A CRISSCROSSED COURSE OF CRYPTOCURRENCIES

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ABSTRACT

Across the world the usage of the crypto currencies is on the rise and a lot of research took place on the Crypto currencies during the last decade. This paper makes an attempt to study about the acceptance of crypto currencies, their volatility, global situation of crypto currencies, and future of crypto currencies. Crypto currencies are not 'legal tender money' in any country but they are not illegal for transactions between private parties in countries including US, Mexico, and several African countries and broadly the situation is same in India as well. However, for income tax purposes they are treated as property and not as currencies. When any currency is not legal tender money, such currency cannot be tendered for any payments to Government authorities, cannot be deposited in banking system, and are not recognized by courts for monetary debt repayments. In spite of these major limitations, crypto currencies are still invested into, exchanged, and tracked by many investors and businesses due to non-ignorable advantages such as near zero cost for remittances, instant remittance facility, international use, discreetness, and traceability. While crypto currencies are being embraced and encouraged, they are also simultaneously surveilled if the regulatory responses are any indication. In this regard, it is imminent to undertake research from multiple angles so as to contribute to the regulatory efforts, awareness for the users, inferences for the businesses, and insights for the investors, all in the larger interest of contributing to the strength of breadth and width of financial infrastructure. To achieve the objectives of this study, descriptive statistics approach is adopted to analyze the prices of Bit coin and Ethereum, which two constitute about 75% of the total market Capitalization of the crypto currencies. The results showed high volatility in the select Crypto currencies with the trend present in the data but when the data is detrended the volatility is comparable.

KEY WORDS: Crypto currency, Bit coin, Ethereum, block-chain, legal tender money, regulation.

I. INTRODUCTION:

Across the world the usage of the cryptocurrencies is on the rise and a lot of research took place on the Cryptocurrencies during the last decade. Cryptocurrencies are not 'legal tender money' in any country but they are not illegal for transactions between private parties in countries including US, Mexico, and several African countries and broadly the situation is same in India as well.

Cryptocurrencies are mere digital currencies but without having any underlying physical currency or credit in the banking system. Therefore, cryptos do not have any physical paper form or coin form.

Any currency to be called so, need to fulfil three requirements viz., medium of exchange, store of value, and unit of account. These three are abstract features and cannot be strictly quantified. Therefore, whether cryptos fulfil these features or if they are currencies regardless of fulfilling or not of the said three requirements depends on the levels of acceptance and usage by the users of the cryptos.

II. TECHNOLOGY FOR CRYPTOS:

By its name and symbolic indication as well, cryptocurrency operates on cryptography. The messages and numbers are encrypted and disclosed. Encrypted in all cases and disclosed to those who are part of the chain of the transactions.

There are certain specific technologies on which the cryptocurrencies operate. Of these, blockchain technology is dominant. The other technologies such as CRAQ, CRUD, etc. were also tested but blockchain is found to be the better of all and therefore, the technology for cryptocurrencies and blockchain have almost become synonymous.

Blockchain is a digital ledger like a physical ledger which used to be maintained at Banks and is still maintained but online. The digital ledger is distributed ledger technology (DLT) which facilitates encryption. Further, DLT also facilitates the transfers, verification, authorization, account updating, status information and the total transactions. Thus, cryptos are simply peer-to-peer currencies which function in electronic form only.

III. SPACE FOR CRYPTOCURRENCIES:

Having discussed the 'what' of cryptos and its technology, we need to discuss the 'why' part of it as well. The main reason why users embrace cryptos is decentralization. There is no single regulatory or other authority or agency that would regulate or operate the cryptocurrencies. The users themselves operate the cryptocurrency implicitly without anyone having any influencing power over the crypto. Because there is no regulatory intermediation, the speed at which the transactions can and do happen is extremely high and in fact, instant. The transactions involving the remittances in cryptos happen between the users themselves and directly. The absence of an intermediator says, a bank, not only reduces the time but also the cost. The process of discussing the fee, the procedure involving therein, and the fee paid to the bank are all absent in case of cryptos. The confidentiality and transparency are embedded in sufficient ratios. For those who have the authorization and ownership of their transactions, the details are available and for those who only need to receive their remittances without the need to know anything else will only receive the remittance details and the remittances. In this aspect, the block chain powered cryptos function in the lines of banking system. This has become one of the concerns of the regulators which claim that the confidentiality provided by cryptos is unhealthy secrecy and can facilitate illegal transactions and funding. Divisibility is another feature. The cryptos can have any denomination without any limitation. They can have a very minimal fraction or of unity. The sum of value of all the divisions of a given crypto currency is the same as the value of unity of that given crypto currency. This is a silent feature which helped cryptos gain entry as equivalents of currencies.

