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Cryptocurrencies: A Currency at all, or a Speculative Investment for the Future?

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Abstract:

Since the introduction of the first Cryptocurrency, Bitcoin, in 2008 there have been many an innumerable amount created. This begs the question, although they are labeled Cryptocurrencies, are they really currencies under the modern definition of Money? This paper will analyze the functions of cryptocurrencies concluding with the idea that currently Cryptocurrencies behave more like a Speculative Asset then an alternative form of money. That is not to say that in the future technologies like blockchain could not be utilized by Central Banks, rather there are to many variables control for at the moment to consider it an alternative to FIAT Currency.

Chapter 1

Introduction

1.1 An Overview

Although money is talked about on a daily basis, many people do not understand where it comes from and what it means. Thousands of years ago, the money that we know today did not exist, yet many of the civilizations of the past - even some of the most primitive - still managed to develop mediums of exchange. In an attempt to understand the complex money system as we know it today, it is easiest to begin at the foundation of money and why it was developed. There has been a progression from the barter system of old to the fiat money that we use today. As time has progressed, currencies were forced to evolve in order to meet the needs of a more advanced society.

In mainstream economics today there are three components of money that must be met in order to classify it as a 'Currency'. That being, (i) medium of exchange, (ii) a store of value, (iii) unit of account, also known as a common measure of value for exchange. These criteria will be applied to judge the suitability of Cryptocurrencies as actual currencies of the future or just another failed currency waiting to implode.

In 2008, the United States, as well as much of the surrounding world economies experienced the worst recession dating back to the Great Depression. Although it is impossible for the United States economy to fall back into a depression like the one in the 1930s due the current size of the economy, the effects of this smaller scaled recession were detrimental (Minsky,1986).

As the commercial banks began to scramble following the collapse of Lehman Brothers, distrust took over the mindsets of many Americans. Enter pseudonymous computer savant Satoshi Nakamoto and his work "Bitcoin: A Peer to Peer Electronic Cash System". Nakamoto realized the state of the economy and that there would be no better time to introduce his new findings relating to cryptocurrencies. Cryptocurrencies, also known as virtual currencies, are defined as being a virtual medium of exchange, one of the three characteristics that make money. Cryptocurrencies are based on block chain (or distributed ledger) technology.

Each blockchain is essentially a database that is shared across a network of computers, run by individuals or groups of individuals called miners that continually record and authenticate transactions. Using cryptography, a blockchain link together and stores the records of all transactions carried out within that network. Every user of the network needs to authorize the transaction in order for it to be verified, and each user can view the transactions. Nakamoto is credited as the founder and creator of the first cryptocurrencies that we will focus on in this paper - Bitcoin. He used the sentiment of distrust that many people were

experiencing at this time by introducing a "currency" that was completely decentralized, therefore requiring no third party mediation. He tackled many issues that first arose when cryptocurrencies were introduced; most notably of these is a 'double spending' phenomenon. Since its introduction Bitcoin has been in and out of the news constantly due to its volatility, something that will be examined later in this writing.

Much credit is given to Nakomoto because at the time when he released Bitcoin, he was able to establish a foundation for cryptocurrencies. Although at first, many believed there was no chance it could ever been on par with Fiat money, i.e. the US dollar or the Chinese Yen, they were intrigued by what it represented, an alternative means of exchange. Yet, Bitcoin was just the beginning of the introduction of cryptocurrencies. Following Bitcoin was the introduction of Litecoin in 2011, an alternative to Bitcoin that was supposedly faster while operating on a different algorithm. Including the introduction of Litecoin, there has been countless creations of cryptocurrencies, yet for the purpose of this paper, I will only be focusing on two others. First being Ripple, which was originally released in 2012, and could be used as both Cryptocurrency and a digital payment network for financial transactions by attaching to banks and allowing for any type of currency exchange. Finally, the Ethereum which was created in 2015; open source platform can be used by application of developers to pay for transaction fees and services on the network.

While much of the discourse surrounding Cryptocurrencies refers to them as actual currencies, there are many other schools of thought that contradict its status as a currency – which will be further expanded on in this paper. Today the modern definition of money consists of four main components, namely; money as a medium of exchange, as a store value, and a unit of account. This paper will work to prove that cryptocurrencies, like Bitcoin, for example, do not meet the criteria to be considered a currency. In fact, when you look at the characteristics, they point more towards that of an asset class rather than a currency. I will further claim this notion by examining if cryptocurrencies are in fact an asset class and not a currency, then what type of asset are they, coming to the conclusion that they are a speculative asset (for now).

The functions of money presented are at the center of the theories relating to money. In order to further claim that cryptocurrencies do not properly meet all the functions of money, we examined through the Chartalist framework. This paper will examine the contributions of economists such as Georg Fredric Knapp in establishing a foundation that would lead to the work done by Randall Wray and other neo-Chartalist/MMT economists. By utilizing this theoretical framework, I intend to show that although the concept of Cryptocurrencies may not have been able to be conceived at the time that many of these economists were writing, their frameworks are still applicable in explaining the shortcomings in calling Cryptocurrencies currencies.

Chapter 2

Review of Related Literature

In the following chapter, I will discuss the origins of money, beginning with the barter system, through a Smithian perspective in order to provide a foundation of the development of new mediums of exchange. I will continue by explaining the two major schools of thought pertaining to Cryptocurrencies, whether they can be seen as a 'Currency' or an 'Investment'. In order to do this, I will examine closely the work of David Yarmack, an NYU professor, who is an expert in Cryptocurrencies, including his work with the foundation Bohme. By establishing this foundation, the decision to even consider Crypto currency as currency or an asset becomes easier, as well deciding whether or not Crypto currency is worth the investment. Along with this, I will delve deeper into the risks and rewards that come along with the use or investment in Cryptocurrencies.

2.1 Currencies

Throughout history, currencies, like the societies around them, have progressed as well as adapted to the needs of the current economy. Currencies, i.e. money, are key components when addressing economic growth. The role of

currencies in societies has been for the purpose of providing a medium for exchange, the ability to store value in order to make purchases at a later date, and finally a unit account which gives the ability to measure any particular item for sale. To understand what money really is, and its value to society, it's easiest to begin with looking back at the beginning of financial systems. Many historians, as well as economists, point to the time of the barter system as one that became the building blocks for economic systems to grow. The bartering system showed the inner workings of supply and demand and how they could affect the value of a certain good depending on the time. In some cases, economists, such as Randall Wray, believe that the barter system never existed and instead money arose from the penal systems where a person would be forced to pay debts to someone he injured. Eventually, these payments became more centralized through the actions of the public authority in issuing obligations such as taxes.

As time progressed bartering became a less efficient medium of exchange due to its situational price variation. This idea was developed further in the work of one of the first major economists, Adam Smith. Smith believed that markets pre-dated the state and therefore felt that government intervention was a construct that was unnecessary. In his "Wealth of Nations," Smith describes the barter system as selfish profiteering as well as negative reciprocity (Smith, 1776). Unfortunately for Smith, anthropologists have been unable to find any evidence that would find the barter system as the origin of money. A common mistake is the automatic assumption that barter is the Origin of money, the real origin of

money as pointed out by Wray stems from penal systems in Mesopotamia as well early Egypt.

As societies became more advanced the bartering system could not last as the main economic unit of exchange, and therefore the creation of Fiat money changed the landscape. Fiat money is defined as money without intrinsic value, which is not back by gold and silver, that's value rests on the confidence that goods and services can be paid for. Interestingly, the term fiat refers to the first words that God spoke according to the story of Genesis in the Bible: "Fiat Luc" in Latin, or "let there be light" in English (Tcherneva, 2007). There are many key components of this definition that can be expanded on further. Fiat money, due to the fact that it is intrinsically worthless, is based on expectations of the future, hoping and trusting that the value of the fiat money will be greater in the future then it is currently. In the field of economics, expectations of the future play a very large role in investment in the present. Therefore, if the investor has faith in the future market and future yield, investing in the right avenue to continue down.

For many societies across the world, Fiat money is the main and only form of currency and will be for the foreseeable future. Yet for some economic minds, Fiat money was a step in the progression of currencies, not the end. That is when the pseudonymous computer savant Satoshi Nakamoto introduced the world's first Cryptocurrency, Bitcoin. This was a topic that had been touched on briefly by some economists in the past, with many people believing that in fact, Milton Friedman alluded to the development of cryptocurrencies in multiple interviews and speeches in the 1990s. Since Nakamoto, many other forms of

cryptocurrencies have been introduced into society such as Ethereum and Litecoin. Economists acknowledge the fact that many of its core properties align with that of traditional currency from the past, yet still, economists and politicians similarly wonder if it's really a currency and a viable currency for that matter.

Cryptocurrencies, at face value, share many characteristics with that of traditional currencies of the past, yet by delving deeper into what cryptocurrencies are, the school of thought that believes in them as a valid substitute to fiat money becomes questionable. As stated above, one of the key components that make something a currency is that it can be used as a medium of exchange. One of the key components of cryptocurrencies, and specifically Bitcoin, is that it is completely decentralized and there is no third party with the ability to influence and trades or deals. It also allowed for the ability to keep one's identity completely anonymous, an aspect that can be seen as both a pro and con in the eyes of many (Ciaian et al., 2015).

