

The Disruption of Cryptocurrencies as a Method of Payment and Its Implications for the Financial System: Evidence from the United States

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Abstract: - In the past decade, the emergence of Blockchain has questioned certain financial institutions. Cryptocurrency upsurge was aimed at conducting financial transactions with more efficiency while being safer, easier, faster, and cheaper. Thus, over-intermediation in finance has been highlighted by Blockchain emergence. Here, a SWOT will be carried out to examine Blockchain and cryptocurrencies, their monetary role, their impact on a financial system based on banking intermediation, and their influence on the future of central banking. About the United States, this paper concludes that cryptocurrencies will eventually spread as a method of payment, which could lead them to be the new form of money under some assumptions. The eventual adoption of blockchain technology by central banks through the introduction of official digital currencies could favor the creation of a more inclusive financial system in the future.

Key-Words: - Methods of payment, Blockchain, cryptocurrencies, fiat money, financial system, central banking, financial intermediation, private banking, financial technology, CBDC.

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1 Introduction

Money is a necessary tool to dynamize the commercial exchange; it is widely known and accepted due to its liquidity. Hence, money is the source and not an outcome of the financial structure. Likewise, “the state is by no means necessary for the development of money to occur. A free market in money is likely to produce something preferable to that which is state-issued, given that if the money produced by the free market does not adequately serve the needs of exchange, then it can be quickly replaced with another form”, [1]. Therefore, cryptocurrencies (CCs) have already created an alternative to official fiat money.

CCs have been widely studied from several perspectives. For example, their use in criminal activities, as an investment option due to price volatility, the value they stand for, and their valuation process since their emergence in 2009. However, none of the above mentioned is relevant to this research, considering “the price of CCs has made many lose sight of the endgame value of such CCs”, [2].

Additionally, some practitioners and academics accept CCs as a disruptive method to carry out economic exchanges. They are generally classified as “technologies that have significant potential to transform businesses” based on the capacity to “decentralize transactions and data management and has the promise to improve the security and transparency of business processes, creating new business scenarios that were not previously possible”, [3]. However, “despite the growth in their size in terms of market capitalization, CCs are still not large enough when seen in the context of the larger traditional finance system”, [2]. Yet, it is relevant to acknowledge the potential institutional impact on the financial structure, which will be the scope of this paper, understanding that Blockchain holds the capacity to acquire size and significance in the future.

Progressively, after approaching private CCs, Central Bank Digital Currencies (CBDC) will be examined. As part of the central banks’ liabilities, such as cash, it would benefit from the trust and full support of national monetary authorities. CBDCs would not require deposit insurance since they

would be fully available, opposite to commercial money, [4]. Furthermore, it is important to acknowledge that CBDCs are created or destroyed by central banks, opposite to private cryptocurrencies, which are issued by the computational capacities of miners, [5].

Moreover, CBDCs are considered an emerging route to solve problems presented in CCs, such as their volatility and therefore the financial inequality according to characteristics of the income, study, and age level of the CCs owner. Additionally, CBDCs as a State-owned type of currency could reduce the excessive energy requirements of CCs due to computational mining.

The main geographic delimitation of this research is the United States, considering its role as a technological innovator and economic leader, in addition to the importance of the US Dollar in the financial system. The role of the US dollar as an international reserve currency, as well as the role played by the US Justice Department, the Internal Revenue Service (IRS), The Securities and Exchange Commission (SEC), and the Commodities and Futures Trading Commission (CFTC), which possess experience in financial regulation, anti-money laundry, and taxation, clearly justify this choice. Consequently, any regulation or conception they might introduce will mark a precedent for other international actors, [2].

Hence, this paper will have the aim of examining CCs' potential disruption as a method of payment, its implications for the centralized financial system, and the role of financial mediators. Accordingly, the research questions are: (I) What do Blockchain, and CCs offer to improve the financial system? and (II) Have CCs the potential to replace fiat in finance? Correspondingly, the hypotheses are: (1) Blockchain technology offers an alternative for financial dynamism that is more direct, cheaper, faster, and safer with less bureaucracy, which might disrupt the entire financial system by disregarding banking intermediation, and (2) CCs could eventually spread as a method of payment, which may lead them to replace physical currency in circulation.

The importance of this paper and its contribution to the academic discussion is that it promotes the understanding of the potential disruption of Blockchain in financial intermediation, from an institutional point of view. This paper also analyses the central banking role and the adjustments that might lead to restructuring centralized finance, which should provide free access to financial services, fairness, and efficiency. Alternative options such as Blockchain, "has the

power to change our very notions of what constitutes money", [1].

2 Methodology

A SWOT analysis will be conducted to organize and display the information collected for this paper. This matrix provides a full picture of the landscape to approach Blockchain and CCs in the U.S. from the four perspectives this analytical tool possesses. SWOT is an acronym that stands for Strengths, Weaknesses, Opportunities, and Threats, especially used for commercial and corporate studies following [6]. However, it was first formulated by the strategic planning conducted in the 1950s, when the external and internal concerns relevant to corporations and their lucrative activities were merged, mostly the surrounding business atmosphere, [7]. Later, the tool was matured by some academics at Stanford University during the 1960s. SWOT utilization has been spread to many other fields of knowledge, being incorporated into a wide category of analysis, mainly in all the branches of social sciences. The influence of the environmental issues brought by SWOT makes it particularly useful for economic sciences.

In a further understanding of the SWOT matrix, the theory shows us how each component approaches internal and external issues, for instance, Opportunities and Threats are external whereas Strengths and weaknesses are internal. When observing this differentiation, the analysis accurately merges both, as well as includes a tacit consideration, that even when there is a certain control over the internal aspects, there are external factors that might be out of hand to determine the outcome.

We will utilize data publicly shared by recognized institutions and available in the literature following a deductive comprehension of the topic, based on "data inference: descriptive, deductions from data", [8]. The scope and focused information will be limited to: CCs used in the U.S., USD Spent per month in the U.S. with CCs, CCs owners by income in the U.S., CCs owners by education level in the U.S., CCs owners by age in the U.S., and CCs owners in the world.

Accordingly, this paper is structured into four sections where findings and discussion will be shown. The first section "Strengths" will include the features of Blockchain benefits and CCs as methods of payment. The second section "Weaknesses" will display environmental concerns in mining, valuation volatility, and transactional limitations. The third section "Threats" will focus on the association with

illicit activities and cybersecurity, monetary sovereignty, private banking, and the intermediation in finance. Finally, “opportunities” will include innovative business models, financial inclusion, and Central Bank Digital Currency.

