

Why is Bitcoin not money? A Post-Keynesian view

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Abstract

Bitcoin got increasing popularity and was considered by the public as a great investment due to huge overvaluation in 2017. In parallel, economists and high-level technicians started to advocate the use of bitcoin and other cryptographic currencies as an alternative to national currencies. However, bitcoin is far from being considered as money, so it is hard for a monetary and payment system to emerge based on these technologies. This paper, apart from briefly presenting the Bitcoin System, shows why bitcoin is not money in the light of the Keynesian theory. We use Keynesian essential properties of Money and Modern Money Theory to define money, and to show that cryptographic currencies are not money. We then go back to Keynes' theory of portfolio choice, established in Chapter 17 of the General Theory, to show what bitcoin really is: at most, bitcoin is a perfect virtual commodity, a virtual liquid speculative asset.

Keywords: Cryptocurrencies; Modern Money Theory; Post-Keynesian Theory.

JEL Classification: E12; E42; E49.

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1. Introduction

“everyone can create money; the problem is to get it accepted”
Hyman p. Minsky, *Stabilizing an Unstable Economy*, 1986, p.255

In 2017, the World witnessed huge overvaluations on the price of Bitcoin and people started to see it as a great investment. For that reason, the popularity of bitcoin and of other cryptographic currencies increased exponentially. Just to illustrate the overvaluations, the bitcoin value in US Dollars was stable in less than USD \$10,00, from its creation in 2009 until 2013. In 2013 it increased to something close to \$100,00, and it reached a peak of \$1.091,97 on November 20th of the same year. This was approximately 900% appreciation in two months. It was the biggest percent overvaluation, but it was just getting started in absolute terms. On January 2nd, 2017 the bitcoin value was \$996,48, in June it reached \$2.974,59 and in December \$19.346,60, the historical peak.¹

Undoubtedly, whoever bought bitcoins in 2013 became rich. If a person spent \$1.000 dollars to buy 100 bitcoins in 2013, that same person has \$1.934.660,00 at the end of 2017. Whoever looked at those numbers could easily get tempted to invest on bitcoins. That is why many people have discovered and recognized bitcoin as a great investment at the time. However, in 2018, its price only decreased, and many people did not get the expected return on their investments.

But if bitcoin had only gotten popularity around its value, there would not be a motivation for this article. With increased popularity, many people, including economists and high-level technicians of relevant institutions like central banks, started to advocate the use of bitcoins and of other cryptocurrencies as an alternative to national currencies, the “money of the future”. Bjerg (2016, p.69) said, using Churchill’s famous quote, that “Bitcoin is the worst form of money, except for all the others”. In fact, the creation of the bitcoin itself is based on the idea of getting rid of intervention and control of a tardy party in the global monetary and payment system (Nakamoto, 2008, p.2).

However, bitcoin and other cryptocurrencies have some properties and characteristics that do not match Keynes’ understanding of money. This paper aims to use a Keynesian view of money to show that bitcoin is not money and so, a global monetary and payment system can hardly be established based on bitcoin. To show that, we use what Keynes and the Post-Keynesians define as essential properties of money in a monetary production economy. We then complement the analysis with a more recent Post-Keynesian approach: we show what money is in nature, and what

¹ All data about Bitcoin value can be found at [Bitcoin.com](https://bitcoin.com)

its fundamental characteristics to the Modern Money Theory (MMT) are. We will make an effort to show how MMT and the post-Keynesian view are related, how similar they are. MMT is based on many authors' contribution, including Keynes, so it is post-Keynesian, but it is even much more. With this framework we can easily understand why bitcoin is not money. But to do so, we must first briefly present how bitcoin works, its characteristics and properties. Once it is understood that bitcoin is not money, we will then go back to Keynes and his theory of portfolio choice established in Chapter 17 of the General Theory, to show what bitcoin really is. We must say that this work is essentially in a theoretical level rather than an empirical or mathematical analysis.

This analysis tries to contribute with the policymaking debate around what should be done with bitcoin and other cryptocurrencies. While some countries want to regulate cryptocurrency operations, and still do not know how because it is not well defined, some people can argue that it should not be regulated by any nation, but the countries should adopt cryptocurrencies as monetary instrument instead. We can see that this is a completely grey area. We hope to contribute with this debate by establishing what cryptocurrencies are and what they are not.

From now on, we will limit the analysis only to bitcoin. We recognize that a huge range of other cryptocurrencies exists, but the bitcoin is a benchmark for them. Their operations are essentially the same in terms of technology. Also, bitcoin is the most relevant cryptocurrency in market capacity. An example of the relevance of bitcoin is that smaller cryptocurrencies are now priced in terms of bitcoin. So, this restriction to the analysis is justified since bitcoin is the most relevant cryptocurrency and the most illustrative one. We will now only talk about bitcoin, but our analysis and our conclusions are valid for any cryptocurrency that follow bitcoin's structure.

The paper is structured as follows: the first section briefly describes the Bitcoin System, its creation and definition, the operation of the Blockchain technology and a few notes on the bitcoin unit. The second section of the paper establishes our Post-Keynesian approach on money. We divided this section into three: the fundamental characteristics of the conceptual framework Keynes developed, and how money is important in it; the original Keynesian and Post-Keynesian essential properties of money in a monetary production economy and the Modern Money Theory approach; and the third section shows a contrast between what characterizes money in the Post-Keynesian approach of the second section and what we have seen how bitcoin is characterized in the first section. We show that bitcoin is not money and why. Then a brief subsection talks about money functions, and in addition we go back to Keynes' theory of portfolio choice to show what

bitcoin really is. Final remarks come after the third section with some openness for future works.

2. The Bitcoin system in a nutshell

The Bitcoin System was created in 2009 by Satoshi Nakamoto. Nakamoto's real identity is still unknown. Nobody knows if it was only one man or a group of people working under the pseudonym of Satoshi Nakamoto, although there are a few clues. The strongest clue is that Nakamoto relates to the Cypherpunks of the 1990's. His paper that established the Bitcoin System in 2008 references to some Cypherpunks projects, which only a handful of people knew about².

The Cypherpunks were a group of mathematicians, hackers and cryptographic analysts concerned with cryptography and privacy-enhancing technologies. They defended the use of these techs to provide freedom from the Government and from the State. Their political agenda has some points in common with the libertarian and the anarchist ones. The first embryo of the idea of cryptographic currencies was developed by this group, highlighting Nick Szabo (creator of the BitGold) and Hal Finney, two of the most probable names for Nakamoto's real identity.

