

Risk-Return Analysis of Select Cryptocurrencies: 2018-2022**G.V. Satya Sekhar¹**¹Centre for Distance Learning GITAM –
Deemed to be University Visakhapatnam 530017, Andhra Pradesh, India.**Email:** sgudimet@gitam.edu**Received: 23.01.2023, Revised: 08.04.2023, Accepted: 22.05.2023****Abstract**

Investors who acquire digital assets through cryptocurrencies should consider that they may or may not get returns. Sometimes, there is a possibility of a loss of the entire real investment of the investor. Every investor faced unexpected market conditions after the pandemic period. Cryptocurrency, an encrypted peer-to-peer network used to facilitate digital transactions, is a technology developed 12 years ago. Bitcoin, the first and most popular cryptocurrency, paves the way for a successful financial payment system that has existed for many years as a disruptive technology. Hence, this paper focused on analysis of investments in select cryptocurrencies during 2018-2022. This paper is based on historical data analysis and a correlation matrix among the selected cryptocurrencies to understand the volatility in the prices of cryptocurrencies. The findings reveal that the impact of volatility in the prices of cryptocurrency is subject to various factors like time scale and market conditions. Further, the correlation matrix among the cryptocurrencies during the study period reveals that: i) Bitcoin is negatively correlated with Bitcoin Cash and EOS; ii) Bitcoin Cash is negatively correlated with Ethereum; iii) Cardano is negatively correlated with EOS; iv) EOS negatively correlated with Ethereum; v) Ethereum is negatively correlated with Bitcoin Cash and EOS; and vi) Litecoin showed positive correlation with all other coins.

Keywords: bitcoin, crypto-asset, crypto-exchange, digital transactions, volatility

Introduction

The concept of an open-source currency, i.e., cryptocurrency' such as a central distribution

agency or state lead control, is an innovation in the present business world (King & Nadal, 2012). Investors who acquire digital assets through cryptocurrencies should consider

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that they may or may not create a fiat currency. Sometimes there is a possibility of a loss of the entire fiat currency of the investor. A digital authentication system is proposed to solve the high cost of existing digital authenticated technology. Kim and Kang (2018) suggested a user authentication service based on blockchain. The total value of all cryptocurrency in circulation is over \$100 billion, arguably posing a credible threat of supplanting central-bank-issued money (Yates, 2017).

As of now, there are nearly 11000 cryptocurrencies available through Initial Coin Offering (ICO). However, the most considerable problem regulators have is that investors buy cryptocurrency on any digital platform and send it to unknown addresses that even digital platforms cannot track. One should know that Intangible Digital Assets can be created through a Non-Fungible Token (NFT).

An irreplaceable unit is stored in a digital ledger or blockchain. NFTs can be associated with special items such as photos, videos, audio, and other types of digital data. Copies of original documents are not limited to the owner of the NFT. So, exchangeability distinguishes NFTs from blockchain-based cryptocurrencies. The blockchain serves as a database for storing all information about cryptocurrency transactions. The creation and control of these transactions are based on cryptographic methods (Butenko, 2014).

Every investor faced unexpected market conditions during the Covid-19 period, particularly during 2020-21. Hence, this paper focused on risk and return on investments in select cryptocurrencies during 2018-2022.

Literature Review

In the context of growing dissatisfaction with the many uncertainties in the economies

of many countries, can cryptocurrencies benefit from confidence more than they do now? (Rogojanu & Badea, 2014). It should be noted that cryptocurrencies do not replace fiat money; they can change the way international business transactions are interconnected, eliminate problems with money management and exchange rates abroad (DeVries, 2016). There is empirical evidence for the ineffectiveness of digital currencies. Most researchers are trying to define crypto-currency as a 'digital asset' but need help identifying how much value it creates. Kim and Kang (2018) analysed block-chaining and digital authentication technology. It is a system proposed to solve the high cost of existing digital authenticated technology. They suggested a user authentication service based on blockchain. The volatility dynamics of bitcoin's logarithmic returns are measured by Ardia et al. (2019).