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Today, cryptos are rarely unknown in the business circles, technology circles, banking circles, and foreign exchange circles. More than like forex market, cryptos get traded round the clock and all through the year without any breaks on any day or any second. Thus, the liquidity for the cryptos is very high although the volatility needs to be studied to appreciate whether the liquidity is stable or not.

IV. WORLD'S TOP 5 CRYPTOCURRENCIES:

There are numerous cryptocurrencies and some estimate states that there are about 5,000 cryptos. However, the top five cryptocurrencies are Bitcoin, Ethereum, Ripple, Bitcoin Cash, and EOS.

Bitcoin is considered as a synonym for cryptocurrencies. It is the first crypto to get popularized. The most popular feature titled as proof of work which is essential in verifying the cryptocurrencies for transaction is introduced by bitcoin. Bitcoin is mined like any other cryptos. But % of the hashrate is allegedly controlled by four entities only viz., BTC.com, Ant pool, Connect BTC, and BTC.Top. It is publicly confirmed that maximum number of Bitcoins that can be mined are 21 million Bitcoins. The smallest unit of Bitcoin is called as Santoshi named after Mr. Satoshi Nakamoto, the inventor of Bitcoin. Bitcoin is globally the dominant cryptocurrency with market capitalization of more than $125 billion and considered to be about 65% of the overall crypto market capitalization.

Ether is considered to be the next in order crypto after Bitcoin. Ether is the crypto whereas Ethereum is the technology which is a public blockchain system. Therefore, unlike Bitcoin which is a peer-to-peer blockchain system, Ethereum works on distributed computing platform. Mr. Vitalik Buterin is considered to be the founder of Ethereum. Ethereum is claimed to have many additional features and scope to compete with Bitcoin much earlier than it would be possible for any later entrant in to the fray. Many initial coin offerings (ICOs) are based on Ethereum technology only.

Ripple is the third most popular crypto after Bitcoin and Ether. Ripple is developed on real time gross settlement (RTGS) mode by Ripple Labs Inc, a technology firm. Ripple has a very distinct feature that it allows payments in cash and cryptos and not just in Ripple but in other cryptos as well. Ripple is considered to be the most economical cryptocurrency for transactions and real time settlement.

Bitcoin Cash is the next in order cryptocurrency. Bitcoin cash is just a fork of the popular crypto Bitcoin. Because lot of blocks in Bitcoin were filled up and there was a long waiting time until creation of new blocks, the need for a new cryptocurrency was felt and achieved. Bitcoin Cash increased the number of transactions in a block resulting in reduction of transaction costs. Bitcoin Cash if one of the latest entrants to fast emerge as one of the top cryptocurrencies.

EOS is the fifth of the top 5 cryptocurrencies of the world. EOS enables horizontal and vertical scaling of the decentralized applications, the latter being the core for any cryptocurrency. EOS is understood to be working on Ethereum technology. EOS has the potential to scale up to millions of transactions simultaneously and either with no or negligible costs.

V. CAN CRYPTOS BECOME ABSOLUTE CURRENCIES?

Since transactions can happen with any medium of exchange, Cryptocurrencies are formally used in an informal manner as currencies. However, certain essential features such as universal acceptance, regulation, frequency of exchange, stability of value etc., are the key to decide whether cryptos can stand equal chance as cash currencies.

Without considering the other factors such as regulation, backup of value in gold or other form, fiat features, etc., cryptocurrencies are still widely used as medium of exchange, instruments for investments and trading, assets for owning, etc. However, the test of volatility is the major criterion cryptocurrencies should prove to enjoy unrestricted acceptance as currency even on an informal note off the regulation.

The test of acceptance of cryptos as currency or currency-equivalent is volatility in their prices. If cryptos are subjected to the test of volatility, they reveal their reliability for using as medium of exchange in transactions. Volatility of cryptocurrencies refers to the fluctuations in the prices or value of the cryptocurrencies. The differences in values of exchange from the average value denotes how much the value of cryptocurrencies are fluctuating. The more drastic the fluctuation of the value or price of a cryptocurrency, more is the risk for the cryptocurrency and less reliable would it be for conducting transactions.

The degree of variation of the price / value of the cryptocurrencies over a period of time explain the volatility of the cryptocurrencies. Volatility can be measured by computing standard deviation and coefficient of variation. The standard deviation measures the dispersion of value or price of the cryptocurrency deviating from its average. The wider the deviation, the higher the standard deviation and the higher the volatility is. Since standard deviation can only be interpreted when a comparable variable is available for the base variable, to compare the volatility of a currency with other currencies, coefficient of variation needs to be computed. Coefficient of variation referred to as CV measures the ratio of standard deviation to the mean of the variables. While standard deviation can be interpreted on a standalone basis also, there are limitations in making meaningful inferences solely based on standard deviation. Similarly, even CV would be more meaningful when inferences are drawn for comparable variables, CV bodes better than standard deviation in offering individual inference of the variable. Broadly, distributions with a CV less than unity are stated as having less volatility and those with a CV greater than unity are considered to be more volatile.