Fortunately for Nakomoto, he saw the state of the economy in 2008 and figured that this would be the time to share his idea with the world. This was brilliant of him simply by understanding people's emotions at the time. During this period uncertainty plagued much of society due to the financial crisis, the world and especially the United States was enduring. Trust began to dwindle, and as word spread the newly introduced idea of cryptocurrencies began to garner respect.

2.2 Cryptocurrency: Is it a Real Currency?

At the same time as cryptocurrencies began to gain respect, the many hidden uses of it became ever more evident. Due to the fact that it is essentially completely anonymous, without a 3rd party, many tenders used it as an opportunity to commit illegal crimes, specifically relating to the trafficking of drugs and even other people. This idea is one of the core arguments in Yermack and Bohmes research relating to Cryptocurrency as a real currency. Yermack works to debunk the theory that Cryptocurrency can be used as a replacement to fiat money or even on the same level as it.

He does this by going through the three main components that make money. That is the use of it as a vessel for the medium of exchange, the ability to store value, and unit account. The rationale for an efficient medium of exchange was highlighted by Milton Friedman, who argued that government-issued money should bear the same rate of return as other risk-free assets. These two goals; that is, a stable unit of account and an efficient medium of exchange seemed to be irreconcilable due to the impracticalities of paying interest on paper currency, and hence Friedman advocated a steady deflation rather than price stability (Friedman, 1960). Friedman's ignorance in to the other functions of money is the main

downfall of his theories when talking about its application to new potentially new currencies such as cryptos.

Bitcoin attempts to overcome the weaknesses of both fiat and gold-based money, functioning as an algorithmic currency with a deterministic supply and growth rate tied to the rigor of mathematics (Yermack, 2014). Beginning with glancing at Cryptocurrency as a medium of exchange, only a small amount of people actually use Bitcoin to purchase goods. In fact, a study was done to show that in 2014, Coinbase, which is the leading digital wallet service, estimated that nearly 95% of activity was a speculative investment (Nathan, 2014). This idea is at the center of the argument as to why cryptocurrencies should not be considered currencies at all. If nearly 95% activity is a speculative investment, then mathematically the amount 5% that is possibly used for the purchasing of goods is simply too minuscule to be considered on the level of fiat money. We also cannot forget that much of that 5% is used for illicit illegal behavior. Since Bitcoin has no intrinsic value, it's worth ultimately hinges upon its usefulness as a currency in the consumer economy. If it is barely being utilized then it has no real worth as a currency (Yermack, 2014).

The second of three components that make up Money is the unit of account. One of the main issues that arise when talking about Cryptocurrency is its Volatility. Due to the fact that the value of a Bitcoin compared to other currencies changes greatly on a day-to-day basis, retailers that accept the currency have to recalculate prices very frequently (Yermack, 2014). What Yermack is implying by this is that the time and cost it would take to do this constantly

wouldn't be worth it, when the fiat money being used currently does not present such issues. Similar to Yermack, Dr. Saifedean Ammous, an economist from Columbia University, believed that the volatility of cryptocurrencies is why they do not meet the criteria of a unit of account. Due to the absence of a central bank, there is no central power with the ability to adjust the money supply, without this there is no power that can provide stability to Cryptocurrencies. The predictability of the supply does not translate to the predictability of the purchasing power since the demand is highly volatile and unpredictable (Ammous, 2016).

In fact, studies show that the volatility of cryptocurrencies is 26 times that of the S & P 500 index (Baek, 2015). In addition to its extreme volatility, interest rates and Cryptocurrencies like Bitcoin are not correlated. Bitcoin, however, does not provide the feature of an interest rate in contrast to traditional currencies, where interest rates are provided by central banks and interest rate term structures are derived from bonds with differing maturities. Hence, valuation models relying on a given interest rate are rendered meaningless (Glaser et al. 2014). The combination of a highly volatile asset as well as no central authority to stabilize makes it reasonable to think that cryptocurrencies could not be considered a unit of account.

The final function to be discussed is cryptocurrencies' ability to store value. Throughout much of history, treating currency as a store of value essentially meant protecting it against theft, either by physically hiding it or by

putting it into a bank (Yermack, 2014). This differs immensely when talking about cryptocurrencies. In order to store Cryptocurrency, it needs to be put in a virtual wallet.

According to Yermack, some digital wallet companies hire third-party insurers, and because of that, there is a cost of keeping it in a digital wallet as well as paying a share to the third-party insurer. Another weakness when analyzing cryptocurrencies as a store of value is its risk of a cyber-attack. Part of the attractiveness of cryptocurrencies like Bitcoin, for example, is the fact that it is completely decentralized. Yet by being completely decentralized, there is no authority to prevent or help with cyber-attacks (Ammous, 2016). This vulnerability is what makes people very cautious when attaching currency to the idea of crypto money.

2.3 Crypto as an Asset

Based of the facts presented above, Cryptocurrency does not fully fulfill any of the three components used to define money. This may be confusing to much of the population due to the fact that it has currency in its name. However, because it does not fully meet the components of a currency, it should instead be considered an asset. Out of the idea that Crypto currency is in fact an asset has come two diverging schools of thought: one that advocates for Crypto currency as a Speculative Asset, and the other that advocates for Crypto currency as a hedge or 'Safe Haven'.

Beginning with the latter, I will first examine the belief of cryptocurrencies as a Safe Haven, glancing particularly at the work of Anne Haubo Dhyrberg as well as Elie Bouri. Much of the literature surrounding Cryptocurrency as a "Safe Haven" begins by looking at its price determinants. This brings us to the work of Irish Economist Anne Dhyrberg. By first analyzing the relationship that Cryptocurrency has to the stock market, she was able to deduce that the stock market and Cryptocurrency are negatively correlated. Once this base was established, Dhryberg furthered her argument by saying Bitcoin possesses similar hedging characteristics to gold and therefore because of this can minimize the effects of an economic downturn, essentially providing a Safe Haven independent of the stock market. Another method used by economists is comparing Cryptocurrency to gold. Bitcoin has previously been compared to gold as they have many similarities; the primary value is derived by the scarcity of supply, the supply is not controlled by a government but independent agents, both assets have high price volatility, and total supply is finite (Dhyrberg, 2015). Based on her findings, she determined that the hedging capabilities of gold could be correlated to the hedging possibilities that cryptocurrencies like Bitcoin possess in relation to stocks. This was significant in distinguishing the characteristics that would in fact point to cryptocurrencies behaving more like an asset class than a currency.

Although in certain ways, cryptocurrencies behave like Safe Haven Assets, majority of the discourse today surrounding them considers them to be Speculative Assets. A Speculative Asset or bubble can be defined as a spike in

asset values within an industry, commodity, or asset class that is fueled by speculation as opposed to fundamentals of that asset class. A speculative bubble is usually caused by exaggerated expectations of future growth, price appreciation, or other events that could cause an increase in asset values. They highlight that Bitcoin is vulnerable to speculation and misinformation and they also criticize that no regulatory body oversees the market. A vital component in the Bitcoin-ecosystem is currency-exchanges, as they link traditional currencies with the digital ones. Due to the fact that they are not regulated and are thus not subject to risk mitigation and governance requirements, they have a substantial default risk, e.g. caused by hacker attacks or even technical problems (Glaser et al. 2014).

2.4 The Origin of Money

Mainstream economics has long asserted that money most meet the four criteria/functions in order to be considered a currency. However, many schools of thought have challenged this assertion in questioning the origin of our definition of money, and how that definition became so widely accepted. William Stanley Jevons, an English economist who is best known for his work on theories surrounding marginal utility, holds a non-conventional viewpoint of money.

To begin, Jevons points out the many civilizations in Africa, specifically West Africa, where at the time of this writing the bartering system was the central medium of exchange. He contends that modern society has been privileged to have an advanced system of exchange and are unable to conceptualize the "inconveniences" that come along with the primitive system like that in West

Africa. With the bartering system being the central system in these areas it became easier to analyze them and their shortcomings. Although the bartering system may not have met all the required functions of money that we know today, at the time it served as system permitted to exchange. This concept is set to be the foundation of Jevons ideologies surrounding money.

According to Jevons the four functions of money still hold; it must serve as a (i) medium of exchange, (ii) a store of value, (iii) unit of account, also known as a common measure of value for exchange, and (iv) a standard of value for lending and borrowing. Yet he stresses that it is in the highest degree imperative that the reader should discriminate carefully and constantly between the four functions of money. We are so accustomed to using the same one substance in all four different ways, that they tend to become confused together in thought (Jevons, 1883).

This distinction is central to Jevons ideas around money. He veers from the conventional idea of money in relation to its four functions because he believes that though it is possible for a currency to meet all four criteria, it is likely that money might not. With this in mind, Jevons furthers this acknowledgment by claiming that it is not necessary for money to meet all four functions, and that it is done out of convenience. Giving an example from the past, Jevons points to the fact that at one time during Queen Elizabeth's rule common measure of value was silver, while gold was used in payments based off its current value in silver. All at the same time, corn was being used for standard of value when contracting college leases. This is furthering Jevons point that

although mainstream economists have hammered home the point of money meeting all four functions, there are many instances where it has come down to preference rather than necessity.