The financial sector has gradually been digitized through introducing online payment gateways like PayPal (Gonzalez, 2004). Crypto exchanges are gearing up to launch bitcoin futures. However, they first want to integrate other cryptocurrencies, such as Ethereum, Ripple, and Bitcoin Cash (BCH), on their platform. Other than bitcoins, there are about 1,000 alternative coins (altcoins) in the global market, with Ethereum being the most popular. Altcoins are cryptocurrencies that were launched after the success of bitcoin Sekhar (2023). The rise of fintech has led to the widespread belief that a significant source of systemic risk in the financial sector is the dominance of financial institutions. It will overturn the hypothesis that new crypto brokerages include hundreds of crypto trading platforms, or "exchanges," where investors can buy and sell cryptocurrency (William, 2018).

Kyriazis (2019) studied cryptocurrencies' pricing behaviour and rejected the Efficient Market Hypothesis. Nevertheless, significant steps toward cryptocurrency efficiency have been traced during the last few years. The profitability of technical trading rules in the cryptocurrency market using trend-following and mean-reverting strategies are examined by Resta et al. (2020). The inception of digital currency showed a successful path, which now numbers as many as 5025 cryptocurrencies as of 13 January 2020. (Caporale et al., 2018).

It was observed that the cryptocurrency market is persistent. Resta et al. (2020) predicted a multivariate stochastic volatility model for discrete bounces in the cryptocurrency market. The results show that constant change is driven by business size and relevance. Omane-Adjepong et al. (2019) show that 'volatility persistence' was powerfully revealed across all trading scales and in conditional market volatilities than in the full-sample and unconditional volatilities. By extension, the markets persist more in volatility across scales. The evidence of demand efficiency and the intensity of volatility persistence is sensitive to time scales, market returns and volatilities measures, and data regimes.

Corbet et al. (2018) considered the role of negative sentiment in the outbreak and development of the pandemic period. The results suggest significant and pronounced time-varying price-volatility effects as investors identified the severity and nature of the pandemic's growth trajectory and potential economic repercussions.

Vaz de Melo Mendes and Fluminense Carneiro (2020) analysis indicates that the strength of dependence among cryptocurrencies has increased over the recent years in the cointegrated crypto-market.

The findings will help investors manage risk while identifying opportunities for alternative diversified and profitable investments. The researchers have briefly discussed the effects of the pandemic period on the crypto market using data relating to 2020.

Every investor should answer the questions: Is Bitcoin the longest-lived? And how long will it work with regular money? Against the background of growing dissatisfaction with the many uncertainties in the economy of many countries, can cryptocurrencies benefit from confidence more than they do now? (Rogojanu & Badea, 2014). The results reveal that cryptocurrency has shown a successful path since its inception, despite volatile market conditions (Caporale et al., 2018). The technology can improve central banks' operations and serve as a platform to launch their cryptocurrencies (Raskin & Yermack, 2016). The nature and the ability of the five largest cryptocurrencies, viz., Bitcoin, Ethereum, Ripples, NEM, and Dash, were examined by Phillip et al. (2018).

Guizani and Nafti (2019) reveal that the numbers of addresses, the attractiveness indicator, and the mining difficulty significantly impact the BTC price with variations over time. Although consumers may have digital banking credentials to access the digital financial system, consumers in many emerging markets need to be more active users of digital channels due to a lack of consumer trust and confidence in the new channels (Malady, 2016).

Yates (2017) highlighted that government agencies explore the potential for cryptocurrencies to compete with government-backed money; the total value of all cryptocurrencies in circulation is over \$100 billion, arguably posing a credible threat of supplanting central-bank-issued money.

Hacker & Thomale (2018) offer two policy recommendations to address the legal uncertainty surrounding token sales. First, they are fixing the disclosure requirement for the code-driven token sale. A dedicated ICO security platform will provide a clear and less burdensome way to comply with EU law for sellers who consider their tokens to qualify as securities. Second, overlapping and conflicting aspects of safety management can lead to each other. It is worth noting that in the face of the next generation of decentralized blockchain applications, only an international co-regulator can effectively balance investor protection and investor access. Blemus (2018) extensively compares the current regulatory trends in selected countries on the various applications enabled or issues raised by blockchain technology. Marian (2015) proposes a regulatory system that imposes costs on anonymity to curtail potential illicit uses of cryptocurrency, such as tax evasion, money laundering, or financing terrorism, without disincentivizing the innovation that cryptocurrency could bring.

