CRYPOCURRENCY: CURRENT SCENARIO AND IMPACT ON GLOBAL ECONOMIC ORDER

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Abstract: Money plays an important role in facilitating economic exchange. Before the concept of money took root, goods were primarily exchanged under the barter system. Ever since the concept of Money as a means for economic exchange and store of value got firmly entrenched, the currency system has been constantly evolving. This age of information technology has been marked by rapid innovations and concept of a digital currency and underlying technologies like blockchain have attracted considerable attention. Digital currency or digital money is a type of currency available only in digital form and does not have physical existence like banknotes. A Cryptocurrency is a digital or virtual currency that uses cryptography for security. In the last decade, Cryptocurrencies have emerged from the background to attract considerable interest not only from technology enthusiasts but also businesses, investors and regulators. The growth of Cryptocurrencies and the attention they have garbed has been due to their promise to put in place an innovative decentralized currency system backed by advanced technologies like block chain and distributed ledger technology (DLT). This revolutionary promise of Cryptocurrencies is also paved with many potential risks and pitfalls and opinion on their usefulness to world economy is divided. Despite their shortcomings and risks, Cryptocurrencies have blazed a trail of innovations which may be hard to ignore. In this paper we examine the prevailing scenario with respect to Cryptocurrencies and the extent to which they have been able to fit into the existing world economic order. The paper also examines the perception of market regulators, central banks and overall government policies of various nations in this context.

IndexTerms - Cryptocurrency, Bitcoin, Block Chain, Digital Currency, Virtual Currency

I. INTRODUCTION

As mankind transitioned from a nomadic life to agriculture based colonies, the need for exchange of goods gave birth to barter system as a medium of exchange. Subsequently gold became a preferred means for exchange. As societies evolved, people devised systems that allowed for better ways to trade goods and services. This lead to need for creation of more accessible mediums of exchange that could also be regulated by the Government and concept of currency first linked to gold reserves and then 'fiat currency" dynamically controlled by Government took root. This system has worked well despite some intermittent shocks like Lehman brothers and hyperinflation in some countries. With rapid progress in digital technology and increasing dominance of online channels for conducting money transactions to digital wallets, digital currency as a class has attracted considerable attention. At least till the last decade, most of the prevalent forms of Digital currency or Digital money were centralized in the sense that a Central point held total control over the money supply.

The first decentralized cryptocurrency, Bitcoin, was created by a developer from Japan with the pseudo name Satoshi Nakamoto. In October 2008, in a paper posted to an online cryptography mailing list, Satoshi Nakamoto introduced Bitcoin as a purely peer-to-peer version of electronic cash which can be transacted without financial institutions. His paper outlined the conceptual and technical details of a payment system that would allow individuals to send and receive payments without involving any intermediary financial institutions. This heralded the birth of Bitcoin. Cryptocurrencies are open-source algorithms which can be programmed by anyone and facilitates peer-to-peer financial networking without the need for third party supervision. The currency is based on cryptographic proof and is built upon blockchain technology.

Some of the biggest plus points of Cryptocurrency like 'decentralization' and 'anonymity' also happens to be the major impediments in its acceptance as a legal tender by various countries. Though Cryptocurrencies lacks a true legitimization, it certainly has emerged from the shadows when it was thought of as something of interest only to hacker community, and has gained a large following from the media, academics and the finance industry. Built upon blockchain technology, it has established itself not only among the technology enthusiasts but a broad section of investors which is evidenced by the considerable rise in its valuations. Cryptocurrency has grown at such a fast pace that many times it has left the regulators and government gasping for policy framework.

II. OBJECTIVES OF STUDY

1) To help in understanding the present status of Cryptocurrency.
2) To examine Cryptocurrency as a digital currency, as an asset, prevailing regulations, trade mechanisms and price behavior.
3) Assess the impact of Cryptocurrency on global economic order. .

III. Sources Of Data

This paper utilizes the secondary data available on Crypto currency websites and crypto currency exchanges. It also refers to the time to time observations by central banks, regulatory bodies etc. on this subject. Other referred material and website includes Statista, a statistical website and other sites like Bitcoin.com, CryptoCompare.com etc. In the course of study for this paper we have also gone through some white papers published in field of cryptocurrency including the paper by Satoshi Nakamoto in October 2008 which heralded the birth of Bitcoin.

