exist in a material form and is prevalent only in the Bitcoin network. A user possesses a set of cryptographic keys to access BTC and modify his/her ownership, implying that the users do not actually own the 'coin' itself. In order to store BTC users download digital wallets for their cryptographic keys. Just like hard cash, if a user loses access to their keys, due to theft, deletion, or misplacement, the user loses the rights to the BTC. This has influenced the development of start-up businesses for secure wallet services, and at this layer of the cryptosphere, trust with an institution re-emerges as a relevant issue.

The UK government defined Bitcoin as “ an asset database that can be shared across a network of multiple sites, geographies or institutions” (Government Office for Science, 2016). This view fails to acknowledge that blockchain is more than a traditional asset database since it allows users to securely collaborate without a central authority. Smart-contracts and the capability of signing preconditions for exchange to occur; users are able to delay a transaction until mutually agreed upon conditions are met (Such as a strike price, expiration date, or funding goal). The transaction with conditions is added to

a pending pool of transactions when created and the system determines if it is satisfied without a real-world third party. Smart-contracts allow users to transfer value, assets, property, shares or virtually anything that can be represented by a token without a middleman. In a way, these are self-executing contracts that use computer algorithms to store and supervise agreements between users. Smart-contracts allow the blockchain to execute scripts that can help automate a plethora of activities that require a contract (Eris Industries 2016). Finally, the blockchain is an open-source publicly shared and immutable ledger that can be examined by anyone but not manipulated by a single entity (Nakamoto 2008). The final result of a transaction is arguably a secure, safe, transfer of digital objects verified by participants on the network without a centralized clearing house processing the transfers.

### **2.3 The Challenges of Regulation**

It may be too soon to determine whether Bitcoin is a speculative mania that will fade with time or an emerging alternative to fiat with the potential to lubricate a financial revolution. Be that as it may, it is beginning to grab the attention of governments and the financial sector. In 2013, JPMorgan Chase & Co filed 175 claims to patent a “Bitcoin-Alternative” which were all denied (Durden 2013). In January 2014 the New York State Department of Financial Services convened to decide on how to approach regulating Bitcoin and in July began enforcing regulation for the first time (Ember 2014a). Later that year in October, the US Department of the Treasury’s Financial Crimes Enforcement Network that established cryptocurrency exchanges as money transmitters that must

follow standard regulation (FinCEN 2014). China has gone back and forth on restricting financial institutions from engaging in trading BTC (Bloomberg 2013), while the US government auctioned 30,000 BTC from an illegal free-market experiment on the dark web (Ember 2014b).

Government's approaches to cryptocurrency reflect the uncertain nature of cryptocurrencies and the difficulties of regulating something like Bitcoin. How should a government define Bitcoin? Is it a currency, a commodity, or a security? Is it a financial, monetary, or equity instrument? The Internal Revenue Service determined that BTC should be considered property for the sake of taxation (IRS 2014). Recognizing BTC as a legitimate alternative to government-backed fiat money could be viewed as a threat to the power that defines monetarily sovereign governments (refer to U.S Const., Art. I., Sec. 8). If a government decided to outlaw Bitcoin they could force users under their authoritative rule to stop operating as nodes. However, since Bitcoin is a decentralized network it can exist as immaterial software all over the globe. Therefore, "It's not clear if Bitcoin is legal, but there is no company to control and no one to arrest" (Davis 2015). This pliancy provides great challenge for regulators (Rainer, Christian, Edelman & Moore 2016).

Bitcoin encounters further complications with current regulatory frameworks when considering transactions between different countries. Imagine a situation where the US imposes sanctions on Cuba and simultaneously the EU enables freer trade with Cuba. The market actor in the EU should have no legal obstacle in the way of investing in a Cuban company. However, transferring money from the EU to Cuba could still be refused due to the fear of the sanctions in the US — depending on the political

relationships between banks in the EU and the US. In this situation, Bitcoin could be used as a means to transfer capital between countries while avoiding the political complications of the respective systems. In a traditional financial institution there is a chain of banks that must each agree to accept a transaction and if one of them denies the claim then the whole transaction is blocked.

## **2.4 Summary**

Cryptocurrency has recently emerged and is continuously evolving; yet it already displays potential to change the nature of exchange. The cryptosphere has a broad variety of layers specialized for different functions that may have far-ranging effects on multiple industries. Bitcoin is not only a protocol operating as a channel for users to transfer value from one party to another. It has many features and due to its open-source nature anyone can contribute and alter its development path. As mentioned earlier, three quarter of the worlds poor cannot access modern finance institutions but have access to cellular devices Bitcoin can provide a secure method of storing value for citizens of countries who cannot access banks. The network protects against fraud, providing users with protection against chargebacks or unwanted chargebacks; BTC are impossible to counterfeit. Using an encrypted hardware wallet can make it even more difficult for people to steal or lose their money. Bitcoin facilitates global participation by allowing transactions to become more interoperable. Any individual, firm, or bank can securely send and receive payments using the network. By means of cryptography, secure payments can be executed without a trusted intermediary. This can change the way cross-border transfers occur, potentially



making them more cost-efficient. With the implementation of smart-contracts users can run a crowd-funding campaign and Bitcoin will prevent any transaction until a certain level of pledges or conditions are met. Nakamoto (2008) mentions micro-payments as being impractical with modern banking institutions; on the Bitcoin network users can create contracts to send repeated and small transactions to another party. These contracts can also be used for dispute mediation. This is achieved by using multiple signatures from different actors to verify transactions and resolve dispute without any of them having control over the other persons money. The usage of multiple signatures allows the network to determine if the appropriate amount of predefined persons — chosen by the individual parties — has signed the transaction.

Bitcoin appears to offer at worst an option and at best a solution to the perceived issues of trust between citizens and the operations of government, and, private and public banks. It stands to threaten the monopoly of banks over connecting lenders with borrowers, managing complex business transactions, and dictating where capital should be invested. Blockchain can even modify the way we participate in political processes such as voting. This can be observed by a project by Jeremy Clark and Aleks Essex (2012). They have created a method called CommitCoin, which utilizes blockchain technology to secure an individuals vote and restrict any political official or bad actor to change the vote. Clark, in a similar way to Nakamoto claims that “CommitCoin allows you to not trust anyone.”

As mentioned earlier, trust is still required by users in the protocol and the coding that governs it. Unless every layperson is equipped with a thorough understanding of computer programming and cryptocurrency then trusting these protocols requires a leap

of faith. However, this has not proven to be a constraint on the growth of cryptocurrency. Noted previously, the market capitalization for cryptocurrency has grown immensely in the last decade. This could be due to users having such a low level of trust for current financial institutions and seeing cryptocurrency as its disrupter. It may also be the result of speculative action with the aim of turning a profit before a market collapse. In regards to cryptocurrency as being a disrupter to existing financial systems, nothing is stopping it from being an enabler. Bitcoin and blockchain are related but they are ultimately separate ingredients in the cryptosphere. This means that the ability to harness blockchain technology is possible by current financial institutions. These technical innovations could disrupt the status quo, decentralizing the perceived monopoly power of banks, or be seized and integrated within the present framework. As the CEO of JPMorgan is simultaneously embracing blockchain but dismissing Bitcoin it seems unlikely that these new applications will change how banking is done (Kim 2017).

This creates a set of fundamental questions, such as: What is money? Where does it come from? Why do we use it? What gives it value? How should control over it be assigned? The concept of money is not easy to define. It is an essential component in conducting any economic transaction. It can perform some essential functions such as being a unit of account, a medium of exchange, a store of value, and a means of deferred payments. The questions formerly posed can be addressed through different economic perspectives. In the next chapter, we will discuss the nature of money from the Austrian economic perspective. This perspective is chosen because Austrian economists are known to be critics of fractional reserve systems, government and overspending due to excess credit.