Sockin and Xiong (2023) suggested a model for cryptocurrency as membership in a decentralized digital platform to facilitate transactions between users of certain goods or services. The problem induced by the cryptocurrency price has to clear membership demand with speculators' token supply. Josias Dewey et al., (2019) glimpse how various governments have approached regulating cryptocurrency and blockchain technology. They state that "Blockchain has also exploded regarding its geographic impact. Once a novelty that was only familiar to people in a handful of countries, technology is now relevant to the global economy."

Valencia et al., (2019) shows that it is possible to predict cryptocurrency markets using machine learning and sentiment

analysis, where Twitter data could be used to predict specific cryptocurrencies, and that neural networks (NN) outperform the other models.

Dogrul et al., (2020) discussed the integration process of cryptocurrencies for the post-pandemic period. They stated that the crisis environment in the world had produced a completely different result. People moved away from uncertainty and turned to investments such as gold and silver.

Moosa (2020) writes with empirical evidence and shows that "(i) the volume of trading can be explained predominantly in terms of price dynamics; (ii) trading in bitcoin is based exclusively on technical considerations about past price movements, particularly positive price changes; and (iii) the price of bitcoin is an explosive process. These findings are interpreted to imply a price bubble".

James & Menzies (2022) introduced new methods to study behaviours among the 52 largest cryptocurrencies between 1 January 2019 and 30 June 2021. They explored the time-varying consistency of the relationships between cryptocurrencies' size and their returns and volatility. They demonstrated greater consistency between size and volatility than size and returns.

Data Analysis

Nguyen et al., (2022) analysed the correlation between different assets in the cryptocurrency market throughout different phases, specifically bearish and bullish periods. It is found that investors tend only to trade cryptocurrencies with high market capitalization during turbulent times, while smaller cryptocurrencies are mainly used for other purposes, such as transaction fees, intelligent contracts tokens, or used to run a digital platform.

James & Menzies (2022) classified the pandemic periods to analyse volatility in cryptocurrencies as: (1). Pre-COVID: 1January 2019 to 28 February 2020; (2). Peak COVID: 1March 2020 to 30 May 2020; (3). Post-COVID: 31 May 2020 to 31August 2020; (4). Bull: 1 August 2020 to 14 April 2021; and (5). Bear: 15 April 2021 to 30 June 2021.

Data for the period, i.e., January 2018 to March 2020, is taken to analyse the trends in values of select crypto-coins on the first of every month. At the same time, data for March 2021 to March 2022 is taken from 'coinmarketcap.com.' This data analysis reveals a caution that the buyer must be aware of market trends.

Table 1 and Table 2 show a positive trend in February, April, and August 2018 and a negative trend of value for all the remaining months in 2018, for holding the bitcoin compared to the previous month's opening value. Table 2 shows an unexpected surge of 425.13 per cent in the price of Bitcoin from 1 March 2020 to 1 March 2021. However, a 4.35 per cent price drop is observed by 1 March 2022.

Table 3 and Table 4 reveal the fluctuation in the value of Bitcoin Cash. It was highly volatile and mainly caused unexpected gain/loss during the study period of 15 months' duration. For instance, Bitcoin Cash had a

Table 1

Bitcoin- Period 2018--2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	14112.2	-
Feb 01, 2018	10237.3	-32.85
Mar 01, 2018	10385	19.41
Apr 01, 2018	7003.06	-37.50
May 01, 2018	9251.47	33.24
Jun 01, 2018	7500.7	-17.30
Jul 01, 2018	6411.68	-15.32
Aug 01, 2018	7769.04	19.40
Sept 01, 2018	7044.81	-5.66
Oct 01, 2018	6619.85	-8.39
Nov 01, 2018	6318.14	-3.21
Dec 01, 2018	4024.46	-33.92
Jan 01, 2019	3746.71	-8.81
Feb 02, 2019	3484.63	-8.39
Mar 01, 2019	3853.76	9.61

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Table 2

Return Analysis of Bitcoin- One Year Holding Period: 2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	8,599.76	-
Mar 01, 2021	45,159.50	425.13
Mar 01, 2022	43,194.50	-4.35

high positive rate of 110 per cent in May 2018 and a high negative rate of 50.41 per cent in December 2018. Table 6 reveals that the price of Bitcoin Cash increased by 49.21 per cent during the 2020-21 period and drastically decreased by 26.7 per cent in 2021-2022.

