

# Cryptocurrencies: A Revolutionary Currency System

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**Abstract:** Money in modern times has evolved from coins, bank notes to digital currency. Cryptocurrencies have emerged as a crucial financial software system. Cryptocurrency, a digital mode of payment has potential to change the financial markets due to its cryptographic technology and its peer to peer network system, but its legal status and regulations vary from country to country due to central government's view on it. Cryptocurrencies have various functions and have eliminated third party involvement such as banks from the transaction process. This paper attempts to comprehensively research on cryptocurrency regulations, trend analysis of few popular cryptocurrency and a complete risk and volatility analysis to know whether cryptocurrencies can be used as another mode of currency.

**Key terms:** Cryptocurrency; Digital currency; Blockchain; Bitcoin; Dogecoin

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## I. Introduction

A growing amount of internet users have triggered virtual world concepts like the electronic transfer of money and thus have created an innovative business phenomenon. As a result, new types of transaction, currencies and trading, have been rising. One among the noteworthy financial forms that have been developed in the past few years is Cryptocurrency. Blockchain and cryptocurrency have attracted substantial interest as it has the potential to transform industries, governance structures and organisations and can collapse the conventional business model. In today's evolving technological ecosystem cryptocurrency has created a buzz and has become a trend in the investment world. A digital currency or cryptocurrency is aiming to become part of the typical financial system and may have to satisfy extensively divergent standards and criteria. When analysing these technological transformations, we must understand the purpose for which these currencies were designed and that they are intended to form an alternate system for payment. Cryptocurrencies are decentralised currency which are not regulated or backed by any authority and it does not need any third-party involvement such as banks unlike the fiat currency. Some government bodies are still debating on backing and regulating cryptocurrency as adaption of this new technology might risk the future of the banking system and might give rise to terrorist funding and various other negative outcomes. Although, on the contrary there are countries that are willing to adapt this technological change in currency. This research paper enhances on the regulatory literature by discussing the effects of regulation on cryptocurrency procedures. Today any company can create their own cryptocurrency by using the aid of blockchain technology and can determine the use of the currency by an initial coin offering (ICO). Once the coin is in the open market it can be utilized and the cryptocurrency can then be used for internal business network payment method to give access to the products and services the company offers; the capital generated from it can be treated as an asset and liability or this can be used for speculative digital currency and the value is determined by the market expectations (Arias-Oliva, Pelegrín-Borondo & Matías-Clavero, 2019). Cryptocurrency markets are unlike stock market where cryptos are traded online 24/7 there are no trade timings. The paper comprehensively explains about the evolution of cryptocurrencies, how cryptocurrencies function, its benefits, risks and challenges, why are they unregulated and the trend analysis of popular cryptos like Bitcoin and Dogecoin with the help of correlation and regression analysis. The basic assumptions taken into consideration while undertaking a trend analysis.

## II. Literature Review

### Cryptocurrency Overview

Technological improvements have been changing the world time to time, Blockchain technology is one of the biggest technological development which has happened in the history of money. The existence of cryptocurrency can be enabled with the help of blockchain technology. Blockchain is a decentralized ledger of all transactions across a peer-to-peer network. Using this technology, participants can confirm transactions without a need for a central clearing authority. Potential applications can include fund transfers, settling trades, voting and many other issues. Cryptocurrency is a digital currency that uses blockchain technology and cryptographic encryption techniques for the creation and control of monetary transactions and authenticate the transfer of funds. Cryptocurrency acts as a medium of exchange, such as Australian dollar or any other fiat

currency. Bitcoin is the first and the most popular cryptocurrency for which blockchain technology was invented. Cryptocurrency is a decentralised currency i.e. it is not regulated by any government body. The process of bitcoin in blockchain technology is unsophisticated, if a person requests for a transaction the transaction is then broadcasted into a peer to peer network of computers called as nodes then these computers with the aid of network of nodes validates the status of the user and transaction using algorithms after the validation the transaction is then verified which involves transaction details like the hash, time, amount, etc. once the transaction is verified it is combined with other transactions and creates a block of data in the blockchain ledger this block will then be attached with the existing blocks in such a way that it is unalterable and permanent then the transaction will be successful (PWC, 2019).