VI. METHODOLOGY OF RESEARCH:

    i.   **Objectives**
- a) To ascertain leading cryptocurrencies while listing out the major top cryptocurrencies and their origins.
- b) To track the prices of Bitcoin cryptocurrency and Ether Cryptocurrency.
- c) To compute the volatility of both the cryptocurrencies viz., Bitcoin and Ether.
- d) To infer if volatility is unusually higher to deter cryptocurrencies from playing the role of real currencies.

    ii.   **Study data:**

To study the volatility of the selected cryptocurrencies, the data should relate to a reasonably long period to even out the aberrations, if any, in the short hauls. Considering this necessity, the daily trading / exchange data of Bitcoin and Ethercryptocurrencies is collected for a period of about 7 years i.e., from 1st October 2013 to 15th August 2020. Interestingly, there is no non-trading day for these two cryptocurrencies all through the period. Since the data is of time series, there is a risk that the data may have the unit root feature involving stochastic processes. Presence of unit root can distort the study and outcome while making inferences of statistical outcomes of the time series data. Therefore, as a first step and the base, the data is subjected to unit root test. Since stationary data is required for computations, the null hypothesis considered existence of unit root implying that the available data is non-stationary. The decision criterion is to reject the null hypothesis if the values of the probability is less than 0.05. Correspondingly, if the values of the probability are more than 0.05 then the data can be considered as stationary and is directly fit for computations.

    iii.   **Methodology:**

As explained above, for moderating the data from non-stationary to stationary, Unit Root Test is required. Once the data is stationary, the data can be tested for symmetric and whether the data is heavy-tailed or no tail normal distribution of the data set. With these tests, it is possible to make inferences whether the volatility of cryptocurrencies is extreme or normal. For observing the pattern of distribution, Skewness is computed to find out whether the data has or lacks symmetry.Furtherto observe the Peakedness of the data,Kurtosis is computed.

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The value derived from the computation of Skewness can be positive, negative,the value from Skewness shows the direction and the extent of the deviation from the central value i.e. the average value which ideally is presumed to have zero as its value. If Skewness is negative, it indicates that the values/prices of cryptocurrency (variable) has frequent multiple small upside fluctuations along with few extremely downside fluctuations. In contrast, if the Skewness is positive, it indicates that the values/prices of cryptocurrency (variable) has frequent small downside fluctuations along with few extremely upside fluctuations.

Kurtosis is often employed in conjunction with Skewness since the utility of both Supplement to each other and provide a holistic understanding of the volatility in the prices of cryptos.The value derived from Kurtosis explains whether the volatility distribution is peaked or flat. If the volatility is uniform then the values /prices of cryptocurrencies are said to be normally distributed and will have a Kurtosis of 3. Such normally distributed fluctuations would be symmetric and bell shaped with zero Skewness. There are three types of Kurtosis viz., Mesokurtic, Leptokurtic, and Platykurtic. Mesokurtic Kurtosis indicates that the volatility distributions are moderate in breadth and curves with a medium peaked height. Leptokurtic indicates that the volatility distributions are closer to the mean values / prices of the cryptocurrencies. It means the fluctuations are high with heavy tails. Platykurtic Kurtosis indicates that the volatility is less towards the tails (ends) and more values / prices are close to the mean.

VII. STATISTICAL OBSERVATIONS ON CRYPTOCURRENCIES VALUES:

The statistical computation of Standard Deviation, Mean, Median, Coefficient of Variation, Skewness, and Kurtosis and the descriptive statistics are presented in the **annexure**hereto. The summary of the observations is presented hereunder for instant reference.

In case of Bitcoin:

a) The CV showed a Variation of 2.0 % in the prices during the study period.
b) The result showed positive skewness i.e. the tail at the right side. The absolute value of Skewness indicated that it is little away from zero.
c) The fluctuations are not spread as the Kurtosis value is very far away from 3 in multiple times, which means the shape of the curve is Leptokurtic in Nature. The understanding of the result is that the fluctuations are very close.

In case of Ether:

a) The CV showed a variation of 1.6 % in the values during the period of study.
b) The result showed that there is a negative Skewness. i.e. the tail is at the left side of the curve and also the absolute value of Skewness indicated that it is a little closer to zero.
c) The fluctuations are not spread as the Kurtosis value is very far away from 3 in multiple times, which means the shape of the curve is Leptokurtic in nature. The understanding of the result is that the fluctuations are very close.

