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WILL BITCOIN BECOME MONEY?

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ABSTRACT

This research examines Bitcoin's potential as money, considering its underlying technology, economic implications, and societal impacts. Through a literature review, the study explores Bitcoin's role as a medium of exchange, unit of account, and store of value, while evaluating its compatibility with different money theories. It analyzes Bitcoin's decentralized nature, unknown creator, and current usage scale. Findings suggest that Bitcoin faces challenges such as limited supply, volatility, and its potential for facilitating illicit activities. It diverges from traditional macroeconomic theories, raising concerns about long-term stability. Despite its limitations, Bitcoin offers transparency and decentralization. The research concludes that Bitcoin falls short of meeting traditional money criteria but acknowledges the potential of Central Bank Digital Currencies (CBDCs) to address these limitations and enhance digital payment systems. The ongoing evolution of cryptocurrencies and the exploration of CBDCs are crucial factors shaping the future of digital currencies and their impact on the financial landscape.

KEYWORDS

Bitcoin, Cryptocurrency, Money, Theory of money, CBDCs



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I. Introduction

In recent years, the global financial landscape has witnessed the rapid emergence and proliferation of cryptocurrencies, with Bitcoin leading the way as the most prominent and widely recognized among them. Introduced in 2009 by an anonymous individual or group known as Satoshi Nakamoto, Bitcoin represents a revolutionary concept that challenges the conventional understanding of money and financial systems. Its decentralized nature, cryptographic security, and potential for borderless transactions have ignited debates about its role as a future form of money.

This paper aims to delve into the fundamental aspects of Bitcoin and explore its potential to transform the existing financial landscape. By examining its underlying technology, economic implications, and societal impacts, we seek to shed light on the possibilities and challenges of adopting Bitcoin as a mainstream currency.

Two countries accept Bitcoin as a currency, El Salvador and The Central African Republic, and some other countries, including Canada and the United States, accept Bitcoin as a legal means of payment. However, our finding suggests that according to economic theory, bitcoin should not be considered money.

The rest of this paper is organized as follows. Section 2 is the literature review. Section 3 describes different theories of money definition. Sections 4 through 6 showed the ability of Bitcoin to become money using theories presented in section 3. Section 7 analyzed the case of central bank digital currencies (CBDCs). Section 8 concludes.

II. Literature review

Bitcoin has garnered significant attention and sparked widespread debate about its potential to serve as a form of money.¹² This literature review aims to provide an overview of the existing research and scholarly discourse surrounding Bitcoin's viability as money. By examining a range of academic papers, studies, and expert opinions, we seek insights into the key arguments, perspectives, and findings related to Bitcoin's role as a medium of exchange, unit of account, and store of value.

Numerous studies have explored Bitcoin's characteristics and assessed its compatibility with the functions traditionally associated with money. Yermack (2015) examined Bitcoin's ability to act as a medium of exchange and found that despite some limitations, Bitcoin does exhibit transactional functionality and can serve as an alternative to traditional payment systems. Similarly, Barber et al. (2012) highlighted Bitcoin's potential as a medium of exchange, emphasizing its benefits in facilitating international transactions and offering lower transaction costs compared to traditional methods.

The economic implications of Bitcoin as money have been a subject of considerable discussion. Dyhrberg (2016) investigated Bitcoin's role as a diversification asset and found evidence that Bitcoin can act as a hedge against traditional assets, potentially providing value in portfolio management. Other studies, such as Bouri et al. (2017), explored the relationship between Bitcoin and traditional assets, examining its potential as a safe-haven asset during periods of market turmoil.

¹ See, for example Mattackal, L. P. (2022, April 12). Cryptoverse: 10 billion reasons Bitcoin could become a reserve currency. *Reuters*.

² See, for example *Is Bitcoin and Cryptocurrency the Future of Money* - FWS. (n.d.).

In contrast, several papers also oppose the future that Bitcoin becomes a currency similar to USD or Euro. Fullenkamp (2014), in his article entitled 'Bitcoin will not make it as money,' argued that Bitcoins are not cut out to be helpful money because of some basic monetary economics that most people have overlooked lately. Similarly, Söderberg (2018) concluded that crypto-assets cannot be classified as money.

