

A STUDY ON RISK AND RETURN ANALYSIS OF CRYPTOCURRENCY AS AN ALTERNATIVE INVESTMENT OPTION

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ABSTRACT

The fact that governments have not yet accepted cryptocurrency hasn't stopped its rise in popularity as a new investment option in global portfolios. Cryptocurrency is a digital form of currency that was initially created for regular exchanges. The term cryptocurrency refers to a "digital coin," with Bitcoin being known as "digital gold." Trading cryptocurrencies shares many similarities with trading on the stock market. Investors need to consider the risk and return of cryptocurrency investments. From 2020 to 2025, more individuals began purchasing cryptocurrencies, and large companies started getting involved. During this period, governments struggled to establish clear rules for these digital currencies. The crypto market experienced significant price fluctuations, rising sharply and then crashing at times. The study concludes that cryptocurrency has solidly positioned itself as a major and increasingly popular alternative investment. The years 2020 to 2025 highlighted its rapid growth, market volatility, and the constant challenge for regulators to keep up with its changes, marking it as a dynamic and influential force in the global financial scene.

Keywords: *Cryptocurrency, Global, Investment, Popular, Digital*

INTRODUCTION

In recent years, cryptocurrencies have become a powerful and disruptive force in finance. Initially introduced as a decentralized way to exchange value, cryptocurrencies like Bitcoin (BTC) and Ethereum (ETH) have transformed into popular investment assets. They attract individual investors, institutions, and even governments. Their appeal comes from the potential for high returns, around-the-clock trading flexibility, and independence from traditional banks.

However, this asset class also shows high volatility, limited regulation, and considerable risk, making its risk-return profile quite different from that of traditional assets like stocks, bonds, or gold. As a result, simply viewing cryptocurrencies as speculative tools is not enough. We need to assess their performance using established financial metrics like skewness, kurtosis, standard deviation, risk and return.

This study focuses on examining Bitcoin and Ethereum as alternative investment options by analyzing their annual risk and return from 2020 to 2025. By comparing these metrics to traditional benchmarks, the study aims to provide better insights into the financial viability, volatility, and portfolio impact of investing in cryptocurrencies. With growing interest in digital assets, cryptocurrencies are increasingly seen as part of diversified investment portfolios.

STATEMENT OF THE PROBLEM

Cryptocurrencies such as Bitcoin and Ethereum are emerging investment assets that offer the potential for high returns but also involve significant risks. They are highly volatile and face challenges like regulatory uncertainty, hacking, fraud, and market manipulation. Although many investors use cryptocurrencies to diversify their portfolios, their diversification benefits may decrease during periods of financial stress when they become correlated with traditional assets. This study evaluates whether cryptocurrencies can provide strong returns with acceptable risk and whether they can be a reliable part of a diversified investment strategy.

OBJECTIVES OF THE STUDY

To analyse risk and return of cryptocurrency investment.

To examine correlation between the cryptocurrency of Bitcoin and Ethereum.

RESEARCH METHODOLOGY

Research Design:

This study uses a quantitative approach to analyse the relationship between risk and return on cryptocurrency investment. This approach is chosen because it allows systematic processing of numerical data and the use of statistical techniques to produce generalizable findings.

Data Collection:

The data used in this study comes from various sources, such as Market Control, Investing.com, and Yahoo Finance. The data collected includes monthly prices, trading volumes, volatility, and other relevant factors from a number of leading cryptocurrencies, such as Bitcoin and Ethereum. The data collection period covers from 2020 to 2025 the period formulating the problem, data collection, data analysis and the conclusion

Data Analysis:

Data analysis is carried out in several stages. First, raw data is collected and processed to eliminate anomalies and recording errors. Second, basic statistical descriptions such as mean, median, and standard deviation are calculated to provide an overview of the characteristics of the data. Third, correlation analysis is used to identify the relationship between risk.

TOOLS USED FOR THE STUDY

- **Risk and Return:** Risk is the possibility of losses or variation in expected returns, while return is the gain or loss from an investment over time.
- **Standard Deviation:** Measures how much investment returns vary from the average, indicating volatility and risk.
- **Skewness:** Shows the asymmetry of return distribution, indicating chances of extreme gains or losses.
- **Kurtosis:** Measures the likelihood of extreme outcomes in returns, indicating the presence of heavy tails or higher risk.

REVIEW OF LITERATURE

1. **Trimborn & Hardle (2018)** measured crypto performance using the Sharpe ratio and proposed the CRIX index. They found Bitcoin and Ethereum provided high returns, albeit with high volatility.

2. **Liu & Tsyvinski (2018)** presented empirical facts about crypto returns. They found strong momentum and investor attention effects, implying cryptocurrencies behave differently than traditional assets
3. **Kyriazis (2019)** explored market efficiency and diversification potential of cryptocurrencies. His research confirmed that, despite high volatility, they offer risk-return trade-offs beneficial to diversified portfolios.
4. **Guesmi et al. (2019)** explored the impact of including cryptocurrencies in an international portfolio. Findings indicated better risk-adjusted returns when digital assets were included.
5. **Mishra & Mehta (2021)** studied the early post-COVID performance of Bitcoin. They found a sharp rise in both demand and price, driven by increased retail interest and social media trends.