VIII. INFERENCES FROM THE FINDINGS:

The CV of Bitcoin is about 2% and the CV of Ether is about 1.6%. While in comparison the volatility of Ether appears to be lower with its lower CV, broadly the CV of both the cryptos are in the same range and closer. However, the Skewness of Bitcoin and Ether appear to be divergent. The Skewness of Bitcoin is positive whereas the Skewness of Ether is negative. Interestingly, the Kurtosis values of both Bitcoin and Ether are Leptokurtic indicating that the fluctuations are very close. Leptokurtic Kurtosis implies that the fluctuations are closer yet broader resulting in extremely high or low values/prices.

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IX. CONCLUSION:

Cryptocurrencies have many attractions and advantages but are not devoid of their share of limitations and risks. One of the major limitations cum risk is volatility of the prices / values of the cryptocurrencies. However, volatility of up to 2% is not unusual and such volatility alone cannot deter or drawdown cryptocurrencies from being currencies. At best, volatility can be one among the other limitations but cannot be a sole or even a major limitation. While this research did not make any efforts to investigate the reasons of volatility in the prices / values of the cryptocurrencies, volatility up to 2% is not unusual for any real/cash currencies or for that matter, commodities, equities, debt paper, derivatives, and even for bullion such as gold.The crisscrossed course of cryptocurrencies may straighten if the regulation, governance, transparency, reliability, and depth and breadth of the cryptocurrency's markets increase since the volatility may also decrease with such enhanced structure and ecosystem.

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2. https://bitcoin.org/bitcoin.pdf
3. https://m.rbi.org.in

ANNEXURE OF RESEARCH WORKINGS

A. RESEARCH TESTS CONDUCTED:

1. Unit root test:

Null Hypothesis (H_o): There is a Unit Root in the Time series data. i. e. Data is Non-stationary

Alternate Hypothesis(H_1): There is no Unit Root i.e. Data is Stationary

Decision Criteria: If the values of the Probability is less than 0.05 then reject the null hypothesis i.e. there is no unit root in the time series data. If the probability value is more than 0.05 then the result can be taken as we fail to reject the null hypothesis.

2. Coefficient of Variation (CV):

It Measures the Consistency of the value representing of the Phenomenon / Product / Variables etc.

Decision Criteria: If the value of CV is less, then it indicates that there is Consistency. Or if the value is more, then it indicates less consistent of the performance.

3. Skewness:

It Measures the direction of Variation from the central value. It may be a Positively Skewed distribution or a Negatively distribution having long tail either at the right side or at Left side. It explains that the distribution is symmetrical or Asymmetrical in nature.

Decision Criteria: If the value of Skewness is zero then the Distribution is Normal whereas it is Positively Skewed if Skewness Value is more than Zero and Negatively Skewed if the value of Skewness value is Less than Zero.

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4. Kurtosis:

This Measures the Peakedness / Flatness of the distribution. There are three types of Kurtosis namely Platy Kurtic, Meso Kurtic and Lepto Kurtic Curve.

Decision Criteria: If the Kurtosis Value (β_2) value is 3 then it is referred as a Normal Distribution and if the value of β_2 is more than 3 it is said to be Lepto Kurtic curve also if the value of β_2 is less than 3 it is said to be Platy Kurtic curve in Nature.

B. DATA ANALYSIS

1. Summary of the Unit Root Test applied for the Crypto Currencies

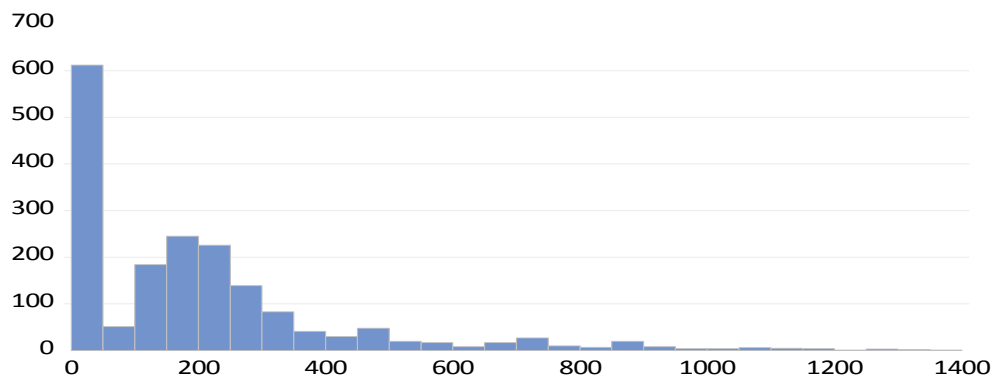| Cryptocurrency	At Level	Null Hypothesis	Result	At First Difference	Null Hypothesis	Result
Ethereum	0.0792	Fail to Reject	Non stationary	0.0000	Reject	stationary
Bitcoin	0.5985	Fail to Reject	Non-Stationary	0.0000	Reject	Stationary

2. Interpretations:

The select cryptocurrencies were at non stationary at level as their probabilities were more than 0.05 value. Hence fail to reject the null Hypothesis.