The literature reviewed showcases diverse perspectives and findings regarding Bitcoin's potential as money. In this paper, a new question is introduced, that is, 'Should Bitcoin be considered money using traditional money theory?' Below, I will provide different money definitions and analyze whether Bitcoin is suitable for applying those theories. Moreover, I would analyze the story of central bank digital currencies (CBDCs), such as e-CNY.

III. Theories of money

To assess whether Bitcoin or digital currencies are money, the first question to answer is 'What is money?' This question has been prevalent throughout history since the first kind of money was invented, as early as 900 AD. Until now, one usually talks about three main definitions linked to how money should be constituted to function in practice as a means of payment.

The first theory of money, metallism, asserted that a commodity with independent market value should back the money, historically gold (gold standard). The value of money was tied to a specific amount of gold, establishing a direct link between the two. While today there is no formal connection between precious metals and traditional currencies, the concept of metallism has influenced the development of Bitcoin. Bitcoin draws inspiration from metallism because it imposes limits on the creation of money. Just as the availability of precious metals and the cost of mining set a natural constraint on the amount of money that can be created, Bitcoin utilizes digital limits to control the issuance of new units. This connection to metallism is also evident in the terminology associated with cryptocurrencies, where "miners" are named after those who extract precious metals from the earth. Therefore, one could describe the underlying theory behind cryptocurrencies as "digital metallism."

The second theory, called 'chartism,' argued that money is a legal creation only created by a state. In the modern economy, it is now usually applied that money is created by a national central bank (or FED in the United States). This makes it irrelevant what money is made of – precious metal, paper, or electronic ones and zeros; what gives them legal validity is that a state has expressly legislated on their existence.

The most popular definition of money today is the functionalism theory, proposed by Stanley Jevons in 1875. This theory states that money needs to fulfill specific functions: means of payment, a unit of account, and a store of value. Means of payments suggested that money should be widely accepted, and buyers and sellers can conveniently use it to exchange goods and services. A unit of account means that money should be a standard measure of value for an economy's goods and services. Moreover, a store of value means that the value of money should not change appreciably. A person's decision to use his or her money should thus not be influenced by a change in value.

Another foundational theory of money is the quantity theory of money, positing a direct relationship between the quantity of money and the price level of goods and services. It suggests that changes in the money supply will result in proportional price changes. The theory is based on the equation of exchange, which is stated below

$$MV = PQ$$

In which:

- M: Money Supply
- V: Money's velocity of circulation
- P: Price level
- Q: The economy's output

According to the quantity theory, if the money supply increases while the velocity of money and the quantity of goods and services remain constant, the price level must rise. Conversely, if the money supply decreases, the price level will fall. It is assumed that the velocity of money and the number of goods and services remain relatively stable in the short run and neutral in the long run, meaning that changes in the money supply do not affect actual economic output or employment levels.

The table below will summarize the four theories of money

Table 1. Different theories of money

Definition	Condition
Metallism	Consists of or is tied to a good with a market value
Chartalism	Legal creation issued by the national state
Functionalism	Must function as: -Means of payment -Unit of account -Store of value
Quantity Theory of Money	$MV = PQ$

IV. Bitcoin is based on blockchain technology

Bitcoin and other crypto access are created based on blockchain, which is crucial in ensuring the security and transparency of transactions within the Bitcoin network.

By definition, blockchain technology is a distributed ledger system that enables the secure and transparent recording of transactions. As its name suggests, it consists of a series of blocks, where each block contains a set of transactions. These blocks are linked in chronological order, forming a chain of blocks. Each block consists of a number of verified transactions. The blockchain can thus be said to be a digital ledger system that stores all of the earlier transactions.

According to the manuscript 'Bitcoin: A Peer-to-Peer Electronic Cash System' by Satoshi Nakamoto, the Bitcoin blockchain is maintained by a decentralized network of computers (called nodes), which collectively validate and record transactions. Multiple nodes verify each transaction through a process called mining, and miners use computational power to solve complex mathematical puzzles, and the first miner to solve the puzzle adds a new block of transactions to the blockchain. The figure below illustrates the structure of Bitcoin.

Will Bitcoin become money?