Working in the same time period as Jevons, Carl Menger was an Austrian Economist, who went on to become the founder of the Austrian School of Economics. Like that of Jevons, Menger was chiefly concerned with Marginal Utility, yet found an interest in the origin of money. Central to Menger's theory was his belief that it was not necessary for the government to implement a form of currency. In fact, Menger believes that direct as well as an indirect exchange will eventually if necessary, lead to the development of the currency. Expressed in his terms:

> *"And further, that the person who wishes to acquire certain definite goods in exchange for his own is in a more favorable position if he brings commodities of this kind to market than if he visits the markets with goods which cannot display such advantages, or at least not in the same degree. Thus, equipped he has the prospect of acquiring such goods as he finally wishes to obtain, not only with greater ease and security but also, by reason of the steadier and more prevailing demand for his own commodities, at prices corresponding to the general economic situation at economic prices."*

Importantly, Menger is attempting to discredit the idea that if someone were to come to the "market place" and were unable to acquire the desired item, he would then have the opportunity to accumulate more items. As he accumulated

more and returned to the marketplace, he would then find it easier to acquire such desired goods as well as exchange other goods he has not acquired. These interactions would not only determine the price without the role of a central government but would accord to Menger, provide a more concrete medium of exchange. Many people do not accept Crypto currency as a currency on par with Fiat money because it is not yet government regulated. Based off of Menger's theory on the origin of money, this is not necessary for the acceptance of Crypto currency as a currency.

Ludwig Von Mises, an Austrian school Economist, had a simple yet similar view on money to that of Menger, being it is a commodity that facilitates the interchange of goods in a society (Mises 1891-1973). Mises acknowledged the four components of money but referred to money as a medium of 'Exchange' as the main function, while the other functions were secondary functions. Mises believes if an economic order has been founded on the exchange of goods, there should be no more important function than the medium of exchange itself. Along with this, he furthers his claim by saying that many of the secondary functions are dependent on the function of medium of exchange, and therefore these functions must be secondary.

Chapter 3

Theoretical Framework of Money

3.1 An Overview

The origin of money is at the center of the debate between the Chartalist vs. Metallist approach to money. The Metallist approach can be explained as one that may have other functions, yet its main function and which it originated from was a medium of exchange. This arose from the belief that as barter societies began to realize the inefficiencies that the system itself was laced with the private sector would then create money nearly "spontaneously. In doing this they would help fix the issues surrounding transaction costs in the barter system (Bell, 1998). These ideas were the foundation of Karl Menger's theory on the origin of money expanded on above, where Menger expands on his shared belief that money is the arrival of economic actors upon a single medium of exchange through market operations that identified the most saleable good (Menger, 1892)

The Metallist approach was given its name due to the school of thought's belief that money would, in fact, have intrinsic value that is backed by precious metals like gold and silver. Unfortunately for Metallists, their approach took a major blow when using these precious metals as backing for currencies was eliminated. This essentially debunked their claim that precious metals would prove the currency's value separate from its current form. At the same time that

the Metallists were establishing their theories surrounding money, the Chartalists were attempting to explain a new theory on the origin of money.

3.2 Chartalism

The Chartalist theory of the origin of money is centered on the idea that money as a medium of exchange comes second to its function as a unit of account and as a means of payment. This differed immensely from the Metallist approach, which valued the medium of exchange as the most important function. Yet, the purpose of the Chartalist approach was to uncover the sources of the value of money, which strayed from the orthodox schools' belief in precious metals. Along with its focus on the different functions of money, the Chartalists believed that the value of money was established by a central authority in order to log the payment of taxes to the state, more specifically debt relations that could only be served through the central authority. John Maynard Keynes, one of the most important and influential economists of the 20th century, coined the term "Chartal Money". He argued that money that is Chartal is not a new concept but has in fact been in existence for over hundreds of years, this is expressed in this excerpt from his 1930s work, A Treatise on money:

> *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 contract. But it comes doubly when, in addition, it 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. It is when this stage in the evolution of Money has been reached that Knapp's Chartalism – the doctrine that money is peculiarly a creation of the State – is fully realized. . . . To-day all civilized money is, beyond the possibility of dispute, Chartalist. (Keynes, 1930: pp. 4–5)*

Here Keynes is referring to money as going through an evolutionary process, where he acknowledges the fact that all money used in civilized societies today is Chartal. This point in evolution was arrived at when the State claimed the right to declare what thing should answer as money in payment of debts owed to it. An important idea here is that money did not come before the state, the state created money in order for persons in society to pay back taxes and other liabilities owed to the state.

When examining the Chartalist approach to money, George Friedric Knapp is proclaimed as one of the "founding fathers" and most influential in establishing its foundation. His work, *The State Theory of Money,* was published in 1934 and outlined much of the key components of Chartalism.

The contributions of Knapp, Innes, Keynes, Lerner, and Minsky to a modern adaptation of Chartalism, the Modern Money Theory approach, heavily influenced the development of MMT. Through their understanding of the nature of money and MMT in the context of modern fiscal and policy operations, a clear departure from orthodox economics can be easily recognized. We begin with

George Friedrich Knapp and his development of Chartalist theory. In his Chartalist approach, Knapp's directly opposes the Medalists attempt to explain the monetary system with no consideration of the idea of a State. Knapp's opposition to the Metalist view that the value of money is derived from the value of the metal standard creates a framework for the Chartalist approach to State money as well as private credit monies.

Knapp's critique emphasizes that the transition of a unit of value to a means of payment requires a conversion rate announced by the state. In terms of payments to discharge debts, the ability of the means of payment to be changed from one material to another (for example, weighed coined gold to weighed coined silver) proves that "debts were always nominal and were never actually 'metallic'; all debts are converted to the new metal, which proves that all units of account must be nominal" (Wray, 4). He uses the example of the tin disc issued by the cloakroom of a theatre. The tin disc issued has legal significance since it ensures the recipients right to demand the return of their coat. The legal significance of the tin disc separates it as a means of payment from the material itself. Therefore, the material used to manufacture the "Chartal pieces" is unimportant since it could be a common metal, gold, silver, paper, or even today, electronic. In order to determine if these pieces are in fact Chartal, we must look at whether they are validated through proclamation.

"A proclamation is made that a piece of such and such a description shall be valid as so many units of value. Validity by proclamation is not bound to any material. It can occur with the most precious or the basest metals (Knapp 1973,

pp. 30 cited by Wray, 4). With this understanding, Knapp goes on to define money as a Chartal means of payment. While Chartalism implies that legislative activity determines what is accepted as a means of payment, it is not merely the legal tender laws which create Chartal money, but also whether or not the means of payment is accepted by the State.

Knapp supports this distinction with his analysis of bank money. He argues that banknotes are not valued by conversion, but instead by their acceptance at banks and public pay offices. Banknotes derive their value from the ability of banks to use their own notes in private transactions, rather than money issued by the State. However, bank money used in payments in the "public pay community" requires that the state accepts these notes in payment to the state. In addition to accepting banknotes in payment, the state must also make payments in these banknotes in order to avoid the redemption of notes and a drain of reserves.

In his analysis, A. Mitchell Innes emphasizes the significant role authorities played in the evolution and origins of money. He believed that money evolved from the “penal system” rather than from a pre-money market system. In his view, “the state (or any other authority able to impose an obligation) imposes liability in the form of a generalized, social unit of account-money thus used for measuring the obligation" (Wray, 9). Further, when the state or other authorities impose an obligation, they are able to determine how such an obligation can be satisfied in terms of pricing. Once again, the material of the means of payments issued by the state is unimportant. What is important is the nominal value

determined by the state, as well as the state's acceptance of it in payments made to the state.

Innes made a unique contribution to his integration of Chartalism with a credit theory of money. Additionally, political economist, Joseph Schumpeter further analyzed the "credit theory of money" in contrast to the "monetary theory of credit". He explained that in the monetary theory of credit, private "credit money" is viewed as a temporary substitute for "real money". A final settlement must take place in real money, which is the ultimate unit of account, store of value, and means of payment. Exchanges might take place based on credit, but credit expansion is strictly constrained by the quantity of real money (Wray, 10).

Therefore, in terms of economic activity, it is only the quantity of real money that matters. Schumpeter's view of the monetary theory of credit can be compared to the modern macroeconomic concept of a deposit multiplier. The key purpose of a deposit multiplier is to maintain an economy's money supply by determining the quantity of cash a bank must keep in reserve, as a percentage of bank deposits. Thus, a deposit multiplier relates the number of bank deposits to the amount of high-powered money (HPM). In the monetary theory of credit view, the real money that is the basis of deposit expansion should be controlled, preferably by a rule that will make the modern fiat money operate more like the metallic money of the hypothesized past (Wray, 10).

On the other hand, the credit theory of money highlights that in order to allow the growth of economic activity, credit usually expands. In turn, the

expansion of credit creates new claims on HPM even as it leads to production. However, because there is a clearing system that cancels claims and debts without the use of HPM, credit is not merely a temporary substitute for HPM" (Wray, 10). Schumpeter asserts that the role of high-powered money as an ultimate means of settlement is not required for most financial settlements.

