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Volatility of Bitcoin and Its Implication to be a Currency

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ABSTRACT

Bitcoin is a cryptocurrency that has gained a lot of importance in recent times. One of the prominent reasons for thehigh transaction of Bitcoin is its tradability. This paper tries to examine the volatility of USD value of bitcoin value and its stationarity. Although there is soaring speculation about Bitcoin's future, there is mixed response amongst Central Governments of many countries about making it as an accepted medium of exchange. But to be accepted as a fiat currency and as a medium of exchange, it has to stand the litmus test. This paper identifies India's stance towards bitcoin.India's readiness to accept bitcoin is one of the areas probed by this paper.

INTRODUCTION

Two things that constitute a significant aspect of the country's financial and economic structure is the payment and settlement structure.The cost of any nations' payment system may be equivalent to about 3%of its GDP (Roy & Sahoo, 2016). An efficient payment system acts as a promoter for ensuring liquidity flow within the economy. Like in any dynamic economy, in India too the robust advances in IT, changes in regulatory framework have encouraged the growth of new payment practices and payment mechanisms. The demonetization move by the Government has acted as a catalyst in improving the payment and settlement structure of the country (Goriparthi & Tiwari, 2017)The current stage of development has pushedconventional payment methods to transform into digital payments,i.e., from cash to e-money payments. These paymentsare made with the use of digital financial instruments (credit/debit cards, electronic cheques/cash).Theadvancement and complexity of technology have given impetus to a higher level of currency known as cryptocurrency popularly known as Bitcoin.Digital currency has the same properties of the real currencies and instigates free flow of cash without many barriers.

BITCOIN

Digital currency is a concept that has gained importance after the emergence of bitcoin. The best example of digital currencies is virtual currencies and cryptocurrency. Cryptocurrency is a digital currency that uses cryptography to ensure its security.The key feature of a cryptocurrency is the security it holds and making it hard to counterfeit. The first cryptocurrency that gained the attention of the public was Bitcoin in 2009 by an individual or a group of people known under the false name of Satoshi Nakamoto.Several authors have developed the meaning of bitcoin. Numerous articles broach the definition of bitcoin from technical, economic and financial dimensions. However, one speciality which is also the characteristic of bitcoin that emerges is that it is notissued by any central authority or agency making its usage anonymous (Kurihara & Fukushima, 2017). The motive behind the creation of Bitcoin was to create an electronic payment system based solely on cryptography which is not confined by human sentiments and emotions of Trust laid on a Central Bank (Nakamoto S. , 2008)which means that two interested and concerned parties could directly transact with each other.The user of a Bitcoin stores it in an e-wallet. To enable a transaction, two keysare used.The user uses the public key which acts as a bank account number which is publicly available for others

to send bitcoin and a private key which works like a PIN which is a secret number that is used to generate a bitcoin transaction. The balances of the account are kept using keys (bothpublic and private keys) which is linked with an algorithm. It uses a public ledger known as a blockchain in which the details such as name, address of the bitcoin users are registered. The blockchain is also used to validate the transaction in the form of digital signatures. The electronic coin is a representation of the multiple chains of signatures (Nakamoto, 2008). The owner of a bitcoin transfers a coin by digitally signing a hash of the previous transactions and the public key of the next owner. The payee can verify the signatures to know the chain of ownership. Bitcoin derives their value from mining. Greater the network, the expensive and challenging it is to mine them.

REVIEW OF LITERATURE

Bitcoin is a cryptocurrency. It is not a legal currency but a private monetary system that manages itself and does not depend on central banks or governments. Since the development of Bitcoin, its trading volume has been increasing largely and rapidly. Some fear the increase in Bitcoin usage as it is quite different from traditional currencies; however, its use is spreading all over the world. Bitcoin is a different kind of currency from any other currencies used around the world. It is not digital cash, which has prevailed all over the world. Unlike central bank- and government-issued currency, Bitcoin can be inflated at will, the supply of Bitcoin is limited to a certain volume, which cannot be changed (Kurihara & Fukushima, 2017)