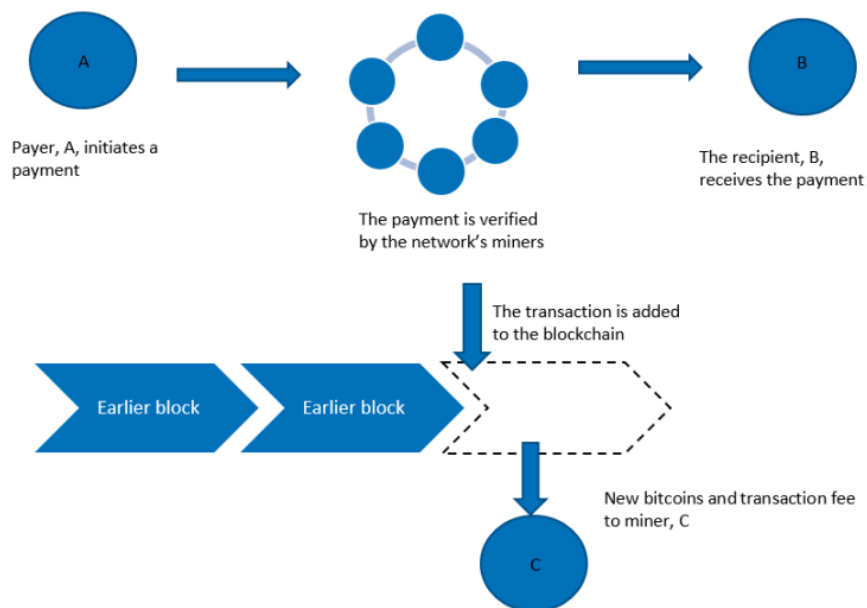


Figure 1. Overview structure of Bitcoin (Söderberg, 2018)

In the book 'Blockchain: Blueprint for a New Economy,' author Swan stated that one of the key features of blockchain technology is its transparency. Once a transaction is added to the blockchain, it becomes publicly visible to all participants in the network. This transparency enables anyone to verify the validity of transactions and ensures that the ledger cannot be easily tampered with.

Additionally, the decentralized nature of the Bitcoin blockchain makes it resistant to censorship and control by any single entity. (Antonopoulos, 2017). The absence of a central authority, such as a government or a bank, allows Bitcoin to operate independently of traditional financial systems and gives individuals greater control over their finances.

In this context, although Bitcoin is a crypto asset, it has several benefits compared to traditional currency, such as its transparency and decentralized nature. However, according to the metallism theory of money, a currency must be backed by a commodity with independent market value. However, blockchain is not an asset with monetary value (McKinsey, 2022) unless the cost to mine bitcoin is considered its value. Therefore, from this perspective, bitcoin should not be considered money.

V. The creator of Bitcoin is unknown

Bitcoin creation is still a mysterious matter in the financial world. Bitcoin was said to have been created on January 3, 2009, by an anonymous person or a group of people claimed to be Satoshi Nakamoto. Earlier, in October 2008, Satoshi Nakamoto (satoshin@gmx.com) published a white manuscript entitled 'Bitcoin: A Peer-to-Peer Electronic Cash System' on Bitcoin.org. This manuscript described a system for electronic transactions without relying on trust, which was called Bitcoin in that manuscript. This manuscript was posted again on the SSRN system on August 22, 2019 (The date written was August 21, 2008) under the name of Dr. Craig S Wright. Wright has publicly claimed to be the main part of the team that created Bitcoin and the identity behind the pseudonym Satoshi

Nakamoto. However, much of the media and the cryptocurrency community regard these claims as false.³

Nevertheless, the purpose of this section is not to investigate who is the creator of Bitcoin or who is the individual or group under the name Satoshi Nakamoto. This section only tries to point out that the creator of Bitcoin is still unknown, and it is not created by the central bank (or it is not claimed to be created by any central bank or official government). Therefore, according to the chartalism theory of money, Bitcoin should not be considered money. It is still worth noting that this is not the case with central bank digital currencies (CBDCs), which will be discussed in a later section.

VI. Bitcoin used is still on a small scale

People may purchase Bitcoin for different reasons. It might include investing to make money, diversifying their portfolio, or using it as a (future) means of payment (Mitra, 2022). In the first two cases, one buys Bitcoin to hold, hoping that its value relating to USDT (or other currencies) will increase. In the last case, in contrast, it is difficult to conclude whether Bitcoin is being used for payment. A rough estimate is that only over 15000 businesses accept Bitcoin as a currency, and there were only 36659 Bitcoin ATMs in the USA till April 2022 (Flynn, 2022). Furthermore, according to Chambers and Mross (2023), even though the application of Bitcoin could lead to several benefits for SME owners, the security, government uncertainty, and upfront cost are barriers to the future that Bitcoin will be applied by SMEs.