The main idea of the Bitcoin System is that there must be a solution for the double-spending problem other than a trusted third party, like a bank. The double-spending problem emerges when the first party transfers the money to the second party in a transaction and doubles the money, keeping it in the account at the same time. This is a problem that emerges only in a digital payment system. In a physical payment system, we cannot give a 10-dollar bill to someone and keep it in our account at the same time. In a digital payment system, I can transfer 10 dollars to someone else and keep the money in my account. The usual way to solve this problem is to have a trusted third party like a bank, to keep the record of each transaction and to assure the debt of the 10 dollars in my account, as an example, and the credit of the same amount in the second party's account.

In his seminal paper that establishes the Bitcoin System, Nakamoto (2008, p.2) proposes the following:

To accomplish this without a trusted party, transactions must be publicly announced, and we need a system for participants to agree on a single history of the order in which they were received.

² Many details of Bitcoin's creation and development, including relevant people involved, can be seen in a documentary directed by Christopher Cannucciari called "Banking on Bitcoin" (2016).

So, basically, the Bitcoin System is a system of account which keeps a record of every transaction for each existing unit of bitcoin. This system is open to all users, it is public. The system that gives the proof-of-record for every transaction is a peer-to-peer network, which means that it is not based on a central server, but it uses computer processing power of all computers connected to the system. The information, the data of the system is spread across thousands of computers. This, says Nakamoto (2008), makes the system computationally impractical for an attacker (hacker) to change it. This peer-to-peer network is also known as the Blockchain.

2.1. The blockchain

This system is based on transaction blocks, which are analogous to a page on a ledger. The “miners” are the computers responsible for verifying that each transaction is legal, by searching the entire history of that bitcoin unit and of the users involved in the transaction. The “miners” must ensure that the first party has enough bitcoin units to complete that transaction, and that the first party got those units from previous legal transactions. This is how double-spending is avoided. Anyone can be a “miner”, you just need a computer connected to the system. Also, “miners” are awarded with transaction fees, a small percentage of the transaction value.

Every block contains the entire history of the ledger, adding the new transactions thereto. That is where the name Blockchain comes from. The blocks are chained to each other. To add another block or another page to the out ledger, the “miner” must solve an extremely difficult encryption problem which requires a lot of computer processing power. So, if someone wants to create a fake page and add it to the ledger, creating a complete fake history that makes the party rich in bitcoin units, he must then solve this encryption algorithm called “proof-of-work”. It is important to note that by simply adding several units of bitcoin or adding one fake transaction to the ledger is useless in this fraudulent attempt, because the entire history of transactions and units is registered by each ledger. And if someone can solve the algorithm, by the time he does it a lot of other honest transactions has already occurred, and other pages have been added to the ledger, because the system generates new honest blocks in every 10 minutes. So, the fraudulent page is now useless because the system always uses the longest block chain.

This “proof-of-work” mechanism is also another incentive for the “miners” to do their job. Every time the “miners” validate one transaction, they also have an opportunity to solve the algorithm honestly. When a new page is added honestly, a new unit of bitcoin is created. As Nakamoto (2008, p.4) states:

By convention, the first transaction in a block is a special transaction that starts a new coin owned by the creator of the block. This adds an incentive for nodes to support

the network and provides a way to initially distribute coins into circulation, since there is no central authority to issue them. The steady addition of a constant amount of new coins is analogous to gold miners expending resources to add gold to circulation. In our case, it is CPU time and electricity that is expended.

Another feature of this system is that it is anonymous. Since it follows the ideas of the Cypherpunks, privacy-enhancing and anonymity are main concerns of the system. Every user is only identified by its IP. The record of the transactions identifies only the IPs of the two parties involved in each transaction. Finally, another characteristic of this payment system is its low transaction cost. Two people can transfer values between them relatively quickly, regardless of the national borders. We must note that a legal problem emerges from those two characteristics above: it is easier to transfer funds around the globe, even illegal funds. This attracted the attention of money laundry and other crime regulators, since bitcoin was used to buy drugs in a website called Silk Road, as an example. Although it is a problem of this system, it is not our concern in this paper.

This is how the Bitcoin System works. This is a description of the payment system and not of the bitcoin unit itself. This particular payment system states that every transaction is accounted in bitcoin units, also recognized by BTC. They are created by the “miners” every time a block is added to the blockchain. So, this particular unit created by the mining process is chosen to be the unit of account and the means of payment for this system. It is interesting to note that the supply of BTC (the units) is limited. Nakamoto stated that the maximum number of BTC that can exist is 21 million, and the expected time to reach this limit is 2140, giving the rate of the mining process.

2.2. The Bitcoin Unit (BTC) and some implications

We must separate the two things: The Bitcoin System, which is the technology described above, and the bitcoin unit, BTC, which is the unit of account of that system. It is important to note that the Bitcoin System could easily use any unit of account and means of payment. It was a choice to use the BTC. The idea was to have a unit totally unrelated to the banking system and to the State. But there is no limitation to use this payment system in Dollars or in any other cryptocurrency.

There are a few implications or problems without even addressing the moneyness issue which is the main goal of this paper. We must say that the BTC is deflationary because of its limited supply. Even though it is divisible, since the supply is limited, the purchasing power of goods and services of a BTC tends to increase if the number of transactions also increases in time. One of the economic fears considered worse than inflation is deflation. With deflation, the good you own or the service you provide in this payment system can rapidly worth less and less units

of account. It decreases the monetary value of production while it increases the purchasing power of money.³

If you do not want to be a “miner”, there are only two ways to acquire a BTC: (1) selling some goods and services accepting BTC as payment, and (2) “buying” a BTC. By “buying” I mean exchange it for the currency you have, for example: exchange it for US dollars. You must, however, find someone interested in exchanging the BTC for your currency. So, it works like an exchange market. A few websites and even a physical store on Wall Street were created to be exchange centers for BTC and other cryptocurrencies. Dwyer (2015, p.85-86) reminds us that the exchange rate for BTC could be defined by the relation between the amount of goods and services that 1 BTC could buy, and how many national currencies are needed to buy the same amount of goods and services. This would be BTC’S Purchasing Power Parity (PPP) exchange rate. But since the amount of goods and services that can be bought by 1 BTC is unknown, the value of the BTC in terms of local currency is defined by demand and supply. Because the supply of BTC is limited, the exchange value of BTC is basically driven by demand. This brings us to a second problem: bitcoin exchange value is highly volatile and demand driven which can lead to a speculative bubble⁴.

A third problem arises because BTC is expected to appreciate in terms of purchasing power and of exchange value: there is an incentive for hoarding it instead of spending it in goods and services. Hoarding can lead to a monopoly problem because just a few individuals can “buy” a huge amount of BTC and hoard it to limit its supply even more. This has a similar economic effect of a Keynesian Liquidity Trap, although the reason is completely different.