IV. About Cryprocurrency & Its Origins

David Chaum was the first to do pioneering work in the area of Digital Money and Cryptography. His paper "Untraceable Electronic Mail, Return Addresses and Digital Pseudonyms" published in 1981, laid the groundwork for research into area of encrypted communication over the internet. In 1983, he introduced the idea of Digital Cash. He subsequently founded DigiCash, an electronic cash company, in Amsterdam. The firm did achieve some success but had issues with commercialization of the product and failed to capitalize on some key opportunities that came its way. The firm finally filed for bankruptcy in 1998. This was followed by some companies offering to buy soft drinks from vending machines using mobile payments and emergence of platforms like PayPal. In the meantime, as Internet became more pervasive, there was emergence of virtual currencies which can be regarded as precursors of present day Cryptocurrencies. These virtual currencies were limited for use within a defined space. Online games were first to popularize the concept of virtual currency that can be earned as well as spent based on one's participation in the particular online platform.

A Cryptocurrency like Bitcoin is also a digital and virtual currency. In 2008, Bitcoin was introduced, which marked the start of Cryptocurrencies. It is quite possible that Satoshi Nakamoto came out with the concept of Bitcoin with the intention to fight the Central Authority's control over money. In the Bitcoin paper, Satoshi described the concept of a purely peer-to-peer version of electronic cash which could be transacted without financial institutions. While Cryptocurrency is also a sort of digital currency, there are fundamental differences too. The digital currency is centralized with one or more regulator or controller and a network of computers that monitor the transactions. On the other hand, Cryptocurrency is decentralized, and the rules are established by the majority of members of the Cryptocurrency community. Cryptocurrencies allow users to exchange value digitally without third party oversight. Cryptocurrency technologies use blockchain and distributed registry. Due to this, no controller can control what is happening on the network, and so all events happen in entire user space.

According to the Bank for International Settlements' November 2015 'Digital currencies' report, "Digital Money is an asset represented in digital form and having some monetary characteristics. Digital currency can be denominated to a sovereign currency and issued by the issuer responsible to redeem digital money for cash. In that case, digital currency represents electronic money (e-money). Digital currency denominated in its own units of value or with decentralized or automatic issuance will be considered as a virtual currency." Bitcoin and its other alternatives in above sense are both a digital currency as well as virtual currency. Since they are based on cryptographic algorithms, so these kinds of virtual currencies are also called Cryptocurrencies.

According to Jan Lansky, a renowned cryptocurrency researcher, a Cryptocurrency is a system that meets the following six conditions:

1. The system does not require a central authority; its state is maintained through distributed consensus.
2. The system keeps an overview of cryptocurrency units and their ownership.
3. The system defines whether new cryptocurrency units can be created. If new cryptocurrency units can be created, the system defines the circumstances of their origin and how to determine the ownership of these new units.
4. Ownership of cryptocurrency units can be proved exclusively cryptographically.
5. The system allows transactions to be performed in which ownership of the cryptographic units is changed. A transaction statement can only be issued by an entity proving the current ownership of these units.
6. If two different instructions for changing the ownership of the same cryptographic units are simultaneously entered, the system performs at most one of them.

V. The Rise of Cryptocurrency

There are more than 1400 or even more Crypto currencies in vogue today. The first mover Bitcoin still continues to have a significant lead even as some recent entrants have gained traction. The top five Cryptocurrencies by market capitalization as of Sept 2018, along with their percent share of total market capitalization are shown in Table 1.

Sr No.	Name	Year of introduction	Market Cap in Billion US $	% Market Cap
1	Bitcoin	2009	112.5	55.79%
2	Ethereum (Ether)	2013	21.7	10.78%
3	XRP Ledger (Ripple)	2012	11.1	5.50%
4	Bitcoin Cash	2017	7.8	3.87%
5	EOS	2017	4.8	2.38%
6	Others		43.7	21.68%
	All Cryptocurrencies		201.7	100.00%

The combined market capitalization of all Cryptocurrencies is approximately USD $201 billion (as of 15 Sept 2018), with the Bitcoin's total market capitalization (market cap) itself surpassing $100 billion, making it worth more than many large companies. The top five Crypto Currencies account for 78.32% share of market capitalization. The same is depicted in form of a pie chart.