The process continued further by taking the first difference and checked the unit root test. The cryptocurrencies have attained stationary at first difference.

Now the cryptocurrencies data is at Stationary and further analysis can be taken up.

Descriptive Statistics of the two major Cryptocurrencies
(for Non – Stationary)
Cryptocurrency - ETHEREUM Statistics

| Series: ETHEREUM	
Sample 1 2500	
Observations 1823	
Mean	203.6621
Median	167.7630
Maximum	1352.435
Minimum	0.459338
Std. Dev.	228.5056
Skewness	1.917721
Kurtosis	7.406575
Jarque-Bera	2592.345
Probability	0.000000

Interpretations:

The Coefficient of Variation calculated value showed 89.13%, indicates the variation is very high in Ethereum-cryptocurrency Prices.

The result showed that there is a positive Skewness i.e. the tail at the Right side.

The data is not spread as the kurtosis value is greater than 3, which means the shape of the curve is Lepto Kurtic in Nature. The understanding of the result is data is very closely related.

Cryptocurrency - BITCOIN Statistics
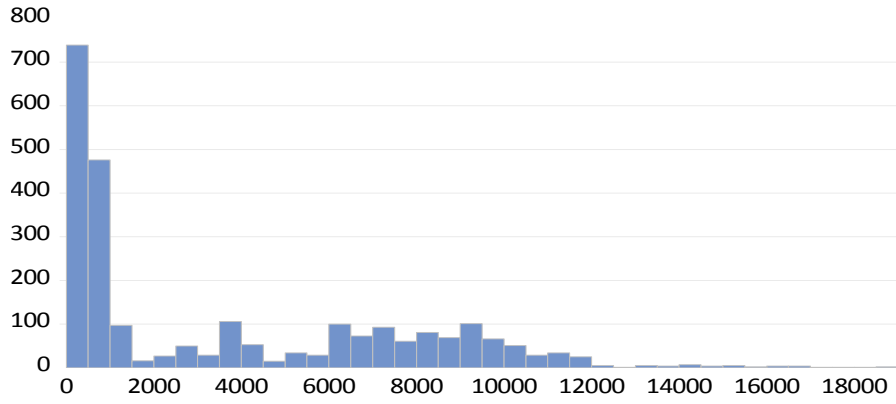
Series: BITCOIN	
Sample 1 2500	
Observations 2500	
Mean	3740.049
Median	1079.185
Maximum	18903.62
Minimum	113.6297
Std. Dev.	3967.856
Skewness	0.859116
Kurtosis	2.648623
Jarque-Bera	320.3943
Probability	0.000000

Interpretations:

The calculated value of Coefficient of Variation as 94.06% which means that there are huge variations in Bitcoin-Cryptocurrency Prices.

The result showed that there is a positive Skewness i.e. the tail at the Right side. The absolute value indicated that it is closer to zero.

The data is spread as the kurtosis value is lesser than 3, which means the shape of the curve is Platy Kurtic in Nature. The understanding of the result is data is not very closely related.

Descriptive Statistics of the two major Cryptocurrencies

(After Attaining Stationary)

Cryptocurrency - ETHEREUM Statistics
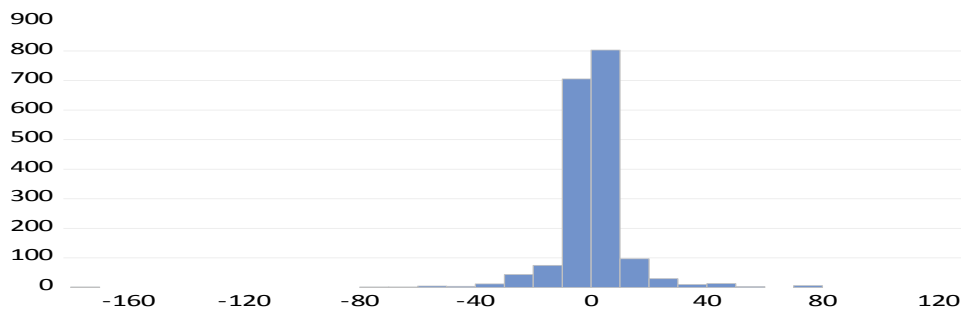
Series: DETHEREUM	
Sample 1 2500	
Observations 1822	
Mean	0.236468
Median	0.013463
Maximum	124.1300
Minimum	–179.2635
Std. Dev.	14.77410
Skewness	–1.715969
Kurtosis	43.46149
Jarque-Bera	125179.8
Probability	0.000000

Interpretations:

d) The Coefficient of Variation had showed there is variation of 1.6 % in the currency Prices during the period of study.

e) the result showed that there is a negative skewness. i.e. the tail is at the left side of the curve also the absolute value of Skewness indicated that little away from the left of zero.