All the three problems are caused by BTC’s limited supply. There is another feature that contributes even more with its limited supply. Each BTC has a code, a unique private key. People can easily forget the key. Or people can be arrested or die without passing the key to someone else. This is called the loss of BTC. Those lost units are called “zombies” and they are lost forever. There is no mechanism of retrieving them to the system. So, the supply of BTC is not only limited, but it also tends to decrease in time.

To summarize this brief section about the Bitcoin System, we need to characterize the Bitcoin Payment System and the bitcoin unit BTC separately. The

³ Barber, S., Boyen, X., Shi, E., Uzun, E. (2012) addresses the deflationary and hoarding problems and proposes an “decentralized organic inflation mechanism”, although they do not make it clear what it is.

⁴ We will go back to that later in the analysis.

Payment System can be characterized by: (1) a solution to the double-spending problem without a trusted third party; (2) a peer-to-peer network called Blockchain, which is a public record of each transaction and each existing bitcoin unit; (3) the need for the “miners” to validate legal transactions, and two kinds of incentives to do that: transaction fees and “proof-of-work” creation mechanism of new BTC units; (4) anonymity of the users in a transaction, and (5) low transaction cost. The bitcoin unit BTC can be characterized by: (1) the limited supply, although divisible, which leads to; (2) a deflationary trend; (3) a volatile and demand driven exchange value, and (4) an incentive to hoarding.

3. Money in a Post-Keynesian view

In the neoclassical theoretical framework, agents were rational and ultimately concerned about utility of the goods. In that world, money could be anything socially chosen to be the means of payment and unit of account, so the double coincidence of wants problem of a barter economy could be eliminated. Money could be anything like salt, gold, or a (central) bank note, with the only requirement that it was being used as means of payment, and means of payment only, as the final goal of the agents was the goods they wanted to buy, and the utility of the goods. Money itself does not provide utility.

Keynes realized that such description did not match our modern economies, and then proposed an alternative theoretical framework, which he called the monetary production economy or, sometimes, entrepreneurial economy. (Carvalho, 2015, p.3). In contrast with the previous framework, in this world agents face uncertainty, and their ultimate concern is monetary accumulation, monetary profit. There are many other properties of the entrepreneurial economy theoretical framework⁵, but we will simplify it to those two properties, which are the most relevant for our analysis on money.

Firms are the main agents of this framework and they seek nominal profits, accumulation of wealth in the nominal form, in the form of money. Firms do not want to increase their capital in terms of goods, in real terms. Instead, they have capital in terms of money and their decisions, which can be to produce some goods or service, or to invest in a financial asset, are taken with the only goal of having more money in the end of the process than in the beginning⁶.

⁵ See Carvalho (1992, 2015) for more a detailed exhibition of several other properties of an entrepreneurial economy.

⁶ This is very similar and even inspired by the Marxist circulation of capital in a capitalist economy.

But agents face uncertainty. Uncertainty arises when you take time into account. Production takes time and a lot of unexpected things can occur during that time. The longer the time involved, the greater the uncertainty. Uncertainty is different from risk because it cannot be probabilistically calculated⁷. To calculate a distribution of probability, by repetition of empirical events or by mathematical calculation, you need to know all possible results or events, all states of nature. When this calculation can be done you are subject to risk, and not to uncertainty. When you throw a die, you know all possible results and all probabilities related to each result, so you face risk on your bet. But when you try to calculate the return of an investment in a 20-year maturation, you simply do not know what can occur. When agents decide in an entrepreneurial economy, they face uncertainty because they do not know what can happen during the relevant time for their decision. And they know that. By knowing that, money becomes an asset, a form of storing value, with essential properties. Money is no longer the only means of payment. As Carvalho (2015, p.10) said, "it is an object of demand itself, instead of serving merely of vehicle for the demand of something else". We highlight the importance of uncertainty here because its fundamental to understand Keynes' vision of the economic process. "Keynes without uncertainty is something like Hamlet without the Prince" (Minsky, 1975, p.55).

In face of uncertainty, decisions must be taken anyway, and agents often find ways to mitigate the uncertainty in their decisions. The protection against uncertainty is flexibility. Since you do not know what events can occur, you need to be able to do whatever you want, or whatever you need to do. Economic flexibility is called liquidity. Liquidity is a property of all assets, and it can be defined as the asset's capability to be converted into purchasing power in the minimum time, with the minimum economic loss. As you do not know what events will occur, you want your assets, or at least a share of them, to be liquid, to be convertible into purchasing power as soon as possible, with minimum loss, if you need it. The liquidity of an asset depends on the existence and on the structure of a secondary market for it, the existence of a minimum demand, low transaction costs, etc. Stocks, for example, have a very robust and developed secondary market, a minimum demand for it and low transaction costs. Stocks are a more liquid asset than nuclear power plants, for example. Liquidity is a relative property, and not an absolute property. Assets are more liquid than others, and there is one asset that has the highest liquidity, the maximum liquidity of the economy: the purchasing power itself, money. Money is

⁷ This concept of uncertainty is commonly known as Fundamental Uncertainty or Keynes-Knight Uncertainty, in honor of Frank Knight's seminal work "Risk, Uncertainty and Profits, in 1921 and Keynes' "Treatise on Probability.

automatically and instantaneously converted into purchasing power with no time and no economic loss.

So, liquidity is a property of all assets that arises in a world with uncertainty. In a world with no uncertainty and with risk only, all probabilities could be computed, and hedge contracts could be written for all states of nature. There would be no need for liquidity, no liquidity preference. With uncertainty, assets provide a new kind of return, a non-pecuniary return, the liquidity premium, or the subject value given by the agent for the liquidity of his asset. The higher the uncertainty, the higher the liquidity premium of an asset and the liquidity preference of an agent. So, there is now a rational reason for agents to demand money as an asset, not only as means of payment, an intermediate for final goals, even though money itself does not provide positive pecuniary income.

But what makes money itself purchasing power? There is another essential characteristic of the monetary production economy: all transactions are established in monetary contracts, explicit or not.⁸ There are two kinds of transactions: future (or forward) transactions and present (or spot) transactions. In the first one, at least one side commits to deliver something in the future. For example: a contract in which one side receives the goods in the present time and has the compromise to pay it in the future, or the opposite, when one side pays the goods in the present time and the other side has the compromise to deliver the goods in the future, or still when both sides commit themselves to deliver the goods in the future. In the second kind, both sides deliver the goods or the payment in the present, like a normal purchase in the supermarket, for example. In general, present transactions do not demand explicit contracts because the transaction happens and gets concluded instantaneously, although the contract is implicit establishing how many goods one side delivers, and how much the payment of the other side is. But this kind of transaction is a very low percentage of the total amount of value in transactions that occur in a complex monetary production economy.