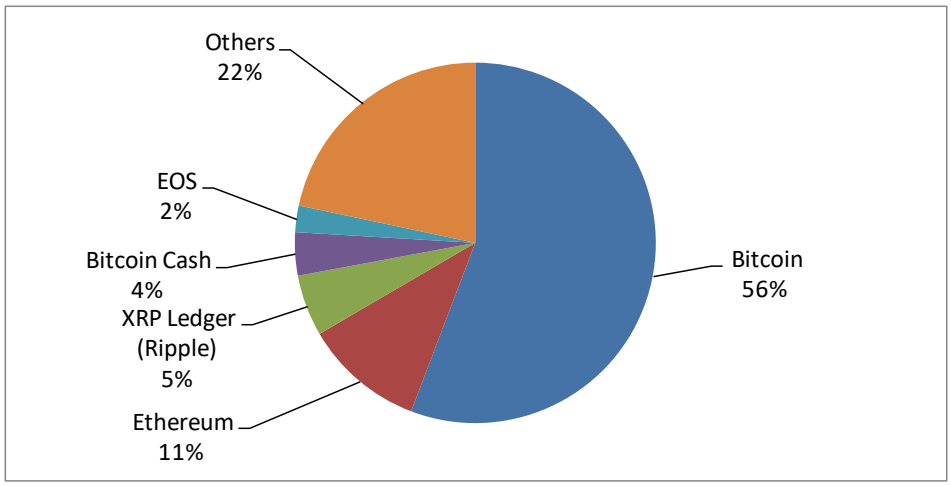

Figure 1: How Crypto Currencies stack against each other

As above statistics show, out of more than 1400 Cryptocurrencies, only few are dominating and others have not garnered the same level of interest.

Bitcoin was launched in the year 2009 as the first decentralized and open source software based Cryptocurrency. While some Crypto currencies had been in existence before launch of Bitcoin, they were primarily restricted to underground and black market trades owing to anonymous and untraceable nature of their transactions. Bitcoin runs on a technology known as Blockchain, which is a digital ledger of activity that cannot be tampered with. There is no central authority governing Bitcoin. A network of "miners" with their powerful computers work together to verify transactions through a complex process of cryptography. The digital token Ether has been created by a blockchain company named Ethereum. Ether is also backed by a blockchain, much like Bitcoin, but the technology is slightly different. Bitcoin cash was created earlier this year after Bitcoin split as some members of its community had a different view and formed a separate group and a new Cryptocurrency branched out of Bitcoin. Another Cryptocurrency XRP Ledger (Ripple) does not use blockchain but uses a distributed consensus ledger using a network of validating servers and crypto tokens called XRP (referred to as Ripples). There are also differences in mining of coins and limits imposed on volumes on different Cryptocurrencies. EOS is one of the newest Cryptocurrency among the top ones and it uses smart contract blockchain with a goal to build a network capable of processing millions of transactions per second.

VI. CRYPTOCURRENCY EXCHANGES:

With Cryptocurrencies hogging the limelight, investors around the world have been flocking to trade in them. As a result a number of cryptocurrency platforms have emerged to meet the need for exchange of these currencies. A cryptocurrency exchange allows customers to buy, sell, and trade Cryptocurrencies for other assets, such as fiat money or other Cryptocurrencies. Many times other less common Cryptocurrencies, loosely called altcoins are traded against Bitcoin and cannot be purchased directly with fiat currency.

The laws governing these exchanges vary widely depending on their location and the type of services being offered by the Exchanges. Though countries are fast coming up with regulations to bring the functioning of these exchanges under regulatory framework, many of these exchanges remain unregulated. Many exchanges also try to attract customers from several countries and besides being vulnerable to hacking and other frauds, they are also subject to ever-changing regulatory environments.

In Nov, 2017, Chinese authorities cracked down on Cryptocurrency Exchanges and these exchanges were forced to shut down or move operations elsewhere. Earlier in February 2014, Mt. Gox, the largest cryptocurrency exchange at that time, suspended trading and closed the exchange as it filed for bankruptcy protection in Japan from creditors. This was due to a large theft of Bitcoins that were stolen out over a period of time from the Mt. Gox wallet. In the latest such breach in September 2108, hackers are reported to have stolen $60 Million from Japanese Crypto Exchange, Zaif. Many other exchanges recently suspended service to Japanese customers following new guidelines issued by the Japanese Financial Services Agency. American exchanges are subject to regulations which vary from state to state as well as federal guidelines. To date, there are more than 200 cryptocurrency exchanges that support active trading. Some of the major Cryptocurrency exchanges include:

