

AN EMPIRICAL ANALYSIS OF POTENTIAL CENTRAL BANK DIGITAL CURRENCY ADOPTION PROCEDURE BY INDIAN GOVERNMENT AND ITS IMPLICATIONS

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Abstract

The following paper discusses the introduction to Central Bank Digital Currency (CBDC) and how the adoption of such a measure will result in a developing economy like India looking at past references. The paper aims to reach new measures of adoption procedure and why it becomes essential to bring out such a concept at an early age. Various documents and research on technologies have proved the significance of virtual currencies. The social media forums which are a buzz with such investment options as provided by cryptocurrency market leads to a talk on potential regulation of the market for fiscal benefits. The committee developing such a digital currency has many options at hand, like hash graph or blockchain, POW or POS framework, adopting ABFT or not and others. The paper concludes determining the best measures a committee can adopt to frame CBDCs, discussing the pros and cons while timing the launch based on certain indices available yet lesser known in general.

Keywords: Digital Currency, Financial Inclusion, Blockchain, Hash graph, CBDC, Fiscal & Monetary Policy

1. INTRODUCTION

Cryptocurrencies which adopt blockchain or hash graph as base technologies have developed considerably over a decade. Blockchain technology is an open distributed ledger which records transactions in blocks. Cryptocurrency transactions are validated by people known as Miners. These people in return get a reward in form of cryptocurrencies which they validate. This process is called “Mining” in the cryptocurrency segments.

The pseudonymous Satoshi Nakamoto, an unidentified person is said to be the developer of Bitcoin, which is world’s first decentralised currency. It is independent of any centralised monetary authority. The technology used in bitcoin became the base for further development of altcoins such as Dogecoin, Litecoin, Cardano, etc. These altcoins run on same technology but employ different algorithm. In the current times, only India has more than 100 million investors in the cryptocurrency segment. More than 20 million people jumped into

cryptocurrencies in India during the year 2021. This shows the drastic growth in short period of time. New bitcoins are created every 10 minutes via this mining process, and will continue until the full supply of 21 million bitcoins has been issued. Ethereum team which developed Ethereum in the year 2015, is working on its new project now called Ethereum 2.0. Ethereum's future developments are tied with DeFi industry: Unlike Bitcoin and Ripple, Ethereum is technically not a currency but an open-source software platform for blockchain applications.

A study carried out the analysis of main five cryptocurrencies (bitcoin, Ethereum, Binance coin BNB, Doge and Litecoin) individually resulted into concluding that majority of these function like traditional equity market scrips where traders submit buy and sell orders, and the exchange clears trades based on a centralized order book. Doge-coin was recently in trend due to its price manipulation by publicly hailed- 'Father' Elon Musk's tweet. It has unlimited supply and comes into existence on 6 December 2013. As stated by Coinmarketcap.com (a portal for cryptocurrency news) on 1 Jan 2021 the price of doge was \$0.004646 and within a period of five months its price became more than \$0.7010. Doge is a high potential coin now, which was originally made as a meme-coin.

Cryptocurrencies can help increase globalization and benefit trade as government intervention is near to nill currently. All over the world, more than 2 billion people are living without integration to banking system and almost 1/3rd of these people are from African continent. Cryptocurrencies can play a major role as an alternative because one does not need to enter banking system in order to integrate oneself to the financial system of the country. The low adoption cost is also a positive factor associated with cryptocurrencies. Virtual money enables new business opportunities. Cash has become only a tool for payment and not of storing value in terms of investments. An asset is liquid, when that asset can be directly exchanged for goods and services, and cash is one such asset. Cryptocurrencies are illiquid in nature as of now because the adoption is not very widespread.