Cryptocurrency has a total market capitalization of \$265 billion dollars and it has been growing vigorously. Today there are over 2000 cryptocurrencies present, among which Bitcoin is the most popular one and it dominates by 67% of the total crypto market ("Cryptocurrency Market Capitalizations | CoinMarketCap", 2019). The price of a cryptocurrency is determined by the basic demand and supply of the coin.

## **BASIC FUNCTIONS**

**Cryptocurrency is a wide industry with complex technology** A cryptocurrency ecosystem, consists of a varied set of actors, various economic sectors, builds interfaces between public blockchains and traditional finance. The cryptocurrency ecosystem is majorly divided into 4 industries and their functions are as follows: -

- **Exchanges** – This industry has the prime function which is purchase, sale and trading of cryptocurrency. These decentralised exchanges simplify peer to peer cryptocurrency trading, some of the popular cryptocurrency exchanges are Bitrex, Polinex, Binance etc. Exchanges work on cryptocurrency pairs that means if a trader feels the price of bitcoin will increase against USD soon, then the trader will buy more bitcoin against USD (BTC/USD) or if the trader feels Bitcoin price will increase more against Ethereum, then trader will exchange more Ethereum with Bitcoin (ETH/BTC).
- **Wallets** – The main function of this industry is to store cryptocurrency. All the exchanges act as wallet where you can store cryptocurrency, but all wallets are not exchanges, some of the popular wallets are Mycelium, Trezor, Coinbase.
- **Payments** – This industry enables payments using cryptocurrency. A cryptocurrency payment gateway is basically allowing merchants or companies to accept transactions in cryptocurrency, some of the popular gateways are Coinbase, Coingate, Shopify. One of the important payment functions which Satoshi Nakamoto (the creator of Bitcoin) describes is that cryptocurrency also has a function of Escrow service. An escrow service is a contractual arrangement in which money flows through a third party and in the case of cryptocurrency it acts as a smart contract that supervises if conditions of the contract are fulfilled. For example, if a buyer makes a payment through a crypto network then the seller receives the money which is stored in escrow and the seller cannot use the money until the buyer unlocks it (It can be unlocked when the buyer provides a private key to the seller). The buyer can release the payment anytime and this gives the buyer a chance to revert the funds if the seller does not fulfil his part of the contract. The seller will receive the funds but cannot use it until the buyer decides to unlock it which is a hassle-free situation without having to involve an actual physical third-party escrow service. (Stancel, 2015).
- **Mining** – This industry is responsible for authenticating, confirming transactions on blockchain and to secure the global records of cryptocurrency transactions (Hileman & Rauchs, 2017)

## **Regulation of Cryptocurrency**

Cryptocurrencies are a highly volatile and highly speculative risky investment; government bodies and central banks are not sure of how to regulate the cryptocurrency ecosystem. Initial coin offering has slowly started to take its shape many companies are using cryptocurrency platform to raise capital, such as one of the popular messaging platform Telegram has raised \$1.7 billion as it provided a platform for ICO promotions (Araya, 2019). Virtual currency is unregulated and there is no government body involved and some companies are taking advantage of this system to create Ponzi schemes, fake ICO, make cybercrimes like hacking into exchanges, etc. some of the most popular scams in the history of cryptocurrency are Bitconnect with \$2.6 billion and Plustoken with \$3 billion these both companies were giving high returns for the investors up to 2% a day and they shut down the companies. To adapt this new technology and to avoid the necessary discrepancies in the market government should intervene and should make necessary arrangements or regulations to strengthen the market.