For future transactions in general, an explicit contract must be established, and it should state, as an example, what would happen if one side does not deliver exactly what was agreed. This is another way of protection against uncertainty. If the contract is not fulfilled by one of its parties, the other party can claim for the penalty established therein, but there is only one legal way to do it: only the State, by the civil law of contracts, can enforce someone to fulfill the contractual obligations. All

⁸ See Davidson (1972, chapter 6, and 2002, chapter 4), for a more complex exposition on the monetary contract system.

contracts, either implicit or explicit, must establish a unit of account and the means of payment. Each contract is a bilateral agreement. I can make a contract with a friend stating that he will provide me one service and I will provide him another service as payment. But only contracts which state the unit of account and the means of payment that the State establishes as the normal one, is enforceable. Only contracts based on the unit established by the State is legally enforceable. Money is such unit established by the State. Only money can be used in all kinds of contracts and make them legally enforceable. And because money can be used for all kinds of contracts and all kinds of transactions, only money itself is purchasing power. “Money in an entrepreneurial economy, being the means through which any contractual obligation is settled, is purchasing power in general form”. (Carvalho, 2015, p.20).

So far, we saw that money in the Post-Keynesian view is an asset chosen by the State to be the unit of account and the means of payment for all monetary contracts, making them legally enforceable. So, this asset becomes purchasing power itself and, in a monetary production economy, where uncertainty is inherent, this asset has the highest liquidity premium, which is a non-pecuniary return that emerges from the capacity of the asset to be convertible into purchasing power in the minimum time and at minimum loss. But there are other properties and other kind of returns that assets provide.

3.2. Theory of portfolio choice and essential properties of money

In chapter 17 of the General Theory (Keynes, 1936[1996]), Keynes established a general theory of portfolio choice, a theory of how agents decide to distribute their capital among different types of assets. This is, in some author's view⁹, Keynes' most important contribution, the general form of the liquidity preference theory established in chapter 15, a theory of capital accumulation. In this chapter, Keynes stated that every asset, every form in which capital can be turned in, has four fundamental characteristics, in different degrees, making them different from one another. Those characteristics are: (i) quasi-rents, (ii) carrying costs, (iii) expected appreciation and (iv) liquidity premium.

Quasi-rent (Q) is a pecuniary yield provided by the asset due to its production process, or simply its possession. This is a net return, already discounted productions costs, taxes, and it is considered for the entire time of maturation of the asset. It is the present value of the net profits for all periods of maturation. For instance, an

⁹ Originally, Hyman Minsky (1975) proposed that chapter 17 was Keynes main contribution, the general form of the liquidity preference theory in terms of capital accumulation and developed it even more, by adding the liability side, making it a theory of balance sheets, not only portfolio. Possas (2015) followed this idea.

industrial plant provides net income due to its production, sales, and revenue. The Quasi-rent is not the revenue, but the net profit. A stock provides net income due to its possession, the distributed dividends. A treasury bond provides net income due to its possession, the interest payment. The carrying cost (c) of an asset is the cost of the mere passage of time, regardless of whether it is being used for production or not. This includes financial costs. It is the cost of simply having this asset in your portfolio. Keynes says that we could simplify and be concerned with $(Q - c)$.

The expected appreciation (a) is the pecuniary return provided by the difference in its price between the moment it was bought and the moment it could be sold in the future. It is important to note that this return could be positive or negative. For example, an industrial plant or a capital good is expected to devalue in time, so its expected appreciation is negative. A stock or a commodity can have huge appreciation or huge devaluation, so its expected appreciation could be positive or negative. In general, a stock is demanded not because of its $(Q-c)$, but because it is expected to be sold in the future for a higher price, so its expected appreciation is more relevant than its Quasi-rent.

We already know what the liquidity premium (l) is: a non-pecuniary return of the capability of the asset to be convertible into purchasing power in the minimum time and at minimum loss. As Keynes put it, it is the power of disposal of the asset. An industrial plant has less power of disposal than a stock or a treasury bond, and both have less liquidity premium than money, for example, and we already know why.

You should note that all those properties are returns or yields of the asset. You should also note that these returns are expected returns, subject values attributed by the agent through the entire time of maturity of the asset. So, for an industrial plant, our common example, the Quasi-rent is the present value of the expected net profits for each period of maturation. The appreciation of a stock, for example, is expected and discounted to be a present value. The liquidity premium of an asset is also an expected value imputed by the agent, which depends on his perception of uncertainty during the period of maturation. The greater the perception of uncertainty during that time, the higher the liquidity premium valued by the agent in present value.

Each asset has all these four properties at a certain degree. A capital good or a fixed capital investment in general has high $(Q-c)$, negative (a) and low (l). A financial asset, like a stock or a treasury bond in general has positive but low $(Q-c)$, positive or negative although relevant (a) and considerable (l). Money is an asset with zero $(Q-c)$, zero (a) and maximum (l). Money does not provide net pecuniary income, it

does not pay interest, so its Q is zero. Money has no relevant (c) . Money should have zero (a) . And finally, money has the highest (I) of the entire economy. All assets can be classified like that and the agent chose assets for his portfolio by comparing its total returns $(Q - c + a + I)^{10}$.

Money does not provide quasi-rents because of the zero (or negligible) elasticity of production. Keynes stated in the same chapter 17 that one essential property of money is that agents cannot have net profits if they decide to produce money. If money production generated net profits, once the ultimate goal of every agent is monetary accumulation of capital, all firms could produce money to have more and more money, instead of producing goods and services. So, when demand for money increases, there is no incentive to employ additional resources in the production of additional quantities of money.

In addition, money should have zero (or negligible) elasticity of substitution. That means that the value of money, in terms of money, does not increase or decrease if agents tend to substitute other assets for money and vice-versa. The only case when this could occur is if uncertainty affects the value of money in the future, which means relevant inflation or deflation. If the value of money is not stable, agents have an incentive to substitute money for other assets and vice-versa. Money loses its property of purchasing power because the values established in the monetary contracts are no longer stable. Agents and the State ultimately, will search for a more stable asset to be the unit of account and the means of payment for contracts. So, money should have zero (a) . Also, that means that the carrying cost of money should be irrelevant because agents do not incur in higher costs to demand more money¹¹.

So, money is an asset chosen by the State to be the unit of account and the means of payment for all monetary contracts, making them legally enforceable. This asset becomes purchasing power itself and in a monetary production economy where uncertainty is inherent, it has the highest liquidity premium. In addition, this asset should have zero or low elasticity of production and substitution, so its Quasi-rents and expected appreciation are zero.