CBDC or a digital fiat currency may be produced to the extent of reserves a country possesses in terms of gold or foreign exchange. Further, these kinds of cryptocurrencies will also act as an alternative to the fiat currency of the country, hence, it may be fungible in nature too. For example, a one-dollar banknote is equivalent to an amount of one dollar in a reserve account and one dollar of CBDC. The difference in central bank money is the technology used to make these representations of central bank money, store value, and process payments. CBDC are never shown on the balance sheet of banks, even though the accounts are opened by such banks only for the purpose of conducting transactions. Intermediaries hold the liability but may be required to deposit 100% of the customers' accounts at the central bank. China is trying to adopt this innovation as soon as possible and currently, is, pilot-testing its CBDC. Whereas, India is also trying to make provisions for regulating this new emerging sector along with creation of its own CBDC. The South African, European, Canadian, and Japanese central banks are all also exploring this concept. Bank of England and HM Treasury are also on the list. The bank will not directly replace fiat currency but will adopt CBDC as an alternative to the existing currency. Rather than just improving existing payment methods, the innovation with CBDC is in the adoption of tokens that add functionality, reach and utility to central bank money. This transformation is being seen as a complement to existing payment methods, as well as a core component in the modernisation of finance. CBDC's impact in payments, banking, central banking, and even the balance of economic power will be profound. For example, if China becomes the first major economy to use a digital currency, it will put pressure on other countries to set up their own. Perhaps the most far-reaching impact of CBDCs on people, and on the potential to spread wealth and grow global GDP, is their ability to vastly expand financial inclusion. The potential to extend payment services to the hundreds of millions of the worlds unbanked who have been hard to reach, and who have no or limited access to digital payments, is compelling, says Herborg.

Digital currency is not going to completely remove the usage of central currency. The central authority issuing central currency is going to act like a service provider and regulator both. The digital currency will become a new form of currency in the recent times as predicted by many theorists and analysts. CBDCs could help get cash or even loans quickly out to people and businesses or allow interest rates to be driven into sharply negative territory. But the implications for the role and profitability of the commercial banks could be profound. In principle, a token based CBDC might be the least disruptive scenario since the tokens would effectively be digital versions of cash and avoid the burden of account management and verification. However, if this were to allow non-financial players like the Big-Tech companies (such as Facebook with Diem- formerly known as Libra) into digital finance this would increase competition in an already highly contested market, further reducing margins and challenging the banks' customer relationships.

2. LITERATURE REVIEW

Satoshi Nakamoto laid out the theoretical framework of cryptocurrencies in “Bitcoin: A Peer-to-Peer Electronic Cash System.” Cryptocurrency can be used in different ways for example, store of value, medium of exchange, etc. The issue of digital currency may bring a global change in the banking system of the countries.

Mining (2018) found that the cryptocurrency like bitcoin is affecting the banking system and economy of almost all the countries globally and this is due to its unique feature in his published article “How Cryptocurrency begun and its impact to financial transactions”. In the era of globalization, any person with a little knowledge of technology can avail the benefits of digital currencies by the medium of trade and investments. Majority of the world governments are still trying to make provisions for its regulation and hence, this time available in between, becomes favourable to many investors around the world.

Vandervort et al. (2015) stated that the future of the cryptocurrency including the Bitcoin cannot be revealed in the present times as a number of factors would determine its popularity and success.

Sharma (2022) wrote “Analysis of Cryptocurrency: An Ethical Conjecture with reference to Indian Scenario”, where the objective of research stood as finding future prospective of cryptocurrency in India and compare traditional investment opportunities with cryptocurrencies. By analysis, the conclusion reached was that people in India still prefer traditional investments more in comparison to cryptocurrency due to lack of regulation, highly volatile market, security threats, lack of information, etc. But there is a considerable rise in cryptocurrency investments during recent times and with time, this growth will continue to be.

Fantacci et al. (2021) worked on Stablecoins which are pegged to or derive its value from a central currency. That means such cryptocurrency will not show intense movements as central currency movements are mostly rigid. These cryptocurrencies are now called as Second-Generation currencies. The stable coins have extremely less volatility which is going to make these types of currencies more relevant in upcoming times because volatility was the biggest issue faced by first generation cryptocurrencies.