Table 3

Bitcoin- Cash 2018--2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	2534.82	-
Feb 01, 2018	1491.12	-47.61
Mar 01, 2018	1204.84	1.38
Apr 01, 2018	688.01	-50.23
May 01, 2018	1348.64	110.14
Jun 01, 2018	995.66	-25.78
Jul 01, 2018	749.18	-26.27
Aug 01, 2018	779.95	4.05
Sept 01, 2018	543.96	-20.02
Oct 01, 2018	531.64	-13.72
Nov 01, 2018	423.07	-20.12
Dec 01, 2018	172.52	-59.41
Jan 01, 2019	150.9	-4.22
Feb 02, 2019	116.55	-26.12
Mar 01, 2019	132.08	9.17

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Data in Table 5 and Table 6 indicates the fluctuation in the value of Cadarno –crypto-currency. It is highly volatile and mainly caused unexpected gain/loss during the study period of 15 months' duration. For instance,

Table 4

Bitcoin—Cash Comparative Table- One Year Holding Period: 2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	308.26	-
Mar 01, 2021	459.96	49.21
Mar 01, 2022	337.15	-26.7

Cardano had a high positive rate of 137 per cent in May 2018 and a high negative rate of 50.47 per cent in March 2018. Table 6 focuses on an unimaginable hike in the price of cardio-crypto currency, with 2657 per cent during 2020-21 and a marginal decline of 26.72 per cent in 2021-2022.

Table 5

Cardano- Period 2018-2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	0.718847	-
Feb 01, 2018	0.515912	-42.13
Mar 01, 2018	0.311973	-27.81
Apr 01, 2018	0.156597	-50.47
May 01, 2018	0.342953	137.91
Jun 01, 2018	0.224533	-37.97
Jul 01, 2018	0.138264	-36.09
Aug 01, 2018	0.143086	-0.92
Sept 01, 2018	0.101877	-24.18
Oct 01, 2018	0.085292	-20.93
Nov 01, 2018	0.069698	-16.10
Dec 01, 2018	0.038991	-41.48
Jan 01, 2019	0.040984	2.60
Feb 02, 2019	0.038598	-7.59
Mar 01, 2019	0.043112	10.08

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Table 7 and Table 8 focus on fluctuations in the EOS value–cryptocurrency value. It is highly volatile and mainly caused unexpected gain/loss during the study period of 15 months' duration. For instance, EOS had a high positive rate of 234.8 per cent in May

Table 6Cardano - One Year Holding Period:
2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	.04751	-
Mar 01, 2021	1.31	2657
Mar 01, 2022	0.9599	-26.72

2018 and a high negative rate of 35 per cent in June 2018. Table 8 reveals that the price of EOS-currency marginally declined in the 2020-21 period and profoundly decreased by 34.29 per cent in the 2021-22 period.

Table 7

EOS- Pre-Covid Period 2018-2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	8.77	-
Feb 01, 2018	12.24	15.50
Mar 01, 2018	8.39	-15.48
Apr 01, 2018	6	-34.41
May 01, 2018	17.67	234.81
Jun 01, 2018	12.29	-35.04
Jul 01, 2018	8.15	-33.96
Aug 01, 2018	7.36	-10.70
Sept 01, 2018	6.44	-8.54
Oct 01, 2018	5.74	-13.55
Nov 01, 2018	5.2	-8.01
Dec 01, 2018	2.89	-43.94
Jan 01, 2019	2.57	-10.14
Feb 02, 2019	2.34	-8.65
Mar 01, 2019	3.54	44.86

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Table 9 and Table 10 reveal the data relating to Ethereum-coin trading from 1 January 2018 to 1 March 2019. Actual growth or loss for holding the Ethereum-coin is compared to the previous month's closing

Table 8

EOS - One Year Holding Period: 2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	3.54	-
Mar 01, 2021	3.47	-1.98
Mar 01, 2022	2.28	-34.29

value. It showed a positive trend in February and May 2018, and March 2019 and a negative trend for all the remaining months of the study period. Table 10 shows an unexpected positive growth in the price of Ethereum Coin during 2020-21 with 544.89 per cent, and it also shows an additional positive growth of 106.18 per cent in the 2021-22 period.