This is an absolute approach to money. Although Keynes created a general theory of portfolio choice of assets, the definition of money is absolute: it is the asset chosen. Hyman Minsky (1975, 1986), when studying the banking activity, stated that

¹⁰ There is a formalized exposition of the choice, but we will not show it here. See Minsky (1975).

¹¹ See Davidson (1972) for a complete exposition of Money's elasticities and properties.

banks do not lend money but banks create money¹². More than one asset¹³ can be used as purchasing power and there is a hierarchy of money, with the asset chosen by the State, that follows Keynesian essential properties as stated above, being in the top of the hierarchy. This is hinted in the case of inflation or deflation that we mentioned above. As the epigraph of this paper states, everyone can create money, the problem is to get it accepted. This relative approach to money leads us to a more recent Post-Keynesian interpretation called Modern Money Theory (MMT). MMT helps us understand how assets including money are created, and how one of these assets gets to the top of the hierarchy and becomes money in the strict sense we stated in the last paragraph. Minsky (1986, p.255) showed us that:

(...) in truth, what is money is determined by the workings of the economy, and usually there is a hierarchy of monies, with special money instruments for different purposes. Money not only arises in the process of financing, but an economy has a number of different types of money: everyone can create money; the problem is to get it accepted.

3.3. Modern Money Theory

Modern Money Theory is a modern version of Chartalism, a heterodox approach to Money where Money is intrinsically linked with the State or with the Law. Although we put it here as a Post-Keynesian approach, it is built on the work of many other economists, including Keynes and Minsky. It is a Post-Keynesian approach because everything we saw until now in the Post-Keynesian view is compatible with the State Theory of Money, but it is much more. Authors like Georg Knapp, Alfred Mitchel-Innes and Abba Lerner, among others, have contributed with the Chartalist approach and with its modern version¹⁴.

Let us make this rhetoric question: what is money? Common answers for this question are misleading. Some people can say that money is means of payment, unit of account and store of value. But those are functions of money, what money can do, not what money is. You could have people answering it with its commonly known story of origin, of society overcoming the double coincidence of wants of a

¹² “Banks, whose liabilities are money, are unlike money lenders whose financing activities are restricted to the contents of their strongbox. Banks lend by taking on an obligation to make payments on behalf of a borrower in the future, confident that when the time comes, they will obtain the asset needed to fulfill these obligations either as a result of flows in their favor by prior borrowers or by dealing (borrowing, selling) in some market.” (MINSKY, 1986, p. 250-251)

¹³ In the 1975 book, Minsky called those assets “near money”. “Furthermore, some financial instruments which we can call near monies, NM, satisfy the insurance and precautionary demands for money. (...) With the introduction of near monies, we introduce, via the institutions whose liabilities are near monies, an endogenous determination of the effective quantity of money.” (MINSKY, 1975, p.73 e 74)

¹⁴ See Wray (1998, chapter 2) and (2014) for a brief history of economic thought of major figures that contributed to MMT.

barter economy¹⁵. Again, this is not what money is. Others can answer with its fundamental properties, as we stated in this section, but it is still a misleading answer. To answer it properly, it is necessary to understand the nature of money. That is what MMT proposes to do: to explain the nature of money (WRAY, 2015, p.261). Although the complete explanation is far more complex and sometimes, hard to understand, because it is not a common-sense, and it can be contra-intuitive, a simple and quick answer: Money is debt. Let us digress.

First, let us establish a few terms because it can be confusing if we do not¹⁶:

- 1) The word “money” refers to a unit of account, a general one, like Dollars, or meters or yards, or pounds. Specific national units of accounts, like Dollars in the US use capital letters.
- 2) “Money things” refer to things, physically or not, that are denominated in “money”, like a coin, a bank note, a demand deposit.
- 3) “Currency” is a “money thing” designated by a sovereign government, like US Dollar bills or treasury bonds.

All “money things” are debts or IOUs (I owe you). An IOU is a liability (financial debt or obligation). Since it is a liability of the issuer, it is also an asset of the holder. All IOUs are denominated in a unit of account. So, every “money thing” is someone’s debt. That does not mean that every debt is a “money thing”. The issuer must always accept the obligation back. The moment an issuer does not accept its IOU back, he is on default. Everyone can issue an IOU. I can write on a piece of paper that I owe you 1 something (my “money”, unit of account). I can use my own unit of account, or I can use someone else’s. I could write in my piece of paper that I owe you 1 MyMoney, or I could write that I owe you 1 US Dollar (the unit of account of the US Government). If I do the former, I bet you will laugh at me, because nothing is measured with my own unit of account, but if I do the latter, you will probably stop and think: “do I trust him? Is he creditworthy?”. So, trust and creditworthiness are a relevant part of this story. But the most important is that in any case, when I issue an IOU, I promise to accept it back whenever you come to me to have your 1 MyMoney or 1 Dollar. If I do not pay you, I’m on default.

As Minsky said, anyone can create money, the problem is to get it accepted. Why would anyone accept MyMoney? Well, if there is a demand for it, people might

¹⁵ Although this common-sense story of origin of money has no historical or anthropological backup, not even theoretical support. See Wray (2015, chapter 8). Wray (1998, chapter 3) briefly examines the origins of money.

¹⁶ This follows Wray (2015, p.XV).

accept it. If I say to my friends and family that everything they want from me, a favor or an advice, or even a good or service, should be paid with MyMoney, I could create demand for my own “money thing”. And if it is too scarce for the demand, I could simply write more pieces of paper. Of course, I could not go too far with my own money, but that is exactly what banks and the National Government do. They issue IOU’s denominated in their money. Banks deposits are “money things” issued by the banks and denominated in the national unit of account. My deposit account is an IOU from the bank to me, saying that the bank owes me a certain amount of Dollars, and it promises me that I can have my Dollars back at any time I want, so it will accept the IOU back¹⁷. This does not mean that every IOU needs to be redeemable at any time. The bank could say that I could only redeem it back after a certain period of time. These are long-term deposits. Finally, US dollar bills or coins are “money things” issued by the Government and denominated in Government’s own “money” (unit of account): US dollars. That means that the Government is saying to you that you can take a 10-dollar bill back, and it will accept it back giving you 10 dollars¹⁸ (probably in another 10-dollar bill).