Bitcoin is a digital currency which is similar to other virtual currencies which can be used for day to day transactions. Bitcoins can be purchased by creating an account with bitcoin exchange. After creating an account, one can transfer funds from banks and once the transfer has been cleared, bitcoin can be purchased as well as sold with the help of those funds. Bitcoin exchanges post current exchange rates between one bitcoin and US Dollar and Euro. People do not consider bitcoin as a medium of exchange in the physical world. Rather, they use hard currencies which cannot be created at will by the central bank. Its little acceptance makes it a poor medium of exchange. But holding a small amount of bitcoin in a diversified portfolio can benefit individual investors (Y. Wu & Pandey, 2014)Bitcoin transactions are not fully unidentified or nameless. The identity of every user of bitcoin is recorded on a public ledger. The estimated market capitalization of the bitcoin system is more than $5 billion. In the year 2009, bitcoin system came into existence. Bitcoins are created by solving difficult mathematical equations. Each equation is completely different and is difficult to solve. That is why it is difficult to create new bitcoins. Interested users put bitcoin wallets in their computers or in their phones. The installed bitcoin wallets produce a unique address as well as an encryption key that helps to verify transactions (Lee, Long, McRae, Steiner, & Handler, 2015)

Bitcoin has a completelydistinct model, its security is approved by a cryptographic algorithm, a Secure Hash Algorithm (SHA) which is 256 bits (SHA256) instead of being approved by a government. There is no guarantee that a Bitcoin will have a secureconnection to any conventional currency. Bitcoin moves in contrast to the traditional currencies and has been declinedbelow a dollar in 2011 to as high as $1,200 in 2013 to about $500 presently. Bitcoin is an independent source so, anybody can take the source code, make negligiblechanges and then build an identical network to Bitcoin thereby developing their own currency. However, the base of Bitcoin protocol is very burdensome to modify because of the decentralization of the network chain (Rose, 2015)Bitcoins are "mined" or developed by decoding difficult math problems i.e. solving the hash existing in the block of a blockchain for new deals. When a user successfully solves a hash, he receives bonus bitcoins as well as a transaction fee if the block was already used in order to approve a transaction. As bitcoins are mined all over the world, the volume of the bounty decreases and the convolution of the code rises, making it more wearisome to mine. Thus, these two things diminishes the rate of creation of bitcoins just like gold, the more it is mined more complicated it gets to mine more (Essays, 2017).

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Author HALABURDA, H. & SARVARY, M has provided a framework that allows us to understand digital currencies better and to make more informed forecasts about their future. There has been continued evolution of digital currencies and the technology that underlies them. New coins (altcoins) mushroomed, with about 700 cryptocurrencies being traded one for another via online exchanges. This altcoin attempted to simplify the cryptographic tools used in Bitcoin and lessen the computation burden miners faced when adding new information to the blockchain. Other altcoins, Peercoin and Novacoin, established in 2012 and 2013, respectively, offered a better solution to the problem of mining. Instead of relying on proof-of-work, they rely on proof-of-stake mining, which rewarded miners in proportion to their stake in the currency (HALABURDA, 2016). Currently, Bitcoin is becoming popular and there is ahope that the society would cut cash and accept digital currencies with the target of heading towards a cashless economy. Given that the introduction is not approved by any government and the innovation is exposed to manipulation as well as speculation, countless countries are hesitant to welcome Bitcoin. The problem of unsafe infrastructure has somewhat blocked Bitcoin innovation to gain unrestricted usage. As the currency is not published or approved by any government, there are concerns over the permissibility of Bitcoin activities. There are obstacles of lawless tender where Bitcoin wants the government's legislation to boost the permissibility of this new currency. Bitcoin currency may transforms the future of banking in developing countries but it is hard to substitute a cash-based society (Wonglimpiyarat, 2016)

The advantages of bitcoin are: small tax is enforced on every transaction that does not change by the amount and risks involved. There are transparency and impartial methods of ascertaining the currency's value. Bitcoin has high built-in security. There is free usage of the currency, and it cannot be stolen. The disadvantages are: less acceptance, continuous advancement of the currency, price fluctuates each time a new cryptocurrency comes out, payments are irreversible, unconfirmed paymentsare not adequately protected, bitcoin users may face legal and fiscal problems as it is not state regulated (BOTOŞ, 2017). There is thethreat of fraud in the use of bitcoin especially in the virtual IT field, where a thorough understanding of the background and the ways used by every consumer is not practical. Keeping in mind the advantages, a concrete basis for a new, prominent payment is given: a decentral power which is based on mathematics. The pool of benefits could create a base for significant innovation in the field of banking (Richter, Kraus, & Bouncken, 2015)