In his discussion on credit and the clearing system, Innes refers to what called the "primitive law of commerce" is the constant creation of credits and debts, and their extinction by being canceled against one another, forms the whole mechanism of commerce (Innes 1913, p. 393 as cited by Wray, 11). He rejected the view that in modern days, credit was introduced as a money-saving device, where prior to this, all transactions were in the form of cash, or coins. Not only did Innes disagree with this, but he also insisted that the exact opposite was true. He believed rather than selling in exchange for an intermediate commodity ("the medium of exchange,") a sale is the exchange of a commodity for a credit (Innes 1913). His notion that as buyers we are debtors, and as sellers we are creditors, supports his view of the market as a clearinghouse for debts and credits, rather than a place of exchange.

We can now use Innes and Schumpeter's arguments to develop a deeper analysis of the monetary operations of a capitalist market economy, which the orthodox view of money does not allow for. Marx, Veblen, and Keynes characterize the monetary production economy as one that is filled with complex financial relations. Rather than disregarding money in order to understand the market economy, they believed that the money of account and credit-debt

relations are fundamental components of viewing the capitalist economy. This follows Innes argument that credits and debts preceded markets which in turn, created the need for markets. For example, in early Babylonia, authorities set prices for the most essential products, which presumably were accepted to satisfy obligations to the authorities. Only after establishing prices in money was the creation of markets attainable. This is an important point as it opposes the orthodoxy barter-based prices and relative prices. Instead, money and prices came first, and markets followed. As a result, markets developed further because those with tax liabilities but no goods and services which the government wanted to buy, had to produce for the market in order to obtain the means to pay obligations to the state.

Keynes understood the "money of account" to be the fundamental concept of the theory of money. He states that money as a unit of account comes into existence alongside the existence of debts, which are contracts for deferred payment, and price-lists, which are offers of contracts for sale or purchase (Keynes, 1930, p. 3 as cited by Wray, 15).

Similarly to Knapp, Keynes argued that both what serves as the money of account, and what will be accepted as money, is determined by the state. Keynes makes an important distinction between money and the money of account: "the money-of-account is the description or title and the money is the thing which answers to the description" (Keynes, 3–4). According to Wray (2014), Modern Money Theory gets its name from the following statement by Keynes:

> *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 double when, in addition, it 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. (Keynes 1930, p. 4)*

Keynes' belief that the right to "re-edit the dictionary" has been claimed for at least four thousand years suggests that Chartalism is applicable to all modern economies and further that the age of modern money started with the rise of authorities. Following Knapp, Keynes asserts that the key determinant of what serves as money is not merely legal tender laws but more importantly, the acceptance by the state. Keynes outlines the following three forms that state money could take; Commodity Money, Fiat Money and Managed Money (Keynes, p. 7 as cited by Wray, 16). He defines commodity money as, "actual units of a particular freely-obtainable, a non-monopolized commodity which happens to have been chosen for the familiar purposes of money," or "warehouse warrants for actually existing units of the commodity" (Keynes).

An example of commodity money is a gold coin valued at one currency unit. Fiat money (representative money), is created and issued by the State. It cannot be converted by law and holds no fixed value in terms of an "objective standard." Managed money is similar to Fiat money however, the State manages the conditions of its issue, and whereby it does holds a determinant value in terms

of an objective standard. An example of managed money is a paper note that is convertible to gold, even if the conversion rate is one currency unit per ounce of gold. Therefore, this proves that a gold standard system can be operated as a commodity or managed money.

Further, as Keynes argued, even a gold standard operates as a state money system, regardless of a commodity or managed money system, since the state can always "rewrite the dictionary," for example, by adopting a silver standard and a conversion rate. The state is free to choose a system based on commodity money, fiat money or managed money. Even if it chooses a strict commodity system, the value of the money does not derive from the commodity accepted as money or Chartalism begins when the State designates the objective standard which shall correspond to the money-of-account (Keynes 1930, p. 11 as cited by Wray, 18). Finally, it is clear that in all three cases, when the state dictates what it will accept at public pay offices, the nominal value of money is determined by the state.

We have established that the state defines money, but this does not mean it controls the quantity of money. However, the state can control its emission of currency. The state's purchase of goods, services, and assets purchased by the Treasury and central bank determine the quantity of currency created. After taxes are paid, the remaining currency goes to bank reserves, eventually, through monetary policy, these excess reserves are drained and replaced with bonds.

Hyman Minsky's view of money, based on the Chartalist approach highlights the "endogeneity" of money. He believed what made money unique is

its creation by financing banks and its destruction by fulfilling obligations on debt instruments. "Because money is created and destroyed in the normal course of business, the amount outstanding is responsive to the demand for financing" (Minsky, 1986, p. 249). This can be clearly shown on the balance sheets of banks. In accordance with Innes and Knapp, Minsky recognized that taxes give value to the money that is issued by the government. This is merely because, in order to pay taxes required by the government, people engage in wage labor in order to be able to pay taxes in a currency accepted by the government.

Through Lerner's approach of "money as a creature of the state", he developed his "functional finance" view of state budgeting. He believed that the state should increase taxes if the public's income were too high and threatened inflation. Additionally, he noted the state should sell bonds only if the public has too much money and not enough government bonds. Most importantly, he argued government finance should be functional rather than sound. By this, he meant achieving government goals such as full employment and low inflation. Lerner opposed the sound finance view of a balanced national government budget which aims to "balance" tax revenues against spending. He upholds the view that,

> *The government should never raise taxes to reduce its budget deficit, but rather should increase taxes only if inflation threatens. The government should never sell bonds (what most economists call "borrowing") simply because it finds itself with a budget deficit. Rather, bonds should be sold only if there is downward pressure on interest rates, pushing them below the central bank's target rate (Wray, 23).*

Lerner's functional finance approach insists firstly that the government is responsible for adjusting aggregate demand using taxes or spending to support the economy, without causing inflation. This clearly demonstrates that inflation is influenced by fiscal policy. Secondly, the government should only issue debt to adjust the interest rate, for the purpose of managing the money and government debt holdings in the non-government sector. This establishes an important relationship between fiscal and monetary policy.

Modern Monetary Theory (MMT) highlights the need for structural policies in order to achieve financial stability, price stability, and full employment. However, it rejects the approach that governments should avoid direct intervention to achieve full employment and low inflation. Rather, MMT supports the idea that the government should implement structural macroeconomic programs that oversee investment projects, pricing mechanisms, and the labor force. Therefore, it does not depend on increasing aggregate demand to achieve full employment.

3.3 Money as Public Monopoly

The Orthodox approach to economics considers money to be neutral; it does not impact the economy. It functions solely to ease the efficiency of transactions - it is in some sense arbitrary to the state of the economy. John Maynard Keynes, however argued the "monetary theory of production", saying that production happens for the purpose of money and that production both begins and ends with money. Other economists like Veblen and Marx agreed that money

was *not* neutral and in fact played an important role in the economy. Money, is instead, and *endogenous* factor of the economy. This is to say that the money supply is not some fixed quantity that has no implications for the real economy. When central banks enact fiscal policy to influence the economy, changing interest rates and reserve ratios, the money supply reacts to these changes; it adjusts itself to accommodate the new demand for loans that will arise from changes in the interest rates. Out of this we also know that loans *create* new deposits - which generates more money in the economy.

Looking at money as a non-neutral institution, we can see it in a more nuanced context. Many theorists and economic anthropologists have argued that money arose from the government's demand for taxes from citizens. Whether or not this is true, it is evident from the past that the government's demand for taxes is what validates currency. Money is a "creature of the state" and the state issues liabilities that can only be repaid in the form of a sovereign currency that they have issued. For example, when Britain colonized India and started demanding taxes, subsistence farming came to an end because individuals needed to search for wage labor in order to meet the government's demand for taxes in a certain currency.

" In a way, the modern state, as in ancient Greece, continues to serve a redistributive function in the economy, where it collects real resources (labor) from the private sector, and then redistributes them back to the private sector "more equitably" in the form of infrastructure, public education, government research and development, and via any other social welfare functions it has been asked to fulfill by voters."

The government decides what currency is acceptable and issues that currency - making them, like all other sole producers of goods, a monopolist. The government is the only institution that can issue currency. Like any other monopoly, the government has the ability to set prices instead of leaving equilibrium up to market conditions. Wray (2011) claims that "the best way to operate a money monopoly is to set the 'price' and let the 'quantity' float—just like the water monopolist does", and that the government unfortunately "usually does not recognize it operates a monopoly money" and believes "that it must pay 'market determined' prices".

