Response of sovereign States to Bitcoin: The use of *Blockchain* and the Central Bank Digital Currencies

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Abstract. Throughout history, monetary control has always been in the hands of the State that plays this role in a centralizing way. However, the invention of a decentralized digital currency called Bitcoin in 2008, which at first seemed harmless, sent a warning signal that it could pose a danger and change the course of monetary history. Thus, this article aims to address the response offered by States in the face of the Bitcoin threat and the consequences of this choice based on monetary theories. Finally, it is concluded that, in fact, the advent of Bitcoin has changed the course of monetary history, however, everything indicates that the Bitcoin will not be the protagonist of this new digital age, but rather the States through the digital version of their national currencies known as the Central Bank Digital Currency (CBDC).

Keywords. State. Digital currency. Bitcoin. Central Banks. CBDC.

1. Introduction

Money, like everything else in life, is constantly changing. In the 17th century, when paper money started to be issued in Europe by several central banks (CBs), few imagined that this great financial innovation could end. Not even the inventor of the internet in the 20th century could imagine that his invention would make the existence of money in the virtual environment viable decades later. However, that time has come and today it is already possible for a Central Bank to issue a digital currency thanks to Bitcoin.

Bitcoin, the first virtual cryptocurrency, emerged in 2008, with the aim of taking the power in issuing currency from the State and central banks, in other words, the objective of Bitcoin from the beginning of its creation was to replace the current system by another that would be decentralizing. Thus, monetary control by the State was put at risk.

As if the anti-State principles that guide it were not enough, the advent of Bitcoin also showed that the digital currency had certain qualities that the physical fiat currency of the government did not have, a fact that made the threat even more latent and worrisome because it was more advantageous in certain respects. Many of these qualities revolved around its digital payment system and, above all, the revolutionary technology that accompanies this crypto asset, which is the *Blockchain*. Faced with this threat, many central banks began to think about solutions to contain the advance of these cryptocurrencies.

In this way, there is a central question that guides this work. If Bitcoin is a threat, what was the solution(s) found by governments to combat it? This article aims to answer this question and show what consequences arise from the path chosen by the States. It will be seen that that old story of knowing your enemy's strengths well and using that to your advantage was exactly what States did to contain the threat.

2. Monetary theory

First of all, it is important to highlight that within economic thought there are two different views about monetary theory. On one side is the orthodox group, on the other side we have the heterodox group. Basically the big difference between these two groups is that the orthodox accept Say's Law and the Quantitative Theory of Money (TQM), while the heterodox deny these two foundations.

In addition to seeing currency as unimportant, functioning only as a means of exchange [1], the orthodox saw the State as something harmful as it was responsible for inflation. Therefore, for the orthodox, the government is only admitted to solve problems of externalities that the market cannot solve, in other cases it generates inefficiency.

On the other hand, for heterodox views, the State has a fundamental role in monetary management. Despite approaching the subject in different ways, both post-Keynesians and Marxists, the two groups that make up the heterodoxy, believe that money and the State are important and, as it is a net wealth, they believe that money cannot stay in the hands of private interest. In addition to the State being important, the heterodox also believe that it needs to have a centralizing power.

With regard to monetary policy, the State acts through central banks. After the emergence of several central banks as public institutions, they began to be criticized because of their proximity to governments. According to critics, this proximity made the currency hostage to political groups and created inflationary threats. It was in this scenario that several theses emerged in the last century, mostly from orthodox theorists, of independence from the Central Bank, according to which the CB should act without interference from the executive power.

However, while most orthodox people wanted independent central banks, others more liberal, like Friedrich Hayek, wanted an end to the Central Bank's monopoly on money issuance. It is based on the theoretical framework of these liberals that cryptocurrencies such as Bitcoin emerged.

Hayek said that the great evils of capitalism, such as inflation and economic instabilities, are caused by undisciplined governments in terms of issuing money and spending. To solve this problem, Hayek presented the proposal for the privatization of currency [2], according to which the government monopoly should be replaced by free issuance. Hayek died before the emergence of cryptocurrencies, but his thinking certainly influenced its creators.