Table 9
Ethereum: Period 2018-2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	755.76	-
Feb 01, 2018	1119.37	34.19
Mar 01, 2018	856.01	-15.87
Apr 01, 2018	397.25	-56.48
May 01, 2018	670.46	77.45
Jun 01, 2018	578.67	-13.89
Jul 01, 2018	455.24	-21.74
Aug 01, 2018	433.87	-7.31
Sept 01, 2018	283.5	-29.81
Oct 01, 2018	233.22	-21.86
Nov 01, 2018	197.54	-13.82
Dec 01, 2018	113.4	-40.34
Jan 01, 2019	133.42	18.70
Feb 02, 2019	107.47	-21.58
Mar 01, 2019	136.84	23.55

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Table 11 and 12 show the value of Litecoin during the 15-month study period. This coin mainly showed a negative trend in 2018, except during May 2018. However, the data shows a positive direction during February and March 2019. Table 18 focuses on the

Table 10
Ethereum- One-Year Holding Period:
2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	219.75	-
Mar 01, 2021	1,417.15	544.89
Mar 01, 2022	2,919.78	106.18

volatility in the price of Litecoin during the pre-and post-Covid periods. It is observed that there was a positive trend of 181.87 per cent in 2020-21 and a negative trend of 32.22 per cent in 2021-22.

Table 11
Litecoin: 2018-2019

Date	Open	Percent change in one month Price Opening value
Jan 01, 2018	231.67	
Feb 01, 2018	163.68	-37.87
Mar 01, 2018	203.12	47.40
Apr 01, 2018	116.9	-45.07
May 01, 2018	148.34	28.88
Jun 01, 2018	118.03	-19.24
Jul 01, 2018	81.5	-33.09
Aug 01, 2018	80.39	-2.97
Sept 01, 2018	61.74	-15.30
Oct 01, 2018	61.1	-8.70
Nov 01, 2018	49.56	-16.51
Dec 01, 2018	32.13	-31.69
Jan 01, 2019	30.46	-6.87
Feb 02, 2019	32.82	7.54
Mar 01, 2019	46.24	38.09

Source: <https://coinmarketcap.com/currencies/litecoin/historical-data/>

Table 13 shows correlation matrix data (2018-2022), showing that Bitcoin and XRP are negatively correlated. At the same time, BNB and XRP are also negatively correlated.

Summary

Investment in crypto-currency through

Table 12

Litecoin - One Year Holding Period: 2020-22

Date	Price Open	Percentage Change For one year holding period
Mar 01, 2020	58.53	-
Mar 01, 2021	164.98	181.87
Mar 01, 2022	113.48	-32.22

online trading is becoming a popular trend. However, one should remember that crypto-currency is not recognized, and it is 'illegal'

Table 13
Correlation Matrix of Bitcoin &
Other Assets – 2022

	BTC	ETH	Copper	Gold	Us Bond
BITC	1.00	0.89	0.15	0.12	0.19
ETH	0.89	1.00	0.21	0.13	0.16
Copper	0.15	0.21	1.00	0.48	0.10
Gold	0.12	0.13	0.48	1.00	0.46
Us Bond	0.19	0.16	0.10	0.40	1.00

Source: Crypto Market Outlook, Dec.2022

as notified by various governments across the globe. Some countries also announced that dealing in crypto-currency attracts the law of Anti-Money Laundering. The unexpected surge of 425.13 per cent in the price of Bitcoin from 1 March 2020 to 1 March 2021 is observed. However, a 4.35 per cent price drop is observed by 1 March 2022. The price of Bitcoin cash increased by 49.21 per cent during 2020-21 and decreased by 26.7 per cent in 2021-22. An unimaginable hike in the price of Cardano-crypto currency, with 2657 per cent in 2020-21 and a marginal decline of 26.72 per cent, was found in 2021-22

The results relating to the study period 2018-2022 indicate that the investor should know that unexpected gains or losses are certain in crypto-asset trading. It also leads to the loss of tangible assets at the cost of digital assets. The research result shows that other assets like copper, gold, and US bonds did not influence much the price of bitcoin during 2022. There was a positive net income during the pandemic period, and negative net income during the post-pandemic period also reveals the volatility of the crypto market. The correlation matrix (2018-2022) data shows that bitcoin and XRP correlate negatively. At the same time, BNB and XRP are also negatively correlated. However, a high positive correlation is observed for the following cryptocurrencies: i) Bitcoin and BNB, Bitcoin and Ethereum, ii) Ethereum and BNB, and iii) BNB and Dogecoin ■

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