1. Coinbase: San Francisco, California, USA
2. BitMEX: Hong Kong
3. Binance: multiple locations in Asia
4. Bitstamp: Slovenia
5. OKEx: Hong Kong
6. Upbit: South Korea

Apart from these Exchanges, there are Bitcoin ATM or kiosks (actual machines) that allow a person to exchange Bitcoin and cash. These may have unidirectional or bi-directional functionality enabling both the purchase of Bitcoin as well as the sale of

Bitcoin for cash against currencies like Dollar or Euro. These are not ATMs in the traditional sense and are rather connected to the Internet, and many times connect the user directly to a Bitcoin exchange. These services are known for charging very high conversion rates and transaction charges.

VII. Cryptocurrency as a Currency and Asset class

Money can be anything that is well accepted towards payment of goods and services. The major uses of money are as a medium of exchange, as a unit of account as well as a store of value. Long ago, the Greek philosopher Aristotle (384 BC - 322 BC) defined essential characteristics of a good form of money:

1.) It must be durable.
2.) It must be portable.
3.) It must be divisible
4.) It must have intrinsic value.

While Fiat currencies which are in vogue today, as such do not have intrinsic value, they have credibility, a degree of guarantee and strength of the issuing authority of the respective nations. Historically, most currencies were based on reserves of physical commodities such as gold or silver, but over a period of time Fiat money was delinked to any scare commodity as Central Banks and Regulators wanted greater control over its supply and have the freedom to adjust the money supply to provide price stability in the face of changing demand.

While crypto currencies give the impression of being currencies, they fail to qualify on many counts including their inability to function as a unit of account. Further extreme volatility in their valuations make them unfit to rely as a common means of payment. Also due to this volatility as depicted in Figure 2, they cannot be regarded as stable store of value.

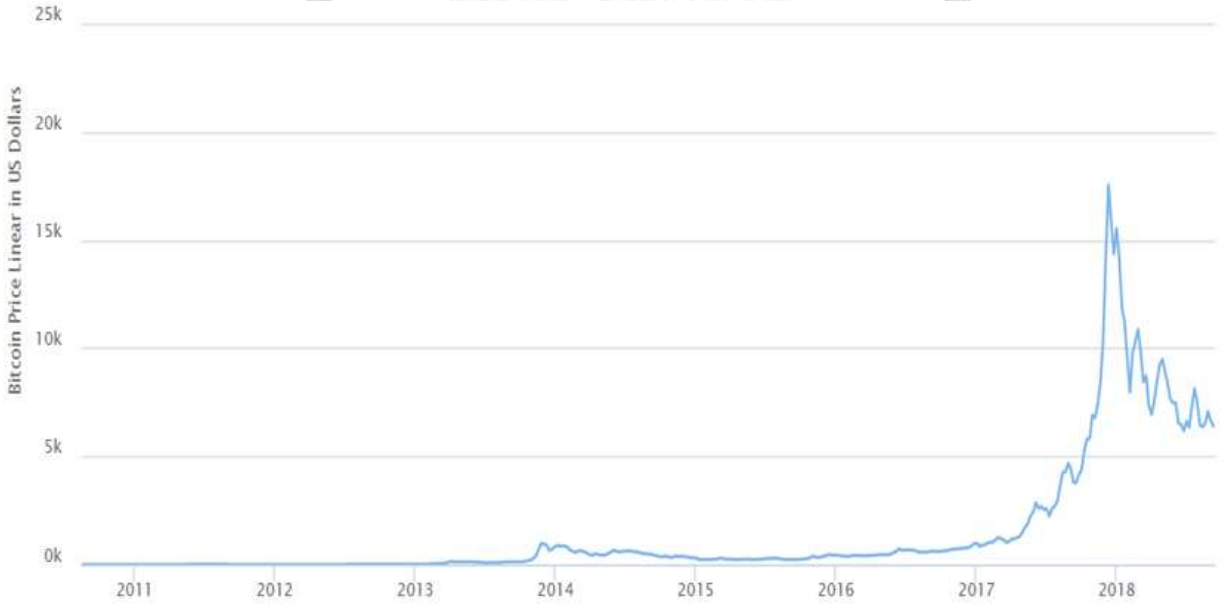

Figure 2: Bitcoin Price History (Source: buybitcoinworldwide.com)

Apart from the fact that Bitcoin like Cryptocurrencies cannot serve the role of a currency as its value is unstable, their transaction processing is also too slow. Thus transactions in Cryptocurrencies are prone to congestion and cannot scale with demand. This stems for their basic requirement to protect the security of the blockchain that makes these Cryptocurrencies secure. In fact, there are limits on the number of transactions which can be completed in a day, and it may even sometimes take days to complete a normal transaction. As Cryptocurrency rules are framed by the community, there is considerable resistance to changing these rules from people for whom the anonymity and un-traceability is seen as a prime feature of the Cryptocurrencies. This means that its very security features hinders its usefulness in everyday use.