## Chapter 3

### Austrian Economic Theory on Cryptocurrencies as Money

Austrian economics is a school of thought in economics that is renowned for advocating liberalism, individualism, and free-market activism. Austrian economics can be traced back to the works of Carl Menger — from the University of Vienna. Prima facie, Austrian economics would welcome Bitcoin with open arms. This is, however, not necessarily the case and to understand why this chapter will discuss the Austrian view on money, its regression theorem, and complications with the interpretation of Bitcoin. Before that this section will overview relevant fundamental characteristics of their economic approach.

Austrian theorists dismiss the idea that demand propels the business cycle for a supply side argument. For example, Austrians argue that low interest rates can cause over-investment. Consequently, over-investment will cause over-production and destabilize the economy. If a crisis does occur then supply declines until it stabilizes with overall demand starting a new business cycle. In this view, inflation is not the root of the problem, but over-investment in response to lower interest rates — an artificial signal created by a central bank that influences entrepreneurs — leads to a crisis in the economy. Accordingly, these signals create a mismatch between consumer desires and entrepreneurial efforts. If currency is created faster than the growth of goods and services it can lead to inflation. Possibly increasing the mean price of goods and services due to a higher circulating supply of currency. Essentially, Austrian economists hold that the government should not simply pump money arbitrarily into circulation and instead find the ‘natural rate of interest’ to avoid economic decline. In this way, the creation of more

money results in the value of money decreasing and an increase in the exchange-ratio for goods and services. Consequently, the prices of goods and services are viewed as signals and these signals could be distorting the decision-making of producers. The ‘natural’ interest rate is one that courts the necessary amount of investment for equilibrium employment and price stability. There is no central authority determining the interest rate of BTC and ultimately market participants (such as nodes, users and developers) delineate everything within the network.

The supply of BTC is predetermined and the rate at which they are issued is predictable based on the computing power available and difficulty of mining. This could be recognized as a ‘natural rate of inflation’ until the total supply of BTC is mined. Further, Bitcoin does not have any government that can control its circulation; it is all up to the participants in the market to perform the necessary tasks to issue BTC. So does Bitcoin align with the theoretical roots of the Austrian approach? This chapter will now discuss the Austrian approach on the functions of money before discussing the regression theorem — a praxeological argument on the origins of money — and why complications arise between their framework and Bitcoin.

### **3.1 The Functions of Money**

A definition of money accepted by the Austrian tradition is that money is a medium of exchange that is liquid and universally accepted. Mises (1912, 32) notes:

[A]n inevitable tendency for the less marketable of the series of goods used as media of exchange to be one by one rejected until at last only a single commodity remained, which was universally employed as a medium of exchange: in a word, money.

Austrians argue that other functions of money such as a measure and store of value may be seen as secondary to the function as a universally accepted medium of exchange. The secondary functions may appear as the medium achieves more acceptability. Schlichter (2011) states that, “[a]ll additional functions that can be assigned to money are the result of money being the accepted medium of exchange.” Similarly, it is argued by Menger (1871) that traits such as a ‘measure of value’ and a ‘store of value’ are not intrinsic to moneyness “since these functions are of a merely accidental nature and are not an essential part of the concept of money.”

There is controversy with calling BTC money among Austrian economists. Pattison (2011) asks: “But if Bitcoin is not money, what is it?” This can be reframed as: Because BTC is not generally accepted as a medium of exchange it cannot be called money. However there are some market actors who voluntarily exchange real goods and services for BTC. Although it may not be a universal medium of exchange it is a medium of exchange. Further, based on an interpretation of Mises and Menger, it appears that the distinction between a medium of exchange and being conceptualized as money depends on a certain degree of acceptance by social institutions. The appropriate degree of acceptability required for a medium of exchange to become money is ambiguous. Menger (1892, 11) designates money as the —universal medium of exchange— in absolute terms,

that is, universality implies the acceptability by the total population. On the other hand, Mises (1949, 398) makes the case that it must be “generally-accepted and commonly-used.” Therefore, a medium can be defined as money if it exists somewhere between being generally accepted and universally accepted. This could mean that either everyone or a good number of people must accept it as a medium to be money.

As of 2018, BTC has not reached the status of being generally accepted. Despite the fact that BTC is arguably not commonly accepted and thus not money as a universal medium of exchange, the question as to whether it can become money stands. A survey report by the World Economic Forum (2015) claims that Bitcoin and the blockchain would reach a “tipping point” in which it becomes widely accepted and predicts that this will occur by 2027. If this predication is proven true, BTC will be money in accordance with the Austrian perspective.

There remains another issue with the Austrian tradition and BTC as money that extends beyond general acceptability. The issue relates to the emergence of Bitcoin and specifically whether or not it aligns with Mises’s regression theorem. The regression theorem offers an explanation for the exchange-value of money as observed today a posteriori a period when money was valued as a commodity for having direct-use value. Essentially, the argument follows that at one point in time money was a good being used in barter and over time became more liquid as a frame of reference for market prices appeared. The following section will discuss the nature of the regression theorem and the interpretation that money must always have its origins in a commodity in order to apply their subjective value theory to it.

### 3.2 The Regression Theorem

In 1912, Mises wrote *The Theory of Money and Credit* as a treatise on money. He expressed an argument tying together marginal utility and value subjectivity with money. Accordingly, money, as any other good, has a downward sloping demand curve and an upward sloping supply curve. Mises demonstrates that money is demanded for exchanges in the future. It is composed of a demand by actors who desire it for future utility and a preserving force by the actors that hold it. The regression theorem is an attempt to account for the historical content underlying the exchange value of money today. This subjectivist-marginalist view maintains that exchange value represents the marginal utility of market actors. A medium of exchange or money is a particular item that an actor accepts or trades for a good or service they consume. An actor does not consume money itself but instead uses it to attain the item they desire to consume. If money derives its value by utility via consumption then the relationship between a medium of exchange and its perceived value is ambiguous: How does an actor value an item they plan to use as a medium of exchange and not directly consume? The regression theorem attempts to explain the value of money and reconcile it with the subjectivist-marginalist approach. Mises (1912, 109) argues that “[t]he price of money, like other prices, is determined in the last resort by the subjective valuations of buyers and sellers. But ... the subjective use-value of money, which coincides with its subjective exchange-value, is nothing but the anticipated use-value of the things that are to be bought with it.” In this way, the issue is how these anticipations of use-value manifest. Mises emphasizes that there is a chain

of causality linking the distant past to the exchange value of money in contemporary times. The link revolves around an exchange-ratio between a medium of exchange and commodities. Varying exchange-ratios over time create reference points used in future valuations of money. Therefore the exchange-value of money in the past holds relative significance to the present and future valuation of money. The current exchange-ratio of money is a link in a chain of dynamic and sequential exchange-ratios. This logic appears to digress into infinity, but the regression theorem proposes that there was a critical moment in time where money was valued by its ability to be consumed.

In *The Theory of Money and Credit*, Mises (1912) disagreed with other perspectives on how money is valued. In the eyes of Mises, Menger laid the theoretical foundation for the technical features of money, but does not adequately express the subjective valuation of money. Mises (1912, 116) claims:

Neither Menger, nor any of the many investigators who have tried to follow him, have even so much as attempted to solve the fundamental problem of the value of money. Broadly speaking, they have occupied themselves with checking and developing the traditional views and here and there expounding them more correctly and precisely, but they have not provided an answer to the question: What are the determinants of the objective exchange-value of money?