Besides Hayek, Friedman was another who influenced the emergence of cryptocurrencies. At the end of his life, he wrote an article exposing the idea that Central Bank independence would not be the solution, but a rule issued by a computer that calculated GDP growth and said the correct amount of currency that should be issued [3]. Coincidentally or not, this thinking is behind the offer of bitcoins, as it obeys fixed and pre-established commands by the computer, as Friedman wanted.

Also, like gold, Bitcoin was created to be scarce in order to protect its value. Since its creation, a total supply of 21 million bitcoins has been established, which will be mined by the year 2140. This shortage is based on Friedman's ideas that the value of money depends only on the total amount of currency supplied. In exposing this thinking, Friedman was criticizing the inflationary bias of central banks that irresponsibly issued currency.

Therefore, the economic thinking behind the Bitcoin system has an orthodox character. Paraná [4], for example, even mentions that “the Bitcoin algorithm was programmed from an unshakable faith in the Quantitative Theory of Money”. Added to this is the fact that its supporters believe that Bitcoin is immune to inflation because of its scarcity, showing concern about monetary control.

3. Bitcoin

Bitcoin was created in 2009, in the midst of an international financial crisis, by Satoshi Nakamoto with the idea of being both a payment system and peer-to-peer decentralized digital currency.

Before the invention of Bitcoin, online transactions needed an intermediary, such as Mastercard and Visa. If there was no such intermediary to record the transactions , digital money could be spent twice, that is, it would be exchanged for more than one good at the same time, a problem called double spending [5].

Bitcoin differs from conventional currencies as it eliminates the problem of double spending without the need for an intermediary through a decentralized system called *Blockchain*. This cryptographic software technology is a kind of ledger that contains the history of all transactions carried out in Bitcoin since the beginning of its creation. Because it was created together with cryptocurrency, many even imagined that both were the same.

In addition to the immutability of data and the consensus mechanism, *blockchain* has several other qualities. Among them, the following stand out: low costs, efficiency, decentralization, transparency, records distributed in chronological order, tracking system and information security through encryption and authentication. All these qualities make *blockchain* the main advantage of Bitcoin.

Despite these advantages of Bitcoin, for many it cannot be considered a currency. Paraná [4], for example, uses Marx's concepts to prove that Bitcoin is not money. This happens due to the simple fact that Bitcoin does not fulfill the elementary requirements that a currency performs, that is, it fails to fulfill its functions, namely: measure of value, price standard, means of circulation or means of exchange, means of hoarding, means of payment and world money. Therefore, Bitcoin is more about financial innovation than currency itself and, for this reason, Bitcoin cannot be considered an alternative to the current monetary system.

It appears that the high volatility of its price has been the major obstacle to Bitcoin's claim to be considered a currency. This problem creates uncertainty and makes it impossible to Bitcoin perform the functions of money in the best possible way and, consequently, decreases the social recognition that is of paramount importance for currency to be recognized as a general equivalent.

It is in this context of volatility that the importance of central banks is found. In addition to issuing currency, this institution acts to regulate money to

ensure that it is a stable measure of value. It can be said, then, that the much-celebrated lack of regulation by an authority, such as the CB, is what makes Bitcoin impossible to be used as a currency.

4. Sovereign States' Response to Bitcoin

Bitcoin has some characteristics that jeopardize the centralizing power of the State. Among the characteristics is the fact that Bitcoin is an instant payment system in addition to using an innovative technology called *blockchain*.

However, it is inconceivable that the currency stays in the hands of private interests. Monetary dynamics need to be under the control of the State, through the Central Bank, as it is an issue that involves money, which is net wealth, and economic problems, such as inflation and unemployment, which directly affect all people of a country. Thus, centralization by the State is more than necessary to ensure that these problems are resolved if they occur.

The trust that people place in the State is important to guarantee a good currency, however, it is necessary more than that to contain the threat of Bitcoin and other private cryptocurrencies. It is in this sense that several countries around the world are moving to use the advantages of Bitcoin in their own favor, such as an instant payment system, the *blockchain* and the idea of digital currency itself.

Much of Bitcoin's success as a cryptocurrency is due to its use of *blockchain* technology. Even critics of this crypto asset agree that this tool is revolutionary, as its use can be extended to various spheres ranging from the private sector to the public sector. Many governments have used this technology that came with Bitcoin to improve their services.