## **Australia**

There are some of the legal issues relating to virtual currency that are still not fully clear. Cryptocurrencies are unregulated in most countries of the world, some of the countries do not accept these currencies as a legal tender, few countries accept cryptocurrencies and are in the process for regulating it. The Reserve bank of Australia has no plans soon, on issuing digital currency with exchange of fiat currency. The

governor has stated that the technology of cryptocurrency has the capability to encounter the traditional currency system (Dewey, 2019). The Australian Parliament's Senate Economic References Committee on August 2015 issued a report regarding digital currency and its effective development of regulatory system and its potential impact of it on the current Australian economy. The Australian taxation office has presented a document regarding taxation law. The following were the discussions and recommendations on issues and gaps of regulatory framework. The document described that any purchase and sale of cryptocurrency will be considered as asset in capital gains tax (Australian Government, 2019). According to ATO if a business receives any cryptocurrency as a payment for sale of goods and services provided then it must be treated as an ordinary income. Goods and service tax is also applicable, and it is calculated on the market value of the currency on 1<sup>st</sup> July 2019 amendments were made to eliminate double taxation on cryptocurrency if any individual is accepting cryptocurrency as a payment method for business purposes then GST is applicable. Australian securities exchange commission has created a website to mitigate risk and safeguard the investors by creating awareness called "Money smart" it mentions that virtual currencies are high risk speculative investments and there are risks associated with buying and selling of cryptocurrency and the exchanges are not regulated, highly volatile, possible risk from hackers as it is stored in electronic wallet, and terrorist funding (ATO, 2019).

### **India**

Government of India has always supported the idea and have started to implement blockchain technology as it has potential benefit in improving the financial system. In the year 2018 Government of India has announced that cryptocurrency will not be considered as a legal tender in India (Ray, 2019). The reserve bank of India has cautioned traders, users and holders by issuing three notifications in the same year. RBI has also notified all the banks and financial institutions not to encourage cryptocurrency related transactions and should not allow any services related to virtual currencies such as, registering, settling, giving loans against virtual tokens, clearing, trading, maintaining accounts opening accounts of exchanges dealing with them, accepting them as collateral and receipt/transfer of money in accounts relating to sale/purchase of VCs. Moreover, RBI has clearly stated in a press conference that regulated entities which are providing these services should exit the market with in 3months (Reserve Bank of India, 2013).

### **Japan**

Japan cryptocurrency is considered as a legal tender and the cryptocurrency exchanges are regulated. Payment services act which was amended in 2016 as Government of Japan wanted to add few regulations with regards to cryptocurrency. The Act communicates that virtual currency is restricted to property whose value is stored electronically. Exchanges operating in Japan should have their office in Japan, one of the members of the exchange should be a resident. If it is a foreign crypto exchange that is if the exchange is registered in other country it should still be registered under payment services act. The exchanges will be reviewed by a public accountant or any Accounting firm and the exchanges must keep a record of all the transactions, accounting records of the business and submit a report to financial services agency (FSA) annually. FSA is an authorised body which can inspect the exchanges on a regular basis and issue guidelines to improve its practices in dealing with cryptocurrency. FSA also has the right to suspend the exchange in the following cases

- If the exchange fails to satisfy any one of the requirements stated under Payment services act.
- If the exchange business has illegally registered or operates without taking permission from the government.
- Or if the exchange business violates any condition of Payment services act.

According the Act the exchanges must do a KYC check before the customer opens an account to avoid fraudulent practices and illegal funding and report any suspicious activity to the concerned authorities. Tax treatment of cryptocurrency According to National Tax Agency any profit earned by disposal pf cryptocurrency will not be considered as capital gains instead it should be treated as a miscellaneous income (The Law Library of Congress, 2019).

### **Advantages of Cryptocurrency**

1. Cryptocurrency is easier to transfer funds between two parties it is easy to open an account in any wallet and make a payment as everything can be done online.
2. It is one most secured way of storing funds as it uses cryptographic technology and it is most possible task for anyone
3. Apart from the owner of the wallet, no one can transfer funds or to make a payment from the wallet and there is no chance of using personal data for fraud.
4. There no involvement of third party such as banks or any other financial institution, so the operation cost of the cryptocurrency is much lower when compared with bank as it eliminates bank fees and commission (Thakur & G. G., 2018).

5. Cryptocurrency and inflation are directly related to each other as there no political forces that is affecting the price of the cryptocurrency it only works on demand and supply equation.
6. Possibilities of transactions are unlimited as the funds can be transferred to any place, any person at any time it is easier to make a cross border transfer whereas with fiat currency there will be international remittance charges attached with it.