Dong et al. (2021) has worked upon statistical models to analyse the effect of a CBDC providing interest in the global environment. A greater rate of interest on CBDC may not lead to financial disintermediation if such a CBDC is the only available medium of storing value. CBDCs would increase lending and investments by/in banks/firms as such deposits and CBDC provided ones are complementary in nature. The monetary policy of a country can further impacts these lending and investment rates through manipulation of different ratios like reserve ratios.

3. DISCUSSION & ANALYSIS

The concept of CBDC or Central Bank Based Digital Currency has been adopted by the biggest country population-wise i.e., China. With this adoption China has become one of the first countries in the world to issue digital currency centrally. The People’s Bank of China published a Whitepaper stating that the role of commercial banks will not be to issue e-CNY but to merely distribute it on demand. Only the central bank will reserve the rights to issue digital Yuan. By the end of June 2021, data states that more than 21 million wallets have already been opened. Corporates also account for more than 3.4 million wallets. This sign of adoption has been observed when the risk associated with such technology is still high in the minds of individuals. Currently, the highest level of security is considered of ABFT (Asynchronous Byzantine Fault Tolerance) which is judged as equivalent to bank-grade security level. The number of wallets opened is correlated to the investment made in cryptocurrency. Higher the number of wallets, greater the amount of market capitalization of the entire crypto industry.

Initially, the discussion in parliaments and houses of countries used to be regarding the question of acceptability of decentralized currency. These discussions resulted into major economies of the world accepting the fact that it is not possible to completely ban such technology as they might miss the train of growth that it brings for the citizens and hence, for the economy as a whole. The government of different countries then started finding out various ways to regulate this new market. Japan became a pioneer of accepting and regulating the market to a certain extent. Looking at the possibilities of regulation, India too is moving forward in the same direction and is expected to bring a new bill clarifying the acceptability questions and taxability of such investment opportunities. Also, the government spokespersons have already clarified that it the probability of banning the entire crypto market as an investment or commerce opportunity is not possible. The

central bank of India, that is, Reserve Bank of India (RBI) has proposed to bring its own digital currency by the end of the year 2021. Some guess that only the central bank's issued centralized digital currency will become the medium of trade and rest decentralized currencies will remain as investment options only. While some people argue that both type of currencies will be allowed for trade as well as investment activities. The bill which is expected to arrive in Winter Session of 2021 will clarify these questions.

Further, the question of whether only centralized currency should exist in the world takes us back to the reasons of creation of cryptocurrency. People who were of the opinion that the banks issuing fiat currency are looting them through time value of money and tax impositions, wanted to get rid of using centralized currency. Hence, came the Bitcoin as a 1st generation blockchain technology-based cryptocurrency which was completely decentralized and allowed any person around the world to acquire it and use it for peer-to-peer transactions. Till date, the inclusion of such currencies has still not reached its maximum potential due to the incidents of frequent theft and loots happening in the system by hackers which subsequently puts a question to the companies also whether they should accept the payment in such currencies. A recent example is the 600-million-dollar loot by hackers from Polygon Network in August 2021. The uncertainty of government policy also hampers this growth. The example of El Salvador accepting Bitcoin as a legal tender is the recent advancement towards the viability and acceptability of blockchain technology.

WHY IS THE GOVERNMENT OF INDIA ISSUING CBDC?

The most crucial aspect of research is the merit of issuing CBDC. Looking at how the concept is already functional in China few general conclusions can be made. The first being 'financial inclusion'. The distribution of fiat currency became a hectic task in the situations of COVID-19 pandemic. The urban population well equipped with digital payment streams faced less problems than rural population, where, keeping aside digital payment streams, even the internet facility was not fully functional. People made long queues outside banks to get some cash in order to maintain their daily expenses. Also, the risk of carrying fiat currency made people more prone to getting affected by the disease. Had there been a digital currency, this risk could have minimized substantially. Further, the citizens wouldn't have faced the problems like shortage of cash or standing in queues for long hours. Digital currency would have shifted the entire process online and encouraged the rural population to indulge and accept it as a medium of exchange considering their risk averse nature. Hence, a greater financial inclusion could be observed if the central bank comes up with a CBDC in future.