If money is to be considered a "creature of the state", then its ability to function must rely in many cases on the state. Many people today consider crypto currencies like Bitcoin to be monetary instruments, yet its functions do not align with this title. One of the most important characteristics of these instruments is that they have an issuer who promises further action in the future. Based off of this rationale two essential promises are derived. The first being that the issuer will accept them as repayment for debt and secondly that they are convertible. Eric Tymoiogne offers a similar perspective when addressing money and alternative currencies. He uses an example of Easter eggs in the forest where easter eggs in an easter egg hunt are placed randomly around the forrest and the "bearers" are the people going out and attempting to find these eggs. These people can be acquitted to the miners of Bitcoin or the people who sell them once they are mined. Yet what Tymoigne focuses on in this example is who are the issuers of the Easter Eggs. These eggs do no magically appear out of thin air, they are

placed there by a third party. In relation to Bitcoin the question arises, who is the issuer? This is still an unknown and because of this many places do not accept Bitcoin. This would therefore invalidate not only as a liability but as a monetary instrument as well.

Tymoignes points out that one of the largest shortcomings of Cryptocurrencies is that they are not liabilities. Yet the reasons for why it fails as a monetary instrument are just as important when discussing its possibility of widespread acceptance. First looking at its supply, one would find that it is completely inelastic. The supply for Bitcoin is fixed at 21 million and since monetary instruments behave in a way that as the demand increases more are supplied and as demand falls less are supplied, Bitcoin would not fit this framework.

While the inability to pay back debts is vital in disproving cryptocurrencies worth as a monetary instrument, Tymoigne points toward its value as an important indicator as well. Based off the equation:

$$P_t = \sum_{n=1}^{N} \frac{E_t(Y_n)}{(1+d_t)^n} + \frac{E_t(FV_N)}{(1+d_t)^N}$$

It is known that financial instruments have a discount value of future streams of monetary payments, yet looking at this equation where P_t is the current fair value, Y_n is the income at a future time n, FV_N is the face value that will prevail at maturity, E_t indicates current expectations about income and face

value, d_t is the current discount rate imposed by bearers, N is the time lapse until maturity ($n = 0$ is the issuance time). This is a standard equation that many financial instruments utilize. In its application to cryptos its value can be determined as 0 (Tymoigne,2013). The shortcomings of cryptocurrencies as monetary instruments make them look ever more like Speculative assets.

Chapter 4

Cryptocurrencies

4.1 Do Cryptocurrencies fulfill the role of money?

Crypto currency and fiat money seem to be similar at face value. The European Central Bank (ECB) defines fiat currency as "any legal tender designated and issued by a central authority that people are willing to accept in exchange for goods and services because it is backed by regulation and because they trust this central authority." Cryptocurrency, however, is not legal tender and is not back by a central government or bank. It is represented digitally where its supply is controlled by an algorithm. Both fiat currency and Cryptocurrency are mediums of exchange which can be used to purchase goods and services as well as store and transfer value.

Cryptocurrencies operate in a decentralized manner. Aside from the absence of a central bank or other authorities, they are a decentralized currency primarily because they do not require any financial intermediaries to make transactions. "In line with the development of virtual money ECB pointed out that the word "money" had to be excluded from the definition since it becomes clear that virtual currencies do not have the nature of a highly liquid asset and have not reached the level of acceptance commonly associated with money" (Dibrova, 2016).

To determine whether cryptocurrencies can fulfill the role of money in the economy, we first consider the three functions of money: i) medium of exchange, ii) store of value, and iii) unit of account. This section will analyze why cryptocurrencies can be suitable to fulfill the role of medium of exchange but

cannot perform the other two functions of money; a store of value and unit of account. To effectively do so, it is important to first understand how each Cryptocurrency functions. We will use the following four cryptocurrencies previously mentioned to develop this analysis; Bitcoin, Ethereum, Litecoin, and Ripple. We begin with the most popular Cryptocurrency created in 2009, Bitcoin.

Bitcoin functions as an algorithmic currency with the supply and growth rate determined by mathematical computation. Bitcoin allows online payments to be sent between parties without the use of a trusted third party or financial institution. Therefore, the supply of Bitcoins cannot be manipulated by any government or central authority. A hash algorithm functions to convert an input of numbers and letters into an encrypted fixed-size output, which is called a hash. The hash algorithm holds the following properties; it is a one-way function, and it produces a unique output. Therefore, it is impossible to generate original data from its generated hash. An electronic coin is a chain of digital signatures.

Coins are transferred from one owner to the next by digitally signing a hash of the previous transaction and public key of the next owner, which are added to the end of the coin. These signatures provide verification of the chain of ownership which ensures control of ownership. While digital signatures replace the need for a financial institution, it still requires a solution to prevent double-spending. This leads us to Nakamoto's proposal for a timestamp server. He states that while a payee can use digital signatures to verify the chain of ownership, the payee cannot verify that one of the owners did not double-spend the coin. "A common solution is to introduce a trusted central authority, or mint, that checks

every transaction for double spending. The problem with this solution is that the fate of the entire money system depends on the company running the mint, with every transaction having to go through them, just like a bank" (Nakamoto, 2).

The purpose of a timestamp server is to take a hash of a block of items to be time stamped and published. As a result, each timestamp in its hash will form a chain, with each new timestamp reinforcing the previous one. All transactions in Bitcoin are stored digitally and recorded in a blockchain. Finally, we can see how unlike fiat currencies which central authorities and central banks can control, Bitcoin is fully decentralized and dependent on cryptography to control transactions and manage its supply.

Ethereum is the second largest Cryptocurrency in terms of market capitalization today. Ethereum is a blockchain based, open software network which allows anyone to build and use decentralized applications. Like Bitcoin, Ethereum is not controlled or owned by anyone. However, Ethereum differs from Bitcoin in terms of purpose and capability. While Bitcoin offers one application of blockchain technology namely, a peer to peer electronic cash system, Ethereum offers numerous forms of decentralized blockchain applications. Ethereum is considered to be more flexible and easily adaptable because users can decide for what purpose they wish to use the platform. Aside from its use as a tradable currency, users are primarily developers who wish to build apps that use the Ethereum blockchain, as well as those who wish to interact with smart contracts on the blockchain.

A smart contract is a computer code which facilitates the exchange of money, content, property, shares, or anything of value. These smart contracts run with no possibility of fraud, censorship, or third-party interference. The Ethereum blockchain tracks the state of every account. In 2016 The Ethereum Foundation stated that there is no concrete policy in place to determine the amount of issuance and the function it will serve. However, they guarantee that they consider the current maximum issuance to be a ceiling and the new issuance is expected to be much less. Therefore, there is evidently a lack of concrete and reliable commitment to a monetary issuance policy, similar to Bitcoin.

According to Ammous, Bitcoin's processing power is approximately 300,000 times larger than that of Ethereum. Ammous notes that this means, "it is far more conceivable for a relatively small coordinated group of computers to alter Ethereum protocol by controlling a majority of the network. Secondly, the dedication of a large pre-mine stock of currency to the developers of the platform means that software development, processing power, and holdings of the currency are all concentrated to a large degree in the hands of the Ethereum Foundation, giving it some degree of discretion in changing the rules of the currency, which no such party holds in the Bitcoin network" (Ammous, 43).

This was realized after the first high-profile smart contract of Ethereum, the Decentralized Autonomous Organization (DAO), was hacked. The Ethereum Foundation edited the blockchain to prevent the hacked ether to be cashed out.

Additionally, they created a new chain which put the ether that had been hacked in the control of the Ethereum Foundation. Using this example, Ammous argues "Ethereum's blockchain cannot really be said to be an accurate immutable ledger of transactions, such as that of Bitcoin, as it was possible to roll the chain back due to one central party controlling a majority of the software development, coin stocks, and processing power" (Ammous, 44).

Although Ether is designed to function as a medium of exchange by way of smart contracts facilitating the exchange of money, it is not designed to be a store of value or unit of account. This is in part due to Ether's lack of a credible method of issuance as well as its nature as a free-trading currency. The first problem with Ether's absence of a stable currency is that potential users are not able to estimate their actual costs since costs fluctuate with the currency. Additionally, if the smart contract platform saw an increase in demand for the currency, prices would rise which would leave current users with higher costs for their contracts? Therefore, potential users could only accurately estimate costs and benefits if the smart contract network relied on a stable currency. These factors, as well as Ethereum's control of processing power and coin stockpiles to exercise significant discretion in the future of the currency, suggests that the ether coins will not be able to attract significant demand as a store-of-value.

Ripple is a Cryptocurrency, created by a private company, designed to facilitate fast and cheap transactions. Ripple allows financial institutions, intermediaries, and individuals to purchase a stock of the currency to pay for the transaction fees for each transaction they wish to make. These transactions must

be paid with the ripple token (XRP) and can be made in any digital currency, fiat currency, or financial asset. For each transaction, the XRP that is used is destroyed; therefore, the XRP supply constantly shrinks. Ripple adopts a distributed ledger which means it does not require intermediaries.

However, as Ammous points out, "given that the ledger is maintained by Ripple, this creates a vulnerable single point of failure, which is both a security liability and a Gordian knot of overlapping international rules and regulations that may in fact end up simply adding another layer onto the many existing layers in money transfers rather than simplifying them" (Ammous, 45). Unlike Bitcoin, Ripple does not use proof of work calculations, that verifies the accuracy of all transactions without relying on trust in a third party. Instead, according to Ammous, "Ripple's system relies on the security and honesty of Ripple Labs." Therefore, "Ripple is not removing intermediation from international transfers, it is offering itself as an alternative to all existing channels of intermediation which have evolved over centuries of iterative success and failure" (Ammous, 45). Ripple as a currency poses many of the same problems with that of Ether. Since the cost is expressed in a fluctuating currency, potential users cannot accurately estimate the cost of transactions. This would require transaction costs to be denominated in a stable, standard currency. XRP cannot be considered a form of money because it is merely designed to process transactions through the Ripple network, and not intended to be a medium of exchange, store of value, or unit of account.