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f) The data is not spread as the kurtosis value is very far away from 3 in multiple times, which means the shape of the curve is Lepto Kurtic in Nature. The understanding of the result is that the data is very close.

Cryptocurrency - BITCOIN Statistics

Series: DBITCOIN	
Sample 1 2500	
Observations 2499	
Mean	4.666923
Median	1.054375
Maximum	2086.528
Minimum	-1625.446
Std. Dev.	184.2976
Skewness	-0.175249
Kurtosis	25.55940
Jarque-Bera	53004.78
Probability	0.000000
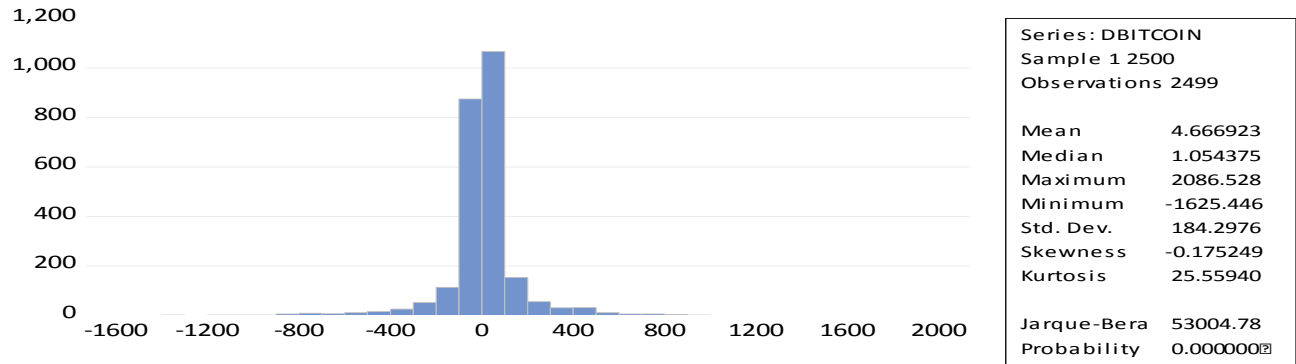
Interpretations:

d) The Coefficient of Variation had showed there is Variation of 2.0 % in the Cryptocurrency Prices during the study period.

e) the result showed that there is a Negative Skewness i.e. the tail at the Left side. The absolute value of Skewness indicated that it is closer to zero

f) The data is not spread as the kurtosis value is very far away from 3 in multiple times, which means the shape of the curve is Lepto Kurtic in Nature. The understanding of the result is that the data is very close.

RESEARCH WORKINGS

Null Hypothesis: ETHEREUM has a unit root
Exogenous: Constant
Lag Length: 19 (Automatic - based on SIC, maxlag=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.671639	0.0792
Test critical values:	1% level	-3.433775	
	5% level	-2.862939	
	10% level	-2.567562	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ETHEREUM)
Method: Least Squares
Date: 08/15/20   Time: 23:36
Sample (adjusted): 21 1823
Included observations: 1803 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ETHEREUM(-1)	-0.003158	0.001182	-2.671639	0.0076
D(ETHEREUM(-1))	0.680200	0.023048	29.51244	0.0000
D(ETHEREUM(-2))	-0.499657	0.028086	-17.79009	0.0000

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D(ETHEREUM(-3))	0.431772	0.030443	14.18286	0.0000
D(ETHEREUM(-4))	-0.418258	0.032018	-13.06333	0.0000
D(ETHEREUM(-5))	0.378020	0.033299	11.35213	0.0000
D(ETHEREUM(-6))	-0.141773	0.034426	-4.118175	0.0000
D(ETHEREUM(-7))	0.239349	0.034485	6.940592	0.0000
D(ETHEREUM(-8))	-0.328824	0.034587	-9.507235	0.0000
D(ETHEREUM(-9))	0.130799	0.035223	3.713448	0.0002
D(ETHEREUM(-10))	-0.114073	0.035254	-3.235769	0.0012
D(ETHEREUM(-11))	0.176806	0.035246	5.016385	0.0000
D(ETHEREUM(-12))	-0.211592	0.034622	-6.111455	0.0000
D(ETHEREUM(-13))	0.117468	0.034542	3.400722	0.0007
D(ETHEREUM(-14))	-0.081099	0.034488	-2.351485	0.0188
D(ETHEREUM(-15))	0.163994	0.033381	4.912854	0.0000
D(ETHEREUM(-16))	-0.103299	0.032071	-3.220952	0.0013
D(ETHEREUM(-17))	0.069721	0.030510	2.285145	0.0224
D(ETHEREUM(-18))	-0.069101	0.028135	-2.456044	0.0141
D(ETHEREUM(-19))	0.227238	0.023162	9.810851	0.0000
C	0.753680	0.358450	2.102608	0.0356

