Volatility of select Crypto-currencies: A comparison of Bitcoin, Ethereum and Litecoin

Jaysing Bhosale
Symbiosis Centre for Management Studies,
Symbiosis International (Deemed University), Pune

Sushil Mavale
Symbiosis Centre for Management Studies,
Symbiosis International (Deemed University), Pune

Abstract

With the ever increasing use of virtual currency and its volatility, cryptocurrencies are being adopted across world for various transactions- legal as well as illegal. The returns earned from crypto currency investments in recent times were huge but there has always been a question on their existence and credibility. A cryptocurrency is a digital or virtual currency that uses cryptography for security. Despite recent issues in crypto currencies, Bitcoin's success and it's growing visibility since its launch has resulted in a number of companies unveiling alternative cryptocurrencies The study tries to compare three crypto currencies - Bitcoin, Ethereum and Litecoin with respect to their volatility and stability in recent times and also tries to understand their trends in recent times.

Key words: Crypto–currency, Bitcoin, Ethereum, Litecoin, Volatility

Introduction

A cryptocurrency (or crypto currency) is a digital asset designed to work as a medium of exchange that uses cryptography to secure its transactions, to control the creation of additional units, and to verify the transfer of assets. A cryptocurrency is difficult to counterfeit because of this security feature. A defining feature of a cryptocurrency, and arguably its most endearing allure, is its organic nature; it is not issued by any central authority, rendering it theoretically immune to government interference or manipulation. Cryptocurrencies are a type of digital currencies, alternative currencies and virtual currencies. Cryptocurrencies use decentralized control as opposed to centralized electronic money and central banking systems. The decentralized control of each cryptocurrency works through a blockchain, which is a public transaction database, functioning as a distributed ledger. The anonymous nature of cryptocurrency transactions makes them well-suited for a host of nefarious activities, such as money laundering and tax evasion.

The first cryptocurrency to capture the public imagination was Bitcoin, which was launched in 2009 by an individual or group known under the pseudonym Satoshi Nakamoto. As of September 2015, there were over 14.6 million bitcoins in circulation with a total market value of $3.4 billion. Bitcoin's success has spawned a number of competing cryptocurrencies, such as Litecoin, Namecoin and PPCoin.

Types of cryptocurrencies:

- **Bitcoin** - Bitcoin is a cryptocurrency and worldwide payment system. It is the first decentralized digital currency, as the system works without a central bank or single administrator. The network is peer-to-peer and transactions take place between users directly, without an intermediary. These transactions are verified by network nodes through the use of cryptography and recorded in a public distributed ledger called a blockchain. Bitcoin was invented by an unknown person or group of people under the name Satoshi Nakamoto and released as open-source software in 2009. Bitcoins are created as a reward for a process known

as mining. They can be exchanged for other currencies, products, and services. As of February 2015, over 100,000 merchants and vendors accepted bitcoin as payment. Research produced by the University of Cambridge estimates that in 2017, there were 2.9 to 5.8 million unique users using a cryptocurrency wallet, most of them using bitcoin.

- **Ethereum –** Ethereum is also termed as Ether as this cryptocurrency is generated on Ethereum platform. It is public platform with open source, block chain based computing. It has a smart scripting facility. It works on the modified version of Nakamoto's cryptocurrency with transaction based payment system. Ethereum was first introduced in 2013 by Vitalik Buterin, who was a computer programmer and researcher in cryptocurrency. Software Development related to Ethereum was funded by an online crowdsale between July and August 2014 and developing a system that went live on 30 July 2015. It initially had 11.9 million coins "premined" for the crowdsale. This circulation was almost 13% of the total circulating currency. The price of the Ethereum currency grew over 13,000% from 2014 to 2017.
- **Litecoin** – Litecoin is treated as a leading rival for Bitcoin currently and the main purpose of designing Litecoin was to process smaller value transactions fast. Litecoin was founded in Oct. 2011. According to the founder of Litecoin, Charles Lee, Litecoin was considered as a silver against bitcoin which was treated as a gold. The difference between Bitcoin and Litecoin is that for mining Bitcoin heavy processing and fast computing is required unlike, Litecoin which can be mined by a normal desktop computer with comparatively lesser processing power. About 84 million Litecoins are there in circulation in comparison with 21 million Bitcoins and Litecoin transaction processing time is about 2.5 minutes compared to about 10 minutes for that of Bitcoin.
- **Ripple** – Ripple was launched in 2012 by a company called OpenCoin with its founder, a technology entrepreneur Chris Larsen. Ripple is a currency as well as a payment system like Bitcoin. The payment mechanism for Ripple is very fast enabling the transfer of funds in any currency to another user on the Ripple network within seconds.
- **MintChip** – Mintchip is actually a creation of government institution like Royal Canadian Mint unlike most other cryptocurrencies. MintChip is a smartcard that holds electronic value and can transfer it securely from one chip to another. Like Bitcoin, MintChip does not need