There is flexibility in payment. With Bitcoin it is very much accessible to send and to get money in any place in the world at any given time. Bitcoin has authority and security. It allows its users to be in control of their deals which helps to keep bitcoin harmless for the network. Brokers cannot demand additional fees on anything without being recorded. They must inform the consumers prior adding any charges. With the blockchain, all concluded transactions are accessible by everyone to see. However, thepersonal informationis not disclosed. But on the other hand, there is lack of understanding about bitcoin. The fact is countless people are still not aware of digital currencies and Bitcoin. People should be educated about Bitcoin so that they can use it in their lives. Bitcoin prices are high volatility. Bitcoin price fluctuatesbecause there is a limited number of bitcoin and the demand for them is increasing day by day. However, it is expected that the fluctuations in the bitcoin prices will decrease as time goes on. Bitcoin prices will settle down, as more businesses, Media, and trading centresbegin to accept Bitcoin(Report, 2014).

SCOPE

This paper covers the volatility of Bitcoin value expressed in US Dollars (USD). Bitcoin is emerging as a trading avenue,and this has taken bitcoin's value to unprecedented valuation especially against the USD. This phenomenon has occurred offlate,and therefore this paper covers a span of data across four years. Since the volatility of beta has reached unprecedented levels the time horizon considered is from 2013-2017.

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Although several countries have taken a stance about bitcoin, India is still wary about using it as a digital payment method.

OBJECTIVE

- To observe the volatility of exchange rate of bitcoin against the selected currency.
- To study if bitcoin can be a mode of digital payment in India.

METHODOLOGY

Secondary data has been used for this study. Theprimary data was collected from Bitstamp the largest bitcoin exchange in the world (Brandvold, Molnár, Vagstad, & Valstad, 2015). Several literature reviewswere made to achieve the second objective of this study. The software tool used for this test was EViews, which is mainly used for time series oriented analysis. A Unit root test, GARCH and ARCH LM test were conducted to test the time series of data.

BITCOIN AND VOLATILITY

The data for this study has been compiled from 1st October 2013 to 31st October 2017. A total of 1469 Observations(after adjustments)[1]have been taken into consideration for the analysis. The data for the same has been collected from Bitstamp (Bouri, Azzi, & Dyhrberg, 2017), which is the largest bitcoin exchange in the world(Brandvold, Molnár, Vagstad, & Valstad, 2015)and covers a daily log of US dollar-based bitcoin values. The section has been divided into three parts: The first part is the test of normality, second being a test on the stationarity of the data and the last part is to conclude on the volatility.

Mean	865.6441
Median	507.0000
Maximum	6445.600
Minimum	103.8000
Std. Dev.	1064.146
Skewness	2.854388
Kurtosis	11.11053
Jarque-Bera	6094.892
Probability	0.000000

Descriptive statistics

The average value of bitcoin over four years stands at $865.6441. From the period 1/10/2013 to 31/10/2017 bitcoin reached the highest point at price of bitcoin $6445.600 and the lowest being 103.8000. We can deduce from the above results that the data has shown a deviation of $1064.146. The data is asymmetric as seen by the high skewness value of 2.8at a significance value at 0.00 it can be said that the datais not normally distributed.

a) To identify the Stationarity of Data

Here,

Ho- Bitcoin value in terms ofUSD is Non-Stationary.

H1-Bitcoin value in terms of USD is Stationary.

[1]Non-availability of values resulted in the automatic adjustment by the software that published the data.

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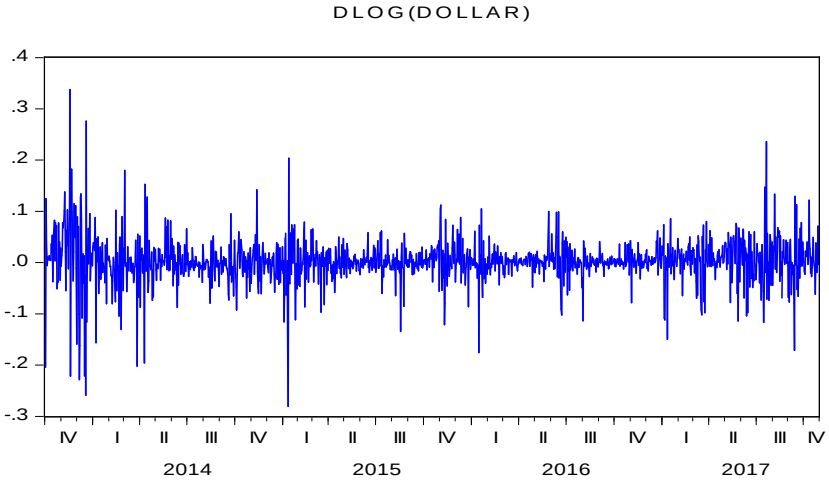
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.19778	0.0000
Test critical values:	1% level	-2.566537	
	5% level	-1.941039	
	10% level	-1.616554	

*MacKinnon (1996) one-sided p-values.