3 Strengths

3.1 Blockchain Added Value

Since its origins, Blockchain has been seen as a revolutionary instrument to achieve “decentralization, democratization, financial inclusion, transparency, trustworthiness, and reliability”, [9], which might provoke a substantial reduction in transaction costs, favoring the operational process, while decreasing risks and timing of cross border transactions. Hence, offering added value through innovation to the financial exchange.

Blockchain works through four tokens: “Asset tokens” equivalent to traditional currencies, known as CCs. “Usage tokens” which are the payment network where transactions occur or the marketplace. “Utility tokens” serve as a channel to send fiat money, usually applied for international transfers without using the intermediation of banks (reducing costs and enhancing efficiency), and “Hybrid tokens”, combine several features of the others. Usually, the spotlight focuses on Blockchain’s functionality, as a tool that can be used for purchasing assets, goods, and services, but implies a system that evades the intermediation role played by financial institutions, [10].

Bitcoin, the first cryptocurrency (CC) ever launched to carry out direct transactions, is considered a Peer-to-peer system in which the role of financial authorities turns superfluous. A person or a group of people by the pseudonymous name of Nakamoto created the first CC in 2009, claiming “cryptographic proof could be the replacement for people’s trust in financial institutions” [11] when confidence in banking declined worldwide after the 2007-2008 financial crisis.

Linked to the peer-to-peer concept, Blockchain provides higher confidence to customers in aspects such as privacy, fraud, or other threats, since it uses cryptographic technology to encode all the information shared in the Distributed Ledger Technology (DLT). Therefore, risk could be removed outside centralized traditional information managing platforms. Attempts by Central banks to guarantee financial security cause rises in the cost of operations, directly paid by customers. Moreover, what Blockchain offers to its users is “decentralized

money transferred directly from one holder to another” thus avoiding traditional bank intermediation, making the process less costly, time-consuming, or bureaucratic, [11]. To further enhance security in each CC, [12] stated “The more aggregate computational power employed in mining for a CC, the higher the value” Simply adding more transactional details to the DLT grants higher trackability and security to Blockchain transactions.

As argued, Blockchain concedes citizens the choice to transfer their confidence towards new monetary instruments considering that “blockchain can record transactions safely and securely without the need for a central body like a bank or stock market”, [1]. Likewise, Blockchain could produce a drastic impact on the reduction of transactional fees of remittances, as well as grant unbanked people access to finance to favor higher financial inclusion rates. Moreover, the creation of alternative funding sources could reduce interest rates and benefit investors beyond the financial institutions.

Furthermore, beyond Blockchain's impact on finance, “The possibilities are unceasing: in higher education, blockchain can assess a person’s competency by certifying skills, experience, and knowledge to future employers; in medicine, it can help reduce health care costs; among government agencies, it may help reduce waste and over expenditures”, [10]. A revolution was introduced as a system of decentralized public trust, where crucial information can be saved, shared, and protected, inside a network available worldwide, cheap, and free of expensive bureaucratic processes, so that it could exert a direct highly positive social impact.

3.2 CCs as Methods of Payment in the U.S.

Regarding the functions of money, we cannot forget that “shells or rocks or gold or paper, in any economy, it has three primary functions: it is a medium of exchange, a unit of account, and a store of value. Of these three functions, its function as a medium of exchange is what distinguishes money from other assets”, [13]. Hence, the medium of exchange attribution in CCs -as an aspect of money distinction- is what will be discussed here. Some academics define this technology as “the latest method for people to buy and sell goods and services” [10], by arguing that CCs are “designed to be used as a means of exchange”, [14].

Despite the potential rivalry between decentralized finance and central banking, a report on virtual currencies shared that the European Central Bank attributed to Bitcoin the capability “to compete against real currencies as a medium of exchange”, [11]. This statement sets a relevant

milestone since understanding CCs as a means of exchange and accepting their monetary nature entails recognizing a potential change in digital payment structures.

Additionally, other researchers claim that “One of the most promising types of electronic money is CCs described as the latest “form of presenting the money we use in everyday life”, [15]. Due to its growing acceptance and use, Bitcoin has been identified with the “new economy” and appointed as “the first successful implementation of a peer-to-peer network that could serve as a payment method”, [16].

Advancing to available data to observe CCs’ performance, in 2021, 59.59% of the crypto owners in the U.S. claimed that the main use of their ownership was purchasing, whereas the other 40.41% kept them only as investments. In contrast to 2020 as it is displayed in Figure 1, the “investment-only” decreased sharply granting space to grow for purchasing purposes, [17]. Due to this trend, around 2,352 US businesses accepted Bitcoin in 2022, [18].

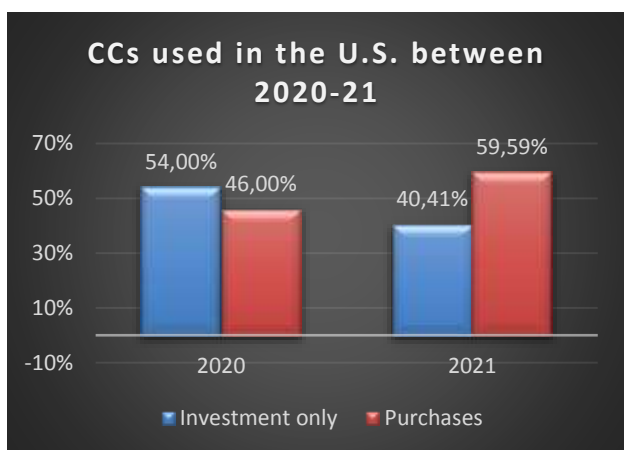


Fig. 1: CCs used in the U.S. between 2020-21
 Source: [17], [19] and own elaboration

Consequently, the settlement of CCs in the sphere of payments could reshape the world of finance. To exemplify this phenomenon, the University of San Francisco, California, published an article named “Current State of Blockchain and CC for Major US Cities” where they mention the dynamics of this technology for purchasing goods and services in 2023. CC and Blockchain boom in the United States has recently had two main causes, the first one focused on attracting miners after China banned the production and use of these coins in their jurisdiction. The second is the growing acceptance of CCs as methods of payment. The main territories conducting such reforms according to the literature are “California, Colorado, Kentucky Nevada, New

Hampshire, New Mexico, Texas, and cities like Miami, New York City, and Atlanta.” Around 20 States have already introduced blockchain-friendly policies throughout the U.S., [20].