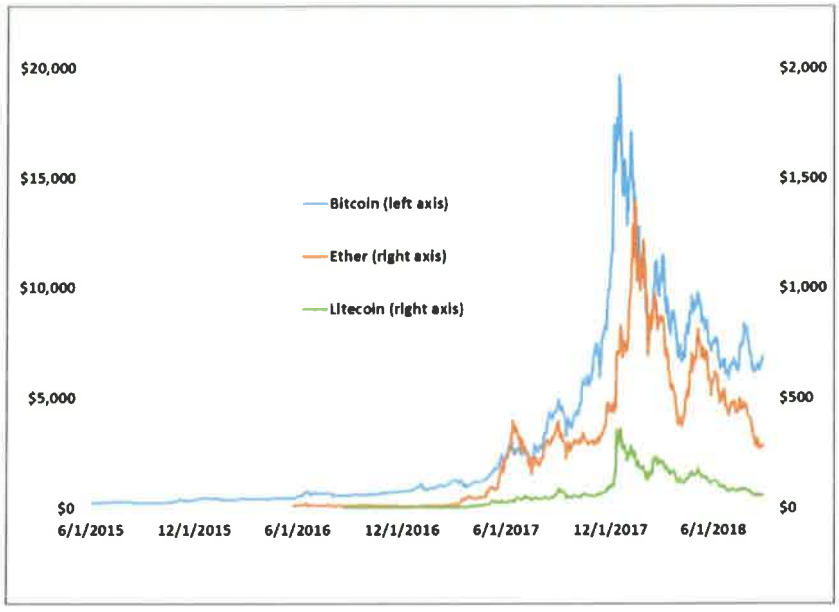
Litecoin, created in 2011 by Charles Lee, is a Cryptocurrency highly comparable to Bitcoin, primarily because it was created based off Bitcoin's original code. While Litecoin and Bitcoin have identical theoretical supply growth rates, Bitcoin's supply growth rate is always lower since its creation predates Litecoin by three years. While there is nothing to differentiate the monetary policy of the two currencies, the difference in the processing power is what has guaranteed Bitcoin the supremacy in attracting investments and in use for settling transactions. Bitcoin's hashing power is roughly a million times larger than that of Litecoin, making it a network far more secure and resistant to attacks, and making its monetary policy far more credible.

4.2 Medium of Exchange or Speculative Asset?

The use of cryptocurrencies as a medium of exchange might appeal to potential users because of the low transaction costs, and the absence of a trusted third party, which would allow for users to purchase certain goods that they couldn't elsewhere, such as illegal drugs. However, the decision to use virtual

currencies as a medium of exchange is dependent on the currency's acceptability, volatility in its price, and confidence in the network. If the cryptocurrency is viewed as a speculative investment, volatility in the price may increase from demand for the asset. We will use Bitcoin to determine whether cryptocurrencies are alternative currencies or speculative assets.

In theory, if cryptocurrencies are used as a medium of exchange, to purchase goods and services, competition with the US dollar and other forms of fiat money will arise, which will affect the value of fiat money. However, if a cryptocurrency is used as an investment, there will be competition among large financial assets such as government bonds and stocks. To characterize the use of virtual currencies as a speculative investment, we begin by observing their price movements and volatility.



Source: Coinbase, accessed through the Federal Reserve Bank of St. Louis Economic Data website on August 27, 2018.

Fig 4.1: Cryptocurrency Values from June 2015 – June 2018

From figure 4.1 above, it is evident that the price of a Bitcoin saw tremendous growth from $993 in January 2017, to $19,650 by December 2017. However, it is important to note, directly after this increase, in less than a two-month period, the price significantly decreased by 65% to $6,906. Thus, from the volatility in Bitcoin's price, we can recognize that cryptocurrencies do not function well as both a store of value and as a unit of account. The fluctuation of cryptocurrencies value in a short period of time, means that goods and services would need to be repriced in units of cryptocurrency frequently. We can further prove that cryptocurrencies function poorly as a store of value by comparing Bitcoin's rate of inflation to that of the U.S. dollar. For example, "Bitcoin lost almost 53% of its value in the first half of 2018, which equates to a 346% annualized rate of inflation. In comparison, the annualized inflation of prices in the U.S. dollar was 2.1% over the same period" (Bureau of Labor Statistics, 2018). Therefore, the pricing of Bitcoin and its high volatility show its use primarily as a speculative investment.

The scarcity of Bitcoin is controlled by miners, who effectively determine the supply of bitcoins, shown in figure 4.2 below.

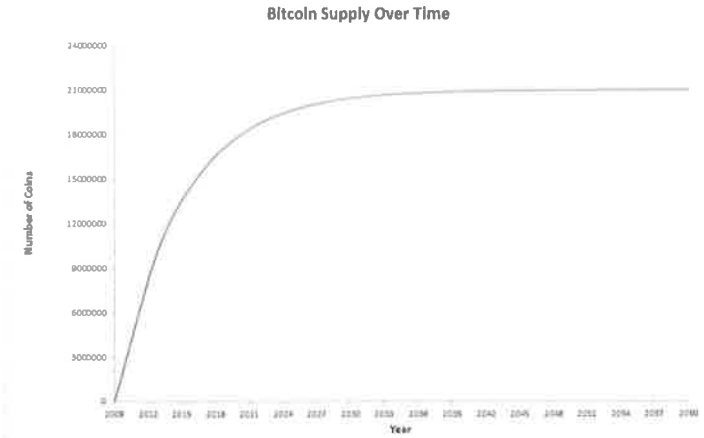


Fig 4.2: Bitcoin Supply Over Time 2009-2060

From its creation in 2009 until 2040, the supply of Bitcoins will continue to increase at a diminishing rate. By 2040, the supply of Bitcoins will plateau at 21 million. Although the supply of Bitcoins today is predictable, the future demand compared to supply, specifically beyond 2040, is highly unpredictable. Thus, the future value and use of Bitcoins is uncertain. Finally, by considering deflationary effects we can further see why Bitcoins will function as an investment, as opposed to a medium of exchange. For example, based on figure 4.2, if the demand for Bitcoins were to increase at a steady rate, demand would exceed supply. This in turn, would lead to an increase in Bitcoin prices, which would ultimately cause deflationary effects.

4.4 Bitcoin: A Speculative Asset, not a Safe-Haven

Recent discourse surrounding Bitcoin as a safe-haven points to the characteristics it shares with the traditional safe-haven: gold. The view that Bitcoin

acts as a safe haven is put forth by the idea that Bitcoin is uncorrelated with any financial turmoil and negative stock returns. However, today further research primarily finds that Bitcoin can only be a safe-haven during extreme market turmoil, and only for certain currencies, namely; CAD, CHF, and GBP. Therefore, this section will argue that it is not appropriate to consider Bitcoin a safe-haven in global markets during times of market stress.

According to Smales, "for an asset to truly act as a safe-haven then we must be able to buy and sell the asset quickly, at a known price, and at relatively low cost" (Smales, 2). As asset prices collapse during crisis, investors look to move to safer and more liquid assets. To determine Bitcoin as a safe-haven asset, we consider its properties in times of crisis. Most important is Bitcoin's returns, liquidity, and price discovery. Research suggests that compared to traditional assets, "price discovery is more difficult, volatility significantly higher, liquidity significantly lower, and transaction costs much higher in Bitcoin markets" (Smales, 2). To examine why Bitcoin should not be considered a safe-haven, we compare its returns with that of other assets, as shown in table 4.3 below.

Panel A: Overall sample	Bitcoin	Gold	10Y Notes	SP500	Nasdaq	Apple
Gold	0.00					
10Y Notes	0.00	−0.33				
SP500	0.02	−0.14	0.36			
Nasdaq	0.02	−0.12	0.29	**0.92**		
Apple	0.02	−0.04	0.20	**0.58**	**0.69**	
Twitter	0.04	−0.02	0.10	**0.22**	**0.28**	**0.18**

Panel B: Sub-sample correlation with Bitcoin returns	Gold	10Y Notes	SP500	Nasdaq	Apple	Twitter
2011–2013	−0.24	−0.14	−0.17	−0.13	0.08	0.02
2014–2016	0.02	0.02	0.00	0.01	−0.01	0.05
2017–2018	0.05	0.01	0.08	0.06	0.06	0.02

Table 4.3: Correlation of Returns, Sample from August 2011 – June 2018

Table 4.3, panel B shows the correlation between Bitcoin returns with that of gold, 10-year note yields, S&P 500, Nasdaq index, Apple stock, and finally Twitter stock. Bolded values represent significance at the 1% level. Therefore, it is evident that Bitcoin has no statistically significant correlation with any of the other assets observed. This further indicates that Bitcoin cannot be proven to hold any clear safe-haven properties, unlike gold which is shown to be negatively correlated with returns.

