

A comprehensive study of Blockchain based Cryptocurrency as a Medium of Exchange

*** Dr. Kishore Kunal, **CMA K.R. Ramprakash, *** Dr. M.J. Xavier, **** Dr. C. Joe Arun**

** Chair, Online Education & Initiatives, LIBA, Chennai*

*** Teaching Assistant, Loyola Institute of Business Administration (LIBA), Chennai*

**** Professor, LIBA, Chennai*

***** Professor & Director, LIBA, Chennai*

Abstract

The current system of using fiat money as a medium of exchange is acting against the welfare of societies because of its inherent inability to control inflation. In this study, we hypothesized that, in a world where fiat money ceases to exist, cryptocurrency will become the natural medium of exchange. We used Kiyotaki & Wright (1989) model of commodity money and compared cryptocurrency with gold as a medium of exchange. The findings asserted the potential of cryptocurrency as the future currency of the world and its possible adoption by major societies in the coming years.

Keywords: Blockchain, Cryptocurrency, Fiat Money, Medium of Exchange.

Introduction

The first cryptocurrency (Bitcoin) came into existence on Jan. 3, 2009 when Satoshi Nakamoto mined the genesis block of bitcoin. What is more interesting in this event, than the birth of a new currency, is the code embedded in the coinbase – The Times Jan/03/2009 Chancellor on brink of second bailout for banks. This shows Nakamoto's lack of trust in the existing monetary system (Pagliery, 2014). Many may find this distrust illogical but there is sound reasoning behind this.

We start with Triffin's Dilemma (Triffin, 1960). Today US dollar is the world's most dominant reserve currency and most of the nations are pegging their fiat monies against US dollar (Taskinsoy, 2019). However, Prof. Robert Triffin postulates that to survive as a reserve currency for the world, the US has to run ever-growing deficits. This will drive up inflation in US and the consequent loss in the dollar's value. Assume at 5% inflation per year, the value of a dollar after 20 years will be only 50 cents and when this situation continues the fiat money will lose its value one day. Thus, people will not accept fiat money at the last period because fiat money becomes worthless at the end of this period (McCabe, 1989). If this is true, we can expect that assertive rational individuals (i.e., people like the one(s) with the pseudo name Satoshi Nakamoto) will stop accepting fiat money after the knowing that fiat money will become worthless after some point of time in the future.

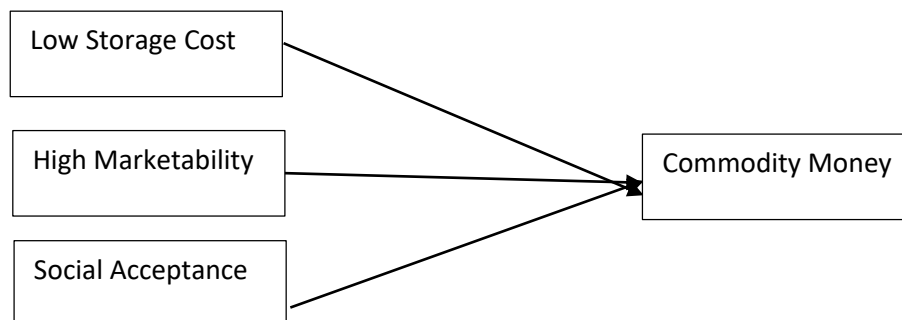
The reason for non-acceptance of fiat money can be better understood if we look at this situation from Nash equilibrium (Nash, 1950). As per Nash equilibrium self-interested, noncooperative individuals will stop using fiat money as a medium of exchange even before the last period based on the anticipation that fiat money becomes worthless at the last period. McCabe (1989) proved with enough empirical evidence that in the long run, Nash equilibrium will be the relevant

model of behaviour for fiat money. McCabe (1989) also postulates that this distrust will happen after enough subject experience (e.g., sub-prime crisis). Thus, the existing fiat monies are set to be doomed. A radical solution will be the creation of a global currency as proposed by JM Keynes (Stiglitz, 2011). And -many influential individuals in today's world are starting to believe - this is what happened through the creation of Cryptocurrency. In a hypothetical situation where fiat monies cease to exist, we postulate that cryptocurrency will become the natural medium of exchange and the study aims to prove this theoretically.

Theoretical Model

Kiyotaki & Wright (1989) in their famed research paper "On money as a medium of exchange" proposed a model, based on Nash equilibrium, for a commodity to endogenously emerge as a medium of exchange. We considered this model fitting for our study as it ignores fiat money and focused on the intrinsic properties and extrinsic beliefs of a commodity to become a medium of exchange. As per Kiyotaki & Wright (1989) model, for a commodity to endogenously emerge as a medium of exchange it must have three properties – low storage cost, high marketability and social acceptance as shown in Figure 1. Further, they postulate that a commodity becomes a medium of exchange and called as commodity money, when it is accepted in trade to facilitate further trade. When we think of commodity money, it is common to think of gold. Gold has more than 1000 years of history as the undisputed global currency. Even today, countries like Russia, China and Turkey are accumulating enormous gold reserves to end the hegemony of US dollar (Taskinsoy, 2019). Hence, we want to compare cryptocurrency with gold on the three properties of commodity money to find out the potential of cryptocurrency to become the future currency of the world.