In Texas, for example, the CCs upsurge has been named by politicians as “the greatest technology shift since the beginning of the internet”. At the same time, San Francisco has the first federally approved and recognized crypto bank. Furthermore, many States have allowed the payment of taxes, public services, parking, funding political campaigns, purchasing real estate, paying for health services, buying any kind of good at businesses, and paying for other governmental fees with a wide variety of CCs. Some States such as Arizona aim to “recognize Bitcoin as legal tender”. Also, the city of Berkeley is using CCs as a crowdfunding mechanism to fund local projects and enhance the affordability of housing in the area since they claim that this technology serves as a facilitator to democratize access to capital; they are even at the point of creating crypto State bonds, [20].

Banks have been involved as crypto brokers, but they have also included CCs as options for workers to receive part of their salaries or saving plans and are allowed to offer custody services for these assets in states such as Virginia [20]. Finally, the monthly amount spent in CC (Figure 2) is mostly moderate, with 68% of them allocated under 1000 USD, in contrast to the 32% who used more, [19].

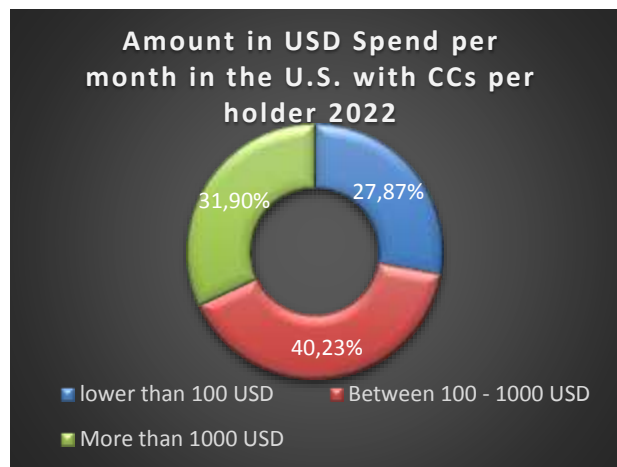


Fig. 2: Amount in USD Spend per month in the U.S. with CCs per holder 2022.

Source: [19] and own elaboration

The importance of this technology not only stays in the commercial ground but also goes to the educational sphere, where many training programs are presenting Blockchain amenities and challenges to citizens for informing adequately to avoid massive losses of capital or the misunderstanding of

risk, all by means of traditional educational channels and social media.

In the spectrum of public recognition, CCs have caused statements such as “Businesses have to go where demand drives them, and here’s a situation with a new currency that’s not the U.S. dollar that more and more people are using,” and even forecasts that estimate “more businesses will embrace crypto in the coming year, and large institutions, like Visa, are creating systems for their customers to save and use bitcoin”, [20].

In conclusion, it is possible to visualize how the United States is getting involved in this new technology to facilitate payments. From an active stance rather than reactive, the change and the orientation of the market and many public actors award a bright near future for CCs as a broadly accepted method of payment.

4 Weaknesses

4.1 Mining and Environmental Concerns

The Blockchain creation process -also known as “mining”- demands raw materials to produce the output -which in this case can be a CC-. Those inputs are “infrastructure capabilities, technological knowledge, time spent, and resources consumed” [2], which involve repercussions far beyond their production prices such as the tremendous ecological harm they provoke to the environment, especially for the energetic consumption required to operate the complex and powerful computational infrastructure.

Here we will only analyze the example of Bitcoin, the most relevant CC, according to its market share. Regarding its annual carbon footprint, Bitcoin pollutes the same as Israel and consumes the same power quantity as the Netherlands, surpassing several times the energy consumption of Hungary. The requirement of a constant source of energy for mining is CCs’ greatest weakness. In addition to the high magnitude required, it is very challenging to utilize suppliers of greener resources. On the contrary, they rely mostly on fossil fuels. In fact, after the Chinese-crypto dispute in the spring of 2021, miners left their operational bases in mainland China. This provoked that the “share of renewables that power the network decreased from 41.6% to 25.1%”, (...) mainly caused by the reallocation of mining facilities in countries like the U.S. and Kazakhstan where energy supply is “either coal- or gas-based”. Of course, this negatively affected the Bitcoin footprint data, [21].

Furthermore, a comparison between Bitcoin and Visa shows an estimated “403,867 is the number of VISA transactions that could be powered by the energy consumed for a single Bitcoin transaction.” Yet, as for footprint, the number increases, it requires 742,046 Visa transactions to equal a single transaction in Bitcoin. Finally, to conclude the dramatic situation of the Bitcoin footprint in the environment, active mining is what maintains the Blockchain system; without it, the recording of data and transactions of CCs would be Impossible. This implies that Blockchain pollution will be maintained. Nonetheless, an example of energy innovation is the case of “Bitcoin’s biggest competitor, Ethereum, which has reduced its electrical energy requirement by at least 99.84% by changing its method of production”, [21].

4.2 Valuation Volatility

The historical stagnation of the fiat value is what has driven investors into Blockchain. For example, the variance in the price to USD of 1300% Bitcoin experienced in 2017, exceeded the traditional behavior of investments such as bonds, stocks, and other financial assets. Likewise, some surveys have found that when crypto traders seek this sort of assets for investing purposes, fit into these three categories: “long-term investment strategy (55%), a distrust of the current financial system (38%), and short-term trading (31%)”. Both of them are simply profit-seeking investments, instead of the innovative potentialities Blockchain offers to finance, which complicates furthermore the misconception of the rate of return in a scenario of robust volatility and speculation, [10].

Nevertheless, high volatility has not only affected Bitcoin but also caused an “8,900% increase in Ethereum and 36,000% increase in Ripple”. Researchers in this matter have named this phenomenon “fear of missing out” and “pump and dump”. Herd-like behavior has driven the beliefs and desires of fast methods to get profits, which eventually caused investors to run a risk to obtain massive gains. For such concerns, the European Central Bank president Christine Lagarde claimed, that CCs “are based on nothing and should be regulated to steer people away from speculating on them with their life savings”, [22].

One of the techniques to settle volatility is stablecoins; they are coins that intend to maintain their exchange value to fiat by keeping a backed asset or currency to support the stability of prices. Hence, stablecoins could be better used as a method of payment. Nonetheless, they have not achieved the desired stability considering that, “holders are

exposed to significant valuation risk, epitomized by the collapse of Terra in May 2022”, [23].