Chapter 5

Risks, Regulation, and Policy Implications surrounding Cryptocurrencies

5.1 Risks

This paper has worked to establish the shortcomings of cryptocurrencies in terms of the three classic criterion of currency in order to further the discourse on the claim that crypto currencies behave more like an asset class than a currency. Through the theoretical frameworks previously discussed, we have established its failure to meet the conditions necessary to be considered a currency. However, while discussing these shortcomings, it has become impossible to ignore the risks associated when dealing with Cryptocurrencies. These risks, that for the most part stem from lack of regulation, would need to be addressed and mitigated in order to even begin considering crypto currencies as viable currencies.

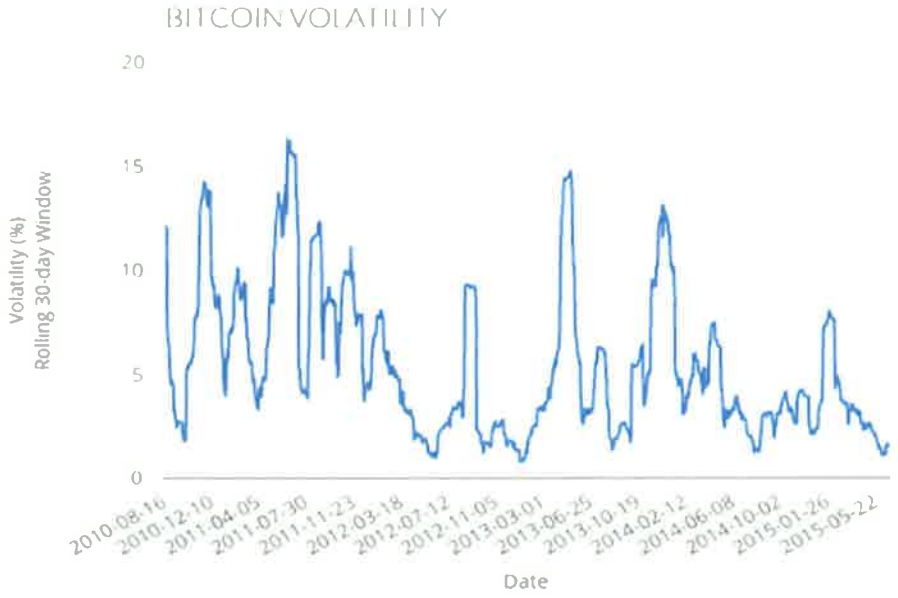
5.1.1 Volatility

One of the defining properties and risks associated with Cryptocurrencies today lies in its volatility. Due to the necessity of Price Stability, when discussing the widespread acceptance of a currency as "money", the ability to address the

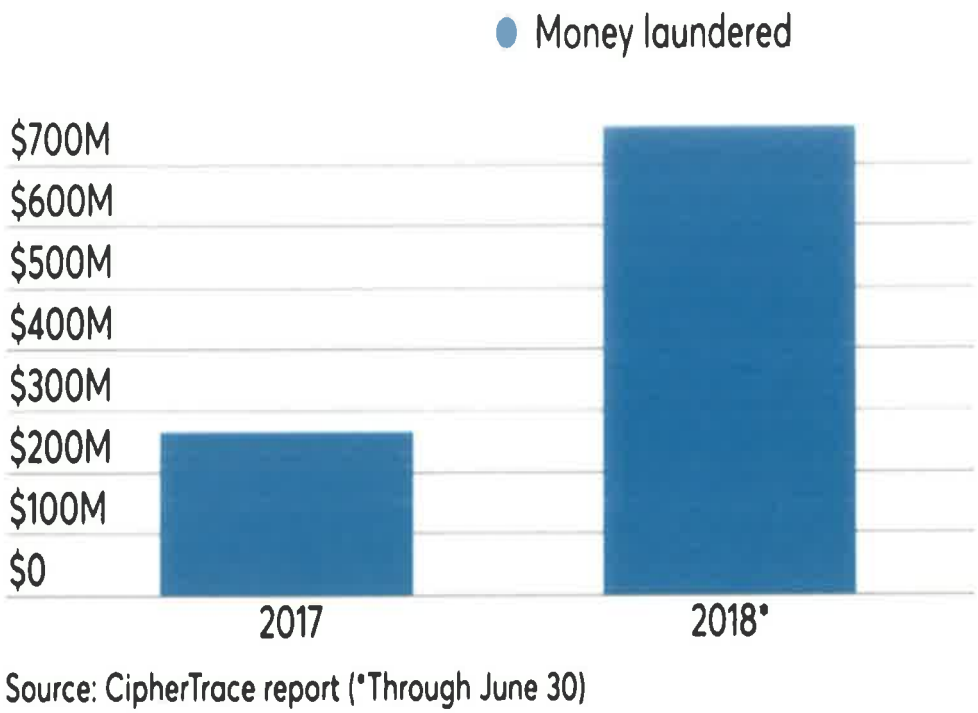
roots of this issue becomes paramount. One of the main drivers of Volatility in the Cryptocurrency market stems from its lack of intrinsic value. Since cryptocurrencies are not legal tender, they have no backing in any fundamental commodity nor by any bank and therefore have no intrinsic value. For the most part, their price is derived from the forces of speculation by investors. Although the risk is naturally inherent when investing, the lack of intrinsic value leading to Volatility induces uncertainty in the consumer. A sense of certainty is vital when investing in an asset because without certainty the challenge of getting people to buy into something new becomes exponentially tougher.

As previously mentioned, cryptocurrencies are not legal-tender and therefore their value is endogenously created. This problem would be more easily addressed if there was a central authority prevalent. Yet, one of the defining attractions to cryptocurrencies was its decentralized platform. When the first Cryptocurrency was introduced it drew interest from many because of the public distrust in the banks. Unfortunately, there is an opportunity cost that comes with the lack of a central authority. In the absence of central authority, there are little to no regulations in the Cryptocurrency market.

Without these regulations, opportunities arise for investors with a large portion of market power to influence the market for personal gain. For example, with Bitcoin, a large investor can express public interest in purchasing a large portion of coins leading to the average investor to speculate that a spike in prices is imminent. Once a favorable target is met these investors buy or sell eventually causing prices to drop again.



In 2015 BitMex, a Cryptocurrency trading platform launched the first ever historical volatility index. The BitMEX 30 Day Historical Volatility Index tracks the rolling 30 days realized volatility by using daily 10:00 GMT to 12:00 GMT 1-minute Time Weighted Average Prices on Bitfinex for Bitcoin / USD, represented in figure 1 (Hayes, 2015). This index has become vital when determining future levels of volatility based on historical analysis.



(Figure 2)(Crosman, 2018)

5.1.2 Money Laundering

When Sashito Nakamoto released the first Cryptocurrency, Bitcoin, his intentions were to create a Peer to Peer electronic cash system that removed the third-party interference. Anonymity, as well as the removal of a central regulator, seemed like a great idea to many given the current financial turmoil that people were enduring. Yet, as seen with Volatility, the absence of the third-party regulator can have unintended consequences in the market.

One of these consequences has been the development of Money Laundering through the use of Cryptocurrency. Money laundering is possible through a process called "Layering". This is the act of receiving money from

multiple parties, and then redistributing it back. The anonymity is key here because even though, all transactions can be tracked on an open ledger people can still go by fake names making it nearly impossible to track. Cipher Trace, a company whose mission is to provide safety to business and governments when dealing with the Cryptocurrency market, found that in 2017, $266 million was laundered via crypto. So far in 2018, that figure stands at $761 million. That is just the laundering of stolen funds, not a complete estimate of all dark market transactions using crypto, represented in figure 2.

Yet the scope of its illegal uses is not limited to Money Laundering, Oxford law school conducted a study in order to quantify just how much is being used for illegal purposes they concluded:

> *"We find that illegal activity accounts for a substantial proportion of the users and trading activity in Bitcoin. For example, approximately one-quarter of all users (25%) and close to one-half of Bitcoin transactions (44%) are associated with illegal activity. The estimated 24 million Bitcoin market participants that use Bitcoin primarily for illegal purposes (as at April 2017) annually conduct around 36 million transactions, with a value of around $72 billion, and collectively hold around $8 billion worth of Bitcoin."(White, 2017)*

Prior to the release of this report, a significant moment for the public in realizing the cryptocurrencies alternative uses for cryptocurrencies was the dismantling of the "Silk Road". The "Silk Road" was an online marketplace for

the purchasing of illegal goods, ranging from drugs to guns, to the ability to call a "hit" on someone. In fact, while the site was in operation, it is estimated that more than 100,000 users bought and sold more than $200 million worth of contraband including drugs, fake ID's, and pornography (Ramey, 2018).

Although it was understood by many that cryptocurrencies were being used for illicit purposes, the extent to which was a wakeup call for authorities such as the FBI. To the extent that as of 2017, "approximately 75 percent of its financial crime related man-hours investigating digital currency" (Fruth, 2018, par. 36). This is an extraordinarily large number and it implies that the FBI views the use of Cryptocurrency as a legitimate threat to national security. Although some people say that FIAT money is used for illicit and illegal purchases, it is not simply the fact that cryptocurrencies are used for such purposes, rather the volume they are used as compared to conventional purchases.