However the way Crypto Currencies have evolved and looking into their promise, it is difficult to write them off completely and they appear to have usefulness in certain pockets at least. Apart for providing a means for cross border exchange of money and acceptance in select areas, their use by countries in special situations could materialize in future. For example a nation faced with severe financial crunch or economic meltdown of its currency may like to use cryptocurrency as a more stable store of value than its own currency and it may be helpful in providing stability to the economy. A recent such attempt was made by debt ridden Venezuela though its actual progress has been doubtful. Venezuela's President Nicolas Maduro announced the launch of "Petro" cryptocurrency backed by oil reserves and claimed that this 'Petro′cryptocurrency raised $735 million in the first day of its pre-sale. However there is wide spread skepticism about this cryptocurrency and it is likely that it has actually failed to take off.

Besides the fact that Cryptocurrency does not have attributes associated with a good currency, most Policy makers, Bankers and Economists are also of the view that Bitcoin and similar virtual currencies are not a currency or a legal tender. Many view Cryptocurrencies as a sort of "financial asset". When evaluating crypto currency as a financial asset, it is difficult to value it since it is not an asset that produces value in the true sense. For example while stocks are financial assets which do not have a physical existence, but they represent ownership of underlying companies which have actual capital. Stocks also provide a stream of income

in form of dividends and buybacks. Almost all listed equities are backed by corporations engaged in business activities that generate some revenue and assets. On the other hand, Cryptocurrencies are not backed by any assets, revenue stream or even business model. The supply of Bitcoin and most other Cryptocurrencies grows at an inflexible and often pre-decided rate. Thus a small number of buyers and sellers can cause disproportionate price movements in Cryptocurrencies leading to bouts of volatility. The last few years have witnessed wild swings in valuations of Cryptocurrencies, both up and down and a large section of enthusiasts and investors has been attracted to it as a 'Get Rich' scheme rather than merits alone. Thus Cryptocurrency falls more in the category of a speculative asset and some even argue that since Crypto currencies are not even treated as legal securities in many countries, their status as an asset is equivalent to collectible items. On the other side, the exponents of Cryptocurrencies claim that Cryptocurrencies have a unique identity and hence they cannot be directly compared to any other form of investment activity or payment mechanism.

VIII. Cryptocurrency: Impact on Global Economic Order

Digital currencies like Bitcoin have opened the gates to fresh opportunities as well as several possible disruptions to the existing global economic order. Cryptocurrencies have made it possible to carry out unhindered cross-border transactions and peer-to-peer transfer without any fee and third party supervision. Cryptocurrencies and their underlying blockchain technology have been growing exponentially in the recent years in terms of adaptation, valuations and influence.

This dramatic rise of Bitcoin and related Cryptocurrencies has evoked mixed and diverse reactions from Bankers, Investors, Regulators and Policy makers. The response from institutions and government in different nations has also been varied. The pace at which these currencies have grown has taken most observers by surprise and this coupled with many grey areas, Government and global regulators are divided on how to address the challenge posed by rapid growth of Cryptocurrencies. Since these currencies are not backed by any Central Government, it emerges that each country has different set of standards. While cryptocurrency is still not a fully legal tender in the true sense, its acceptance or restrictions on its use vary from country to country.

Japan which is home to some of the world's most active Cryptocurrency exchanges also happens to be the first country to adopt a system to regulate cryptocurrency trading. This was done after its exchanges were subject to hacking and reported theft of digital currency. A new law enacted in April 2017, identified virtual currency as a form of payment. While the law still does not define Bitcoin or other Cryptocurrencies as legal tender, it acknowledges that they can be used to purchase things. The law also made it mandatory for any virtual currency exchange that wants to do business in Japan or with its citizens, to register with the country's Financial Services Agency (FSA). Japan is big market for Bitcoins and allied currencies and considerable volume is traded in the Japanese currency.