Since the exchange-value of money emerges from a chronological arrangement of exchange-values doesn't this become a circular argument? According to Mises, it does not, because the regression analysis goes back until the emergence of a universal medium



of exchange out of a direct-exchange economy. Preceding that, the item (or commodity) is only valued for its direct usages. As follows, Mises explains that monies present demand can be traced to a final exchange under a barter economy. By ending the regression on that final exchange Mises attempts to avoid circularity in his logic.

The regression theorem is ultimately an argument based on praxeological deductions (Mises 1949). The methodological approach of praxeology is custom for Austrian economists. A central principle to praxeological deductions is that market actors are rational and optimal in pursuit of their desires. This assumption contrasts to market actors as being impulsive, unaware, and, aimless. Following this logic, the theory has two unique components. The foremost segment applies the marginal utility theory to money. Subsequently, the second component addresses the origination of money, demonstrating that there is no logical fallacy in the theorem, and the transition from a market based on equivalent bartering to indirect exchange. In regards to the second component, Mises (1912, 110) claims:

[T]he objective exchange-value of money must always be linked with a pre-existing market exchange- ratio between money and other economic goods (since otherwise individuals would not be in a position to estimate the value of the money), it follows that an object cannot be used as money unless, at the moment when its use as money begins, it already possesses an objective exchange-value based on some other use.

In this passage Mises refers to the origin of a unique form of money that arises from a barter economy in which there were no preceding ratios between the price of goods and the newly emergent money. It follows that, the second component of the regression theorem only explains the beginning of money ex nihilo. It accounts for how a barter economy transitions into a monetary based economy where economic exchange is carried through as a matter of course. It is erroneous to believe that the theory claims any possible mediums of exchange require an objective exchange-value in direct-exchange following the development of a framework of exchange-values that can be used as a reference. Further, it does not have anything to say about the origination of any possible universal or secondary medium of exchange.

This implies that a medium of exchange, such as fiat money, or BTC, can peg its exchange-ratio onto any pre-existing framework with referable exchange-values. Following this logic, a new medium of exchange does not need to begin as an actual commodity non-monetary use in order to become a universally accepted medium. The only requirement is that exchange-values can be followed back to a time when a variety of directly used objects functioned as money, and ultimately to the period where an object experienced its final usage in a direct-exchange. The regression theorem does not attempt to clearly address the motivations for actors to establish a specific currency, replace preceding mediums or continue their usage. Furthermore, it cannot explain the amount in which a new medium is exchanged with earlier forms. The praxeological argument, in respect to the regression theorem, only suggests that it contradicts logic for a new universally accepted medium to manifest without a preceding framework of exchange-ratios in place. If there are no market prices that can be referenced, market

actors cannot make economic estimations using new money. Hence, if no price ratios have been set in terms of money then market actors can only trade objects directly for an object of equivalence. The praxeological deduction does not imply any strict guidelines on the motivations during a transition from trading objects directly to indirectly. There is no criterion stating newly emergent mediums of exchange must be fixed to a specific price-ratio or legally redeemable for an older medium. It simply contends the idea that a new universally accepted medium of exchange can manifest without a pre-existing price framework.

### **3.1 Controversy with Bitcoin and the Regression Theorem**

Generally speaking, the regression theorem aims to express how a universal medium of exchange achieves its exchange value. Mises (1912, 111) illustrates that, “[b]efore an economic good begins to function as money it must already possess exchange-value based on some other cause than its monetary functions.” A crucial deduction from Mises in relation to the origin of money is that it is a prodigy of the market.

A common critique of Bitcoin from the Austrian perspective is that it does not comply with the regression theorem. This section will overview these complications and discusses the nature of the regression theorem. Pattison (2011, 9) argues that “[b]itcoin does not hold up as a legitimate money ... because it did not begin as a commodity money and therefore has no intrinsic value and violates Mises’ Regression Theorem.”

Generally, this problem can be summed up as follows: the regression theorem points out that the manifestation of a new money for indirect exchange stems from being previously

valued for its characteristics in direct-exchange. According to Pattinson's argument, if the regression theory is accepted BTC must first be valued as a commodity for direct-exchange before ever becoming a legitimate form of money. Following this logic, BTC being used as a medium of exchange must disprove Mises because BTC did not emerge as a commodity from direct-exchange.

Graf (2013a, 2013b) defends BTC claiming that its emergence is in line with the theory of regression because it was valued directly. Graf frames his argument around different motivations for why actors could have previously valued BTC and Bitcoin. He believes these motivations may range from BTC as being a way to test the Bitcoin network or as promoting an ideological cause. Graf asserts that there is no need to suppose that a universal medium of exchange must begin as a physical object as opposed to being intangible. Further, Graf believes that all goods should be considered as contenders for becoming money, regardless of whether they have any physical qualities.

In parallel with this notion Surda (2017) argues that one can only refute BTC as money by denying the a priori assumptions of the regression theory. Surda supposes that the regression theorem claims money must originate as a commodity. Hence, if BTC is being used as money then Surda suggests it is essential that it once had value as a commodity for direct-exchange. Surda tries to explain the direct use-value of BTC as being based on ambiguous motivations. The arguments from Graf and Surda can be framed in the following way: the regression theorem implies that all money requires a prior existence as a commodity and since the theory is intact BTC must have had (or has) value in direct-exchange. According to this view, it does not matter if economists are

unaware of the rationale of market actors to value and exchange BTC. This logic is in fact circular since Surda assumes the regression theorem is an absolute truth.

Both of these arguments misinterpret the regression theorem. As noted in the previous discussion on the regression theorem, it is not attempting to explain a property, such as being previously used as a commodity, which may be true for something to become money. It is a praxeological argument that delves into how money could have emerged from a state in which money did not previously exist. Bitcoin has not emerged during a state of pure barter and just like fiat; it does not require a non-monetary use in order to gain the status as money. The only thing implied by the regression theory that could restrict the adoption of BTC as a universally accepted medium of exchange is a pre-existing framework of exchange-ratios. Hypothetically, if BTC became a universal medium of exchange, the money regression could look like this: BTC → USD → Minted gold and silver → all the way back to a commodity oriented barter economy. However, if a global crisis caused all relevant information on exchange-ratios to disappear, and the regression theorem is true, then BTC could not emerge directly as money. The heart of this argument is that the economy must be first monetized with exchange-ratios in some particular commodities, and then mediums without intrinsic value — such as BTC or fiat money—could become prevalent in exchange. This point will be expounded on in the following summary.

### 3.2 Summary

Based on the previous discussions, a formulation of the regression theorem can be ordered following the way Mises (1912) argued:

1. Once a medium of exchange is sufficiently liquid, it can, hypothetically, sustain itself through increasing adoption even if it does not have non-monetary uses, as liquidity creates demand. This medium may or may not have value in direct use, be tangible, backed or redeemable for anything, but must emerge in a market that already has a framework of prices.
2. Before a medium of exchange emerges it requires liquidity.
3. Before a medium of exchange is liquid it requires a price.
4. A catallactic sequence influences price and liquidity. This process is fundamentally a market phenomenon that emerges from a barter-state.
5. The price and liquidity of a medium emerging from a barter economy is established after it already had direct-use value as a commodity.

The original price and liquidity of commodity money is determined by its non-monetary functions. Therefore, commodity money obeys the logic of the regression. Fiat money obeys the logic of the regression since pre-existing money determines its exchange-ratio, and its liquidity is achieved through collective faith. BTC obeys the

regression theorem, as it manifests when there is an existing framework of exchange-values in place. As far as the regression is concerned it is irrelevant to question whether or not BTC has had any value in direct use before being used for indirect exchange. Since a pre-existing framework of exchange-values was in place, the regression theorem does not dispute the emergence of BTC. Respectively, an integral component BTC required for use via indirect-exchange was the trust and confidence in its protocol by the actors that initially procured it. Inquiring into the rationale of market actors, and, the qualities of BTC that influenced decision-making is not within the boundaries of discussion for praxeological rhetoric or Mises' regression theory.