To identify the Stationarity, an ADF (Augmented Dickey-Fuller) test has been used.Therefore its necessary to check if the data is stationary or not. On the other hand, the ADF test can handle more complex models than the Dickey-Fuller test,and it is also morepowerful,but it should be used with caution as like most unit root test type1 error is relativelyhigh. This unitroot test has been performedat various levels. According to the null hypothesis, the bitcoin value of USD is non-stationary. The applied data resulted in less than 5% significance,so the null hypothesis has been rejected proving that the values of bitcoin inUSD are stationary. The sample period taken is from 1/10/2013 to 31/10/2017.As the time series data has tobe tested for stationarity a dickey fuller test was conducted



Bitcoin daily return Graph

The Graph represents that the Bitcoin value in USD is stationary and hasn't deviated much from the mean line. Although there are few spikesthe data is stationary.

b) This component is performed to check leverage and volatility

Presample variance: backcast (parameter = 0.7)
@SQRT(GARCH)^C(7) = C(3) + C(4)*(ABS(RESID(-1)) - C(5)*RESID(-1))^C(7) + C(6)*@SQRT(GARCH(-1))^C(7)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.002336	0.000648	3.606856	0.0003
AR(6)	0.086293	0.020042	4.305589	0.0000
Variance Equation				
C(3)	0.001714	0.000741	2.311823	0.0208
C(4)	0.176415	0.011412	15.45895	0.0000
C(5)	0.057646	0.037624	1.532167	0.1255
C(6)	0.847140	0.008992	94.20847	0.0000
C(7)	0.913287	0.112760	8.099421	0.0000

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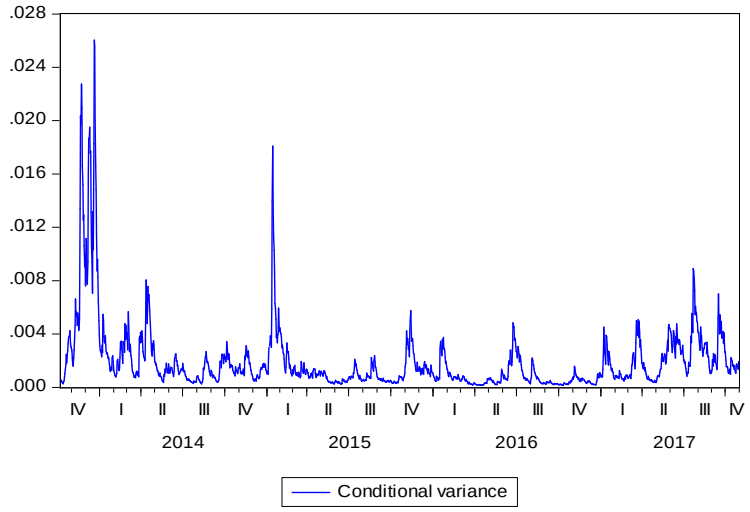
According to the GARCH estimation model, C(4) tests whether the volatility is autoregressive this is proven trueonly if the probability is significant. We infer that the volatility of bitcoin value in USD is autoregressive. Thismeans that the past data influences the Future Market. C (5) Asymmetric tests if the good and bad news have an effect on the volatility of thebitcoin values in the above analysis. The result is positive which means the positive news has nosignificant impact on the bitcoin values. C (6) Garch checks the clustering volatility of the bitcoin values at asignificant level of 5% level. Thecoefficient value is 0.84 which means there is high clustering volatility.



From the above graph, it is seen that there is a high volatility on 20/12/2013, 16/1/2015 and 21/7/2017 as presented by the peak points on the graph. The above suggests that the above mentioned 3 Days were volatile.

ARCH LM TEST

It estimates any heteroskedasticity is found in residuals of PGARCH equation; this is necessary to verify any ARCH effect has remained in the data or not. In this test, it represents

H0- Arch Effect remains in Residuals.