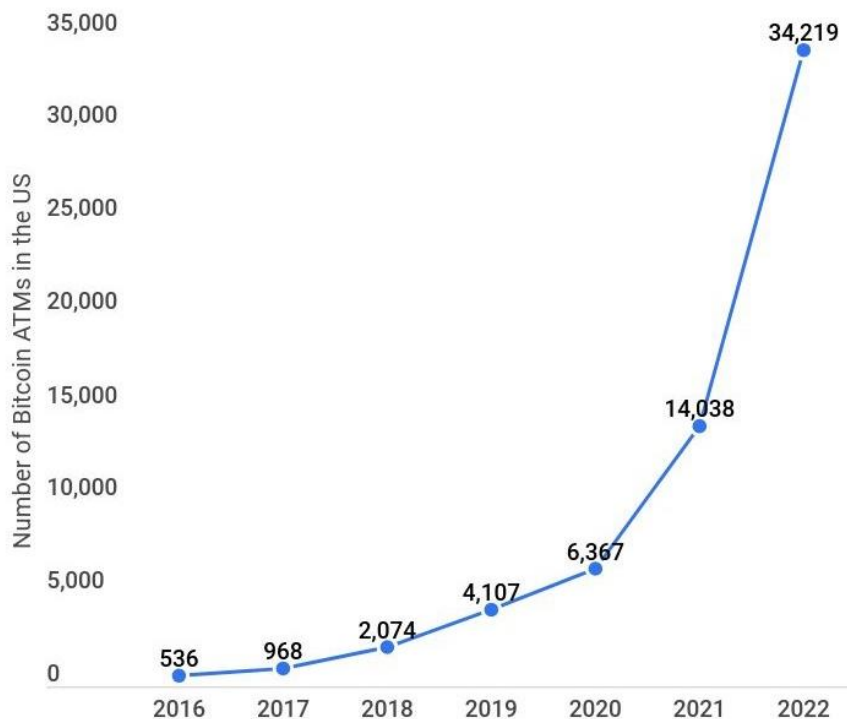


Figure 2. Number of Bitcoin ATMs in the United States, 2016 – 2022 (Flynn, 2022)

³ See, for example Brewster, T. (2015, December 11). Time To Call A Hoax? Inconsistencies On “Probable” Bitcoin Creator’s PhD And Supercomputers Revealed. *Forbes*.

However, a bright side for the future of Bitcoin is that the use of Bitcoin has increased sharply since it was introduced in 2009. According to Figure 3, the number of daily transactions of Bitcoin peaked at 561448 transactions per day in April 2023. The average number of transactions in 2020 is also over 300000 per day, around 600 times higher than in 2010. This statistic suggests a future that the number of daily transactions of Bitcoin will increase, and most companies will accept Bitcoin in the next periods. If this is the case, Bitcoin will satisfy the functionalism theory of money, that it will become a means of payment, a unit of account, and a store of value.