USA accounts for considerable volumes in Bitcoin and other Cryptocurrencies. USA presents many different set of views from various sections of authorities. The 'Financial Crimes Enforcement Network' which is a bureau of the Treasury Department, holds the view that "virtual currency does not have legal tender status in any jurisdiction". However the country has exchanges dealing exclusively in Cryptocurrency and the rules vary from state to state. The Securities and Exchange Commission has stated that it views Cryptocurrencies as a security. The agency stated that it is examining to apply securities laws to everything from cryptocurrency exchanges to digital asset storage companies known as wallets. The Commodity Futures Trading Commission is in favor of treating Bitcoin as a commodity. The Internal Revenue Service (IRS), U.S. government agency responsible for the collection of taxes and enforcement, says cryptocurrency is not actually a currency and is like a property and has issued guidance on how it should be taxed. Treasury officials of U.S. Government have been quite vocal about possibility of misuse of Bitcoin by criminals and their main focus on Cryptocurrencies is to make sure that they are not used for such activities.

The European Union also like the others does not consider Bitcoin as a legal tender. The Policy on allowing and regulating Cryptocurrencies exchanges depends on the individual country within the EU. As per the website cryptocompare, about 4% of Crypto currency's daily volume is done in Euros. EU leaders have also voiced concern about money laundering risks of Cryptocurrencies and also risks related to financing of illicit activities. Others, like India, China and South Korea have taken an uncertain or hostile stand with respect to cryptocurrency. But things could change in these countries as well. In September 2018, Indian Markets regulator SEBI (Securities & Exchange Board of India) has sent its officials to foreign countries to study the initial coin offerings and Cryptocurrencies. This is aimed to help in understanding of Cryptocurrencies systems and mechanisms.

The most notable facilitating environment for Cryptocurrencies appears to be put in place by Japan. At the other extreme end, Bangladesh passed strict anti-money-laundering laws targeting Cryptocurrencies in 2014 which states that anybody caught using virtual currency could be jailed up to 12 years. Even though the Chinese authorities ordered crack down on Cryptocurrency exchanges, People's Bank of China, has recently tested a prototype cryptocurrency of their own. This and similar other projects if successful, can pave the way for other nations to adopt full-scale government approved Cryptocurrencies in the near future.

The prospect of Cryptocurrencies to succeed in the long run is still a matter of considerable debate. However, the underlying blockchain adaptation has attracted considerable attention due to its several advantages. Some economists see the rise of Cryptocurrencies akin to dotcom bubble and are quite concerned about its misuse for money laundering and terrorist funding activities. Nations like Japan have taken a more pragmatic view and see it as beneficial to the global economy in a broader sense.

Cryptocurrencies absorption into the Global economic order is likely to remain contentious due to their very nature. Cryptocurrencies facilitate a payments system with no central bank and are exchanged using encryption. They are not backed by any other secure asset and also are not the liability of any regulatory body or Banking institution. Many experts are of the opinion that while these digital currencies may not pose major risk at the prevalent levels of use, their widespread use in future can lead to economic instability as being decentralized they are beyond the control of individual nations.

I. Discussion and Conclusion

Cryptocurrencies which appeared quite scary and mysterious in their initial years have certainly gained more acceptance in the last decade. While a considerable degree of skepticism remains and there are many red flags to their widespread use, it is hard to ignore the rapid strides made by Cryptocurrencies in terms of evolving technology, interest generated and money invested in them. Compared to conventional currencies, Cryptocurrencies rely up on a radically different approach to ownership, control and anonymity. It is also due to this anonymity provided and limited identification of cryptocurrency participants, there are concerns regarding its misuse for money laundering and terrorist financing. Cryptocurrencies with their exponential growth in their present form pose long term challenge to the stability of the financial system as widespread use of Cryptocurrencies and products can give rise to new financial vulnerabilities and risks. While these differences from conventional Fiat currencies pose numerous risks and threat to current money market systems, Cryptocurrencies have injected a degree of innovation and may present opportunities at least in select pockets.