The second and most important benefit is record of transactions and track. With information of transactions being stored in blocks, the tracking agencies can reduce the time of investigation in matters of nation's security. The funding to anti-national agencies can be located and such activities can be stopped. Even the transactions accounting for frauds and thefts can be minimized by having such concrete information tracking system. The government will be able to maintain transparency in such situations. The CBDC can be developed in the said manner as above in order to facilitate proper record system.

Another advantage might look more like fear rather than opportunity. The fear of missing out, that is, FOMO. World is slowly yet steadily moving into the direction of adopting blockchain technology for various economic purposes. Regulation of cryptocurrencies seems more beneficial than completely banning all activities related to it. It has the potential of making people rich sooner than the usual stock market as it bears greater risk. Time and again people declaring themselves millionaires through investing in cryptocurrencies is not a new phenomenon. This potential of increasing per capita income of individuals in a country by raising their net worth drastically in short time span is like a train that must not be missed at any cost! If the government decide that such cryptocurrencies can be traded or invested only by using the central bank's issued digital currency, this will help the apex authority in keeping track of where the money is flowing and conduct significant research for the economic development of the nation.

Tax incentives for government is yet another major benefit. Considering the risk involved in such transactions made possible through cryptocurrencies, the government may adopt aggressive taxation policy on investments and transactions. Any government around the world may not want to miss this lucrative opportunity to balance the income inequality, as the cryptos may increase the inequality to a greater extent. Transfer of money from one place to another will be made possible in a snap of finger. Although, the current banking system allow such transfer, but cryptocurrency will allow greater inclusion. Thus, maintaining liquidity in the economy will become easier than it was ever before.