In the next chapter, the issue of BTC as being considered a functional alternative to fiat money will be discussed through the lens of a Modern Monetary Theorist. This view was chosen because it contrasts with the Austrian tradition and in some ways is antithetical. For example, an Austrian economist might claim that central planners distort the market by creating artificial signals that result in a misallocation of resources — laying the foundation for a market collapse. Austrians tend to take the position that governments are exogenous institutions that impede on our individual freedoms. On the other hand, Modern Monetary Theory (MMT) views the government as having the capacity to ensure market stability and full employment, and combat inflation. Therefore, the way MMT views the functions of money and its application through government will be examined followed by a discussion on how MMT approaches BTC as an alternative to fiat money.

## Chapter 4

### Modern Monetary Theory on Cryptocurrencies as Money

Before examining the view of Modern Monetary Theorists on cryptocurrencies this chapter will first overview some of their theoretical starting points. Modern Monetary Theory (MMT) is a collection of ideas that attempt to offer a clear understanding of the dynamics in a —modern—monetary system (such as a fiat system). A crux of MMT is that a monetarily sovereign government, a currency-issuing country, is not constrained by the fear of insolvency (Pierce 2013). Since a monetarily sovereign government determines the level of production for its legal tender it can always create currency to pay debts. For example, a government such as the US or Japan, can spend money into existence without collecting taxes or accruing foreign debt and it can do this with digital tallies (the majority of money exists only in digital form) (Carrillo 2017). In this way, when the government spends money into existence they are stimulating the circular flow between consumption and production whereas collecting taxes is a means to extinguish the currency. Eric Tymoigne explains (2014, 644):

A logical conclusion is that the injection of government currency through expenditures or advances to other sectors (initial finance) must occur before the destruction of currency through tax enforcement and repayment of advances (final finance). Currency must be injected before it is destroyed.



Moreover, federal taxation and bond offerings exist as tools used to reduce circulating money from the economy. According to Tymoigne (2014), these tools can be used to modify the distribution of resources, incentives and stabilize both prices and interest rates. The imposition of taxes acts as a mechanism that reduces the disposable income of firms and households while destroying the government currency and hence that maintains the value of the medium of exchange. The tax is a drain from the circular flow and creates final demand for the currency. Such is the case that a monetarily sovereign government can spend before saving. Instead, taxes may be used to control inflation, leaving less money available for spending (Tymoigne 2014). Essentially, a monetarily sovereign government has the capacity to manipulate numerical values on accounting entries for the economy. In this fashion, government deficits have different implications for proponents of MMT as opposed to Austrian economists. As Pierce (2013) claims “[v]irtually all economic commentary and punditry today, whether in America, Europe or most other places, is based on ideas about the monetary system which are not merely confused – they are starkly and comprehensively counter-factual.” From the MMT perspective “the reality ... has always been that government spending has come first and taxation later” and therefore “[w]e must revisit the concept of the national debt itself and recognize it for the national equity it is in reality. We have only saddled ourselves with this debt delusion because we have forgotten what the true relationship actually is between public spending and taxation” (Cook 2013).

As Pierce (2013) points out, we tend to forget that if the government does not spend, the economy cannot receive income, therefore the political debate on government deficits is erroneous and potentially dangerous. Logically, this is because a government

that produces its own currency and requires it for taxation must first put it into circulation. Therefore, the political discourse of a sovereign government should be goal oriented and concerned with full employment and price stability (Pierce 2013). Along these lines, MMT opposes suggestions that inflation can be handled with a certain level of unemployment (Pierce 2013).

The implications of MMT are that unless a sovereign country (that issues its own currency) is running a trade surplus, it is essential that a government incur a deficit to guarantee that there is enough money in the economy for GDP to grow and achieve the goals of full employment and price stability. Consider that an imperative component to GDP growth is the sales of goods and services. If a business cannot sell its products, it will reduce capacity, reducing employment and production, causing GDP growth to slow down. For the economy to grow, goods to be purchased and sold, and, there needs to be an adequate supply and turnover of money in the economy for spending. Behaviors of individuals such as saving, paying off private debts, and the concentration of money in the hands of hoarders, must be considered in policy-making because they all reduce the amount of money circulating in the economy. The behavior of government is different from individuals that must worry about saving to spend. Instead, the role of the government is to moderate the circulating supply of money with specific goals that benefit the general public. This begs the question of what exactly is an adequate supply of money circulating and how does an economy achieve that status? In order to answer this question the following section will discuss the functions of money from the MMT perspective.

## 4.1 Overview of the State Approach to Money

Unlike the Austrian economics interpretation of the origins of money MMT does not believe money emerged following the existence of markets. Instead, money is viewed as a mixture between contracts and legal efforts from a state-like authority. This perspective — the state or Chartalist approach — is the bedrock of MMT. Essentially, an authoritative role enforces an obligation (a liability) using a legal structure and an elected unit of account in order to measure the commitment. The following section is an overview of some literature from Knapp, Keynes, Ingham, and Wray in order to understand the state approach to money that is underlying MMT.

In the regression theorem, the origins of money are traced back to a period when governments do not exist and there is only pure-barter. For Knapp (1924), one cannot reasonably suppose that a monetary system can exist without a state and the value of money has nothing to do with any precious metals but the notion that they are accepted by private and public entities (such as banks and the state). He believed that all debts are described by a unit of value, which can be used as a means of payment and this description could change over time. Thus, debts in this sense are nominal and can be characterized by the different forms they take.

Knapp (1924, 31-2) frames the state approach to money by explaining that, “[w]hen we give up our coats in the cloak-room of a theatre, we receive a tin disc of a given size bearing a sign, perhaps a number. There is nothing more on it, but this ticket or market has legal significance; it is a proof that I am entitled to demand the return of my coat.” He continues to explain the irrelevance of the form it takes, “[t]he “ticket is then a

good expression ... for a movable, shaped object bearing signs, to which legal ordinance gives a use independent of its material. Our means of payment, then, whether coins or warrants possess the above-named qualities: they are pay-tokens, or tickets used as a means of payment... Our means of payment have this token, or Chartal form,” then he explains the importance of an authoritative legal structure, “money is a creation of law ... it is a creation of the legislative activity of the state, a creation of legislative policy” (Knapp 1924, 40).

However, the legislative policy in itself is not what gives money its value, instead it is a decision by the state, “[t]he laws do not decide what shall be valuta money ... for they are powerless against their creator, the State” (Knapp 1924, 111). The state grants money its value when it determines that it will use a unit for its own expenditures and therefore accepts that unit as a means to settle debts. Innes (1913, 1914, 1932) echoes this belief and traces the conception of debt-based relationships to the tribal arrangement referred to as wergild that obviated conflict between different clans or families. This practice added a cost to injury and/or murder because the family of the victim would be compensated for their loss. Wergild was established in a legal framework and certain people would be appointed to recall the debts in order to give them a degree of authenticity (Ingham 2004a). This is a representation of the power authorities hold in establishing credit and debit relations. In this case, an authority imposes an obligation — a liability — articulated in a generally acceptable mode that is then used to benchmark that obligation. The argument can be re-framed: as far back as historical records show,

authorities have been setting prices in units they determine to satisfy obligations between different actors.<sup>8</sup>

Wray (2014a) illustrates this argument, explaining that historical records from Babylonia show that authorities set prices for the most vital goods and services and that “[o]nce prices in money were established, it was a short technical leap to creation of markets.” This argument contradicts the Austrian approach because it claims that a monetary unit and framework for prices emerges before the need for markets.