In recent years, several countries have already applied *blockchain* in various sectors to maximize the efficiency of their bodies, reduce corruption and bureaucracy. The European Union uses *blockchain* in the fight against counterfeiting, China in registering health data, Chile in processing payments from public entities, Canada in government contracts and Denmark in intra-party voting.

Brazil also acted in this way. Therefore, it is sarcastic to think how in a few years the State turned Bitcoin's main weapon, the *blockchain*, into its ally. Today, it is part of the Digital Government Strategy, which aims to create a *Blockchain* Network for the State and use it in the most different areas of government to improve public services. This would certainly seem unimaginable to many early Bitcoin users who thought *blockchain* was intrinsic to cryptocurrency.

All the examples cited prove that the revolutionary *blockchain* technology has an infinite range of applications outside the Bitcoin world. It is interesting to highlight how the government used a decentralizing technology, a characteristic so celebrated by Bitcoin enthusiasts, in favor of the State, which is a fully centralized structure. *Blockchain* characteristics, such as transparency, traceability, security and decentralization, are used, in this context, not to make the State more liberal, but to further strengthen the government's power by gaining the trust of the citizen, since the authenticity guaranteed by this technology allows digital public services to bring the individual closer to the government.

Blockchain being used in various areas of government is one the State's response to Bitcoin, because the creation of a State-owned *blockchain* network facilitates the implementation of a digital currency in the future. In this way, the trend is for the State to consolidate itself more and more using Bitcoin's most powerful weapon, the *blockchain*.

As if using its main weapon was not enough, Brazil also adopted an instant payment system called Pix. This system is nothing more than an answer, as the CB president said, to cryptocurrencies, because it is as efficient, cheap and fast as these. In this way, by having such characteristics, Pix prevents to a certain extent the dissemination of cryptocurrencies as this payment system removes the intensity of the medium of exchange function of private crypto assets. By failing to perform one of its functions very well, Bitcoin is weakened and becomes just a speculative asset.

However, Pix has not only come to weaken private cryptocurrencies, but also to be the way forward for the future implementation of a digital version of the national currency. Therefore, the aim is to make Brazilians familiar with a digital payment method such as Bitcoin. It could even be said that Pix is working as a test to see if CBDC would work, and the result surprised. This is so true that the CB of Brazil is already thinking about implementing the digital Real soon.

Here it is important to open a parenthesis to say that payment system, such as Pix, is not the same thing as CBDC. This reservation is necessary, because many confuse these terms, as is the case with Cambodia. In that country, the government launched a payment system, as stated by the director of the local CB, however, several media outlets classified it as a CBDC.

Even though both work as a means of payment, there are clear distinctions between them. PIX is a means of payment and transfer using electronic currencies from commercial banks. It performs only one of the functions of currency and to use PIX it is necessary to have a bank account, because the electronic money comes out of the account that the individual has in the commercial bank.

On the other hand, the digital currency has all the functions of a fiat currency, not just a means of payment, as the CBDC is nothing more than the cryptographic version of the national currency, with some exceptions, such as the Petro of Venezuela and

the SOV of Republic of the Marshall Islands, which are separate currencies. To make a transaction with CBDC, it is enough to have a digital wallet or a hardware wallet (physical wallet) where the money is stored. In other words, in a transaction the money will come out of the digital wallet and not the bank account as with Pix.

Closing this parenthesis, it should also be noted that not all countries are acting in this way. Therefore, it is not a general rule to create an instant payment system like Pix before a CBDC. You can create it directly, as happened in Venezuela. However, it is worth noting that in these cases the consequences can be catastrophic, because the population will not be used to digital payment. It is enough to observe that in the first year of the Petro's existence, in Venezuela, many were confused about its operation and did not know how to use it very well in local businesses.

In other cases, such as Sweden and China, there was also no creation of an instant payment system by the government before the CBDC, but this will not prevent the use of e-krona and digital yuan, respectively, in their countries. The explanation for this is because both States already had private payment platforms that are widely used by their populations, Swish in Sweden and WeChatPay and AliPay in China. Therefore, these populations are already more than adapted to this type of payment. It is no coincidence that the first two developed countries to create CBDCs are also the ones that most use payments on digital platforms. Therefore, the experiences of other countries point out that the decision to create Pix before the CBDC was more than right, because in Brazil there was no private payment platform like these countries.