What does make Government different from private agents, like banks, firms, and households? Its sovereign power. Among other powers that are not relevant to us, Sovereign Governments have the legal power to determine the unit of account that they will accept for official and legal accounts. In terms of which we have already stated in this section the power to determine the unit of account of contracts. In general, they choose the national unit¹⁹. Another power is to issue currency (an IOU) denominated in its own unit of account. But why would someone accept an IOU denominated in its own unit of account (like we said before, a 10-dollar bill that says that the government will pay me back 10-dollars)? Legal tender laws, alone, cannot explain why this IOU is accepted. As we saw in my own IOU example, if there is a demand for this “money thing” it would be accepted. And Sovereign Governments have a third power which creates that demand: the power to impose taxes and to determine what he will accept as payment. The Government is saying that it will accept its IOU as payment for the taxes, that this IOU is a way for other agents to fulfill their obligation. Taxes create the minimum demand to make national currency accepted, and will normally create more demand, as legally speaking other things are

¹⁷ This is how Minsky (1986) describes banking activity. Banks do not lend money, they create money. They do not need money before crediting some value in my account. They are creating an IOU, money.

¹⁸ This is misleading, as Wray (2015, p.49) argues. We will see in a moment what the Government should be saying instead.

¹⁹ Although it is not impossible that a government can determine that legal contracts are denominated in a foreign unit.

denominated in that unit. So, Government's IOU is implicitly saying that it is promising to accept it in the payment of taxes, instead of saying that it will payback. As Wray (2015, p.48) puts:

Why would anyone accept government's "fiat" currency? Because the government's currency is the main (and usually the only) thing accepted by government in payment of taxes.

In the Gold-Standard era, currencies were convertible in a commodity, gold. That does not deny the fact that the US Government owned you 10 dollars if you were holding a 10-dollar bill. It only means that you could redeem the Government's IOU in an additional form, in gold. This was designed to increase the confidence on Government's IOU because gold is a commodity, highly valued by the society. Gold itself is not a "money thing", as it is not a liability of anyone, it is a commodity, a scarce, shiny, durable, useful, beautiful commodity, and highly valued around that. We could instead have a Peanut-Standard, but I doubt someone would redeem Government's IOU in peanuts as it is an abundant, ugly, perishable commodity. Even during the Gold-Standard, gold itself was not a "money thing" because you could not use it to pay your taxes. You would need to convert it into dollars in an exchange market and pay your taxes in dollars. Although it was supposed to increase the confidence in the Government, it caused runs against the Government making them less trustable instead, if they did not have enough gold reserves to pay all demands for conversion. So, it was abandoned. As Wray (2015, p.45) states

Historically, governments have sometimes maintained a reserve of gold or silver (or both) against domestic currency. It was thought that if the population could always return currency to the government to obtain precious metal, then currency would be accepted because it would be thought to be "as good as gold". (..) We have moved on to what is called "fiat currency": one that is not backed by reserves of precious metals.

Government's IOU is much more accepted than a Bank's deposit, which is much more accepted than my own IOU. This leads us to the hierarchy of "money things". We can hierarchize all "money things", all IOU's, in terms of acceptance. In the top, we have Government's "money thing". Below, we have banks' deposits. Banks' deposits are highly accepted, not only because the Government guarantees that every deposit is redeemable in the national currency. If the bank lacks currency to redeem all withdraws, the central bank lends more currency to the bank, as the lender of last resort. On the bottom of our hierarchy, we have private non-financial IOU's, like corporate bonds. It is important to note that the lower in the hierarchy the "money thing" is, the less accepted it is and, in Keynesian terms, the less liquid it is. Since Government's IOU is the "money thing" that can be used to fulfill any legal contract, it is purchasing power itself, so it has the higher liquidity premium. An IOU that is highly accepted is highly liquid if there is demand, secondary markets, low

transaction costs, etc. In fact, Government can even determine that other IOU's can be used to fulfill legal contracts, for example, banking deposits, making them even more liquid. This hierarchy or pyramid is a relative approach to money, in contrast with the absolute Keynesian approach, although Keynesian definition and essential properties of money fit into the relative approach. Let us see, at last, if every IOU has the other two Keynesian properties of money, apart from liquidity.

Each IOU has zero (or negligible) elasticity of production. You cannot employ more resources to produce more IOU. You simply issue it. And its issuing does not generate net profits. When I write a piece of paper saying that I owe you 1 my money or 1 Dollar, this does not generate net profits. Instead, it generates more debt, and it can create liquidity and default risk (for example: if I promise to pay it back in a different "money unit" like Dollars). The Government's IOU does not have liquidity or default risks because it is denominated on its own unit of account. In the case of Gold-Standard, or in Government IOU's denominated in foreign currencies (external debt), it could have liquidity and default risk, as the issuer must have a considerable reserve of Gold, or the foreign currency to meet each obligation. If it is denominated on its own currency, it can always issue more IOUs²⁰. Not every IOU has zero (or negligible) elasticity of substitution, though. The value of non-interest paying IOUs, in terms of itself, does not increase if more people demand it instead of other asset. My piece of paper saying that I owe you 1 Dollar will always primarily be valued as 1 Dollar. It can be exchanged for different values if its demand changes, but this is its exchange value, just like the exchange value between two national currencies, it is a secondary value, not the value in terms of itself. One-dollar bill will value 1 Dollar despite the demand for it. The exception is interest-paying IOUs. If when I issue an IOU I promise to pay interest in addition to the promise to accept it back, its primary value will not remain constant in terms of itself, but will increase in time, making its elasticity of substitution not negligible.

So, to conclude, what is money in the post-Keynesian view? Money is debt in its nature. Money is always a liability of someone and, consequently, an asset for someone else. To be accepted, someone must be willing to hold it and demand it. People will hold and demand that debt as a "money thing" if it must be used as means of payment for something, like in the case of taxes for Government's IOU, and if they believe the issuer is creditworthy and will fulfill the promise of payback. The moment it is accepted, it becomes a "money thing" and acquires liquidity, since a secondary market for it starts to be developed, a minimum demand exists, and the

²⁰ I will not digress about economic consequences of that, although it is not what common sense and conventional economic theory suggest. See Wray (2015) for more details.

transaction costs are low. The IOU now has power of disposal, at a certain degree. The more accepted the IOU, the bigger its secondary market will be, the bigger its demand, and the bigger its liquidity. The less accepted, the lower the power of an IOU as a “money thing”. Highly accepted IOU is also known as high-powered money, and, in our economy, it is generally the sum of the government currency and bank reserves. We can say that other IOU’s are “money things” too, but they are less powerful and stricter because they are less acceptable, have less liquidity. For a “money thing” to become the “money thing” (in an absolute sense, like the first Post-Keynesian approach) it must be highly accepted, and it must have high liquidity. Only Government’s IOU and other IOUs backed in Government’s IOU, like bank reserves can get to the top of the hierarchy because of Government’s sovereign power to impose taxes, to impose what it will accept as payment and the unit of account for it. As Wray (2015, p.50) concludes, Taxes drive Money.