In summary, volatility appears as the greatest weakness, since it affects the construction of the most important characteristic of payment instruments, the “creditworthiness and the faith of the public in their ability to pay back any debts owed by them” [10]. The relevance of CCs relies on their contribution to facilitating financial exchanges rather than on their conversion to fiat. This will not occur until the markets calm and investors’ rationality prevails, which might lead to a redirection of investment to the platform technologies or even to the adaptation of business to a new financial world. However, this Crypto world’s future remains unclear; some retractors claim, “they are a bubble that will sooner or later fully implode. To others, they will prove the foundation for fundamental innovations in decentralized finance”, [23].

4.3 Transactional limitation

This section will be approached from two perspectives, firstly, the technological capabilities to process transactions and their processing times; secondly, the income, age, and academic characteristics of CC owners in the U.S. and how it affects CCs penetration into the market, which provokes fewer use commercial transactions.

The payment processing times are the major technological drawback of blockchain technology. Despite its exponential increase and wide acceptance as a method of payment, it currently requires up to an hour to process a successful transaction. On the contrary, traditional payment channels need only a couple of seconds for some transactions.

Generally, one blockchain in Bitcoin comprises “1 megabyte of data”. Considering its mining process, the timing for a new block creation is approximately 10 minutes. Consequently, Bitcoin can handle 7 transactions (each transaction needs 250 bytes) per second compared to the 65.000 transactions Visa could take at the same time frame. Annually, bitcoin could take up to “220 million transactions” while the global financial system can even surpass 700 billion payments, for example, Visa in 2019 processed 138.3 billion transactions [21]. Visa could manage to process 9285.7 transactions for each of Bitcoin’s in maximum capacity, it represents 0.01% of Visa per second transactions; in the case of bitcoin’s position in the global payment system, it can hold 3.14% of the total yearly figure. If compared to Ethereum, the second most used CC, “Bitcoin had 264,899

transactions on January 6th, 2022” whereas “Ethereum, had 1,212 million transactions on the same day” [24], even lower than the Bitcoin capacity which is already not sufficient.

The second limitation, for the case of Bitcoin worldwide, is that only 0.01% of the holders - around 10,000 people- possess 5 million Bitcoins. Considering that the limit of production is 21 million, that concentration trend represents 25% of the total, [23].

CCs’ ownership is quite unequal since the distribution of wealth in CCs is very similar to fiat, “1% of wallets possess 99% of the total digital assets in bitcoin for the post-2008 period”, [2]. Nevertheless, the distribution of CC ownership by group income -not by quantity- in the U.S. for 2022, reveals a lack of concentration of ownership in the richest groups (Figure 3). However, considering that a higher number of people belong to the lower-income groups, there is a much lower representation of these economic classes, [25].

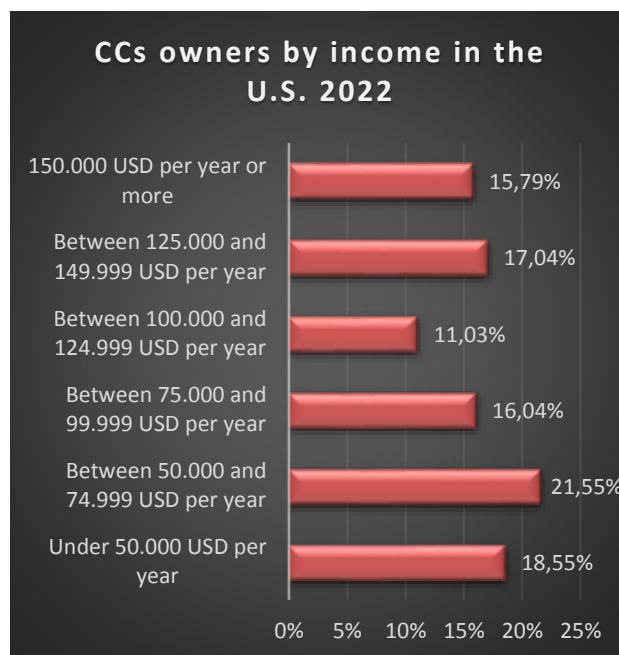


Fig. 3: CC owners by income in the U.S. 2022. Source: [25] and own elaboration

Moreover, Figure 4 and Figure 5 show a different pattern, according to which the allocation of owners is highly concentrated in two categories: two-thirds of them have advanced education - university degrees- and nearly 70% are between 25 to 44 years of age, [25].

To summarize, Bitcoin, as the most representative CC, suffers firstly from important limitations in transactional operations because it does not have the technological infrastructure to satisfy financial exchange demand, since the

quantity of transactions needed to maintain the current economic dynamism exceeds by much Bitcoin’s capacity.

Secondly, the high concentration of coins in a small percentage of the population makes it more of an investment rather than a currency, so it weakens its positioning as a method of payment. If CCs are not in constant use and exchanged to purchase goods and services, they will only remain as speculative investment assets, provoking thus a reduction in the innovation required to cope with higher transactional volumes.