H1- Arch effect does not remain in Residuals.

Heteroskedasticity Test: ARCH

F-statistic	1.113976	Prob. F(1,1483)	0.2914
Obs*R-squared	1.114641	Prob. Chi-Square(1)	0.2911

With a p-value of 0.2911, it can be inferred that there is no significant effect of ARCH Residuals (significance value @5%). Hence the null hypothesis is rejected. This proves that the data is fit for the study.

It is evident from the above analysis that Bitcoin value is expressed against an existing and a dominant currency. Despite its extreme volatility several countries have welcomed and accepted Bitcoin to be used as a medium of exchange and are widely recognized as a tool for speculation. Countries like Estonia, USA, Denmark, Sweden (Reuters, 2017)though encourage cryptocurrency, India's stance is silent on this matter. This forms the basis for the second objective of this paper.

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OBJECTIVE 2

Currency is an accepted medium of exchange for all monetary related transactions and settlement. Several currencies today are also accepted internationally. For a medium of exchange to evolve as an accepted currency, it has to satisfy three criteria namely: medium of exchange, unit of account and store of value. (Ciaian, Rajcaniova, & Kancs, 2016). Although bitcoin is widely traded commodity today that has ushered cryptocurrency concept, there has been an active debate on whether bitcoin can function as a replacement of existing standardcurrencies like US dollar, Euro, Yen to name a few. The following discussion explores if bitcoin fulfils the three criteria and can be hailed as a new currency.

The Principal function of currency, it's a mode of payment, it has to be commonly accepted, it has to be a store of value, and it's a transaction currency. Bitcoin only meets the characteristic of a transaction currency as stated by Alex Weber who served as the head ofBundesbank, Germany.

Bitcoin needs market participants to act as a medium of exchange. The main benefit of bitcoin is it has alow cost of transfers in comparison to the standard currencies. Bitcoin has shown tremendous growth in the last few years,butstill, it is difficult for the bitcoin users to accept bitcoin as a medium of exchange. And there are several reasons for it. The bitcoin users find it difficult to procure new bitcoin, challenging to grant loans in Bitcoins as it is not as liquid as fiat Currencyand requires ahigh level of computer knowledge as it operates electronically.A currency serves as a unit of account,but on the other hand, the prices of bitcoin are highly volatile. One more advantage of bitcoin is that a bitcoin can be dividedinto small fractions. But at the same time, it can also create confusion among the bitcoin users regarding the bitcoin prices expressed in many decimal places.Currency also serves as a store of value whereas currencies are inflationary, bitcoins are deflationary (Ciaian, Rajcaniova, & Kancs, 2016). Even if it is an advantage for the bitcoin users, but it may minimise its use in the trading of goods and services due to the threat of hoarding

Price volatility is considered to be a significant threat for bitcoin to be accepted as a global currency. The fluctuations in the prices of bitcoin will affect the purchasing power of firms as well as consumers. (Ciaian, Rajcaniova, & Kancs, 2016). As of April 2017, RBI has set up an interdisciplinary committee (Helms, 2017) by the department of economic affairs of Ministry of Finance.It is chaired by a Special Secretary Economic Affair and includes representatives fromtheDepartment of Economic Affairs,Department of Revenue(CBDT), Ministry of Home Affairs,Ministry of Electronics and Information Technology,RBI National Institute for Transforming India and State bank of India. The introduction ofany new cryptocurrency may require an amendment of the Currency Act.Despite distrust engulfing non-fiat cryptocurrencies, central banks across the globe have taken into consideration the effectiveness and technology used. Few laws in thecurrency have to be as per currency act. Hence as of now, it cannot be adopted as a cryptocurrency.

CONCLUSION

The technological transformation has changed the way we pay, use and invest in money. Going by a well-known adage "make hay while the sun shines", investors are optimistic about the future of Bitcoin as a trading avenue. Although the enthusiasm is rife, thevolatility associated withBitcoin also cannot be ignored. Although it is a has brought in a revolution, extreme unbridled fluctuationsdo not signal a stable development of any system. The Bitcoin value of USD is volatile as examined in this paper.India unlike many countries is silent about Bitcoin's role as an investment avenue and to consider it as an accepted currency. Also, India is not yet ready for such kind of technology advancements. Bitcoin's limitations may not make it a currencyshortly. It is also seen that Bitcoin does not imbibe the features of a fiat currency making its usage difficult as a primary currency in India.

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