4. Does Bitcoin fit in the Post-Keynesian view?

Bitcoin has several similarities with money, it can have some common money functions, but it differs from money in its nature, in its essence: Bitcoin is not an IOU. No one, not even Satoshi Nakamoto, is promising you to accept your BTCs back, not even in BTC value. In that sense, bitcoin is much more like gold or any other commodity (and it was designed to be like that). Once you understand MMT, this conclusion is obvious. Tymoigne (2013) reached this conclusion very quickly. In addition, he showed that the fair value of bitcoin is zero. Our conclusions are similar and inspired by his. Although a commodity like gold or bitcoin can have some money functions at a certain degree, it is not a “money thing” because it will never have Keynesian essential properties. Let us differentiate a “money thing” from a commodity.

All “money things” are debts. Every “money thing” is a liability, but not all liabilities are a “money thing”. To become a “money thing” they must have Keynesian essential properties. A “money thing” can perform money functions in certain degrees, but that does not mean that everything that can perform some money function is a “money thing”, because things without Keynesian essential properties can perform money functions as well, like commodities. A Commodity is a specific type of good, and a good is not a “money thing” in the same way that a “money thing” is not a good. Clower’s (1965) famous quote says that “Money buys goods and goods buy Money, but goods do not buy goods”.

A good is something that can be produced by a production process, the normal production process of a monetary production economy. That means that you

can put more effort, you can employ more resources on its production and have more net profits. Even if that good is a natural resource, like apples in a tree or gold in gold mines, you can increase its production (or in that case, extraction) by putting more workers or more machines to do the job. As Nakamoto (2008, p.4) states, bitcoin is the same, since it must be mined to be acquired and people must put more effort in its extraction, but in that case, it is computer effort, processing power and computer resources. We can already notice that goods, by definition, cannot have zero (or negligible) elasticity of production. In addition, goods have intrinsic utility, even if this utility is only because of the scarcity. Goods have intrinsic value in terms of itself. Gold, as we said in the case of Gold-Standard, has its value because it is durable, scarce, shiny, beautiful, it is fashion to have it in jewels around your neck or in your watch. Each good, as it is scarce in some degree and needs to have more effort employed to increase its production and supply, has its value in terms of itself, affected by demand fluctuations. So, goods do not have zero (or negligible) elasticity of substitution. Some goods can have low elasticity of production and substitution, but never zero or negligible. Debt can have zero or negligible elasticities.

Bitcoin does not meet the two Keynesian essential properties: bitcoin's elasticity of production and substitution are not zero (or negligible). The first one is obvious, because there is an incentive for "miners" to create new BTCs, although Nakamoto designed this incentive to be decreasing until the supply reaches a maximum value. As Nakamoto (2008) said himself, you can put more effort in the case of processing power and computer effort to produce BTCs. That production generates profit: one BTC. Because its supply is limited, the elasticity of substitution is not negligible, so the value of BTC increases or decreases if agents tend to substitute other assets for BTC and vice-versa, because its supply is limited and the agents know that. A "money thing", an IOU can be supplied indefinitely to meet the demand, so its value can remain stable and the elasticity of substitution is negligible. As Wray (2014, p.28) said, "there is no limited supply of either private or state IOUs—so long as either is willing to issue IOUs, they can be supplied". In fact, it must be supplies to meet demand or its elasticity of substitution will rise.

4.1. A quick review on money functions

Commodities, like "money things" can perform some commonly attributed money functions, means of payment, unit of account and store of value²¹. Anything can be used as means of payment. We saw that each contract is a bilateral agreement, and both parties must state what they accept as payment. As we saw, I can make a

²¹ See Yermak (2015) for an analysis of those three functions to the Bitcoin case. He concludes that Bitcoin is not means of payment, not a good unit of account nor a stable store of value, yet.

contract with a friend establishing that he provides me a service and I pay him with handshakes or with favors. To be a means of payment in a small scale, a “money thing” is not needed. Not even to be the means of payment widely accepted by the society, it is just more difficult. You just need a stable rate of conversion to the social unit of account and an exchange value to the means of payment needed to pay taxes²². It is not impossible that the means of payment established by the government as the means to pay taxes is only demanded as means of payment for taxes and another means of payment is demanded for everything else, as long as there is a stable rate of conversion to the social unit of account and an exchange value to the means of payment needed to pay taxes. In general, this does not occur, and the widely accepted means of payment is usually a government’s IOU (national or even foreign, in extreme cases²³). Until now, bitcoin is not generally accepted as means of payments, although a few firms are starting to accept it as means of payment²⁴.

The unit of account can also be anything. The “money” is just a unit to measure the “money thing”. You can call that unit as you wish. It can be Dollars, meters, pounds, or even BTCs. But we saw that only a Sovereign Government can establish the unit of account that will be used as measure for legal contracts and for the “money thing” that will be used for tax payment, and that unit of account is usually the national one (in extreme cases, it is possible that a Sovereign Government chooses another unit of account, like a foreign unit, like Dollars, or a supranational unit, like the Euro). You can establish bilateral contracts in any unit of account but remember that the contract is not legally enforceable. BTCs are being used as unit of account for other cryptocurrencies, but that is it. Goods and services are still denominated in national units of account. You just convert the value to BTCs by an exchange rate.

Finally, the store of value function. Again, anything can be store of value, however, an expected increasing or stable nominal price is the essential condition for value to be stored in time. It is not the real value that matters, as in a monetary production economy, agents want to accumulate wealth in nominal terms, in terms of money, not in terms of utility of goods. Goods can have expected increasing or stable nominal price in time, for example, real estate or gold or any other goods that

²² In that case, the common properties of money in the conventional story apply. That means of payment, that can be a commodity, must be durable, not perishable, divisible, with low transaction costs, etc. But those characteristics are not necessary properties.

²³ “Cigarette money and foreign money can come into wide use only when the normal money and the economy in general is in a state of chaos” (Lerner, 1947, p. 313)

²⁴ I believe that those firms are now accepting BTCs as means of payment, not because it is a good and representative means of payment, but because they are expecting future appreciations in terms of dollars and they want to accumulate BTCs now. So, it is only for speculative purpose as we will see in a moment.

have expected increasing or stable nominal price. It is important to highlight that this is different from the expected appreciation, the property of assets in Keynesian theory of portfolio. To be store of value, the expected nominal price must be increasing or stable during indefinite time. The expected appreciation is the return provided by the difference in the price between the moment the asset was bought and the moment it could be sold in the future, but it must be sold, and it is planned for a definite time. This is speculation. Something can have a complete unstable nominal price, increasing and decreasing in indefinite time, but it can still have expected appreciation if the difference of price between the time it was bought and the time it was sold is expected to be positive.