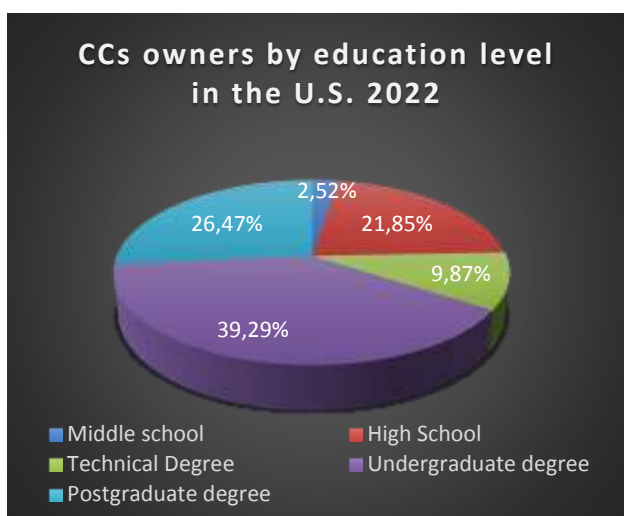


Fig. 4: CC owners by education level in the U.S. 2022

Source: [25] and own elaboration

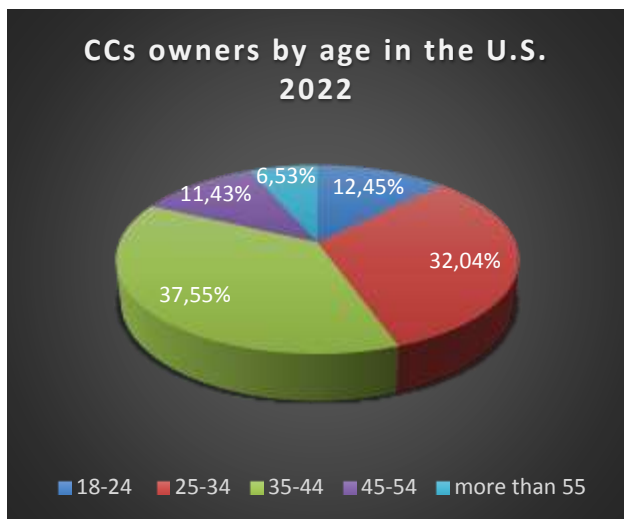


Fig. 5: CC owners by age in the U.S. 2022.

Source: [25] and own elaboration

5 Threats

5.1 Association with Illicit Activities and Cybersecurity

This perspective will include firstly how CCs have been used for criminal funding and illegal exchange; secondly, how they serve to avoid international financial sanctions; and lastly, malware and cybersecurity concerns.

The World Bank Group stated in 2018 that there is a “strong positive correlation between the use of CCs and indicators of corruption”, [23]. Many CCs facilitate transactions for a wide variety of crimes such as corruption, [26]. CCs provide a high degree of anonymity that permits evading official controls so that Blockchain can be used as a means of conducting fraudulent financial transferences.

The dark web is another popular form of an illegal marketplace, where drugs, weapons, and human trafficking activities can be exchanged. An example was the website “Silk Road” disabled and brought to justice in the U.S. in 2013. They were prosecuted for “money laundering, terrorism financing, tax evasion, bribery, and many other illegal activities”, [27]. Public opinion blamed directly decentralized finance technology such as blockchain for permitting those exchanges.

Furthermore, international economic sanctions contemplate CCs as the escape route, considering them as financial tools to conduct hidden international operations. Consequently, new counter-status quo alignments are operating throughout Blockchain to avoid the use of international reserve currencies.

In the current situation of Russia after the 2022 Ukraine invasion, some analysts argue that Russian capabilities to trade using CCs were massive, and strengthened before the invasion started, anticipating the potential sanctions that were eventually imposed. The strategy undertaken is to “mask the origin of such transactions” to permit business as usual with their commercial partners. Some estimations indicate, “more than \$400 million worth of CC, went to entities that are probably affiliated with Russia”, [28].

Consequently, Russia is considering launching its digital Ruble to enhance the control and facilitate the profits of blockchain anonymity; whereas governments who imposed sanctions focus on demanding more control and commitment from blockchain operators to prevent all kinds of illegal activities and enable law enforcement.

Blockchain allows 24/7 operations since its high security is granted by the decentralized information system in all nodes, which makes it virtually impossible for hackers to cause significant damage to its accounting system. Consequently, hackers do focus on attacking users rather than the system, hence they seek to control personal information to access private keys. When keys are exposed, criminals have the possibility to carry out operations to steal coins from users' wallets, [27]. These unauthorized situations are not protected by any entity due to the decentralized nature of Blockchain. Opposite to private banks, they oversee the cybersecurity administration of wallets, when attacked, affected account holders can complain to request the reintegration of stolen funds.

In conclusion, the mentioned scenarios of illegal activities and cybersecurity concerns must be considered for investing, trading, or regulating CCs since these issues impede the settlement of CCs as methods of payment. Therefore, they represent a potential threat not only for users but also for the technology itself. Consequently, to advance in the CCs development, deep research should be conducted to face accordingly these challenges.

5.2 Monetary Sovereignty

Monetary sovereignty is an attribution of the State, appointed to the economic regulatory power or the central bank. Nonetheless, there are other relevant regulations worth mentioning such as commercial rules, taxes, prohibitions of illegal monetary activities, or fiscal policies, which have a direct impact on the economic dynamism as well, [27].

In the sphere of taxation, CCs have a significant grey area that makes their tax rate classification difficult. For instance, if they are taken as a method of payment, does it mean they are foreign currencies? Could they be subject to those rules? or, are they investment assets? and should they pay a rental tax for profits, [23]. Further questioning emerges when CCs are used as money, should they be taxed for the profit made on the transaction day compared to their original purchased price? This is just a simple overview to mention how State regulation appears to be relevant to the topic, yet only monetary sovereignty will be under our attention.

In broad terms, monetary sovereignty is the power States have, to control their currencies. It entitles them to keep a unique control over these three aspects: firstly, "to issue currency" declared legal tender inside its frontiers; second "to determine and change the value of that currency"; and lastly, the exclusivity of regulation over its

currency and "any other currency" inside its jurisdiction. Both of them "correspond to the role of money as a medium of payment" whereas the other is an attribution of "the role of money as a unit of account", [29].

These three rights also require a centralized body that recognizes and prints that legal tender - known as a central bank-, which is appointed by the highest law in the hierarchy of normativity - normally a constitution- and has independence from other branches of the State apparatus. Its main objective is "to control the issuance, and circulation of such currency, based on the adopted monetary plan to protect and maintain the economic stability", [27].

Consequently, a "wide adoption of a digital currency outside of government intervention would be a major shift in power", [10]. Moreover, it is a massive threat to the distribution of power, especially inside the financial institutions. Fiat is based on a system formed by intermediation, whereas the "decentralized nature" of Blockchain and CCs does not require to pass through centralized bodies and their scheme of intermediaries such as private banks.

The impact of this threat on the economy is obvious if the government's main concern is the stability of prices and unemployment, and overall, the safeguard of the nation's economic performance, which allows citizens to live properly. Consequently, dismantling central banking authorities seems by no means an option for the Nation-State's social structure, [30].

However, many governments also support pro-technological trends to improve competitiveness. For example, "cash payments are used for only 1/3 of transactions". Accordingly, "Governments also appear to follow this trend, actively trying to reduce the amount of cash in circulation", [10].