#### LIMITATIONS

1. Cryptocurrencies are high volatile investments investing in this market will be very risky as it creates problem in the short term.
2. Reversal of payments are not possible and once the payment is done to an address it cannot be cancelled. When a cryptocurrency is transferred to wrong cryptocurrency address i.e. if Bitcoin is transferred to an Ethereum wallet address the funds cannot be retrieved.
3. The technology is very complex, and it is very difficult to understand every detail of the technology (Bunjaku & Gjorgieva, 2017).

### III. Methodology

In this section we will we will further discuss and analyse trends of popular cryptocurrency like Bitcoin and Dogecoin its volatility analysis and risk analysis. These analyses are done to recognise whether cryptocurrency can be considered as a currency and check it market behaviour. The data used are daily closing prices of Dogecoin and Bitcoin coin desk index for the past 5 years from the year 2014 to 2019 which comprises of 1700 observations. The data collected for analysis is from coin desk website which is a reliable website for cryptocurrency prices and statistics. The research is mostly presented in a quantitative approach. As mentioned in the previous parts the research will be done in in a quantitative approach using statistical tools such as trend analysis to predict trend such as a bear to bull market of Bitcoin and Dogecoin and predict future trends, standard deviation to analyse risk and volatility of these coins and correlation analysis to know the relationship between USD and cryptocurrencies.

#### Empirical results

Trend analysis is a statistical tool to analyse the relationship Bitcoin, Dogecoin with USD this procedure is performed to assess the hypothesized nonlinear and linear relationship. To do this analysis we are undertaking regression analysis as it is convenient to collect data at different levels of variable here prices of Bitcoin and Dogecoin are independent variables whereas time, a dependent variable.

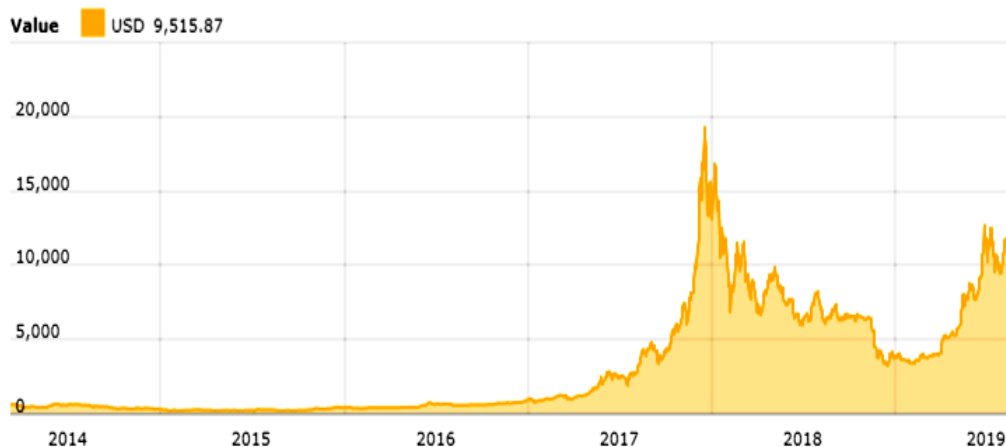


Figure 1.1 Price of Bitcoin from 2014 – 2019 (BTC/USD) source: Cointelegraph.com



**Figure 1.2 Price of Dogecoin from 2014 - 2019 (DOGE/USD) source: Coinmarketcap.com**

The above figures 1.1 and 1.2 shows a linear graph of Bitcoin and Dogecoin respectively with regards to US dollar. Currencies did not have much fluctuations in the price from the year 2014 to 2016 both the coins have an upward trend in the year 2017 where the prices hit its all-time high (BTC \$18,334 and DOGE \$0.0137) where the market went bullish we can also see that from the year 2018 there is downward sloping trend in this year there was a bear market in the cryptocurrency space.

To get to know a more detailed trend analysis on these popular cryptocurrencies we can perform regression analysis. Regression analysis of BTC and DOGE can be calculated using formula:

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}$$

$$b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

Regression analysis is being done to know where the points fall near the trend line this will show the predictability of the prices of Bitcoin and Dogecoin. After taking into consideration of 2064 observations the following regression results were found.

