Review of Central Bank-Issued Digital Currency (CBDC) as a Vehicle for Widespread Adoption of Digital Assets

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Abstract

With the rise in popularity of digital assets in the recent years, the existence of decentralized, multi-national currencies is becoming an important topic of discussion for central banks, since their control and sovereignty over their respective economies might be in need of a regulated payment system that fits the needs of an increasingly globalized society. One of the most discussed solutions around the world are Central Bank-issued Digital Currencies (CBDC), which bring with them delicate topics regarding legislation, viability and the security of their users.

Index Terms – Digital currency, CBDC, payment, transaction, currency issuing, blockchain, finance

I. Introduction

Since its first mention in 2009[2], the concepts of blockchain and cryptocurrency have spawned several advancements and projects that have caught the attention of the masses in the technology sphere. From smart contracts to decentralized communication networks, the idea of a trustless distributed way of storage and transmission of data has changed the views of a large group of people, not only regarding the usefulness of these models, but also questioning if the current centralized mechanisms are on their way out.

The most attractive point of decentralization is the security achieved by the replication of the data into every node of the network and the consensus algorithms defined for these nodes to decide the true state of the data, which completely protects the data from outside tampering. However, there is still a sense of ironic lack of trust in this mechanism, which is fortified by the most popular of blockchain: Bitcoin. The volatility of the cryptocurrency is always the first talking point of blockchain deterrents, especially since the crash of 2018[3]

To combat this sense of skepticism, various alternative uses of blockchain have been developed in recent years. The first great example are stablecoins, which are cryptocurrencies whose value is associated or tethered to that of a non-digital asset or commodity. Today we have examples of stablecoins associated to fiat currencies (USDT, TUSD), commodities like gold (DGX) and even some that compile other digital assets (nUSD, CDP), and new users feel more comfortable using tokens with values associated to assets with which they are more familiar.

However, the lack of accountability that comes with entirely decentralized systems keeps discouraging users from entering the market. In a survey performed by finder.com[4], they discovered that most see it as not worthy or necessary to make investments in a system in which no person or institution can be held accountable for the actions of malicious users or errors in the system, despite it being specifically designed to avoid these events.

Figure 1. Price of BTC from January 2016 to August 2020. The "crypto winter" of 2018 caused a massive drop in prices, which planted a sentiment of distrust in most current and potential users.

This opened an opportunity for a new type of asset to arise: Central Bank-issued Digital Currencies (CBDC), which represent an attempt to bring the benefits of digital assets to the traditional finance system and to gradually move society past the need for fiat currency. In this document, we will review the concept of CBDC and its viability, along with the recent proposals of Uruguay and Sweden for its implementation, and how important they may become in the following years.

II. Description

According to the United Kingdom's Institute and Faculty of Actuaries[1], CBDC are defined as a set of digital assets exclusively issued by Central Banks, which:

- Offer broader access than reserves.
- Have greater potential functionality for retail transactions compared to cash.
- Have a separate operational structure to other Central Bank-issued currencies
- Can be interest-bearing, paying to a different rate than reserves under realistic conditions.

Much like the centrally issued money we use today; it is expected to be a form of central bank liability that can fulfill the purposes of both a medium of exchange and a way to store value in a safe manner. A diagram that compares CBDC to other forms of currently used currency is shown in Figure 2, which not only shows its versatility and usefulness, but also the fact that it has the potential to be diversified for specific uses in wholesale or general purposes, should the necessity for it arise.

They also highlight that the widespread use of CBDC could have several effects in the entire financial landscape of a country, if they are designed to be a perfect substitute to privately issued e-money:

II.a. Interest rates

Given their ease of access, lack of holding limits and that they should be interest-bearing, they could eventually become a tool to define a lower rate under the ones of the money market, which can influence the

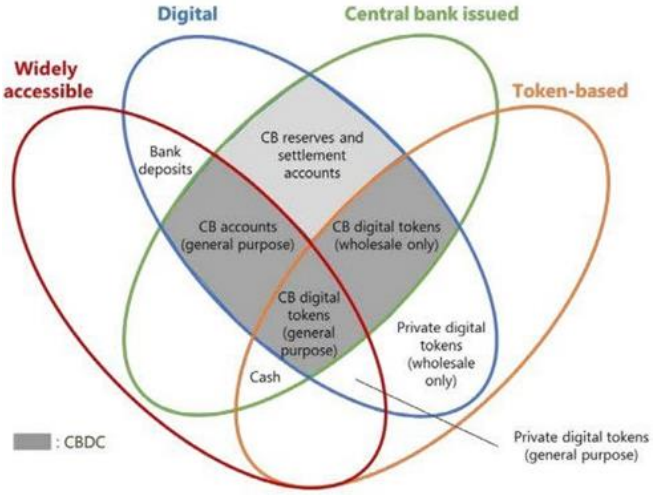

Figure 2. Diagram explaining the qualities of CBDC, as it encompasses all the characteristics of other forms of currency we see and use nowadays[1].

holdings of institutional investors of other liquid and low-risk assets, like short-term government bills.