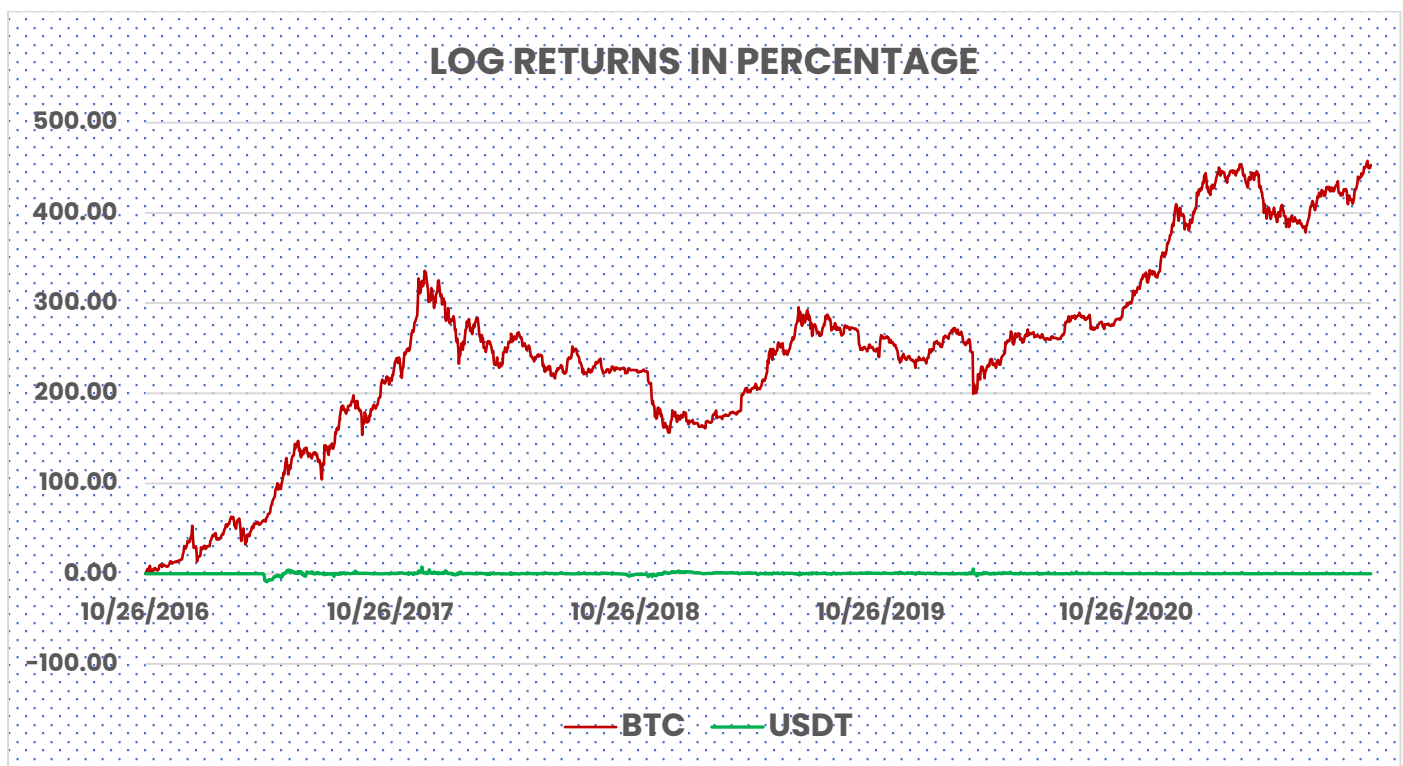
Specifically, from India's perspective, the greatest advantage will be to curb the presence and functioning of entities responsible for duplicity of currency notes which is the reason for activities related to money-laundering, terror-funding, loot, and other anti-national and anti-social happenings. Few Indian cities have become the epicenter of such activities. If proper financial inclusion is attained throughout the country, this problem will be minimized. Also, a track record of activities will help further in such matters. Inclusion of digital currency will provide

the scope to central bank to reduce the flow of fiat currency notes and thus, the activities of such nature will forcibly be reduced looking at greater chances of being caught.

ANALYSIS OF PAST BEHAVIOR

The cryptocurrency cycle has crossed the 2.6 trillion-dollar market-cap as in October 2021 making fresh All Time Highs (ATH). The most famous blockchain based cryptocurrency Bitcoin solely contributes around 1.2 trillion dollars which shows the dominance of the oldest cryptocurrency. Further, the next spot is taken by Ethereum- a blockchain based cryptocurrency which unlike the Bitcoin, is continuously improving its system of working. Ethereum has become one of the most famous and first cryptocurrency to introduce smart contracts. The total market-cap stands around 500 billion-dollars and the ecosystem are developing like no other currencies in the segment. It has become the base for developing other currencies which makes it a potential currency which may cross Bitcoin in all aspects in future along with growing awareness.

Major cryptocurrencies around the world have followed the 'halving cycle' pattern, which shows that after a major bullish run, the entire market along with each currency almost halves. After a particular time period the bullish run again starts leading to new ATHs. The past decade proves this trend. But, when it comes to the question of stable coins, which are pegged to a centralized currency or a similar benchmark, this movement is not seen. The stable coins have shown a continuous movement in a fixed interval over the years. Normally, when the decentralized currencies not pegged to any benchmark run into the bearish phase, we observe the rise in such pegged currencies. This happens due to the Fear, Uncertainty and Doubt (FUD) in the market which prevails when the altcoins and Bitcoin's value deteriorates.



A graph showing comparison of Bitcoin and Tether USD (a stable coin) during last 5 years.