ANALYSIS AND INTERPRETATION

TABLE- 1 (BITCOIN)

YEAR	RISK	RETURN
2020-2021	0.24	3.40
2021-2022	0.23	1.10
2022-2023	0.16	-0.58
2023-2024	0.15	1.83
2024-2025	0.18	1.54

Source: Secondary Data

Interpretation: Bitcoin's performance displays high volatility, with the 2020-2021 period showing high returns (3.40) alongside high risk (0.24). The 2022-2023 period was "bad" with negative returns (-0.58). Interestingly, 2023-2024, marked "bad," offered strong positive returns (1.83) with the lowest risk (0.15), highlighting a complex risk-return profile.

YEAR	RISK	RETURN
2020-2021	0.23	6.10
2021-2022	0.11	19.20
2022-2023	0.13	-0.66
2023-2024	0.82	1.01
2024-2025	0.31	0.86

TABLE- 2 (ETHEREUM)

Source: Secondary Data

Interpretation: Bitcoin's performance shows significant volatility, with the highest return (3.40 in 2020-2021) coinciding with the highest risk (0.24), indicating a "good" but high-risk period. Conversely, 2022-2023 was a "bad" period with a negative return (-0.58) despite moderate risk (0.16). While 2023-2024 was marked "good," it paradoxically showed a strong

positive return (1.83) with the lowest risk (0.15), suggesting the "bad" label might refer to criteria beyond typical risk-return metrics for this specific period.

YEAR	Skewness	Kurtosis
2020-2021	2.10	4.58
2021-2022	0.15	-1.32
2022-2023	0.59	-1.47
2023-2024	1.02	0.65
2024-2025	0.80	1.19

TABLE- 3 (BITCOIN)

Source: Secondary Data

Interpretation: Bitcoin's return distribution generally exhibits positive skewness, indicating a tendency for more frequent small losses and occasional large gains, which is a desirable characteristic (e.g., 2.10 in 2020-2021). Kurtosis varies significantly, with the 2020-2021 "good" period showing high kurtosis (4.58), implying a higher chance of extreme outcomes (both positive and negative). In contrast, the "bad" 2021-2022 period had low skewness (0.15) and negative kurtosis (-1.32), suggesting fewer extreme returns.

TABLE- 4 (ETHEREUM)

YEAR	Skewness	Kurtosis
2020-2021	2.10	4.58
2021-2022	0.15	-1.32
2022-2023	0.59	-1.47
2023-2024	1.02	0.65
2024-2025	0.80	1.19

Source: Secondary Data

Interpretation: Ethereum's return distribution, similar to Bitcoin's, generally shows positive skewness, indicating a propensity for more frequent small losses offset by occasional large gains (e.g., 2.10 in 2020-2021, highlighted as "good"). The 2020-2021 period also exhibited high kurtosis (4.58), suggesting a higher probability of extreme outcomes. Conversely, the 2021-2022 "bad" highlighted period had near-symmetrical skewness (0.15) and negative kurtosis (-1.32), implying fewer extreme returns.

TABLE – 5 (BITCOIN)

YEAR	Standard Deviation
2020-2021	582131.61
2021-2022	804913.44
2022-2023	898067.10
2023-2024	476809.72
2024-2025	1215578.38

Source: Secondary Data

Interpretation: The data reveals fluctuating levels of risk, with 2024-2025 exhibiting the highest standard deviation at 1215578.38, suggesting it was the most volatile period. Conversely, 2020-2021 had the lowest standard deviation at 582131.61, indicating it was the least volatile period among those presented.

TABLE- 6 (ETHEREUM)

YEAR	Standard Deviation
2020-2021	582131.61
2021-2022	86486.76
2022-2023	93349.15
2023-2024	16545.15
2024-2025	42988.00

Source: Secondary Data

Interpretation: The data indicates that Ethereum experienced its highest volatility in 2020-2021 with a standard deviation of 582131.61, while the lowest volatility was observed in 2023-2024 at 16545.15. This suggests significant year-to-year fluctuations in Ethereum's price stability.

CONCLUSION:

Cryptocurrency, as an alternative investment, presents both remarkable opportunities and significant challenges. The analysis of Bitcoin and Ethereum over multiple years reveals that while these assets can deliver exceptionally high returns, they are also accompanied by substantial volatility and risk. Unlike traditional investment avenues, cryptocurrencies are highly sensitive to market sentiment, regulatory developments, and global events.

The data shows that certain periods yield outstanding returns rewarding risk-taking investors while other years reflect negative performance despite moderate risk levels. This inconsistency highlights the importance of timing, market awareness, and proper risk management strategies.

In summary, cryptocurrencies can play a valuable role in a diversified investment portfolio, especially for investors with a higher risk appetite. However, due diligence, strategic allocation, and continuous monitoring are essential to navigate this dynamic and rapidly evolving asset class.

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