Keynes understanding of money, influenced by Knapp and Innes, anticipated the development of MMT.<sup>9</sup> As follows, Keynes supposed that modern forms of money and their role as recording information, “comes into existence along with Debts, which are contracts for deferred payment, and Price-Lists, which are offers of contracts for sale or purchase” (Keynes 1930, 3). He claims that money “in the shape of which a store of General Purchasing Power is held, derives its character from its relationship to the Money-of Account, since the debts and prices must first have been expressed in terms of the latter” (3). He defines the money-of-account as “the description or title” and money is the item that “answers to the description” (3-4).

Keynes (1930, 4) saw the importance of an authority in determining the monetary unit and enforcing its use:

The State, therefore, comes in first of all as the authority of law which enforces the payment of the thing which corresponds to the name or description in the contracts, But it comes in doubly when, in addition, it

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<sup>8</sup> For a more detailed historical account see Hudson (2004) and Ingham (2004a, 2004b).

<sup>9</sup> See Ingham (2013a, 6)

claims the right to determine and declare what thing corresponds to the name, and to vary its declaration from time to time – when that is to say, it claims the right to re-edit the dictionary. This right is claimed by all modern states and has been so claimed for some four thousand years at least.

He also believed that the forms of state money could vary between three types that can exist without any determinant casual link between them but instead are at the will of the authority. These three forms are “[c]ommodity money, fiat money and managed money, the last two being sub-species of Representative Money” (Keynes 1930, 7). He describes commodity money as the “actual units of a particular freely-obtainable, non-monopolized commodity which happens to have been chosen for the familiar purposes of money,” or as receipts representing “existing units of the commodity” (7). Fiat money as, “created and issued by the State, but is not convertible by law into anything other than itself, and has no fixed value” (7). Managed money as, “Fiat Money, except that the State undertakes to manage the conditions of its issue in such a way that, by convertibility or otherwise, it shall have a determinant value” (8). The character of the monetary system is ultimately determined by the wishes of the state as it can reconfigure its defining traits at will. For instance, a state has the ability to transition from a fiat monetary system (where there is no commitment to a exchange for a reserve unit) to a form of managed money (allowing the issued notes to be converted for a reserve unit). This can happen in any order and does not resemble the regression analysis laid out by

Mises that requires a sequence unfolding to a particular moment where a commodity emerged from a pure barter economy.

Fitting cryptocurrencies into one of these forms is particularly difficult. However, as will be mentioned later, MMT recognizes cryptocurrencies more as commodity money than any other form. Generally speaking, a commodity is a product or service that experiences fungibility in varying degrees. In a sense, BTC appears to fit this description, as every unit is treated as a perfect equivalent regardless of the node that first received it. However, this is a narrow view of cryptocurrencies, as such, when one considers the whole cryptosphere, each protocol and their respective units, they represent a degree of product differentiation. Hence, from an aerial view of the cryptocurrency ecosystem, the degree of fungibility that may exist within a particular protocol can experience nullity depending on the wishes of users operating under different protocols. These elements range from distinct branding, functionality for users, the protocols interface and their perceived instrumentality. Examples of traditional commodities consist of gold, wheat, corn, or, crude oil. Unlike cryptocurrencies, these commodities have a tangible form. Further, while products — consumables — tend to be forged using a commodity as an input this is not necessarily true inversely. Yet, with cryptocurrencies they are intangible and synthesized utilizing other physical commodities (such as computers). Specifying the form of money — defined by Keynes — that represents a best fit for cryptocurrencies is difficult. I believe they transcend these definitions but may be best represented as a sub-species of commodity money.<sup>10</sup>

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<sup>10</sup> This is an investigation that goes beyond the scope of this paper hitherto but will be examined further and included as I continue my research.

Keynes postulated that the “Age of State Money” could be traced back to over 4,000 years ago (Keynes 1930, 5). Keynes applies the state theory of money to every economy observed through known historical texts, claiming they were either based on commodity money, fiat money, or managed money. MMT piggybacks off Keynes’s idea that the era of state money began when the state authorities “claimed the right not only to enforce the dictionary but also to write the dictionary” (5). This understanding of money has influenced how MMT views the functions of money in conjunction with fiscal, monetary and general policy options. The next section will overview the functions of money from the MMT perspective.

## **4.2 The Functions of Money**

MMT tells us that a sovereign country that issues its own currency creates demand by forcing their citizens to pay taxes with it (Wray 2014b). In the US a citizen is forced to pay taxes in US dollars, therefore citizens must acquire US dollars. In contemplation on the existence of ‘modern’ or ‘fiat’ money, it is clear that it does not grow on trees, but must be produced by a country’s central bank. In the US the Federal Reserve Bank assumes this role. The form that money can take in these institutions is as bank notes or key-strokes on a computer (Carrillo 2017). So then how does money created by the government come into circulation? Consider the divergences between the government and private sector. If the country is monetarily sovereign the government does not have any real budget constraints. Contrarily the private sector, being composed of the private domestic sector (goods and services produced bought and sold within the country) and



the private foreign sector (goods and services imported and exported to and from other countries), is budget constrained, meaning it must have money before it can spend. Therefore, money can be seen as brought into circulation when the government finances government services and when the government buys directly from the private sector. The idea that a government can produce its own currency means that it can buy anything for sale in the country — in its own currency — without ever being insolvent. More importantly, it can spend first without having to collect taxes. This is the essence of MMT and a major reason why followers of this approach would conceptualize a budget deficit as being better than a budget surplus. Be that as it may, a budget deficit is not without its own dangers, as Pierce (2014) maintains “[t]his doesn’t mean that governments can spend without limit, or overspend without causing inflation, or that government should spend any sum unwisely. What it emphatically does mean is that no such sovereign government can be forced to tolerate mass unemployment because of the state of its finances – no matter what that state happens to be.”

As follows, money can function as a means, under a monetarily sovereign government, to combat unemployment and create price stability. Consider how the private sector and public sector relate to the budget according to MMT. When the amount of money the government spends is exactly equal to taxes collected, the government is said to be running a balanced budget. If government spending is greater than the taxes collected, the government is running a deficit while the private sector experiences a surplus. If the government spends less than it is collecting in taxes, the government is running a surplus while the private sector experiences a deficit. MMT proponents argue in favor of a deficit that satisfies an unmet demand for money, establishes full

employment and encourages economic growth. Mosler notes in his correspondence with Armstrong (2015):

MMT recognizes that the currency is a public monopoly, taxes function to create unemployment and the funds used to make payments to the government come from the government. The price level is a function of prices paid by the government and loans create both deposits and required reserves. The national debt is nothing more than the dollars spent by the government that haven't been used to pay taxes and remain outstanding as 'net savings' in the economy until used to pay taxes. They 'rest' in the form of cash, reserve balances at the Fed and balances in securities accounts at the Fed.

Of course, a government could orient policy for a budget surplus but this would cause the private sector to be in a deficit unless the country experienced a trade surplus. Consider that the US has been importing more than they export consistently since the 1980s. MMT recognizes that to reduce government debt or achieve a budget surplus either public welfare can be reduced or taxes on the private sector can be increased (Pierce 2014). The latter would drain the private sector of liquidity and increase private sector debts. As a consequence, reducing the circulation of money to unburden the government from debt obligations reduces the economy's capacity to spend which may stunt economic growth.