Yet, the rise of CCs and Blockchain meets for the first time an implicit threat to legal tender, so the implementation of policies should include deeper and more careful approaches, which sometimes policymakers -especially congressional or parliamentary- do not possess. An example of an early adapter is El Salvador, whose "Bitcoin as their official currency" policy based its decision on the dependence of "remittances which are 25 percent of their GDP" [30], but there is not so much information yet to understand the effects such policies might cause.

Some States are shifting their policy measures to prohibit private CCs. Blockchain technology has demonstrated its utility and gained its title as a promising tool in the future of finance.

Consequently, States such as China in April 2020 and, even the European Union, have declared their intentions to launch their digital currencies, [30]. This strategy could deal with Blockchain's threat, as it could change the direction of CCs, perhaps dismantling their private characteristic, but presenting numerous reforms in the structure of private banking.

This issue has been mentioned by many researchers, "the battle is not about whether blockchain will or will not become used but rather what type of economy it will lead to" The key will be related to the future distribution of roles, considering "The intellectual battleground is now who will get to control these technologies" [1]. After all, the current "primary purpose of CC is to overcome the prevalent issues with traditional currencies by giving control back over to the currency holders as opposed to a monetary authority", [31].

5.3 Private Banking and the Intermediation in Finance

Blockchain will perhaps become the channel where "all financial transactions will occur", [10]. Hence, the channel where CCs operate must be explained, since not all transactions in blockchain occur peer-to-peer, it is just one type. Transactions are divided into the ones that are direct and others that use centralized exchanges "whose purpose is to facilitate such peer-to-peer trades". They use intermediaries, known as "centralized exchanges", which administrate the private keys of the payer and process the payment to the payee "on their behalf, charging a commission or fee for doing so", [23].

Beyond the channels where transactions and payments occur, banking has one massive mission in the national economy, because it serves as a creator of dematerialized money by lending; it borrows money from savers several times so that it can mediate to redistribute capital for funding private projects. Opposite to Banks, CCs cannot multiply coins in the Blockchain as banks do. However, the facilitation of alternative instruments "for Social crowdfunding platforms" [9] substitutes in a sense banking funding. Despite a non-profitable use so far, it can turn into peer-to-peer direct lending. Thus, it would provide interest for the lender rather than for intermediaries without the need to create money, competing thus against the profitable banking industry.

Since their creation, banks have been necessary for daily economic activity, since they provide users with services "to keep money easily, to deposit it, to quickly transfer it" [32], yet now that blockchain is

on the table, they must adapt to a new market dynamism. For example, the bank could apply a strategy to become those centralized exchangers mentioned above, and in that sense, survive a potential intermediation disaster. However, it can be a threat to the decentralized finance philosophy and turn it into an alternative liquidity source with the same level of intermediation or even more. In any case, under these conditions, private banking must reformulate their strategies to attract customers to intermediation, which did not occur before CCs, if someone was underbanked, they had to face financial exclusion without an available alternative.

6 Opportunities

6.1 Innovation Business Models

Blockchain is also a great opportunity for businesses to adapt to a world of constant innovation. Some academics have identified that 85% of firms dealt with this technology to enhance their market share because 77% of them claimed that CCs have lower transaction costs. Beyond the potential opportunities, there must be a strategy to follow the adaptation, aimed at answering the following question "Hold crypto on our balance sheet or simply adopt crypto-enabled payments?" This expands the understanding of this technology far beyond the academic discussion of this paper, [18].

Regarding the so-called "hands off" and "hands-on" strategies, the first one includes only the acceptance of CCs as a method of payment but "using a service provider to do the conversion and thus keep crypto itself off the books", [18]. This strategy only tries to increase the number of clients. This approach is highly common since it is even used by some States in the U.S. to pay for public services, as it was mentioned in the method of payment section. It is the fastest and easiest option without introducing internal changes in the business model while reducing volatile risks. However, it also implies higher transactional costs to pay for third-party conversion services.

On the contrary, the "hands-on" strategy involves a direct acceptance and use of CCs by businesses, avoiding the third party who converts the CCs and deals with all the volatility risk. Therefore, those who follow this strategy must carry out an internal reform of their business financial administration. This could generate a reduction in transaction costs, a better capability to manage smart contracts, an increase in security standards, and a reduction in cross-border transaction timing, etc. However, here the following question could

arise: “What adjustments does the Treasury foresee in anticipation of the eventual issuance of digital currencies by central banks?”, [18]. It introduces a proactive business strategy for adapting to a new financial structure, which would grant a smooth transition for those who anticipate the winds of change.

Th “hands-on” approach includes higher volatility risks. However, a way to avoid risk is to operate with stablecoins. Considering that innovation is not in one CC, but in the Blockchain technology instead, those who prefer stablecoins would also continue operating in CCs with lower risks but enjoying this technological business shift, [18].

Another opportunity for business choosing “hands-on” relies on the transaction itself rather than on the costs. CC transactions take a couple of minutes regardless of the place on earth where the sender and receiver are located. On the contrary, the timing for fiat will depend on whether it is domestic or international, the same bank or different, whether it is the same currency or not, and whether it is a working day or not. Due to that, it could take up to several working days to proceed. During this time neither the sender nor the receiver has access to the funds, which increases uncertainty and risk in operations. In terms of commerce, shipping, trust, and celerity, blockchain exceeds fiat’s performance, [18].

One of the greatest external opportunities for CCs in this regard is the change in business towards accepting Blockchain to make commercial exchanges since this method of payment/investment is rapidly developing. Nevertheless, it finds resistance from users in aspects such as the incapability to pay with them, “29.5% of respondents cited not owning CC as their current merchants do not accept it”, [25].

Finally, yet importantly, an eventual adaptation of business to CCs will take a rather long time, assuming that Blockchain is considered “a critical part of the evolution of finance. When your company chooses to engage with crypto it triggers changes across the organization as well as changes in mindset”, [18].

6.2 Financial Inclusion

A growing percentage of the population, mainly illegal immigrants, does not have any access to financial services and thus they are commonly considered “unbanked”.

For the unbanked, Blockchain and especially CCs could provide access to certain financial services, Around the globe, “Approximately 1.1

billion unbanked have mobile phones that represent about two-thirds of the unbanked population”, [10]. These people could be part of the financial system by owning digital wallets and thus avoiding the inefficiency of banking processes, which is common in locations with high levels of financial exclusion. In this situation, the use of CCs is the “access to financial services to the un- and under-banked, allow for extremely low-cost money transfers and remittances across state borders”, [12]. Kenya is the best example of financial inclusion through CCs and could be a lighthouse for all developing countries seeking to promote disruptive financial inclusion at low fees.

