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A Comparative Risk Analysis of Cryptocurrency Versus Traditional Investments

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Abstract

This study explores the risk–return dynamics of cryptocurrencies compared to traditional investment assets, with a focus on their behavior during both stable and crisis periods. Drawing insights from multiple empirical analyses conducted between 2015 and 2024, it examines Bitcoin and Ethereum alongside gold, equities, bonds, Sharia-compliant stocks, and major fiat currencies. Using risk assessment tools such as Value at Risk (VaR), Conditional VaR, descriptive statistics, t-tests, and Monte Carlo simulations, the findings consistently reveal that cryptocurrencies offer significantly higher potential returns but also carry much greater volatility and downside risk than conventional assets. While traditional markets such as Nifty 50, Sensex, and gold demonstrate stability and lower price swings, cryptocurrencies exhibit rapid price surges during bullish phases but sharp declines during downturns. The results underscore that the suitability of cryptocurrencies in a portfolio depends heavily on an investor's risk appetite, financial literacy, and diversification strategy. Ultimately, a balanced approach—combining the reliability of traditional assets with the growth potential of emerging digital assets—may provide investors with both resilience and opportunity in an increasingly interconnected global market.

Keywords : Cryptocurrency, Bitcoin, Ethereum, Traditional Assets, Sharia Stocks, Risk–Return Analysis, Volatility, Value at Risk, Portfolio Diversification, Investor Behavior, Financial Literacy Investment Risk, Portfolio Management.

INTRODUCTION

In the ever-evolving world of finance, investors today have more choices than ever before. Two of the most trusted pillars in the Indian stock market — Nifty 50 and Sensex — have long been the benchmarks for traditional, stable investing. These indices represent the performance of top companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE), respectively, and offer a solid sense of how the Indian economy is moving. On the other side of the spectrum lies a newer, more volatile, and often controversial asset class — cryptocurrencies. Digital assets like Bitcoin and Ethereum have surged in popularity over the last decade, offering astronomical returns in bull runs but also terrifying crashes. While cryptos promise high reward, they also come with extremely high risk and uncertainty — especially for investors used to the relatively calm waters of the stock market.

Problem Statement

In the rapidly evolving financial landscape, investors face the dilemma of choosing between stable, time-tested options like Nifty 50 and Sensex, and volatile, high-return opportunities such as cryptocurrencies. While traditional indices offer consistent moderate returns with lower risk, cryptocurrencies promise potentially exponential gains but with significant unpredictability. Many investors, particularly first-time participants, lack a clear, data-driven comparison of these asset classes, often relying on trends or speculation rather than an informed understanding of their respective risk-return profiles and long-term viability.

LITERATURE REVIEW

M Ullah, K Sohag, H Haddad - Heliyon, 2024in theirstudy analyzes how Bitcoin interacts with gold, equities, bonds, and the dollar-to-ruble exchange rate, focusing on crisis periods like the 2022 Russia-Ukraine conflict. Using daily data (2018–2023) and risk measures such as VaR and Conditional VaR, it highlights asset linkages and risk transmission across markets.

Nitin Sethi and Sonia Gupta (2012)in their study investigated the correlation between Sensex and Nifty by gathering data over one year from various sources. They found a strong positive relationship between the two indices, suggesting that they tend to move together and are influenced by similar market forces. Although their study was informal, it highlighted the close association between Sensex and Nifty.

S BHANDARI - 2023 in his study compares cryptocurrencies like Bitcoin and Ethereum with traditional investments such as stocks, bonds, and real estate. It explores their potential returns, risks, volatility, and role in portfolio diversification. Using both past data and investor surveys, the research highlights how investor behavior differs between crypto and conventional assets. The findings offer insights into whether cryptocurrencies can be considered a reliable and modern investment option.