Blockchain can also be used in the economic sphere. According to the Bank for International Settlements (BIS), 80% of central banks are doing research on Central Bank Digital Currency (CBDC) whose operation revolves around and based on *blockchain* technology. Despite using the same technology as private cryptocurrencies, their operation is completely different because CBDCs are controlled by the Central Bank.

These CBDC studies are part of central banks' response to the Bitcoin threat. This time, the answer was using the very essence of Bitcoin, which is to be a digital currency. It is because of it that the States proposed creating CBDCs to modernize the financial system. Coins, which by the way, go against the most anarchic principles of private cryptocurrencies. Therefore, everything indicates that soon, perhaps in fifty years or less, most countries in the world will already have a digital version of their national currencies, a fact that will completely change the current financial system as we know it and the way of carrying out monetary policy.

States have found that these CBDCs solve a number of problems that physical currency struggled to solve. In addition to reducing the most diverse costs involved in printing, storing, transporting and distributing paper money, the CBDC can be created to help the country circumvent sanctions, recover the hegemony of the national currency due to the decline in the use of physical money, decrease the use of private cryptocurrencies, increase financial inclusion and track illegal transactions to prevent crimes such as money laundering. These are just a few examples, as the applications are diverse.

Nevertheless, despite all these applications, the main purpose of a CBDC will be to help the country's economic policy. In the current financial system, a part of the currency created by the Central Banks that is transferred to the banks is retained in the banking system itself. In certain moments of uncertainty or in situations of low interest, many banks choose not to lend as much because of the high risk and low profitability. Thus, by being retained in the banks, a part of the monetary base created by the CB does not enter the economy, a fact that harms the government's economic policy.

In contrast, the CBDC has the potential to make monetary policy more efficient because of the way it works. Unlike electronic money created by banks, digital currency will be created by the CB itself. In addition, the digital currency does not stay in the bank account, but in the digital wallet of each individual, as if it were an account in the CB itself. In other words, instead of having a bank account, one would have an account directly with the Central Bank, as is the case today with commercial banks and the government treasury. By having a digital wallet, the CB will have control over the monetary balance contained in it, a fact that will allow the Central Bank to have greater control over the money supply.

The digital Yuan in China has shown that CBDC can have a feature that physical fiat currency did not have, which is the fact that it can be programmable. During the testing phase, the digital yuan that the government distributed to the population through lottery could only be spent within the period stipulated by the State. Those digital yuan that were not spent, the government collected.

This fact shows that CBDC can be extremely effective in increasing domestic consumption in periods of recession when the economy needs a boost. It can also be useful in countries that do not have a good social security system, as in these cases many prefer to save to consume in the future instead of using it in the present moment that the government needs.

However, it is worth mentioning that this feature works in specific cases where the government distributes resources or increases the money supply in order to encourage consumption at the expense of savings. It is important to highlight this so that some do not think that the government will randomly collect digital currencies that already belonged to the individual.

The digital currency will also facilitate the application of welfare policies. Unlike what happens

today with bank accounts, the digital wallet allows the Central Bank to send financial assistance, as in the case of the pandemic, directly to the account of an individual who lives in remote areas that are difficult to access the bank. Therefore, digital currency is the easiest way for the government to inject money into the economy.

These features of CBDC, such as programmable currency and the ease of injecting money into the economy, can make monetary policy more efficient. For the heterodox, CBDC can stimulate investment, employment and income growth and, consequently, promote economic growth in a more potent way. In other words, CBDC can make the goal to be achieved more precisely. Whereas for the orthodox, the CBDC can make the CB more independent. This fact will help the central authority to have more effectively control the amount of currency, as the CB will know in real time the monetary balance present in the digital wallets and the total volume of transactions recorded on the *blockchain.*

The fact that the *blockchain* has the record of all transactions allows the CB to have greater control over monetary dynamics in greater agility for the operationalization of policies in general. In short, the CBDC can transform the way economic policy is carried out and much of this is due to the fact that the CB will no longer be dependent on the banking system to make its policy. However, this independence can have catastrophic consequences for commercial banks.

5. Final Considerations

Thus, Bitcoin, one of the most emblematic inventions of the 21st century, has as a fundamental principle to remove State power in the issuance of currency. Based on this, the question that remains in the air is "does Bitcoin really pose a threat that one day it will replace the State currency?" This question remained unanswered for a while, as, truly, this cryptocurrency has certain advantages over physical fiat currencies.