5.1.3 Climate Concerns

Cryptocurrencies are a relatively new way of viewing money, yet the risks that come along with its introduction may leave it in the shadows for quite a bit longer. A lot of the discussion today around cryptocurrencies and their risks come from the volatility aspect as well as the fact that there is no centralized authority monitoring it and therefore leaving it susceptible to online attacks. What many people fail to realize is how

dramatic of an effect Crypto currencies have on the environment. The world, for the most part, has brought environmental protection to the forefront of issues that need to be confronted – however, some countries/administrations fail to redirect their focus to these issues.

Most people outside of the disciplines of economics and computer science do not understand the workings of Bitcoin, let alone the environmental risks that come along with them. For this study, I examined the work of Ton Truby, from the school of law at Qatar University. According to Truby, Bitcoin mining and transactions are an application of Blockchain technology employing an inefficient use of scarce energy resources for a financial activity at a point in human development where world governments are scrambling to reduce energy consumption through their Paris Agreement climate change commitments and beyond to mitigate future climate change implication.

Blockchain Technology, which will be discussed further in this paper, is a ledger of all transactions across a peer to peer network that is completely decentralized. The costliest user of the Blockchain Technology is by far and out Bitcoin. Truby recognizes the potential security and financial benefits that Cryptocurrencies like Bitcoin present. However he also recognizes that the mining of Bitcoin requires more energy than that being used by the whole country of Denmark, and that that poses some serious issues (Truby, 2018).

Therefore, if this were to possibly be considered a currency and introduced as an alternative to fiat money, the amount of energy used and consequently the amount of CO2 released would be exponentially grow greater. In order for cryptocurrencies to even begin to be considered as an alternative currency or even a widely invested asset, a way of obtaining the currencies without emitting a ridiculous amount of energy will be necessary.

5.2 Existing Regulations

Over the past few years, the adoption of cryptocurrencies has grown exponentially forcing lawmakers to understand how these cryptocurrencies work and the best way to regulate them. This differs from country to country, and even state to state in the US due to not being touched on a federal level, yet. Therefore, this section will work to outline the different existing regulations that are prevalent throughout the world.

5.2.1 The United States

The United States is a peculiar case in relation to Cryptocurrencies because there has yet to be any legislation passed on the Federal Level. To begin, the only bill that has been drafted recently on the federal level is the Uniform Regulation of Virtual-Currency Business Act (URVCBA). Although this bill has yet to be passed, its intentions are not to provide specific regulations to be implemented, rather a structure for guidance in creating such regulations.

Therefore, this means that states are up to chose how cryptocurrencies are implemented and how they can be regulated.

For the most part, states have been hesitant to touch crypto currencies mainly because there is still a lot to be learned about them. However, as they have garnered more attention in recent years, some states have began to pay more attention to them. For example, Arizona passed the Arizona House Bill 2417, outlining regulations for blockchain technology, the main platform utilized by many cryptocurrencies (Rep. Weninger, 2017).

5.2.2 China

Risks surrounding Cryptocurrencies are generally consistent in most advanced modern societies. Similar to the United States in this recognition, China has implemented direct and indirect regulations in an attempt to mitigate these risks to the public. Chinas regulations began with restrictions surrounding initial Coin Offerings (ICO's). ICOs are similar to IPOs in the sense that funds are accumulated through outside investors in exchange for a stake. In the case of ICO's FIAT or other Cryptocurrencies are traded for tokens of the new currency being created. The first regulation in relation to cryptocurrencies began in the start-up phase by placing a ban on ICO's. This regulation works because ICOs that raise cryptocurrencies such as Bitcoin and Ethereum through the irregular

sale and circulation of tokens are essentially engaging in public financing without official authorization, which is illegal (LOC).

The regulations implemented on ICOS do not only encompass the initial ban on these coin offerings but also further introduce new regulations surrounding the platforms to which cryptocurrencies operate in. The companies who provided these platforms were informed under the new ICO rules they were prohibited from selling and purchasing Cryptocurrencies. The goal of the government was to cease the usage of cryptocurrencies completely in the economy and therefore provided a set date as to when these would be implemented.

Separate from the ICOs was Chinas regulations facing Bitcoin mining. Aforementioned, in order to obtain Bitcoins originally without the purchasing of them mining with the use of an algorithm, is necessary. Realizing the energy costs alone associated with mining alone, Chinas leading group Internet Financial Risks Remediation reportedly requested that local governments remove existing, preferential policies for Bitcoin mining companies in terms of electricity prices, taxes, or land use, and guide the orderly exit of such companies from the Bitcoin mining business. For the most part, China was able to achieve its goal due to findings that concluded while at the beginning Bitcoin traded with Chinese Yuan was near 90% as of 2018 global Bitcoin trading to under 1% (LOC).

Chinas forms of regulation differ then the stereotypical forms of regulation due to their regulations centering on abolishment rather attempting to fix issues associated with Cryptocurrencies. This is significant for a multitude of reasons

beginning with the fact that if China considered Cryptocurrencies to be a potential alternative to FIAT money regulations wouldn't be put into place to ensure their abolishment. Interestingly enough although China has implemented very strict policies surrounding cryptocurrencies since its introduction, the Central Bank of China has actually begun discussions the PBOC reportedly completed trial runs on the algorithms needed for a digital currency supply, "taking it a step closer to addressing the technological challenges associated with digital currencies."(Yang, 2017). This is consistent with my thesis that right now Cryptocurrencies are an insufficient alternative to Fiat Money and rather behave more like a Speculative Asset. Yet, to say that the algorithms behind these cannot be utilized by central banks in the future would be rash.

5.2.3 European Union

Prior to the introduction of Cryptocurrencies, the first Payment Services Directive was implemented in order to provide a legal framework for payment services. Since the implementation of the First Directive, there has been three more culminating in the Fourth Payment Services Directive. The prior directives saw an inability in its application to Cryptocurrencies as they were very broad when discussing virtual money and payment services as a whole. The Fourth Anti Money Laundering Directive was implemented in 2015 whose goal was to eliminate channels for money laundering. With Cryptocurrencies as well as other

virtual currencies not directly be addressed in this framework, the European Commission felt adjustments were necessary.

> *In 2016, the European Commission released proposed changes and additions to the Fourth Anti Money Laundering Directive. The proposed changes outlined custodian wallet providers and virtual currency exchange platforms within the scope of the AMLD, meaning they would be obligated to fulfill due diligence requirements and have in place policies and procedures to detect, prevent, and report money laundering and terrorist financing. (LOC) This proposal was the first major step by the EU in addressing risks associated with the use of Cryptocurrency. Since then there have not been really any regulations passed regarding Cryptocurrencies specifically, rather acknowledgments that the platforms they run on could possibly be utilized in the future.*

5.3 Policy Implications

In the United States, the FED has the ability to create monetary policy in order to achieve desired levels of price stability and low unemployment. A major debate surrounding cryptocurrencies today is as they become more prevalent, is it possible that its adoption could lead to difficulties in implementing monetary policy by the FED.

Currently, one of the essential ways that Central Banks implement monetary policy is through its control of the money supply. Since nearly all the money prevalent in society today is FIAT money, this has been a relatively effective method. The introduction of cryptocurrencies is worrisome because as they become more prevalent and gain more market capitalization it becomes tougher to control the level of inflation. This implies either adjustments to FIAT money or adoption by central banks of certain cryptocurrencies.

The adoption of cryptocurrencies by central banks has also been discussed, but its implications on monetary policy are still prevalent. Proponents argue that, if individuals held a CBDC on which the central bank set interest rates, the central bank could directly transmit a policy rate to the macro economy, rather than achieving transmission through the rates the central bank charged banks and the indirect influence of rates in particular markets (Perkins). The implications of the effect of Crypto currencies on monetary policy are still being studied before the process of widespread adoption begins. Governments and banks all around the world are spending time thinking about crypto currency and its implications in an attempt to mitigate risks to the implementation of Monetary Policy.

6

Conclusion

This paper has worked to establish and understanding of the origin of money in order to better understand the theoretical frameworks of Chartalism and MMT, and to apply these frameworks to Cryptocurrencies. In its current state, it is hard to consider Cryptocurrencies as an alternative to Fiat money, due to its shortcomings in terms of the functions of a currency. Using the Chartalist framework, I was able to assert the importance of the functions of money that Crypto currencies fail to complete. The functions of a currency are at the center of the Chartalist framework, which claims that less attention should be paid to the function of money as a medium of exchange as opposed to its other functions.

To say that Crypto currencies will not be utilized in the future would be harsh and ignorant to the benefits of crypto currencies. Many central banks have already begun the process of analyzing algorithms and platforms for their own potential forms of virtual currency. Unfortunately, the many financial and security related risks that are associated with Crypto currencies prevent them from being

universally accepted. I believe that once real regulations are implemented in order to monitor crypto currencies, it will become possible for crypto currency to be instituted as legal tender. However, for the moment, crypto currencies remain to behave more like an asset class than a currency.

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