However, they say that the overall effects of CBDC on the structure of interest rates could be quite hard to predict. An analysis performed by the Bank of Canada[4] backs this claim with some scenarios. For example, holding interest-bearing CBDC could offer a better alternative to cash for individuals looking to avoid negative interest rates during a recession, but they could also drive deposit rates down as they offer a potentially lower outside option, increasing the competition.

II.b. Security and privacy

Depending on the jurisdiction, the issuing of CBDC might require the implementation of new Anti-Money Laundering (AML) and Countering Financing of Terrorism (CFT) laws.

The implementation of such laws may be a sign of lack of privacy by the population since these controls might require centralized monitoring of transactions to prevent fraud. Of course, this would all be dependent on the technology used by a certain country for the issuing of their currency, and this can vary from country to country.

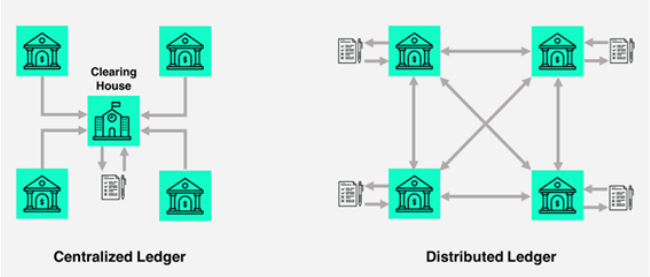

Figure 3. Representation of the difference in centralized (right) and decentralized or distributed (left) ledgers and networks. The centralized model allows for rigorous control and enforcement against malicious users or laundering, but the distributed model offers security against attacks focused central nodes or institutions.

On the other hand, if anonymous digital transactions are allowed by design, the sentiment towards the system would improve along with its efficiency, but it would make it easier for users to avoid the security measures and eventually generating social costs.

III.c. Financial Stability

Without the commercial risk associated to banks, CBDC provide a safer alternative for transactions and deposits, as banks are not completely backed by reserves since part of their services include lending. The evidence of this come as bailouts offered to the institutions during Bank Runs, such as the ones given by the U.S. Federal Reserve during the 2007-2009 crisis[5].

Since CBDC are accessible directly without the intermediation of banks, it can represent a lower risk option for the most conservative population, but it can also bring major concerns for the stability of commercial banks and those that chose to keep using their services.

III. Recent Examples

As the concept becomes more widespread, more countries ponder the possibility of eventually implementing CBDC. A survey conducted by the Bank for International Settlements[6] showed that out of 63 central banks (representing 80% of the global population and over 90% of the world's economic output), over 70% were conducting work on CBDC by 2018, with 31% of those focusing on issuing them for general purpose, 13% on wholesale and the remaining 56% on both scenarios.

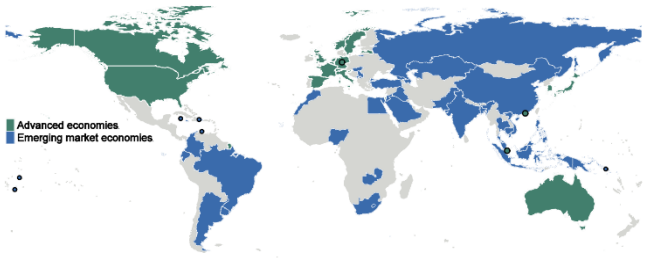

Figure 4. Respondents to the survey conducted by the Bank for International Settlements on CBDC-related work. Note the consideration of both advanced economies (green) and emerging market economies (blue) for the survey.

One of the countries that has shown the strongest interest in their development, regulation and implementation is Sweden. The Riksbank, Sweden's central bank, recently released an economic review that focuses on the "e-krona", their proposal for a CBDC.

In this document, they establish the role of a central bank as "a lender of last resort", since they can expand the supply of publicly issued money and provided credits to banks, which allows them to satisfy temporary liquidity shortcomings[7]. However, they also highlight that the current monetary and payment systems might become less useful in a world where globalization becomes more prominent by the day.

In order to ensure the survival of a payment market that can satisfy the needs of the entire society, while preparing for the eventual popularization of international stablecoins and other projects by Big Tech firms, they have considered the issuing of electronic krona (e-krona) that, by design, ensures the privacy of its users that also allows for implementation in the private sector and collaboration from international firms for improved cross-currency payments. They also explain how a public centrally issued currency can be useful to society in terms of achieving uniformity (i.e. bypassing commercial intermediaries) or how a CBDC can establish a more controlled system that can withstand hardships or crises[8].