During the time that this question remained unanswered, States began to act against this imminent threat. It is at this point that the difference lies: the way in which the State proceeded with this issue. The way he acted was not by strengthening his fiat currency or completely exterminating the creation of private cryptocurrencies, but by using the advantages of his enemy, which are the instant payment system, the use of *blockchain* and the very idea of digital currency.

Returning to the initial questioning, today we can say that Bitcoin does not represent a threat to the centralizing power of the State. Bitcoin was created, among other characteristics, to be decentralized, efficient and transparent. However, he failed to achieve these goals, as over time the power, which should have been decentralized, became centralized in the hands of a few people, due to the economic power of some miners, and he was not able to be so transparent due to several fraud reports that surrounds it.

Over time, its disadvantages became more and more latent. Problems such as lack of accessibility, which provokes inequalities, very high mining costs, lack of complementarity between monetary functions and, above all, its high instability prevent it from performing well all the functions of a currency. In this way, it can be said that at this very moment it is not a currency itself and, therefore, there is no possibility that it will take the place of the national currency.

Furthermore, these fluctuations make even the orthodox believe that State power would be important. This is because the instability of Bitcoin would cause problems for the economy, since, for the orthodox, it is the market via relative price fluctuation that best organizes the economy, and such fluctuations in Bitcoin's value distort this efficient functioning of the market.

However, even if Bitcoin does not pose a threat today, the States' response has already been given. The initial provocation of Bitcoin made possible a series of transformations in the structure of fiat currency to the point that central banks are planning to create digital currencies. There is consensus that these would not have been created if Bitcoin had not existed. Like it or not, Satoshi Nakamoto's invention spurred States to improve public services through *blockchain*, and more than that, it enabled them to enter the era of digital economy with the introduction of the Central Bank Digital Currency.

At the beginning of these considerations, a question was asked about the threat of Bitcoin and it was found that today it does not represent a danger to States. However, with the creation of CBDCs, it is the State that can become a threat to certain institutions, such as the banking system. Therefore, many private banks are already on the alert, as the emergence of CBDCs could represent the end of many of them.

The role of private banks will be greatly reduced. As the digital currency is stored directly in the individual's digital wallet, the need for third-party intermediation is eliminated. In this way, the role of banks may be restricted to just distributing digital wallets in addition to converting physical or electronic money into digital currency and vice versa while paper money is still circulating.

Over time, the trend is that citizens prefer to store their money in a digital wallet with CBDC than in a bank account with electronic money, as the CB brings greater security and does not charge abusive fees. In this way, digital currency will eliminate the need for bank accounts.

This preference for digital wallets can cause many banks to go bankrupt. Digital currency has the power to reduce the amount of currency that is made by commercial banks through the banking multiplier, given that the number of deposits decreases as people transfer money from their bank account to

their digital wallet. This reduction in deposits also prevents the bank from exercising its role as a financier because of losses in the reserve, which would make it lose relevance in generating short-term investment, as Keynes believed. The sum of all these complications causes a drop in liquidity and a possible bankruptcy of the banks because they are no longer profitable.

It is precisely because they are unaware of the damage to financial stability that most central banks are waiting for others to take the first step, because in this way it is possible to learn from the mistakes of those who have already implemented it, given that the impacts, if the project fails, could be gigantic. Perhaps this is the case with the United States, which is constantly watching the steps of China's digital yuan. However, in this unusual race, whoever gets ahead may have the advantage of having their digital currency as a universal equivalent in the future, and right now, China is ahead.

Finally, it is not so relevant how long most central banks will adopt a digital currency, what is certain is that we have already witnessed the beginning of a transformation. The speech by the president of the CB of Brazil about Pix's response to private cryptocurrencies made us open our eyes to a reality that knocks the doors of many central banks. If this possibility once seemed distant, today it is no longer a simple exercise in conjecture about the financial system of the future. We are already witnessing the emergence of a new economic era and the pandemic only accelerates this transformation as it drives the use of digital media. Therefore, it can be said that just as machines marked the beginning of the Industrial Revolution, Bitcoin was the trigger for the beginning of a new era of digital economy, where CBDCs can represent the end of the period of paper money.

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