SUMMARY OUTPUT

<i>Regression Statistics</i>			
Multiple R		0.739939657	
R Square		0.547510695	
Adjusted R Square		0.547291466	
Standard Error		401.3790725	
Observations		2066	

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>
Intercept	42309.20769	11.45065523	3694.915868
	815.940002	0.11853428	49.97433122

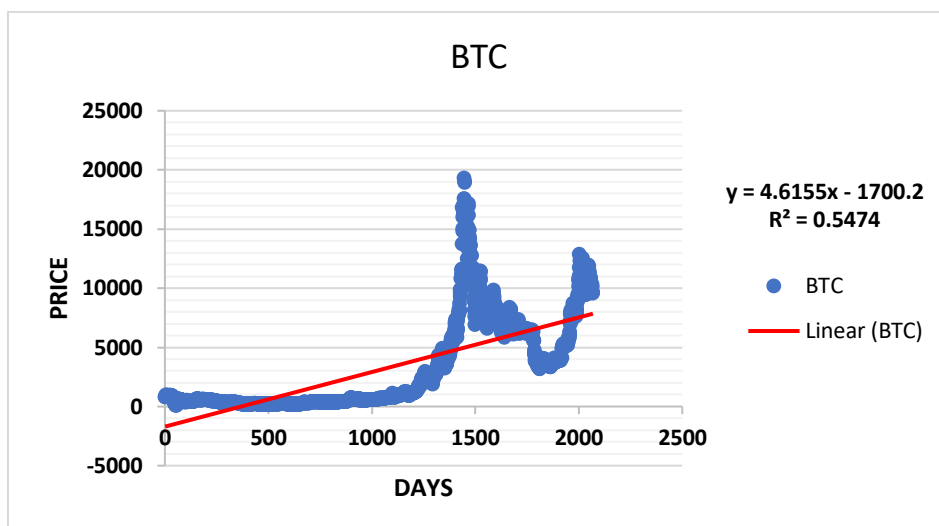


Figure 2 Scattered chart of Bitcoin with trend line

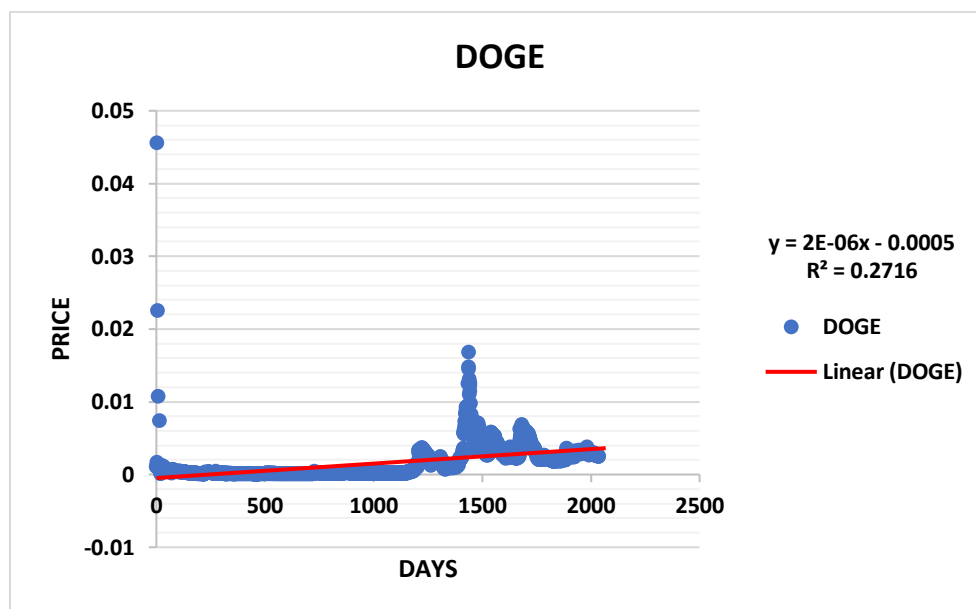
Bitcoin has an upward sloping trend line the prices of Bitcoin is increasing at fast pace. To interpret the regression statistics summary there are three major references which can be used for trend analysis. Multiple R is the coefficient of determination that interprets the strength of the variables for Bitcoin multiple r is around 0.739 which means it has a positive relation in other words, Bitcoin prices and days has a positively linear relationship.  $R^2$  this determines the goodness of fit for Bitcoin prices  $R^2$  for Bitcoin is around 54.7% that means 54.7% of the observations can be explained by the movements in benchmark in this case bitcoins price movements are difficult to estimate Hence it is not considered as good fit. Standard error this is another measure of good fit this shows how much of the population deviates from actual mean in the above figure 2 shows the scattered graph of Bitcoin it tells us that most of the points lie away from the trend line which means most of the Bitcoin price points deviate from the actual mean.