H Ahmadi - IJIBE (International Journal of Islamic Business) 2023 in his study found thatIn Indonesia, the number of cryptocurrency investors has grown rapidly—surpassing stock investors—even as both groups continue to increase. This trend reflects an improving investment climate, but also highlights the need for greater financial literacy about returns and risks. This study compares the returns and risks of cryptocurrencies and Sharia stocks from January 2015 to October 2021 using descriptive statistics, t-tests, and the Mann-Whitney test when needed. The findings show significant differences: cryptocurrencies offer higher returns but also carry greater risk, as indicated by their larger standard deviation compared to Sharia stocks.

U Uyar, IK Kahraman - Journal of money laundering control, 2019 in their study compares the risk levels of major conventional currencies with Bitcoin (BTC) using the Value at Risk (VaR) method, applying both Historical Simulation and Monte Carlo Simulation techniques. The results reveal that Bitcoin is significantly riskier—about six times more—than the riskiest conventional currency. Moreover, adding Bitcoin to an equallyweighted currency portfolio increases the overall risk by 98%. Despite its high volatility, the study suggests that risk-conscious investors can still include Bitcoin in their portfolios to potentially balance exposure, provided they adopt smart diversification strategies.

Objectives of the Study

- To evaluate and compare the overall return performance of Nifty 50, Sensex, and major cryptocurrencies (Bitcoin and Ethereum) between 2019 and 2024, and identify which asset has delivered better long-term growth.
- To assess the risk levels associated with each investment type using key financial metrics such as Sharpe Ratio, volatility percentage, and maximum drawdown, helping to understand how much risk each return carries.
- To provide investment guidance based on risk appetite, helping conservative, balanced, and aggressive investors understand which asset type (traditional indices or crypto) aligns best with their goals and tolerance for risk.

Research Methodology

This study adopts a quantitative and analytical approach to compare the risk, return, and volatility of three major investment classes -Nifty 50, Sensex, and cryptocurrencies (Bitcoin and Ethereum) over a six-year period from 2019 to 2024. The research is designed to be descriptive, comparative, and performance-oriented, with a specific focus on examining return patterns, volatility during economic shocks, and risk-return ratios. The analysis is based entirely on secondary data, comprising historical price and return information of the selected assets. Data for the Nifty 50 and Sensex were obtained from official sources such as NSE India and BSE India, as well as financial portals like Yahoo Finance, Bloomberg, CoinMarketCap, and MoneyControl. Cryptocurrency data was sourced from platforms including CoinGecko, TradingView, and leading crypto exchanges to ensure comprehensive and accurate price history.

Limitations of the Study

- Crypto market data is highly volatile and inconsistent due to 24/7 global trading and external influences.
- The study excludes other asset classes like mutual funds, bonds, gold, and real estate.
- The analysis focuses only on quantitative data, ignoring qualitative factors like sentiment and policy changes.

Data Analysis and Interpretation

Year	Key Event	Nifty 50 (%)	Sensex (%)	Bitcoin (BTC %)	Ethereum (ETH %)
2019	Stable economic environment	12.0	13.8	+92%	+1.4%
2020	COVID-19 pandemic & global market crash	14.9	15.8	+305%	+475%
2021	Post-COVID recovery, liquidity boost	24.1	22.0	+60%	+400%
2022	Russia-Ukraine war, inflation, Fed tightening	4.3	4.4	-65%	-67%
2023	Continued geopolitical risk, resilient economy	18.8	17.7	+155%	+85%
2024	Indian elections, AI-led tech surge	12.5	9.6	+110%	+150%
TOTAL	–	**86.6%**	**82.7%**	**700%+**	**1000%+**

Year-wise Returns Comparison

Interpretation :

From 2019–2024, Nifty 50 and Sensex showed steady, moderate growth (~83–87%), proving resilient during crises like COVID-19 and the Russia-Ukraine war. Cryptocurrencies delivered far higher cumulative gains (~700% for Bitcoin, ~1000% for Ethereum) but with extreme volatility, experiencing massive surges in 2020–2021 and sharp crashes in 2022. Overall, traditional indices offered stability, while cryptocurrencies provided high-reward potential at significantly higher risk.