Another noteworthy example of CBDC is the Uruguayan e-Peso. The idea of a digital currency arose mainly from the need of economic inclusion in the country, as part of a program created in 2011, and the Financial Inclusion Law approved in 2014[9], which had universal access to currency, the formalization of the labor market and an improvement in the efficiency of payment systems as main goals.

Given how the access to banking services has increased in the last few years in Uruguay, so have grown the use of debit and credit cards, POS terminals, ATMs and transfers between banks. This highlights the discrepancies that are created by a financial system based on financial competition, where certain conditions and terms do not necessarily cover the needs of the majority of the population, and this is the main reason why a proposal for a unified monetary system is well-received.

Figure 5. Distribution of transaction volume for Uruguayan e-Peso pilot program. Note the nearly equal distribution between cash-in transactions (blue), cash-out transactions (purple) and money orders (red), pointing to a use in multiple services.

The project, which is already supported by international companies (IBM), national payment networks (Redpagos) and the Central Bank of Uruguay, is designed to not require an active internet connection, keep transactions anonymous but traceable and offer instantaneous settlement, along with other improvements in security when compared to cash.

After a pilot program that lasted from November 2017 to April 2018, they concluded that there is evidence of the reach of the e-Peso to the more secluded areas in the country, and that the main cause of interest is the cost of current platforms. However, there are issues to still be discussed, like the impact the adoption of the e-Peso could have in existing businesses or its possible implications in tax evasion.

IV. Current Discussion

The popularization of the concept of CBDC brought with it a discussion on whether these are really necessary, if they are only a way for central banks to tighten their grip on their economies against the popularization of cryptocurrencies and how can they stand against attractive decentralized systems.

A report published by the World Economic Forum[10] highlights that adoption of CBDC brings the potential for faster and cheaper domestic and cross-border payments, since there is no production costs associated to electronic currencies, to improve AML/KYC functionalities to prevent tax evasion and fraud and to provide alternatives to digital payment technologies offered by the private sector.

On the other hand, they also note the potential for exclusion for populations who are not willing or able to fully adopt CBDC, which could marginalize them even further, the increased exposure and vulnerability to cyber-attacks and power outages, and that a blockchain-based CBDC would also amplify the problems that are intrinsically associated to blockchain: scalability,

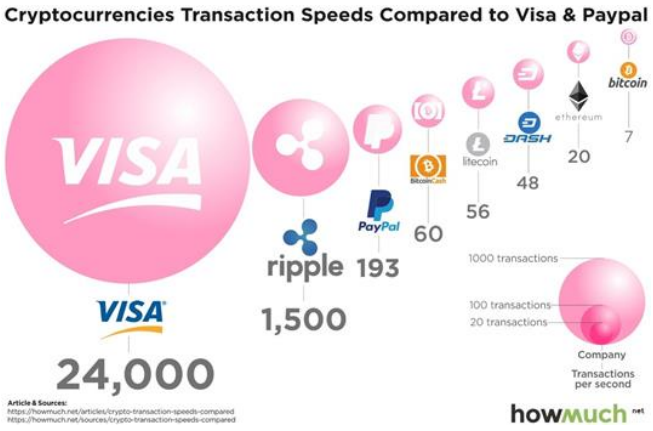

Figure 6. Representation of transaction speeds (transactions per second, TPS) for different blockchain-based networks compared to Pay-pal and Visa. The sharp decrease in this metric is seen as one of the most worrying factors of designing blockchain-based CBDC

confidentiality, key management and transaction speeds.

In contrast to this point, there are examples that show increased adoption of cryptocurrencies as alternatives to centrally issued money in countries with unstable economies. Some examples include the large amount of people without access to current banking systems (around 600 million living in Sub-Saharan Africa) or those that seek refuge from hyperinflation (e.g. Venezuelans investing nearly 17.1 billion bolivares into BTC in the early days of 2019[11])

V. Conclusion

As a society, we cannot ignore the importance of diminishing the boundaries in payments and transactions to which we have grown accustomed. If society keeps moving towards a more globalized state, the availability of currencies that can be used in multiple local, regional and international services becomes a necessity, and digital currencies might be a suitable first step towards a financial system that can cover the needs of its users.

But the problems and situations of societies within countries cannot be ignored since the solutions towards problems of wealth distribution and access to banking services cannot be delegated to international initiatives or projects that aim to establish payment services. The idea behind CBDC is set to be a compromise between the two edges of the spectrum: a forward-thinking, adaptable way of making financial services readily available for the entire population of a country while not losing the necessary grip on the issues that may define the course of their economies for the following years or decades.

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