Figure 1: Properties of Commodity Money



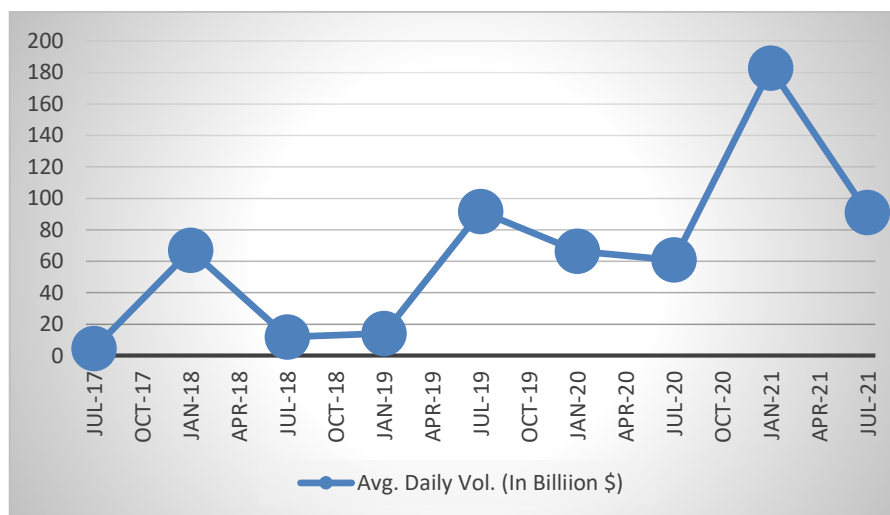
Analysis and Findings

The first point of comparison as per Kiyotaki & Wright (1989) model is the storage cost of cryptocurrency and gold. Both the commodities need to be stored to protect them. If you lose them, they are gone (Alterman, 2011). They are not like share certificates where you can pay a fee to get it back. To keep gold safe, we can rent vaults in banks, which will cost from \$50 to \$200 per year. To keep cryptocurrency safe, we can buy and use cryptocurrency storage wallets. The prices of most of these wallets are in the range of \$40 to \$100. We can see that both gold and cryptocurrency doesn't need more storage space and they are almost equal with respect to the cost of storing them upto a certain point. Even-though cryptocurrency occupies only a miniscule of the space that gold needs (Phadke, 2020) we are not able to find any absolute advantage for cryptocurrency over gold, with respect to storage, as both of them has almost negligible storage cost when compared with their

values. Hence, from the perspective of storage cost both these commodities are having equal advantage.

The second point of our comparison is marketability of the gold and cryptocurrency. Kiyotaki & Wright (1989) postulates that marketability is closely related to saleability, i.e., the quality of being easy to sell as a greater number of people are willing to buy them. Further, Meneger (1892) states that a commodity can be considered as highly saleable when it can be surely and easily disposed of at every moment at a price matching to the general economic price of that commodity. Thus, the availability of a ready market to trade and the quantity of trade are the important considerations for marketability. It is of common knowledge that there are various centralized and decentralized exchanges available for gold trade throughout the world. But it may be surprising to many, that as on August 15, 2021 there were 393 centralized cryptocurrency exchanges (<https://coinmarketcap.com/>) operating throughout the world. Thus, both gold and cryptocurrency have ready markets to trade, around the world. With respect to the quantity traded, the average daily trading volume of gold, based on last ten years data, is \$183 billion (<https://www.gold.org/goldhub/data/trading-volumes>). The daily trading volume of cryptocurrency for the last four years (from July 2017 to July 2021) is collected and presented in Figure 2.