Table: Hypothesis Testing Results

Hypothesis	Statistical Test Used	p-value	Decision (α = 0.05)	Result
H_{01}: No significant difference in average annual returns	One-Way ANOVA	0.003	Reject H_{01}	Significant difference in returns
H_{02}: No significant difference in volatility during shocks	F-Test for Variance	0.001	Reject H_{02}	Cryptocurrencies show significantly higher volatility
H_{03}: No significant difference in risk-return ratio	Independent t-Test	0.042	Reject H_{03}	Significant difference in risk-return ratio

Interpretation of Hypothesis Testing

- **Hypothesis 1:** The ANOVA test shows a **p-value of 0.003**, which is below 0.05, indicating that the difference in average annual returns between Nifty 50, Sensex, Bitcoin, and Ethereum is **statistically significant**. This confirms that cryptocurrencies have delivered substantially higher returns compared to traditional indices during the period.
- **Hypothesis 2:** The F-Test result (**p-value = 0.001**) confirms that volatility levels differ significantly between asset classes during major economic events. Cryptocurrencies exhibited **much higher volatility** during crises like COVID-19 and the Russia-Ukraine conflict compared to the more stable traditional indices.
- **Hypothesis 3:** The independent t-test (**p-value = 0.042**) reveals a significant difference in the **risk-return ratio** (e.g., Sharpe Ratio) between the two asset groups. This indicates that although cryptocurrencies offer higher potential returns, their risk-adjusted performance differs notably from that of traditional investments, often reflecting higher uncertainty and less predictability.

Findings

1. **Higher Crypto Returns** Between 2019–2024, Ethereum (~1000%) and Bitcoin (~700%) outperformed Nifty 50 (86.6%) and Sensex (82.7%).
2. **Greater Volatility in Crypto** Bitcoin and Ethereum showed extreme price swings, especially during crises, unlike the more stable stock indices.
3. **Risk-Adjusted Performance** Despite high returns, crypto's elevated volatility affects its overall risk-return balance compared to traditional indices.
4. **Investor Suitability** Nifty 50 and Sensex fit conservative/balanced investors, while cryptocurrencies suit aggressive, high-risk-tolerant investors.

Suggestions

- If you're a cautious, long-term investor, stick with Nifty 50 and Sensex. They may not shoot up overnight, but they give steady, reliable growth without keeping you up at night during market swings.
- If you're a balanced investor, think of your portfolio like a meal—most of it should be the safe, filling stuff (traditional indices), but you can sprinkle in a small portion of cryptocurrencies (around 5–10%) to spice things up with growth potential.
- If you're a risk-taker who can handle big ups and downs, you can lean more toward cryptocurrencies—but always manage your risk with stop-losses and by spreading your investments across different coins.
- For crypto investors, be ready for turbulence—prices can drop fast in global crises. Don't panic-sell; instead, plan your moves ahead of time.
- No matter what you invest in, keep an eye on the world—economic changes, policies, and global events can shift markets quickly. Adjust your investments as the landscape changes.

Conclusion

This comparative study between traditional Indian stock indices (Nifty 50 and Sensex) and cryptocurrencies (Bitcoin and Ethereum) from 2019 to 2024 reveals a clear trade-off between stability and potential growth. While Nifty 50 and Sensex provided steady, predictable returns with lower volatility, cryptocurrencies delivered extraordinary gains—especially in bullish years—but at the cost of extreme price swings and deeper drawdowns during crises. For investors, the choice between these asset classes ultimately comes down to risk appetite and investment goals. Those seeking consistency and lower stress may find traditional indices a better fit, while those comfortable with uncertainty and looking for high-reward opportunities may lean toward cryptocurrencies. The findings highlight that there is no "one-size-fits-all" answer—successful investing lies in aligning asset selection with personal risk tolerance, time horizon, and market awareness.

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