personal identification but unlike Bitcoin, it is backed by a physical currency, the Canadian dollar.

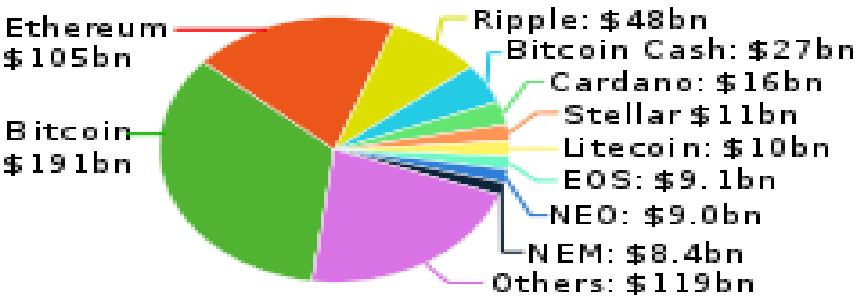


Fig.: Cryptocurrency market capitalizations as of 27 January 2018, in billions of US dollars.

Literature Review

(Nakamoto) in his paper describes a bitcoin to be introduced as a peer to peer electronic cash system. It allows electronic cash to be sent to other party without using any financial intermediatery.

(Raymaekers, 2014) in his research article states Bitcoin to be a cryptocurrency which was introduced in 2009 to be first decentralized digital currency. Bitcoin allows online payments to be made by sending money via banks, buying goods and services online to be done from one party to the other without going through a financial institution (Raymaekers, 2014). There are many advantages of using bitcoin currency such as the speed of transaction, security of transaction, cost and convenience (Raymaekers, 2014). The technology that supports bitcoin is blockchain technology. Over US$1.2 billion has already been invested in blockchain start-ups (Shin, 2016). Blockchain technology increases the efficiency and transparency of governance, financial and security settlements, and financial clearing processes. Hence, blockchain is of great interest to businesses legitimately involved in the bitcoin eco space (Robb, 2017). With its origins in distributed databases, the blockchain's data is partitioned into blocks, continuously adding new sequential blocks of data (Swan, 2015). The blocks are linked together using cryptographic signatures which results in transactions being time-stamped, and tamper-proof. A recent study

estimates that within five years blockchain could allow for $16bn of cost savings by simplifying accounting and audit processes.

Bitcoin only very recently became a subject of research in economics. The topic has been of interest for longer in computer science. A small number of theoretical papers written by computer scientists address incentives. (Eyal, 2013) show that mining is not incentive-compatible and that the so-called "selfish mining" can lead to higher revenue for miners who collude against others. The threshold for selfish mining to be profitable is lower than for double-spending attacks. (Babaioff, 2012) argue that the current Bitcoin protocols do not provide an incentive for nodes to broadcast transactions. This is problematic, since the system is based on the assumption that there is such an incentive. Additional work in the computer science field includes (Christin, 2013), who examines the anonymous online marketplace in cryptocurrencies. Some work on Bitcoin has been reported in legal journals as well, but there is very little in the economics literature. One of the few exceptions is the European Central Bank's (2012) report on virtual currencies. Using two examples, Bitcoin and Linden dollars, the report focuses on the impact of digital currencies on the use of fiat money. (Gans, 2013) analyze the economics of private digital currencies, but they explicitly focus on currencies issued by platforms such as Facebook or Amazon (that retain full control), and not decentralized currencies such as Bitcoin. (Dwyer) provides institutional details about digital currency developments. (Moore, 2013) empirically examine Bitcoin's exchange risk. Using Bitcoin traffic at Wikipedia, (Glaser) examine whether user interest in cryptocurrencies is due to interest in a new investment asset or in the currencies themselves. Their results suggest that most of the interest is due to the asset aspect.