Mechanism of validation of transactions is another important issue while dealing in such currency. The current cryptocurrency market is majorly based on Proof-of-Work (POW), which requires individual validators, and this validation of transaction is called Mining. But it requires heavy processors and uses a lot of energy posing a threat to environment in long run. This is the reason few cryptocurrencies are working on a model called Proof-of-Stake (POS) which increase the energy efficiency and won't require the process of Mining. A completely different option available is Hash graph technology. Unlike the blockchain technology which requires validation, the hash graph technology stores the data in different nodes and these nodes randomly transfer the hash information to different nodes. When all the nodes match the

information, the transaction gets validated automatically. It has a proven improved speed over blockchain based currencies for transactions but still the transaction speed for smart contract is still improvable.

4. SUGGESTIONS

Looking at the above scenario, many measures or steps can be drawn. The adoption of CBDC will not only prove to be a major financial inclusion, but also help in controlling the economic forces in a much-improved manner. The following aspects can be analyzed in detail to understand the segment and derive fruitful conclusions:

- Fear & Greed Index is an index used for the cryptocurrency market which shows the current sentiment of the market. The market sentiment may be either in greed, depicting bullish run or it may be in fear, depicting the bearish market sentiments. This index will help in understanding the suitable time to enter the decentralized market through the medium of CBDC.
- Uncertainty Index is another index which shows the extent of Fear, Uncertainty and Doubt (FUD) or the downside sentiments of the cryptocurrency market as a whole. This index is prepared using the intensity through which the critical words are being used in different platforms which maybe newspaper, social media sites, etc. The use of this index will further improve the launch time of CBDC with precision.
- The demand and supply forces of economy is controlled by monetary policy of any nation. The knowledge of how stable coins pegged to benchmarks perform when the altcoins and bitcoin moves can provide many opportunities to the monetary policy committee of any country to arbitrage and hedge.
- The Government of India and RBI can work together in order to develop a system which can keep track of all the activities and transactions involving the cryptocurrencies. For example, the government can make it mandatory to trade in cryptocurrency only using the CBDC issued by the RBI. So, a person willing to transact or invest in cryptocurrency will first have to buy the CBDC and further the altcoins or bitcoin can be bought using this CBDC. If a mechanism is adopted to track just the CBDC transactions, it will be sufficient to see where the money in the economy is flowing. The potential threat activities can also be minimized. An exchange not following such a pathway can be given notice and if the mechanism is still not adopted, the exchange's activity can be closed.
- Improved taxation system can be developed using the CBDC. The use of CBDC-based ATMs can be a completely new breakthrough as well. For example, a machine can be kept in the ATMs which will just scan the QR-code in the individual's CBDC application and further provide the option to take out funds as required. This ease of transaction will improve the inclusion in the long run and will lead to better tax collections by the government which can be utilized to further strengthen the system for its loopholes and infrastructural development of the country leading to economic development.
- The CBDC committee may further look into the validation process and adopt the POS based technology, though it will require deep technical know-how and continuous improvements looking at how new the concept is. This will set an example in the world about how environment conscious the government is regarding its policies. Or a completely new Hash graph technology can be adopted after analyzing the pros and cons.
- The ABFT level security is at present the most superior security level involving cryptocurrency transactions according to many. A detailed look into how it performs and at what extent this security level can be broken, will play a major role in determining the complete track of transactions involving CBDC.

5. CONCLUSION

CBDC being a new concept in the modern economy has extreme potential and threats to overcome. The use of CBDC will improve the financial inclusion as well as the fiscal and monetary policy measures. RBI and Government of India are combinedly doing a commendable job in adopting a technology at such an early age. This shows the futuristic view of the country and will provide it a first-mover advantage in many respects. But this is not an easy task, as the information in domains of decentralized currencies and digital currency is available considerably very less. The understanding of minute details will only help in better execution, so specialized experts will be required at every phase and not just in the beginning while developing the CBDC. With a proper roadmap and dividing the entire work in phases, an analytical and in-depth view in each phase can be developed leading to well execution of the entire roadmap.

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