Prior to 1971 in the US, state-issued money was backed by the total amount of gold. In this case, a government can become insolvent. However, following the adoption of a state-issued money that cannot be redeemed for gold and the ability of countries to float the value of their own currencies, the elements of a commodity-backed system no longer apply. US dollars are spent into existence (this could not be the case with gold). Congress determines the appropriate quota for government expenditures and tax guidelines. By a matter of force the IRS and respective legal system ordain taxation, which drives the currency, upon the economy. Technically speaking, the US government cannot fully deplete its own currency. As long as the sum of money borrowed and interests are measured by the respective currency, the government may print or issue reserves to satisfy debt obligations. Essentially, this implies that the scarcity of money is a political decision. The debt ceiling is an arbitrary limit on monetary units that the federal government borrows. But this does not mean that there are no consequences for excessive public expenditures. MMT still views inflation as a pressure, but provides a unique way of combating it. A function of taxes is to combat inflation and maintain price stability (Armstrong 2015). If there is too much money in the economy, which may cause inflation, taxes can be used to destroy any excess money from the economy. To keep the amount of money at a level for the private sector to function properly and maintain price control, the government can use taxation, or encourage private savings and the purchase of imports. Alternatively, to ensure that there is an adequate supply of money in the economy, a government can add more money with government spending, or encourage private investment and exporting. In this way, taxes are a lever that the government uses

to take money out of the private sector to maintain price stability and prevent excess inflation.

MMT focuses on achieving price stability and full employment, by using money as a tool. For example, a government offering a job to the unemployed rather than keeping them unemployed can anchor prices and combat inflation. The guaranteed job, which could be at minimum wage, sets a price floor for wages, provides a source of income and can provide the necessary skills to transition to the private sector. Using money in this way allows the government to utilize the full capacity of labor and provides a measure of how large a government deficit should be (an amount adequate for full employment). This provides an alternative to the long-run Phillips curve (the non-accelerating inflation rate of unemployment). For example, if inflation becomes too high, pressure can be reduced by transferring labor from the private sector to the 'buffer stock.'

### **4.3 Bitcoin and Modern Monetary Theory**

From the perspective of MMT, questions such as, why does the U.S. dollar have value? Why are people willing to work and produce in order to obtain it? Can be answered by recalling the way in which they view the functions of money. The value of the currency is connected with peoples need to settle obligations with the government. Ultimately, the US dollar has final demand because of taxes; inter alia, the government's ability to make us write contracts and produce using the US dollar. Proponents of MMT claim that Bitcoin does not have anybody standing behind it enforcing rules and laws, and, requiring people to make payments with it.

In essence Bitcoin lacks government backing and confidence and trust necessary to maintain its value; it has no final demand because no government accepts it for tax payment. Although this is currently true, it may change with the recent passage of SB1091 in the Arizona Senate titled “Income tax payments; bitcoin” (Peterson, Farnsworth, Grantham and Weninger 2018). Along with the introduction of SB464 in the Georgia Senate titled “Taxes and License Fees; state revenue commissioner to accept cryptocurrencies for payment” (Williams 2018). In 2017, Sweden became the first country to settle a debt using BTC (Petcher 2017). Further, the Arizona governor officially signed a blockchain bill, HB 2417, that states, “[a] contract relating to a transaction may not be denied legal effect, validity or enforceability” (Weninger 2018).

There are a few arguments coming from MMT perspective against the functionality of BTC as an alternative monetary instrument. The rest of this section will briefly overview their position that BTC are “not monetary instruments” (Tymoigne 2013b). Tymoigne (2013b) states that:

Given that bitcoins are supposed to be monetary instruments, they must follow the preceding basic rules of finance. We clearly know who the bearers are ... but who is the issuer? In other words, who put the eggs in the forest and is willing to accept them in payments due to him or her. I can tell you the answer for Easter eggs: none of the persons who put them in the forest promised to accept them in payments.

First, recall that the Bitcoin protocol allows nodes (miners) to create blocks and in return are rewarded BTC. Now, there is no issuer that resembles a Federal Reserve or central bank, but the responsibility of issuance is on the user. When a block is constructed there is a special transaction called a ‘coinbase transaction’ that allows the miners to assign BTC to themselves (or any address on the Bitcoin network chosen as an output). As long as the necessary proof-of-work is provided with the block, other nodes in the community will accept that issuance of BTC to the miner. The network and the growing adoption of Bitcoin ultimately determine the current circulating supply. For all practical purposes, the ‘eggs’ were placed in the forest by Nakamoto (since they are coded into the protocol) and it is the nodes that are forced to accept them for performing the necessary amount of proof-of-work for the continued operation of the system. In this way, the miner is a mediator in the distribution of BTC and by operating as a node promises to accept only BTC for performing the tasks deemed necessary by the protocol to ensure the honesty of the network. Conceptually, it is the community of nodes that play the role of the central bank. It could be said that Bitcoin is a bank and BTC are liabilities of that bank, placed in circulation by the community itself at a rate dependent on the supply of nodes and demand for verification of transactions. Tymoigne (2013b) further asserts that “[g]old coins are ... monetary instruments that contain only one promise, that of being accepted back by the issuer to settle debts due to him (usually a government)” and “[p]rivate banks issued notes that they would not accept in payments ... Bitcoins have no intrinsic value so their fair value would drop to zero.” If nodes can be conceptualized as mediating the issuance of the currency, and the protocol requires that nodes accept BTC for performing work, is it fair to claim that this requirement by the protocol is not a

promise in itself? As long as the US government is solvent, US dollars will be accepted as tax payments by law; as long as the Bitcoin network has users willing to operate within its protocol, BTC must be accepted as a fee for validating transactions and is enforced via rules governed by its code. Accordingly, taxation is a legal obligation that forcefully creates a final demand for USD. Further, the obligation of users to accept BTC for verifying transactions and continue to operate in line with the governing rules of the Bitcoin protocol is a voluntary means of creating demand for BTC.

Another criticism from Tymoigne (2013b) is that the supply of BTC is imminently inelastic and:

If a monetary instrument works properly, its supply changes with the quantity demanded. It goes up when there is more demand for it, and down when there is less demand for it ... The bitcoin supply is fixed in terms of flow (BTC 25 per 10 minutes now) and in terms of maximum outstanding amount (BTC 21 millions).

In a simple model where Bitcoin exists in a vacuum and is not open-source, this statement is true. However, that is not representative of reality, Bitcoin Core (the name of the software that enables the use of the currency) is open source. This means that if the supply of 21 million is hit and excess demand for BTC exists, theoretically, the community could agree on forking Bitcoin (which has already happened in order to increase transaction speed) and increasing its supply while maintaining the rest of the rules in the original protocol (Hearn 2015). Further, the community could even organize

and change the rules of the protocol to suit whatever is required by this hypothetical demand. Concerning the destruction component of a currency, the protocol could be changed in the future to allow for part of the transaction fee to be payable to the system itself, destroying it endogenously. This may be complemented by setting the protocol to increase circulating supply at a given (variable or fixed) target-rate for inflation.

It is quite clear that proponents of MMT do not believe that BTC (possibly even other cryptocurrencies) can function as an alternative to fiat money or be considered as a monetary instrument. Be that as it may, they maintain that it has other uses (Tymoigne 2013):

The structure of the payment system, not bitcoins, is actually what makes the bitcoin project so successful. It is supposedly so secretive that you can trade a bunch of illegal stuff and evade taxes. Think Easter eggs (or tulips) for coke, Easter eggs for guns, Easter eggs for prostitutes, the sky is the limit ...

And Wray (2013) asserts that “bitcoins have no use other than to circulate illegal products” and “[a]s long as we’ve got cokeheads, bitcoins have value because cokeheads will take them.” According to this logic, it appears as if cokeheads give BTC a type of final demand.