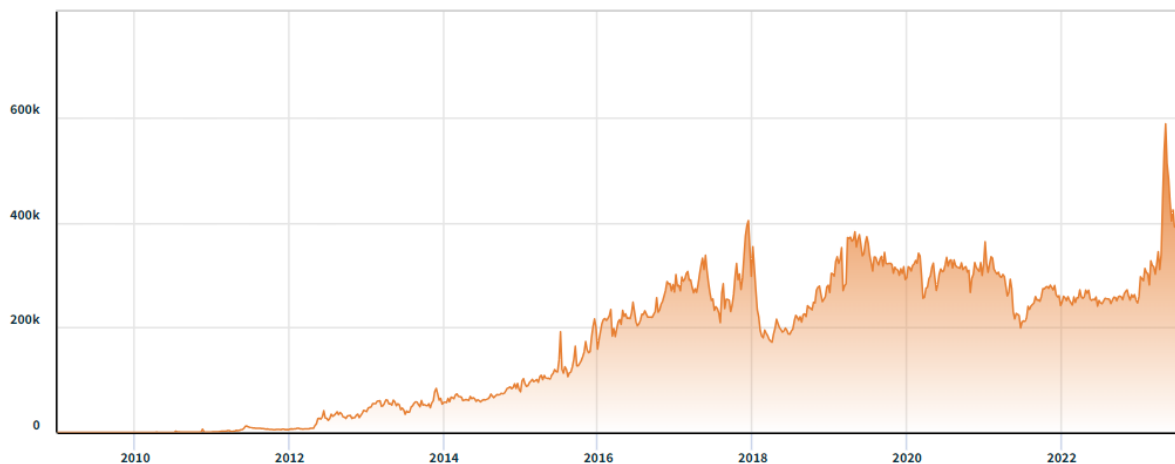


Figure 3. Number of daily transactions on the blockchain of Bitcoin from January 2009 to June 28, 2023 (Nasdaq data link)

VII. Bitcoin did not follow the macroeconomic theory

Fullenkamp (2014) stated that Bitcoins make terrible money. Even though many researchers might oppose this opinion, I believe that somehow this is true, according to macroeconomic theories. We know that Milton Friedman's theory is correct in the long run, and inflation is always a monetary phenomenon. Therefore, if the growth rate of Bitcoin is zero, the inflation rate should also be zero. However, the actual condition should link to the equation of exchange $MV = PQ$, in which M is the money supply, V is the velocity of circulation, P is the price level, and Q is the real GDP.

Unlike traditional fiat currencies, Bitcoin has a finite supply cap of 21 million coins. As a result, in the long run, Bitcoin exhibits deflationary tendencies, as its supply cannot be increased to meet growing demand.

However, if the growth of M is 0, the inflation rate should also be 0 as long as the growth rate of velocity is equal to the growth rate of real GDP. For any nation, I believe that real GDP will keep growing due to population growth and market inefficiency. So, to have zero inflation, velocity will have to rise proportionally with real GDP. Nevertheless, this is unlikely to happen because the fixed supply would lead to the propensity to hoard Bitcoin. This is predicted to lead to an appreciation in Bitcoins holder wealth, but hyperinflation to a nation's economy.

This theory of money also leads to the relationship between GDP and money valuation; that is, when the GDP growth rate shows rising economic productivity, the value of money in circulation increases. In other words, the value of money (Corresponding to the number of assets that can be paid or corresponding to other currencies) should not be varied significantly in the short run, but it is able

to be varied in the long run. This has also been the case with traditional currency. For example, the exchange rate of USD to EUR has been relatively stable in the last five years, with the difference between the highest and lowest value being approximately 30% (See figure 4). Nevertheless, this is not the case for Bitcoin, as its value compared to USD has increased 17 times between 2018 and 2023, reaching its peak at \$69000 in November 2021 (See figure 5). In the short run, Bitcoin volatility was much higher than the traditional economic concept. As in Figure 6, the 30 days volatility could go up to 15.85% but could also be as low as 0.85%.



Figure 4. USD to EUR exchange rate 7/2018 – 7/2023 (Source: Google Finance)