R-squared	0.431573	Mean dependent var	0.239048
Adjusted R-squared	0.425194	S.D. dependent var	14.85174
S.E. of regression	11.25999	Akaike info criterion	7.691968
Sum squared resid	225935.3	Schwarz criterion	7.755995
Log likelihood	-6913.309	Hannan-Quinn criter.	7.715601
F-statistic	67.64845	Durbin-Watson stat	1.996372
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ETHEREUM) has a unit root
Exogenous: Constant
Lag Length: 18 (Automatic - based on SIC, maxlag=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.638715	0.0000
Test critical values:	1% level	-3.433775	
	5% level	-2.862939	
	10% level	-2.567562	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ETHEREUM,2)
Method: Least Squares
Date: 08/15/20   Time: 23:38
Sample (adjusted): 21 1823
Included observations: 1803 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ETHEREUM(-1))	-0.381769	0.057506	-6.638715	0.0000
D(ETHEREUM(-1),2)	0.061941	0.057551	1.076290	0.2819
D(ETHEREUM(-2),2)	-0.440132	0.056110	-7.844141	0.0000
D(ETHEREUM(-3),2)	-0.009062	0.055217	-0.164117	0.8697

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D(ETHEREUM(-4),2)	-0.429334	0.053907	-7.964318	0.0000
D(ETHEREUM(-5),2)	-0.052289	0.052536	-0.995307	0.3197
D(ETHEREUM(-6),2)	-0.196203	0.050689	-3.870736	0.0001
D(ETHEREUM(-7),2)	0.041126	0.048119	0.854662	0.3929
D(ETHEREUM(-8),2)	-0.289873	0.046760	-6.199171	0.0000
D(ETHEREUM(-9),2)	-0.160579	0.044594	-3.600914	0.0003
D(ETHEREUM(-10),2)	-0.276239	0.042861	-6.445045	0.0000
D(ETHEREUM(-11),2)	-0.101012	0.040296	-2.506786	0.0123
D(ETHEREUM(-12),2)	-0.313627	0.039563	-7.927358	0.0000
D(ETHEREUM(-13),2)	-0.197227	0.037832	-5.213280	0.0000
D(ETHEREUM(-14),2)	-0.279282	0.036676	-7.614752	0.0000
D(ETHEREUM(-15),2)	-0.117381	0.031864	-3.683881	0.0002
D(ETHEREUM(-16),2)	-0.221769	0.030600	-7.247366	0.0000
D(ETHEREUM(-17),2)	-0.154416	0.024123	-6.401137	0.0000
D(ETHEREUM(-18),2)	-0.224188	0.023174	-9.674313	0.0000
C	0.110100	0.265894	0.414075	0.6789

R-squared	0.476703	Mean dependent var	0.013972
Adjusted R-squared	0.471126	S.D. dependent var	15.50988
S.E. of regression	11.27936	Akaike info criterion	7.694856
Sum squared resid	226840.2	Schwarz criterion	7.755835
Log likelihood	-6916.913	Hannan-Quinn criter.	7.717364
F-statistic	85.48633	Durbin-Watson stat	1.994711
Prob(F-statistic)	0.000000		

Null Hypothesis: BITCOIN has a unit root

Exogenous: Constant

Lag Length: 9 (Automatic - based on SIC, maxlag=26)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.369831	0.5985
Test critical values:	1% level	-3.432782	
	5% level	-2.862500	
	10% level	-2.567326	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(BITCOIN)

Method: Least Squares

Date: 08/16/20   Time: 11:09

Sample (adjusted): 11 2500

Included observations: 2490 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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BITCOIN(-1)	-0.001023	0.000746	-1.369831	0.1709
D(BITCOIN(-1))	0.763336	0.019996	38.17502	0.0000
D(BITCOIN(-2))	-0.607806	0.025090	-24.22463	0.0000
D(BITCOIN(-3))	0.508844	0.027709	18.36380	0.0000
D(BITCOIN(-4))	-0.414338	0.029186	-14.19623	0.0000
D(BITCOIN(-5))	0.330479	0.029624	11.15584	0.0000
D(BITCOIN(-6))	-0.225015	0.029185	-7.709928	0.0000
D(BITCOIN(-7))	0.168003	0.027724	6.059839	0.0000
D(BITCOIN(-8))	-0.116522	0.025114	-4.639783	0.0000
D(BITCOIN(-9))	0.092271	0.020051	4.601753	0.0000
C	6.188261	4.045972	1.529487	0.1263