Among the “banked” population, in the U.S. approximately “46 million people, 13.7% of America’s total population, currently own CC”, compared to the 27 million, equivalent to 8.3% of the population in 2021. This significant increase has recently begun: “2021 was the year that CC was in the spotlight as major institutions, celebrities, and public figures all jumped on the crypto bandwagon.” This triggered that 55% of owners are looking forward to increasing their CC, [19].

Globally “there are over 20,000 CCs” and 420 million crypto users in 2023. The 46 million in the U.S. represent almost 11% globally. However, the countries with the highest percentage of CC owners over the total population are the United Arab Emirates (27.67%) and Vietnam (26%). For the other high percentage countries, the figure stays between 13.7% and 9.3%, as can be observed in Figure 6, [24].

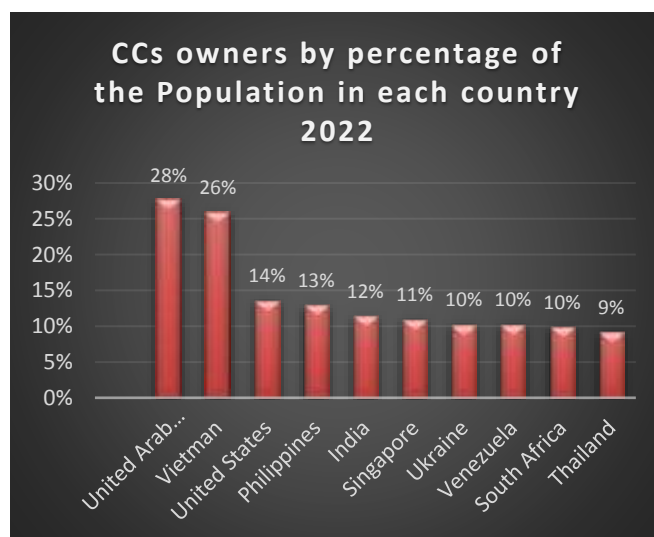


Fig. 6: CC owners by percentage of the Population in the world in 2022

Source: [24] and own elaboration

Nonetheless, these top five in the ranking change according to the pattern of classification. Considering that India is more demographically concentrated, its 11.5% is bigger than the others in the number of people, so the ranking changes as seen on Figure 7. First, India has 50 million more crypto owners than the other four nations of the list combined, the United States is second and almost doubles Vietnam -the third-, from then onwards the trend line flattens. Another remarkable case is the fifth, China, with 19.9 million, which shows an interesting number despite the prohibition on CCs.

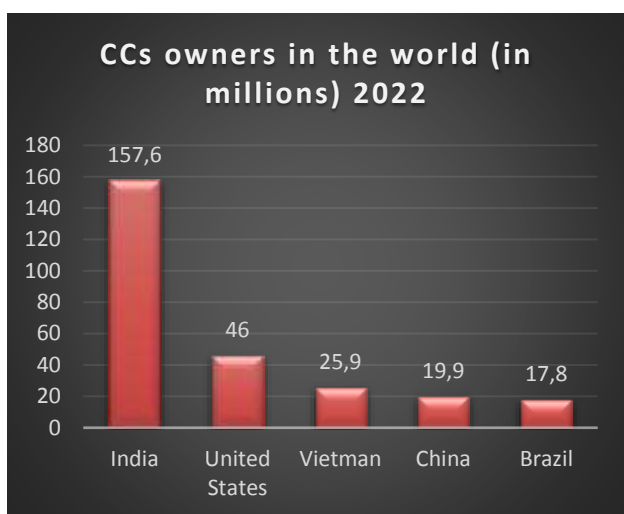


Fig. 7: CC owners in the world (in millions) 2022
 Source: [24] and own elaboration

Another factor to mention for inclusion is the infrastructure capacities. In the case of cash machines or Automated Teller Machines (ATMs), the United States surpasses the facilities by 890% of the four other countries combined in the top 5 list of this category shown in Figure 8.

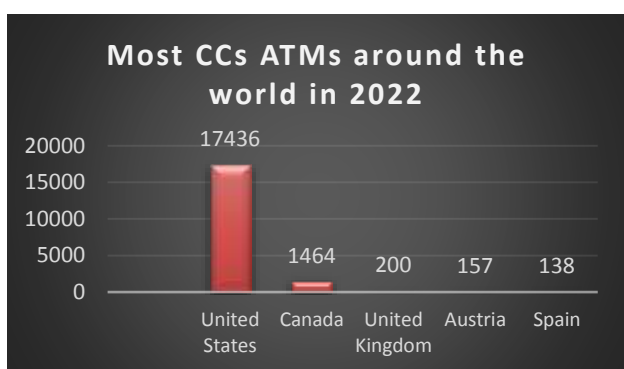


Fig. 8: Most CC ATMs around the world in 2022
 Source: [24] and own elaboration

To summarize, if the strategy of governments is to enhance access to financial services, this technology appears to be a prominent solution, granting a massive opportunity for policymakers or

corporations leading CCs to gain users while serving the community. Secondly, there is a clear progression of the population getting involved in the world of Blockchain. The U.S. numbers remain high in comparison with other countries around the world, but they are not high enough yet to introduce pressure for dramatic changes.

6.3 Central Bank Digital Currency (CBDC)

The role of central banking is under scrutiny since “algorithmic digital currencies such as bitcoin appear to be viable competitors to central bank fiat currency”, [1]. Doubts about central banks' monetary policy have arisen due to their inability to control inflation, prevent crises, or regulate private banking. Hence, the strengthening of decentralized finance could be perceived as a challenge for the central banking structure. However, they should not necessarily be antagonistic since the opportunity relies here on the convergence of both.

Regarding CC regulation around the world, whereas some States prohibit, and others permit them as a type of asset, there are other central banks such as the Chinese one, which are opting to develop their CBDC arguing it “could enhance financial integrity compared to cash”, [33]. This implies firstly that the blockchain system is highly effective for financial purposes; and secondly, that the predominance of Blockchain is not only possible but also forecasted by some central banks, [4]. Approximately 130 countries around the globe are on the track to create or are currently researching their own CBDC, [2]. Central banks could be trying to anticipate the transition to avoid conceding monetary sovereignty to private CC makers “Given the current level of interest demonstrated by the various central banks it is, however, highly likely that state-issued CCs will play a huge role in the future of finance”, [34].