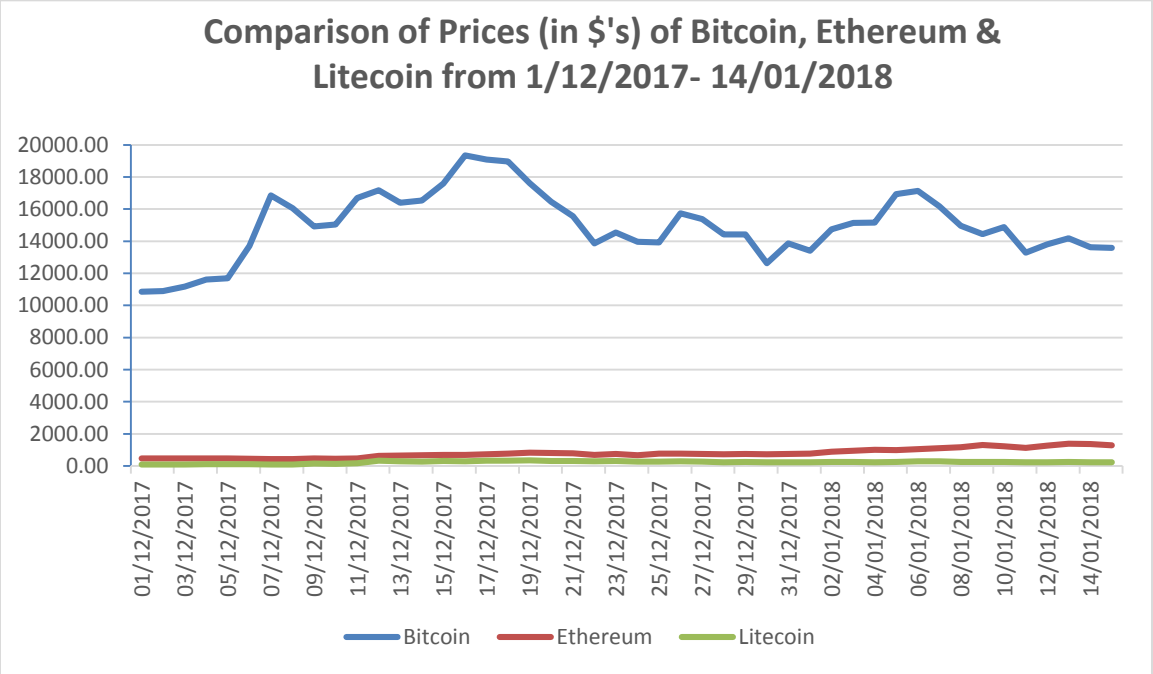
Objective

To study the current performance of different cryptocurrencies mainly Bitcoin, Ethereum and Litecoin in recent times and also to analyze the volatility of different crypto currencies for future investments.

Research Methodology

The closing prices for major cryptocurrencies Bitcoin, Ethereum and Litecoin were compared for December 2017 and January 2018 as this was the time when the volatility of crypto-currencies was

very high. The secondary data collected for the analysis purpose was selected from Coindesk website. It was seen from the chart that there is a highest volatility of Bitcoin and the prices for the Bitcoins show a declining trend but at the same time Ethereum and Litecoin comparatively showing increasing trend as they are newly introduced coins into the market.