The pioneer among these currencies, Bitcoin has witnessed a dramatic surge in value followed by a good fall and considerable degree of volatility. ICOs (initial coin offerings) for new Cryptocurrencies are emerging at a rapid rate and the number of Cryptocurrencies stands at more than 1400 in number. This rapid growth has given rise to doubts and many observers see Cryptocurrencies akin to Ponzi schemes where investors let lured by possibility of quick returns. Cryptocurrencies have attracted enough users to draw attention of state authorities in many countries. Though Cryptocurrency is not a legal tender in the strict sense in almost all parts of world, many countries have permitted Cryptocurrency exchanges and many have started to regulate these exchanges by bringing them under their purview. However many other nations view Cryptocurrencies with a good degree of suspicion and they are still a debatable and contentious issue. While few of these nations have come out totally against use of Cryptocurrencies, other countries are still evaluating the developments and are undecided on how to proceed further.

Today Bitcoins can be used as a payment system for exchanges to operate a few online transactions and in some countries even to buy some real things or services but mostly not for paying back debt. The currency itself remains unstable and unpredictable, exhibiting wild price fluctuations. Compared to conventional currencies, Cryptocurrencies involve a radically different approach to ownership and anonymity which makes them more difficult to be covered under regulatory framework. While the existing Cryptocurrencies do not come near to the attributes needed in a good currency, different authorities have varying opinion whether they fully qualify even as a financial asset. At this stage Cryptocurrencies are not backed by official bodies like the central banks or respective governments, and with high degree of volatility exhibited in their price, investors run a high risk in dealing with them. Further the Cryptocurrencies Exchanges are not very robust and many do not fall under any regulatory purview. Despite these shortcomings it is hard to ignore the massive interest generated among investors, software community and amount of money invested in this new area. Further there are many evolving uses of Blockchain technology which lies at the center of Cryptocurrencies. Lead taken by Japan to being all Cryptocurrencies exchanges under regulatory ambit and trying to create a framework where Cryptocurrencies can coexist in specified area is the right approach at this juncture. This will help to being in clarity in an area which has long operated outside the regulatory framework. It is possible that Japan in coming years may set the stage for how Cryptocurrencies can play a larger role in society and also confirm to some basic regulations.

As we have brought out in this paper, there is considerable variation in views and approach by public and regulatory authorities in individual countries of the world towards Cryptocurrencies. Cryptocurrencies have covered enough ground where government cannot sit aloof to developments in this field and have to now formulate policies in this direction. It cannot be ruled out that central banks may in future create their own cryptocurrency and may permit their use for some specified transactions in addition to use of Fiat money.

References

[1] Alexander D'Alfonso, Peter Langer, Zintis Vandelis. 2017. The Future of Cryptocurrency, An Investor's Comparison of Bitcoin and Ethereum. Economist. https://www.economist.com/sites/default/files/the_future_of_cryptocurrency.pdf

[2] Yaov Vilner. Jul 14, 2018. Cryptocurrency Exchanges Are Getting Better In User Experience And Liquidity. Forbes.

[3] Alex Hern. 29 Jan 2018. Bitcoin and Cryptocurrencies – what digital money really means for our future. The Guardian – International Edition

[4] Sarah Hansen. Jun 20, 2018. Guide To Top Cryptocurrency Exchanges. Forbes

[5] J Lansky. January 2018. Possible State Approaches to Cryptocurrencies. Journal of Systems Integration. 9/1: 19–31. doi:10.20470/jsi.v9i1.335

[6] Amy Castor. May 11, 2018. How Japan Is Creating a Template for Cryptocurrency Regulation. Bitcoin Magazine

[7] Satoshi Nakamoto. October 2008. Bitcoin: A Peer-to-Peer Electronic Cash System. https://bitcoin.org/bitcoin.pdf

[8] Mike Cummings. August 6, 2018. Assessing cryptocurrency with Yale economist Aleh Tsyvinski. Yale News

[9] James Surowiecki. April 10, 2018. Bitcoin would be a calamity, not an economy. MIT Technology Review

[10] Rebecca Perring. Cryptocurrencies Don't risk world economies, Mark Carney tells G20. Daily and Sunday Express

[11] Paul Schrodt. March 1, 2018. Cryptocurrency Will Replace National Currencies By 2030, According to This Futurist. Time

[12] Jon Danielsson Director, London School of Economics. 15 Feb 2018 Why Cryptocurrencies don't make sense. https://www.weforum.org/agenda/2018/02/why-cryptocurrencies-dont-make-sense

[13] 17 June 2018. Cryptocurrencies: looking beyond the hype. BIS Annual Economic Report

[14] Aaron van Wirdum. Apr 24, 2018. The Genesis Files: How David Chaum's eCash Spawned a Cypherpunk Dream. Bitcoin Magazine