These claims most likely stem from criticisms of the infamous Silk Road network, which was an online black market for drugs and other illicit goods. Ross Ulbricht was not only arrested for his free-market economic experiment, Silk Road, but his BTC were traced to his identity and seized (Haun 2017). Further, the DEA special agents Carl Force



and Shaun Bridges tasked with investigating Ulbricht were caught committing fraud by Kathryn Haun, a former US attorney for the US Department of Justice (Haun 2017). Special agents Force and Bridges believed that Bitcoin was anonymous, and, so secretive that one could get away with illegal activity, but failed to realize that anyone can examine the blockchain ledger and trace the movement of BTC. Haun (2017, 5) discovered a digital trail on the blockchain that revealed the transaction history showing that the DEA agents were embezzling hundreds of thousands of dollars in digital currency during the case. Any type of crime that can involve cash can also be committed with digital currency (Haun 2017). The difference is that it may have been even more difficult to catch the corrupt DEA agents if they were using cash, as the blockchain ledger is an immutable copy of every transaction that has every occurred in the network (Haun 2017, 6). In Haun's (2017) testimony before the US House of Representatives Committee on Financial Services and Subcommittee on Terrorism and Illicit Finance she claimed that:

There are plenty of legitimate uses of cryptocurrencies ... I know many small business owners, investors, academics, and even government employees who use cryptocurrency. These are not people engaged in illicit activity but rather people looking to take advantage of a more open and seamless system to transact with one another ... Cryptocurrencies also promote financial inclusion for the unbanked, including in parts of the world that lack stable financial institutions.

Further Haun (2017) argues that:

[E]arly misuse is a fact of life with many emerging technologies, and cryptocurrency is no exception ... Although we now all use the internet every day, in the beginning it was disproportionately used by those engaged in nefarious behavior – for things ranging from child porn to online fraud. With each technological advance, bad actors figure out how to exploit and there is some period where law enforcement plays catch up, a kind of cycle of innovation and adaption . . . The potential for terrorist use of cryptocurrencies certainly exists, as it exists for cash or any asset . . . To date we have seen only limited instances of terrorists using cryptocurrencies

And regarding cryptocurrencies versus other means to finance illegal behavior, Haun (2017) remarks that:

Cash and prepaid cards are two prime examples. There is little reason to use a digital currency account where your IP address may be tracked with each login, there is a permanent record to trace where the funds came from and where they moved to.

#### **4.4 Summary**

MMT is a powerful framework for understanding a monetarily sovereign government and its policy pursuing full employment and price stability. At the heart of MMT is a monetarily sovereign government operating as a monopolistic supplier of money, which has an unlimited capacity to spend on other sectors. Being in a surplus is consequently a bad thing, because that means the government is absorbing more money via taxation than what is being injected into the economy. This is because they are withdrawing money, which can be conceptualized as a claim on resources, from every other sector in the economy.

In turn, MMT's optimism for modern financial institutions compared to older forms that relied on a gold standard is in part due to their capacity to increase liquidity. Under the gold standard system governments could not spend as much as they wanted in order to provide public goods and services. Since the transition from a monetary system backed by a commodity to a promise of redemption for taxation, MMT argues that governments can spend up until full employment is achieved. The scarcity of the USD in this way is artificial and constrained by misconceptions of its operations. It follows that the options for the application of government spending to ensure a degree of subsistence for its population — in a modern monetary system — are vast. Thus, a monetarily sovereign government's decision between austerity measures and spending jobs into existence, raising living standards and wages, is a sociopolitical decision.

As noted earlier in the chapter, Tymoigne (2014) challenges BTC as being a monetary instrument and deems it to be a commodity. The underlying argument is that if BTC is a commodity then it is an awful monetary instrument with no final demand. This is based on a conception of BTC as being similar to gold and not being accepted as

means to settle debt obligations. A monetarily sovereign government giving up its ability to spend money into existence and reverting back to gold would be disastrous in the MMT framework. The gold standard was limited by the total amount of gold available, which constrained the capacity of government spending. This constraint could arguably fail at keeping up with population and economic growth. Depending on the relative scarcity of gold at a given time, increasing amounts of goods and services could cause a deflationary spiral or limit economic growth by the rate at which gold is extracted. The nature of this argument will be followed up on in the conclusion.

## **Chapter 5**

### **Conclusion**

Money plays an irrefutable role in the arrangement and functioning of interconnected economic processes. It exists as a channel between firms and households, the laborer and his or her product, the producer and the means of production; it is inescapable and pervasive in modern economies. Money can be divisive between different socioeconomic classes in hierarchical social structures. Thorstein Veblen's view on institutions is unique in the sense that he believed them to be "not only themselves the result of a selective and adaptive process which shapes the prevailing or dominant types of spiritual attitudes and aptitudes; they are at the same time special methods of life and of human relations" (Veblen 1889, 188). Inevitably hierarchies of money fuse with the varying institutions of its respective communities through habitual function in their lives. Veblen could be interpreted as implying that institutions are symbolic arrays representative of orderly patterns of human activity to procure certain material conditions. Accordingly, money can then be interpreted as a symbol that can be quickly recognized by its users for embedding — both formal and informal — culturally relevant forms of trust through norms and rules.

MMT characterizes money as the creation of the state and emphasize the bond between the state and its issuance of currency. Austrian economics, for all practical purposes, views money as a system of signaling the wishes of individuals that has been seized, controlled and distorted by the state. However, both frameworks recognize the monopolistic control the state has over money. In this way, money can symbolize the power of the state. The former believes that the consolidation of this power can be used

to appropriately solve issues of unemployment, price stability, and resource allocation. The latter purports that this consolidation of power will deliver very limited economic performance and infringes upon the capability of individuals. Both frameworks ultimately desire similar outcomes such as full employment, economic growth, price stability, and, proper resource allocation, but they reach their goals in different ways.

The phrase “In God We Trust” has become a prominent element on the US dollar since 1957. It is a reflection of the influence monotheism has had in western civilization. It also exists as an example of how symbols can court the trust of its users. Monotheism, a belief in a singular god, or a singular authority, is not a unique means of courting that trust. A misconception about Bitcoin is that it eliminates the need for trust in consolidated authorities — or third parties — and is ‘trustless’ as Nakamoto puts it (2008).

Cryptocurrencies are becoming more interconnected and potentially even interdependent with traditional financial systems. BTC could not have emerged without the necessary development of particular financial institutions. Further, it cannot survive without the current institutional infrastructure and the trust they have accumulated. It is possible to trade cryptocurrency pairs, such as BTC for Litecoin, but the only way to enter the cryptocurrency market is to purchase BTC with a state-issued currency. Individuals who seemingly trust their own currency (since they use it) exchange it for BTC. The rise in popularity Bitcoin has received may reflect a transition of social trust. Bitcoin by itself does not produce or dispose of trust, it allows for trust to take on a new form. Instead of trusting traditional financial institutions backed by governments users extend their trust into technology. However, this is not a unique transition particular to finance and is more obvious in other sectors. For example, people trust that their GPS will guide them to

where they want to go. A key component to cryptocurrency is the decentralization of trust, not the elimination of it. Could Bitcoin be a reflection of people losing faith in traditional monetary systems? Regardless, this trust ultimately emerges from the social provisioning process and is propelled by technical and cultural changes.