R-squared	0.372767	Mean dependent var	4.683380
Adjusted R-squared	0.370237	S.D. dependent var	184.6302
S.E. of regression	146.5181	Akaike info criterion	12.81658
Sum squared resid	53218063	Schwarz criterion	12.84229
Log likelihood	-15945.65	Hannan-Quinn criter.	12.82592
F-statistic	147.3279	Durbin-Watson stat	1.996930
Prob(F-statistic)	0.000000		

Null Hypothesis: D(BITCOIN) has a unit root

Exogenous: Constant

Lag Length: 8 (Automatic - based on SIC, maxlag=26)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.37221	0.0000
Test critical values:	1% level	-3.432782	
	5% level	-2.862500	
	10% level	-2.567326	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(BITCOIN,2)

Method: Least Squares

Date: 08/15/20   Time: 23:39

Sample (adjusted): 11 2500

Included observations: 2490 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BITCOIN(-1))	-0.506815	0.035264	-14.37221	0.0000
D(BITCOIN(-1),2)	0.269772	0.034605	7.795714	0.0000
D(BITCOIN(-2),2)	-0.338821	0.033664	-10.06493	0.0000
D(BITCOIN(-3),2)	0.169474	0.031792	5.330674	0.0000
D(BITCOIN(-4),2)	-0.245538	0.030831	-7.964088	0.0000
D(BITCOIN(-5),2)	0.084198	0.027316	3.082349	0.0021
D(BITCOIN(-6),2)	-0.141324	0.026524	-5.328217	0.0000
D(BITCOIN(-7),2)	0.025755	0.020563	1.252459	0.2105
D(BITCOIN(-8),2)	-0.091128	0.020037	-4.547895	0.0000
C	2.381755	2.941282	0.809768	0.4182

R-squared	0.408918	Mean dependent var		0.049607
Adjusted R-squared	0.406773	S.D. dependent var		190.2644
S.E. of regression	146.5440	Akaike info criterion		12.81654
Sum squared resid	53258346	Schwarz criterion		12.83991
Log likelihood	-15946.59	Hannan-Quinn criter.		12.82502
F-statistic	190.6327	Durbin-Watson stat		1.996746
Prob(F-statistic)	0.000000			

The Graphical Presentation of observed of non-stationary data.

Average Price (PE)

Average Price of BTC
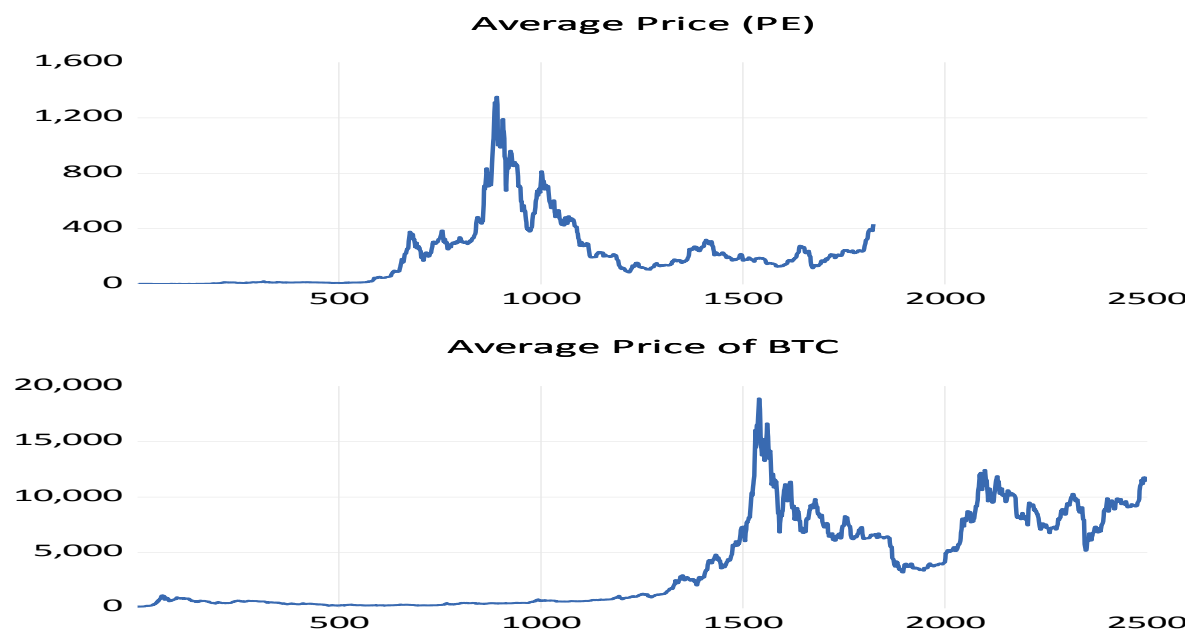
The Graphical Presentation of observed data after attaining Stationary.

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DETHEEUM

DBITCOIN