China started by launching an experiment to avoid the use of the U.S. dollar, traditionally attached to certain international trade exchanges. Because of that, the Chinese central bank is adopting Blockchain, where the digital yuan is expected to perform as an exchange currency, [4]. The usually named “early birds”, or “early adapters” are the first ones to apply innovative solutions. Those who adapt first to transitions are the ones who could lead the way. Consequently, their implementation could impose some protocols, principles, infrastructure, or even trust into their CBDC, which could locate them in a favorable position, as the Federal Reserve comments on the current role of the USD, [35].

The case of China is crucial, considering its place as the world’s second-largest economy and its

role as a commercial superpower. It is a milestone for Blockchain that China leads the way in adapting its financial structure to this technology, as well as a guide for the 130 other countries advancing carefully in the launch, pilot and development stages [36], while many are observing implementation strategies and performance of others, hence, “the general expectation appears to be that, in time, the issuance of CBDCs will become widespread, [23].

One of the key views on this topic is trust in monetary instruments. As it is known, it was commonly held by States through institutions such as central banks. However, it has been surprising that the peer-to-peer concept brought by cryptography could change the perception of that trust’s source, [37]. Nevertheless, central banks still have their recognition, despite all the contemporary debate about their role, as they are still perceived as serious and reliable entities, separated from politics, and scientifically guided. Trust is explained as “Individuals also tend to correlate trust with the brand” which led them to wonder whether the CBDB “would be a hybrid, backed by a public-private consortium?”, [37].

Nonetheless, some threats are also found in CBDC, for instance, the Bank of International Settlements argued that the G7 monetary authorities agreed on three main principles to develop CBDC, “i) the issuance of a CBDC should not compromise monetary or financial stability; ii) a CBDC should coexist with and complement existing forms of money; and iii) a CBDC should promote innovation and efficiency”. However, a trilemma situation also appears in the CBDC and commercial banking according to [38] who states that only two of these three policies can be achieved: “(i) free convertibility between CBDC and bank money, (ii) parity between CBDC and bank money, and (iii) central bank monetary sovereignty”, [39].

One of the most frequent concerns CBDC has for financial stability purposes is what [38] called the “deposit substitution risk”. This highlights the threat of banking disintermediation where individuals shift from bank money to CBDC, since it would affect the commercial banks’ liquidity and therefore their lending power, consequently leading to a credit shortage that could provoke financial instability.

The main drawback of disintermediation is related to the role of private banks and their experience in managing risk, privacy, investing, lending, and clients’ knowledge. These are aspects not yet developed by central banks at the general public level, therefore, the risks of a direct account of citizens to central banks not only stay in the

spectrum of financial stability, or monetary sovereignty, it also involve expertise in delivering financial services to individuals. Similarly, if the massification process of CBDC implies incentives that make the market impaired could cause “havoc with maturity transformation”, [40].

In conclusion, even though central banking and decentralized finances contradict themselves, Blockchain adoption by central banks could bring to the financial structure some advantages, not only strengthening financial inclusion but also reinforcing the role of central banks, opposite to CC’s initial aim [31]. It could possibly reduce financial intermediation, as the structural conception underneath Blockchain suggests. Nonetheless, intermediation must be carefully redesigned to avoid liquidity risks, following regulatory recommendations by central banks.

7 Conclusions

Blockchain technology has provided a new way to carry out financial transactions, allowing a reduction of the bureaucratic phases of intermediation -which makes them less expensive-, since peer-to-peer technology makes some operations direct and faster, especially remittances and international payments. However, Blockchain is still very slow for daily purchases compared to traditional channels such as Visa. Additionally, it offers superior standards of safety by using encryption and decentralization; nevertheless, the energy and environmental costs of mining remain outstanding.

Despite the different nature of CCs compared to other financial assets, CCs still share similar characteristics and functionalities with money and other financial tools. CCs are innovative monetary instruments to be accepted as channels of payment, able to compete against or even replace traditional money. However, to achieve so, their technological capability to process transactions should be improved to reduce volatility, enhance their range of commercial acceptance, eradicate their association with criminality, and develop greener solutions for energetic demand. Eventually, whether crypto will play the role of fiat exceeds the boundaries of money’s functions. “All money is a matter of belief” [41] so the society will finally choose between a decentralized financial system or the current one.

The peer-to-peer philosophy of Blockchain has always supported the decentralization of finances, which implies a direct threat to central banks’ power and the monetary sovereignty of States. However, Central Banks could also enjoy Blockchain development in case they decide to create and

manage their CBDCs. They could take advantage of such technology while strengthening financial inclusion and reducing transaction costs. Central banking will adopt Blockchain technology if they apply an innovative approach to adapt to new realities. Additionally, CBDC could significantly reduce or even make disappear private mining thus solving environmental concerns, since being State-owned could introduce more sustainable methods for CBDC creation.

Opposite to the scenario of private banking, the Blockchain idea to sink financial costs would provoke at least a reduction or even the disappearance of commercial banks' benefits. Banks could eventually become administrators of private keys, wealth managers, or hedge funds, which will depend on identifying customers' needs to shift in that direction. Nonetheless, its traditional mission will not be compatible with the emerging Blockchain-driven system.

Once the arguments were presented, discussed, and analyzed above, it could be forecasted that despite private CCs being speculative assets, however, the revolution in finance will take place through CBDC, which will be a relevant monetary instrument shortly. It will negatively affect private banking and discourage the use of physical forms of money. However, to maintain the institutional equilibrium, central banks will conduct partnerships with private banks, responsible at first to deliver CBDC to the citizens. Later, the implementation of this new form of money, which is a central bank direct liability, will coexist with the creation of money through loans by private banks, which will lead to a profound restructuring of private banking.

CBDC will probably cause a disruption in the traditional money supply by conventional loans, as well as favor a more proactive role of central banks in daily operations. Citizens will have access to payment channels through the CBDC. Thirdly, it would adjust the banking mission to digital wallet managers more focused on cybersecurity, thus lowering private banks' monetary power and reducing the financial fees charged by them.

To close this paper, future research fields are the effect of CCs on the distribution of wealth, remittances, the population unbanked, and financial inclusion, especially from a developing economy point of view with challenges in financial access for their citizens. A deep analysis of the effects of the Blockchain disruption on financialization, monetary sovereignty, and central and private banking should be accomplished, once evidence from countries that have already developed CBDC is available.

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