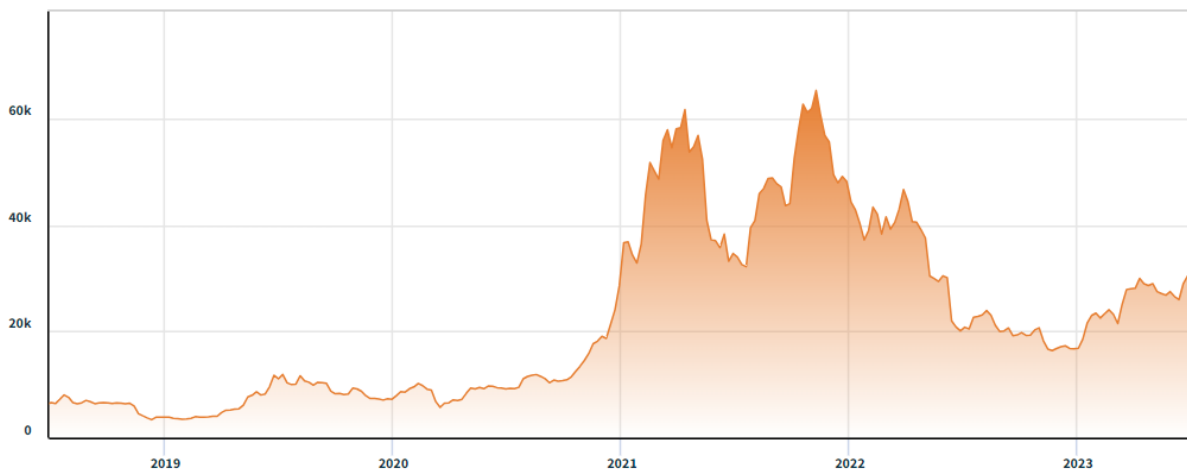


Figure 5. Bitcoin to USD exchange rate 7/2018 – 7/2023 (Source: Nasdaq data link)

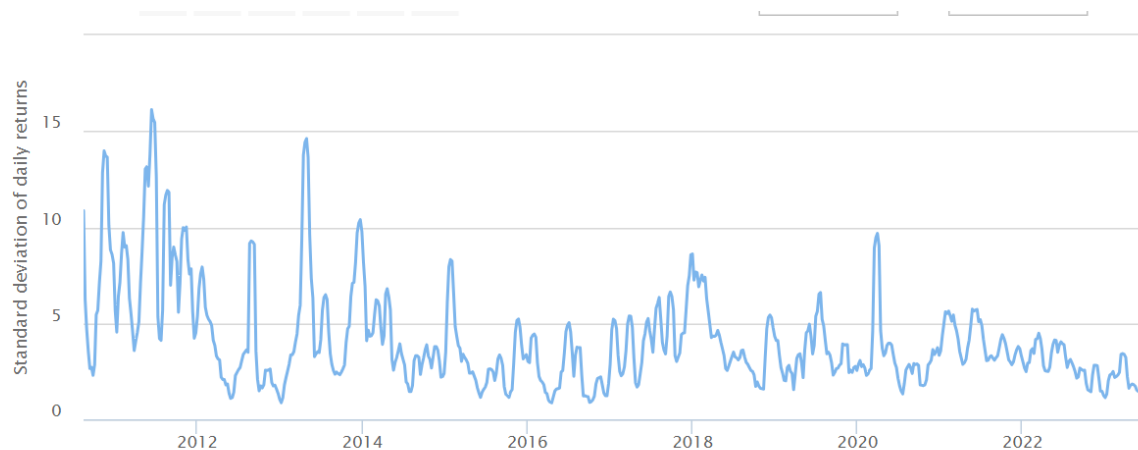


Figure 6. BTC/USD 30-day volatility 2010 - 2023 (Source: Buybitcoinworldwide.com)

In short, according to traditional macroeconomic theory, such as Milton Friedman's quantity theory of money analyzed in this section, Bitcoin should never be considered as money or a traditional currency. This is because Bitcoin has a limited supply, at 21 million coins, which opposes the long-run real GDP and inflation rate. Also, compared to traditional currencies like USD or EUR, BTC has a much higher volatility rate, which opposes the relationship between currency valuation and GDP growth.

VIII. Other potential societal threats

Apart from not following the traditional theory of money, another reason that prevents Bitcoin from becoming a currency is its externality.

Bitcoin (and other crypto assets) have been pointed out as a problem because they enabled anonymous payments, which is said to facilitate criminality. The Europol report entitled 'Cryptocurrencies: Tracing the evolution of criminal finances' pointed out that the use of cryptocurrency as part of criminal schemes is increasing, and the uptake of this payment medium is accelerating over time. The criminal related to Bitcoin is no longer confined to cybercrime activities, but it has now related to all types of crime that require the transmission of monetary value. Howcroft (2023) also stated that crypto crime hit a record at 20 billion USD in 2022, and as much as one-quarter of all Bitcoin users and around half of all Bitcoin transactions can be linked to some form of illegal activity (Foley et al., 2018).

Another aspect that has been discussed is the amount of energy that is needed to 'mine' Bitcoin. As stated earlier, the Bitcoin Protocol is constructed to require considerable computational power and, thus, a considerable amount of electricity. Therefore, It has therefore been discussed whether Bitcoin further increases climate impact or leads to computer equipment and energy being used in a way that is not in the long-term interest of society. However, this is not the case for some other cryptocurrencies, such as Dash, which use less energy-intensive means of validating transactions.