We can already note that BTC has a highly volatile exchange rate, its price in Dollars, so it does not meet the condition to be a good store of value, although it can have expected appreciation and be a speculative asset. Other studies have shown that bitcoin is a highly speculative asset. Yermack (2013) argues that bitcoin does not behave like a currency according to the common money function, but instead resembles a speculative investment like the Internet stocks of the 1990s. Baek and Elbeck (2015) ran a regression that showed BTC prices are 26 times more volatile than the S&P index, and that what drives its price is speculation of buyers and sellers. Fry and Cheah (2015) realized that bitcoin is subject to bubbles as other assets, but the bubble component of bitcoin's price is substantial. In addition, they argue that bitcoin's fundamental value is zero²⁵.

For IOUs, a necessary condition to have stable price in time is that the issuer is trustable, creditworthy. If the promise to payback the IOU is trustable, its value can be stable, but if you do not trust that the issuer will payback his IOU, its value, in time, will decrease and tend to zero. It can still be positive if other people still trust the issuer and still demand his IOU, but the moment everyone stops trusting him, the IOU's price will tend to zero. If the issuer is promising to payback in his own unit of account and own IOU, it is highly improbable that he will default, unless he voluntarily decides to do so. So, a Sovereign Government that is issuing an IOU denominated in its own unit of account and is promising to payback in the same IOU will not default, unless he wants to. If the issuer is promising to payback in other unit and other IOU, he must be in a liquid position to be trustable. If I am issuing a lot of pieces of paper promising that I will pay back in Dollars and do not have enough Dollars for that, I am in an illiquid position, and people can doubt on my payback capability.

²⁵ Just like Tymoigne (2013).

4.2 - So, what is Bitcoin?

Now that we distinguished store of value from expected appreciation, let's go back to Keynesian theory of portfolio choice, developed in chapter 17 and briefly described in the last section. All four properties described by Keynes are characteristics of every asset, every form in which wealth can be allocated. Assets are distinguished by the degree of each return, and we can characterize every family of asset by the degree of its Quasi-rents, carrying costs, expected appreciation and liquidity premium. We can now analyze in which family of assets bitcoin most fits in. We know the following

- (i) Fixed capital goods, or instrumental capital, have high and relevant (Q), high and relevant (c), negative (a) and low (l).
- (ii) Real estate has low (Q) (only if it is used for production or for rent), considerable and relevant (c), negative or positive, although not that relevant (a) (unless the market is on a bubble) and low (l).
- (iii) Commodities have zero (Q), positive, although not that relevant (c), negative or positive but relevant (a) and considerable (l) (because commodity markets are well organized).
- (iv) Financial assets like stocks and bonds have positive but not that relevant (Q), low or irrelevant (c), negative or positive, although relevant (a) and considerable (l).
- (v) Money has zero (Q), zero (c), zero (a) and maximum (l).

We have seen in the first section of this paper that bitcoin does not provide net profits due to its use in production or its possession, so bitcoin has zero (Q). As it is a digital virtual asset, there is no carrying cost, so (c) is zero²⁶. The most relevant expected return of bitcoin is the expected appreciation, as its value in terms of Dollars has increased significantly in the last months and years, and more people are buying because they are expecting to increase even more. And because BTC's supply is limited, we already saw that its exchange value, in terms of dollars, is essentially demand driven. Bitcoin's (a) is relevant and positive, for now. Finally, as there is demand for bitcoin (although only because of its expected appreciation), there are low transaction costs and the market is already well organized for BTCs exchange, bitcoin liquidity premium is high, but not the maximum, so (l) is high²⁷. We can say

²⁶ Tymoigne (2013) says that Bitcoin's carrying cost is not zero since you need at least a computer, energy and internet supplies. Nowadays, almost everyone has a computer or a smartphone with internet and power, or can use internet and power from public places. I consider these costs irrelevant.

²⁷ When Tymoigne (2013) reached his conclusion about Bitcoin, the market was still small and there was not a high speculative demand like today, so he concluded that Bitcoin has zero liquidity

that bitcoin has zero (Q), zero (c), positive and extremely relevant (a) and high (l). Bitcoin fits almost perfectly in the third family of assets we described: Commodity. In addition, it has a particularity that the carrying cost is zero. That makes bitcoin a virtual commodity, the perfect commodity.

5. Final remarks

We have briefly described the Bitcoin System. We must separate the system from the BTC unit. We concluded that the Payment System can be characterized by: (1) a solution to the double-spending problem without a trusted third party; (2) a peer-to-peer network called Blockchain, which is a public record of each transaction and each bitcoin existing unit; (3) the need for the “miners” to validate legal transactions and two kinds of incentives for them to do that: transaction fees and “proof-of-work” creation mechanism of new BTC units; (4) anonymity of the users in a transaction and (5) low transaction cost. There is nothing wrong with the technology of the payment system, although people can question the anonymity and its consequent use for illegal transactions. But that is not our point. In turn, the bitcoin unit can be characterized by: (1) the limited supply, although divisible, which leads to; (2) a deflationary trend; (3) a volatile and demand driven exchange value and (4) an incentive to hoarding.

Then, we presented the Post-Keynesian view of money. Money is debt in its nature. Money is a liability of someone and, consequently, an asset for someone else. To be accepted, someone must be willing to hold it and demand it. People will hold and demand that debt as a “money thing” if it must be used as means of payment for something, and if they believe the issuer is creditworthy and will fulfill the promise of payback. The moment it is accepted it becomes a “money thing” and acquires liquidity. The “money thing” must fulfill the two Keynesian essential properties: zero (or negligible) elasticity of production and substitution. For a “money thing” to become the “money thing” (in an absolute sense) it must be highly accepted, and it must have high liquidity. Only Government’s IOU and other IOUs backed in Government’s IOU, like bank reserves, can get to the top of the hierarchy and be characterized as an asset with no Quasi-rent, no carrying costs, no expected appreciation and maximum liquidity premium.

Bitcoin does not fit the description because it is not an IOU. Bitcoin does not meet the two Keynesian essential properties of money. Additionally, following the properties of assets in the Keynesian theory of portfolio, bitcoin is much more like a

premium. I understand that Bitcoin market is now much more developed, there are low transaction costs and its demand is very high for speculative motives, so its power of disposal is considerable.

commodity (as it was designed to be). We argue that it is a perfect commodity, as it has no carrying cost, it is virtual. Bitcoin is a speculative asset because the most relevant expected return is the expected appreciation. The idea of having an international monetary and payment system based on bitcoin is complicated and quite hard to become true because it will increase economic and financial instability, but this is a topic for future works: the economic consequences of the Bitcoin System and possible similarities with Keynes' Bancor idea.

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