Figure 2 - Daily volume of Cryptocurrency Traded in the World



Source: <https://coinmarketcap.com/charts/>

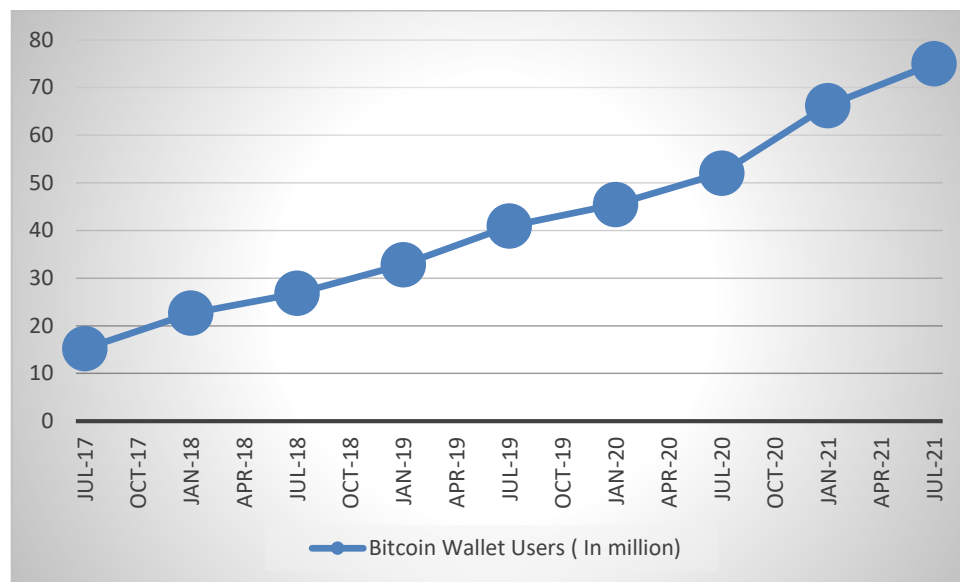
It can be seen from the figure that the daily quantity traded is growing from mere \$4.51 billion per day in July 2017 to \$ 91.01 billion per day in July 2021. It is interesting to note that during January 2020, the daily traded volume reaches \$182.72 billion – on par with that of the average daily traded volume of gold (\$183 billion). The rapid increase in the volume of cryptocurrency transactions reflects its heightened liquidity and saleability.

We can conclude that with respect to marketability, cryptocurrency and gold are similar. However, we conjectured that cryptocurrency is more marketable than gold because of its portability. Fekete (2003) argues that the speed with which a commodity can be transported to the place of demand, is an important aspect of its marketability. Gold being a physical commodity has only moderate level of portability but cryptocurrency being virtual in nature - can be exchanged within minutes across the world – is highly portable. Kurtzman (1993) asserts that annual exports from US are lesser than the value of funds traded in the financial markets before lunch in a day. Thus, when looking from the

perspective of volume of financial transactions happening in the world, portability of a medium of exchange seems to be an essential element for its marketability and cryptocurrency scores high in this.

Kiyotaki & Wright (1989) asserts that a certain level of social acceptance is necessary for a commodity to become a medium of exchange. When comes to social acceptance, it is a well-known fact that gold has the highest score. However, it not just to compare the level of social acceptance of a commodity which is considered precious across the world for thousands of years, with a commodity which is only a decade and half old. Cryptocurrency is a new innovation and its potential for acceptance can be measured by analyzing its rate of adoption (Rogers, 2010). Due to the lack of data about the users of all the cryptocurrencies we are substituting it with the data of number of users of bitcoin wallets over the years. As bitcoin accounts for more than 44% of the cryptocurrency market (Bouri, Shahzad & Roubaud, 2019), the rate of adoption of cryptocurrency can be ascertained from the increase in the users of bitcoin wallets, as shows in Figure 3.

Figure 3: Bitcoin Wallet Users



Source: <https://www.statista.com/statistics/>

The number of wallet users increased from 15 million to 75 million within five years, showing an average annual increase of 23% in the adoption of cryptocurrency. Kaul (2021) projects that the number of global cryptocurrency users reached 221 million by the end of June 2021. Another estimate shows that global crypto ownership rates at an average of 3.9% and some 18000 businesses, around the world, are accepting cryptocurrency payments (Global Crypto Adoption, n.d.). Thus, as per diffusion of innovation theory (Rogers, 2010), cryptocurrency has been successfully adopted by the innovators and now early adopters are starting to use it. It is evident from the interest shown by world leaders like Bill Gates, Mike Tyson, Lionel Messi etc., on cryptocurrency (Ramirez & Moynihan, 2019). The disclosure of Elon Musk's \$1.5 billion investment in bitcoin and the acceptance of cryptocurrency payments by Tesla creates wider awareness for cryptocurrency (Elliott, 2021). PayPal in April 2021 added cryptocurrency in their wallets and it seems Facebook also has similar plans (Laboure, 2021). These are big developments in cryptocurrency adoption and will accelerate its use as a medium of exchange. Laboure (2021) also states that more than one-third of millennials believe that fiat money will soon be replaced by cryptocurrencies. Thus, with respect to social acceptance, cryptocurrency is gaining momentum but it is still in its infancy.

Conclusion

The study compared the potential of cryptocurrency to become a medium of exchange, with that of gold, based on Kiyotaki & Wright (1989) model. Cryptocurrency is on par with gold on storage cost, scores a point higher than gold with respect to marketability and started to gain significant social acceptance but not at a level to compare with gold. Thus, the only point where gold scores higher than cryptocurrency is in its social acceptability but it is unjust to expect an innovation like cryptocurrency to be accepted throughout the world, within a decade and half of its inception. We believe, because of gold's limitation with respect to portability and increasing adoption of cryptocurrency by significant agents like Facebook, PayPal, Tesla, etc., cryptocurrency will gain higher social acceptance in the coming years.

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