IX. It is different for Central Bank Digital Currencies (CBDCs)

Even though it has been pointed out in earlier sections that Bitcoin did not satisfy different theories of money to be considered as a currency, and there are social threats to the use of Bitcoin, I believe that a solution to this is the Central Bank Digital Currencies (CBDCs).

By definition, CBDCs represent a digital representation of a nation's currency backed and regulated by the respective central bank. The central bank maintains the issuance, distribution, and regulation of CBDCs, ensuring their legal tender status and stability within the financial system. Until now, there are 119 countries that are developing digital currencies, and 18 countries have made significant progress. It is predicted that by 2025, there will be some countries start using CBDCs in parallel with traditional paper money.

Different from Bitcoin and any other crypto asset, CBDCs can solve the problems that were listed in the previous sections. As it is issued by the central bank of a nation, it would satisfy the chartalism theory of money. Also, because it will be used in parallel with traditional paper notes, and its characteristics are similar to traditional money, there is no need to worry about CBDCs scale or value variation.

Furthermore, I believe that the introduction of CBDCs is a means to enhance financial inclusion, promote an efficient payment system, and provide a reliable form of digital currency.

CBDCs can provide individuals and businesses, including those currently unbanked or underbanked, with access to a secure and inclusive digital payment system. By leveraging digital technologies, CBDCs can enable financial services to reach underserved populations and contribute to broader financial inclusion objectives.

Also, CBDCs have the potential to streamline and improve payment systems by offering faster and more cost-effective transactions. The use of blockchain or distributed ledger technology (DLT) in CBDC implementations can enable instant peer-to-peer transactions, reducing reliance on intermediaries and improving overall payment system efficiency.

Thirdly, CBDCs can provide central banks with enhanced tools for implementing monetary policy and managing financial stability. The digital nature of CBDCs enables central banks to monitor and track transactions in realtime, potentially facilitating more effective regulation and supervision of the financial system.

However, according to Fanti et al. (IMF), the societal threat is still a concern to CBDCs usage, and it should be discussed more in another manuscript to improve the development process of CBDCs.

X. Conclusion

In conclusion, the question of whether Bitcoin will become money is a complex and multifaceted one. This research explored the fundamental aspects of Bitcoin and its potential to transform the existing financial landscape. By examining its underlying technology, economic implications, and societal impacts, we have gained insights into the possibilities and challenges of adopting Bitcoin as a mainstream currency.

Analyzing different theories of money, it became apparent that Bitcoin does not fit neatly into any one theory. While it draws inspiration from metallism in terms of imposing limits on the creation of money, it lacks the backing of a commodity with independent market value. Additionally, Bitcoin's decentralized nature and unknown creator challenge the chartalism theory that money is a legal creation by a state.

Furthermore, Bitcoin's current usage remains on a relatively small scale compared to traditional currencies, and its value has exhibited high volatility. These factors raise questions about its ability to function effectively as a medium of exchange, unit of account, and store of value, which are key requirements for money according to the functionalism theory.

Moreover, Bitcoin's divergence from traditional macroeconomic theories, such as the quantity theory of money, raises concerns about its long-term stability and its potential impact on economic systems.

However, it is worth noting that this research does not imply that Bitcoin has no value or utility. Bitcoin has demonstrated the potential to provide transparency, decentralization, and financial inclusion. It has sparked innovation and inspired the development of other cryptocurrencies. Additionally, the research acknowledges that the introduction of Central Bank Digital Currencies (CBDCs) holds promise as a means to address some of the limitations associated with Bitcoin and other cryptocurrencies. CBDCs, backed and regulated by central banks, have the potential to offer a secure and inclusive digital payment system, streamline transactions, and provide central banks with enhanced tools for monetary policy. Further papers should focus more on researching whether CBDCs could be a perfect substitution for traditional money.

In summary, while Bitcoin has made significant strides in challenging traditional notions of money, this research suggests that it falls short of meeting the criteria and requirements of various money theories. Its limitations, including volatility, lack of intrinsic value, and societal threats, pose significant challenges to its widespread adoption as money. However, ongoing developments in the realm of cryptocurrencies, including the exploration of CBDCs, may offer alternative paths toward achieving the goals of a digital and transformative financial landscape.

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