Users who hand over their trust — symbolized as state-issued currency — for BTC are transforming their trust into the support of a technological development. This technological development offers a sense of monetary freedom. However, the supposed monetary freedom from the state via cryptocurrency does not imply freedom from potential tyranny of the market. Arguably, cryptocurrency is a social institution that aims for market-based centralization over coercive centralization. As MMT makes clear, monetarily sovereign governments manage and control their currency and have the power to penalize citizens who do not obey their rules (such as paying taxes and settling debts in their respective currency). In this sense, the centralization of control over the creation of money and the trust backing it is forced. With cryptocurrencies market actors are able to opt out or even switch currencies without having to deal with any specific oversight.

Trust in money can be observed as being the result of a social process, cultural trait, or a financial institution. In social processes trust emerges when there is a framework of pre-existing inputs and predictable retribution. This may influence other social institutions such as cultural norms and taboos. For example, students trust that their studious efforts will pay off with their degree that will earn them an income. Similarly, when a student asks a teacher a question s/he trusts the authoritative role of the teacher as being credible enough for an appropriate answer. Trust created by a cultural trait is trust held for recognizable features that feel familiar to our cultural experience. For example, a

person may instill more trust in someone who shares similar values over one who does not. Trust as a result of financial institutions emerges from the interdependent relationship between the government, the household and firm, and the central bank (In the case of the Federal Reserve the central bank is different from the government). Supplanting this logic, trust can be displaced if the social process, the familiar cultural trait, or the financial institutions that are trusted fails. Verification of transactions on Bitcoin is accomplished by the network itself, trust is mitigated from singular entities (such as a central bank) to voluntary participants (the nodes). Those who purchase BTC with money, with or without awareness, place trust in the technology and code governing the protocol.

A general conclusion I want to make is that cryptocurrency can be an alternative to fiat money as long as trust exists. Cryptocurrencies can exist as a partial-complement to the current monetary systems or potentially displace it if governments decide to legally accept it for debt obligations. If people are capable of trusting a government issued currency and exchanging it for a cryptocurrency — that cannot be used to pay taxes with — they are also capable of trusting a cryptocurrency to function as a means of exchange. There is no reason that this technology cannot be harnessed by governments and displace their respective monetary system endogenously. Bitcoin, among other cryptocurrencies, are open-source and may be modified by any person with the right technical proficiency to encode an application that aligns with their political values. Currently, cryptocurrency is an ambitious experiment and if it replaces fiat money it will not be due to being trustless. Instead, it will be because they are trusted for functioning better than then the alternative. This may be the result of faster clearing times, cheaper fees, their



immutability, inclusiveness, being open-source, or their ability to disintermediate and automate costly financial relationships through smart-contracts. Cryptocurrency is still in an early stage of development but its existence begs some very fundamental questions on the nature of monetary systems. Envisage a monetary system that is maintained and governed through community-ownership. Blockchain, in the form of Bitcoin, represents a protocol that is ran by the users for the users. There is no private owner of Bitcoin, it is not a private company, and, nodes are not forced by any overarching social institutions to perform tasks for an exploitive wage.

As of now, BTC is a unit accepted by a relatively small-community as a store of value, a means of payment, a unit of account, and, a means of exchange. The question of whether or not it can be an alternative to fiat money can be reframed as: Can BTC establish enough users on the network to provide the right amount of credibility and liquidity to be trusted on a global scale? This is an open-ended question, but Bitcoin has undoubtedly grown its network size since its conception. Current institutions, such as centralized crypto-exchanges, price trades of BTC within the boundary of exchange-ratios with the US dollar (among other currencies). In order for it to be trusted on a global scale there is a need for people to start thinking in terms of BTC opposed state-issued currency. This adoption could occur due to a growing distrust for the behavioral patterns of traditional financial institutions. However, it could also emerge from those same institutions embracing the technology and forcing it upon users. Currently, the volatility of BTC in terms of USD makes this a difficult burden for producers and consumers that want to maintain their livelihood. As retailers are starting to accept BTC for goods and services it is unlikely that they are enthusiastic about holding onto something volatile. On

the other hand, volatility could be encouraging adoption by luring in speculative actors. If BTC is to become a legitimate currency it must gradually become preferable to pre-existing options for transactions. Hence, it can be said that money functions as long as actors are confident in its ability to be accepted by someone else. Hypothetically, if gold regained its claim as a generally accepted medium there would be nothing backing it of equal value. Now imagine that there is no government to promise accepting gold, or treat it as a liability, where does it gain its value? Beyond its potential usefulness for jewelry, false teeth, or other conspicuous displays of wealth, if a general confidence in gold's capacity to function as money magically disappeared, it would be worth relatively little. This argument also holds true for government-issued fiat money if the government stops accepting it.

The Austrian tradition, specifically Mises's regression theorem, states that for an item with the status of a medium of exchange, a schema of pre-existing exchange-ratios must already be in place. The regression theory, through a praxeological examination, determines that the very first medium of exchange must have emerged from a state of barter and used in direct exchange. However, it does not imply that all mediums of exchange must transition from direct exchange. There is no logical reason to assume, within this framework, that BTC cannot achieve the necessary amount of liquidity to become a primary or generally accepted medium of exchange.

To put it in a different way, the liquidity of money is essential for money to function appropriately in both economic perspectives. The Austrian school praises the nature of liquidity from a free market, where as MMT believes liquidity is best administered by a monetarily sovereign government. This is why when an MMT theorist

examines a cryptocurrency, such as Bitcoin, which has no central authority and a limited supply (reminiscent of a commodity such as gold), could claim that it would be a bad monetary instrument. However, this view fails to acknowledge the dynamics of cryptocurrency and the implications of Bitcoin as being an open-source application. Since Bitcoin is open-source there is nothing stopping an actor from modifying the code and creating their own rules for governing its respective network. Further, if users participating in the new network found the rules to be unsatisfactory they can either opt out and use another cryptocurrency or vote to fork the protocol. During a fork, the blockchain of a cryptocurrency experiences a schism into two forms of itself. Generally speaking, this occurs when stakeholders — participating nodes or developers — hold conflicting ideas on the development of the cryptocurrency. In essence, the dynamics of forking can be viewed as a process of voting for new systems of governance. It allows actors to express their concerns and create a network that aligns with their personal values and preferences. Instead of lobbying or fundraising for a change in policy, forking a cryptocurrency lets actors design what they believe will be a better system. Hence, MMT's perceived constraints of a commodity-backed currency do not apply to BTC. Hypothetically, if the limit of BTC were to be reached and fears of a deflationary spiral emerged, actors could fork Bitcoin, while maintaining or changing the governing rules, and increase the supply of BTC to meet excess demand. In spite of this, until BTC — or any cryptocurrency — is issued or accepted as a means of settling debts by a government, it is not considered a monetary instrument from the MMT perspective.

The blockchain application through Bitcoin is only one cryptocurrency that could act as an alternative to fiat money. Being the first cryptocurrency of its kind has elicited a

certain reputation and dominance in the crypto-market. Yet, the future of cryptocurrency is uncertain and Bitcoin could be replaced by a competing cryptocurrency. Nonetheless, the evolution of money proves that the same thing can be said about any traditional currency. If trust is the heart of money, then as long as cryptocurrencies continue their trajectory of adoption, it is probable that their liquidity will increase due to their function as a medium of exchange and non-monetary applications (such as smart contracts and voting mentioned previously). A global transition from fiat-systems to cryptocurrencies is beyond the control of any individual. Should this occur, traditional currencies would likely lose their value and new institutions would need to be developed in order to adapt. They could also exist as a complementary system that provides a check on fiat money, allowing users to perform capital flight and apply pressure to their respective government that is not following their wishes. Change is not easy, but it is also not impossible. Cryptocurrencies could certainly operate as an alternative means of performing the functions of fiat money — especially in the absence of institutions that provide trust. Be that as it may, if cryptocurrencies will ever become money is an issue that can only be addressed with patience.

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