#### SUMMARY OUTPUT

<i>Regression Statistics</i>			
Multiple R		0.522563386	
R Square		0.273072493	
Adjusted R Square		0.272720299	
Standard Error		508.7402715	
Observations		2066	

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>
Intercept	42455.55286	13.65791398	3108.494674
	0.001129	139778.5798	5019.868622
			27.84506734



**Figure 2.2 Scattered chart of Dogecoin with trend line**

Dogecoin has an upward sloping trend line the prices of Bitcoin is increasing at a very slow pace. To interpret the regression statistics summary there are three major references which can be used for trend analysis of Dogecoin. Multiple R is the coefficient of determination that interprets the strength of the variables for Dogecoin multiple r is around 0.522, Dogecoin prices and number of days has a positively linear relationship.  $R^2$  this determines the goodness of fit for Bitcoin prices  $R^2$  for Dogecoin is around 27.7% that means 27.7% of the observations can be explained by the movements in benchmark in this case Dogecoins price movements are difficult to estimate Hence it is not considered as good fit. Standard error this is another measure of good fit this shows how much of the population deviates from actual mean in the above figure 2.2 shows the scattered graph of Dogecoin it tells us that most of the points lie away from the trend line which means most of the Dogecoin price points deviate from the actual mean.

Standard deviation of Bitcoin and Dogecoin is a statistical measure to analyse the risk with annual return of an investment and throws light upon volatility. Standard deviation shows risk measurement and the probability that these cryptocurrencies moves in an unexpected way. I am using this statistical tool as it is most commonly used, and it is convenient to use for different levels of data. Standard deviation is calculated by:

$$\sigma = \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$$

Volatility and standard deviation are linked closely to each other, this also means the degree of cryptocurrency prices that differ from the actual mean. Standard deviation also interprets the risk of the cryptocurrency. To analyse the volatility of the cryptocurrency the daily standard deviation needs to be annualised based on the period used. Standard deviation of Bitcoin is 9.3% and it has an annualised volatility of 4.24% this means Bitcoin is highly volatile and a risky investment and the standard deviation of Bitcoin is if high but if on the past 17 months data is considered Bitcoin is stable. Bitcoin has larger range of spread in the last 5 years that means the price will fluctuate in a large range in the short-term. Dogecoin standard deviation is 71% and Dogecoin is very high speculative cryptocurrency and a very risky crypto the annualised volatility of 32.6% which is has a larger fluctuation when compared with Bitcoin. Dogecoin has even larger spread than Bitcoin and only an aggressive investor would like to invest in cryptocurrency.

#### IV. Conclusion

Cryptocurrency is a widely debated subject matter and will be so in the future. It is not only a virtual currency, but also has potential to become something superior; a security model for a financial market or for any corporation, because cryptocurrency has an encryption system which is in theory impossible to disrupt (Brander, 2014). Cryptocurrency being one the revolutionary change in the financial market space. Governments and central banks are making efforts and are pursuing research to regulate cryptocurrencies to curb illegal activities

such as terrorist funding and money laundering. After careful analysis of the popular cryptocurrency like Bitcoin and Dogecoin it is seen that cryptocurrency are highly speculative and volatile in the short-run as the coins are not stable it will risky for individuals to consider this as a currency but due to government intervention the currency is much more stable taking into consideration only the last 18 months. Cryptocurrency has its negative impacts on financial systems, but the advantages outweigh more. In my opinion cryptocurrency has been criticised more by the experts due to lack of understanding of fundamentals and technology behind it and there are much more questions unanswered.

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