Source: Coindesk.com

Descriptive Statistics for the 3 coins: Bitcoin, Ethereum and Litecoin

	Bitcoin	**Ethereum**	**Litecoin**
Mean	14967.66196	795.6145652	233.6580435
Standard Error	302.8996276	41.25476809	11.03228387
Median	14902.06	755.08	245.62
Mode	#N/A	#N/A	#N/A
Standard Deviation	**2054.365226**	279.8034506	**74.82458965**
Sample Variance	**4220416.483**	**78289.97094**	**5598.719216**
Kurtosis	-0.111106887	-0.534128459	-0.554776212
Skewness	0.023807786	0.601462495	-0.743057689
Range	8483.48	951.01	256.51
Minimum	**10859.56**	**435.66**	**96.6**
Maximum	**19343.04**	**1386.67**	**353.11**
Sum	688512.45	36598.27	10748.27

Count	46	46	46

Data Analysis

1. The average price for the Bitcoin was $14967 over a given period, with a standard deviation of around $2054. So coefficient of variation can be calculated as
   COV = (Standard deviation * 100) / Mean = (σ * 100) / μ

   In order to judge the consistency in the performance, coefficient of variation is computed as 13.76%

2. The average price for the Ethereum was $796 over a given period, with a standard deviation of around $280. So coefficient of variation can be calculated as
   COV = (Standard deviation * 100) / Mean

   In order to judge the consistency in the performance, coefficient of variation is computed as 35.17%

3. The average price for the Litecoin was $233.66 over a given period, with a standard deviation of around $74.8. So coefficient of variation can be calculated as
   COV = (Standard deviation * 100) / Mean

In order to judge the consistency in the performance coefficient of variation is computed as 32%.

From the above data analysis, it can be observed that though the trend for Bitcoin seems to be going down but in terms of stability of the performance, Bitcoin is much more consistent than other two coins for the comparison. Coefficient of variation for Bitcoin is much smaller than Ethereum and Litecoin.

Also when we compare Ethereum and Litecoin prices over a given period, though the average price for Ethereum is much more than Litecoin price, Litecoin price performance is more stable than Ethereum prices.

Market potential of cryptocurrency

The market capitalization is the value of all the units of a cryptocurrency that are for sale on the market right now. It is a strong indicator of demand because it shows you how much money has been invested in a particular altcoin.

In a report published on January 3, 2018, Royal Bank of Canada (RBC) Capital Markets analyst Mitch Steves confidently stated that the cryptocurrencies and blockchain technology applications market could increase thirteen fold in 15 years, reaching $10 trillion.

According to Steves, cryptocurrencies represent only a part of the $10 trillion pie, the bulk of which is in the rest of the ecosystem existing around blockchain technology and cryptocurrencies.

Steves argues that block chain technology will permit creating a "Secure World Computer," a decentralized world computer without a third-party intermediary, intrinsically more secure because there won't be centralized servers that can be hacked, and suggests that next-generation killer apps will be built on top of this secure layer.

Future scope

Some of the limitations that cryptocurrencies presently face – such as the fact that one's digital fortune can be erased by a computer crash, or that a virtual vault may be ransacked by a hacker – may be overcome in time through technological advances. What will be harder to surmount is the basic paradox that bedevils cryptocurrencies – the more popular they become, the more regulation and government scrutiny they are likely to attract, which erodes the fundamental premise for their existence.

While the number of merchants who accept cryptocurrencies has steadily increased, they are still very much in the minority. For cryptocurrencies to become more widely used, they have to first gain widespread acceptance among consumers. However, their relative complexity compared to conventional currencies will likely deter most people, except for the technologically adept.

A cryptocurrency that aspires to become part of the mainstream financial system may have to satisfy widely divergent criteria. It would need to be mathematically complex (to avoid fraud and

hacker attacks) but easy for consumers to understand; decentralized but with adequate consumer safeguards and protection; and preserve user anonymity without being a conduit for tax evasion, money laundering and other nefarious activities.

In India, the Union Budget presented on 1st February 2018 made it clear that cryptocurrency will not be made legal in the country.

Conclusion

With the advent of blockchain and cryptocurrencies being as new and revolutionary as it is, predicting the five-year projected value of Bitcoin, Ethereum and Litecoin requires numerous factors to be considered. Through a combination of qualitative research conducted through interviews with industry professionals, linear regression, and a Monte Carlo analysis, it can be concluded that Bitcoin can leverage its existing user base and proven use case is likely to experience more growth in the five-year time horizon. Ethereum, while having a lower expected value has a much greater variance as a result of its strong correlation with speculation, news, and hype. Ethereum's wide range of outcomes, both positive and negative, indicates that it should be included in the investment portfolio to take advantage of this fact. With Litecoin showing lesser variation than Ethereum, Litecoin can be preferred as new investment option.

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