

**IS BITCOIN THE BENCHMARK?
RISK ADJUSTED PERFORMANCE OF CRYPTOCURRENCIES USING
MODIGLIANI M² AND OLS ANALYSIS**

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Abstract:

Over the past decade, the cryptocurrency market has undergone a remarkable evolution, characterized by a burgeoning array of digital assets that have gained significant traction in terms of usage, adoption, and market capitalization. Notably, Bitcoin remains the predominant force within this landscape, commanding over 60% of the total market capitalization. It frequently functions as a benchmark for assessing the performance of various other cryptocurrencies. This paper undertakes a thorough analysis of the performance of selected cryptocurrencies over the past eight years that are selected based on their market capitalization and their importance within the dynamic crypto ecosystem applying M²(Modigliani-Modigliani) risk adjusted performance, utilizing Bitcoin as a benchmark for comparative evaluation. And further, also measure the impact of the returns of bitcoin on these cryptocurrencies using the OLS Regression and make necessary investor implications.

Keywords: Benchmark, Capitalization, Cryptocurrency, Crypto Ecosystem.

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1. Introduction:

Cryptocurrency is a virtual or digital currency that is hard to counterfeit or spend twice. Cryptocurrencies operate on decentralized networks, usually utilizing blockchain technology, a distributed ledger that keeps track of every transaction on a network of computers, in contrast to traditional currencies that are issued by governments. Bitcoin was the first cryptocurrency and is now the most well-known. It was founded in 2009 by a person whose identity is still unknown under the pseudonym Satoshi Nakamoto (Wikipedia contributors. (2025))³. Since then, countless more cryptocurrencies also referred to as altcoins have been developed, each with unique characteristics and applications. Peer-to-peer transactions made possible by cryptocurrencies eliminate the need for intermediaries like banks, providing financial services that are quicker, less expensive, and more secure. Despite their frightening volatility and regulatory unpredictability, cryptocurrencies have become immensely popular as payment methods, investment tools, and innovative solutions for a variety of businesses. Originally utilized by a select few computer experts, Crypto is now employed all over the world. Crypto's price has increased dramatically, massively, and slowly. After reaching a record high of over \$3 trillion in 2021, the market dropped two-thirds of its value to \$800 billion in 2022. Since then, the market has increased even further, reaching \$3.46 trillion today(PwC.(2025))⁴. Crypto aims to replace traditional hedges based on trust with speculation, greed, and terror. financial system that is not founded on trust. The cryptocurrency system is built on cryptography and a number of separate but concurrent incentives for various system members, including as mining and block rewards, rather than the traditional financial regulation features of supervision, chartering, and deposit insurance. In recent years, the decentralized, trustless ideal has been supplanted by large financial middlemen, the same organizations that cryptocurrency inventors sought to eliminate. For instance, cryptocurrency was first made available through unfriendly blockchains, but more amiable and well-established systems have since been developed, enabling people and businesses to "custody" their cryptocurrency in institutional "wallets" or accounts. Cryptocurrency-facilitating infrastructure has emerged, including hosting or custody services known as wallets, exchanges, payment systems, decentralized financial platforms, etc. (Congress.gov. (2025))⁵ Cryptocurrencies have become a hot topic globally, and India is no exception. We need clearer

³ <https://en.wikipedia.org/wiki/Bitcoin>.

⁴ <https://www.pwc.com/us/en/industries/financial-services/fintech/bitcoin-blockchain-cryptocurrency>.

⁵ [Congress.gov/crs_external_products](https://www.congress.gov/crs_external_products).

regulations, especially with all the attention and potential risks involved. In India, the situation with bitcoin is quite fascinating. Unlike some countries that have strict rules or outright bans, India is in a bit of a gray area it hasn't banned crypto, but it also hasn't made it fully legal. This “wait-and-see” approach creates constant uncertainty due to ongoing talks and shifting policies. The landscape of cryptocurrency in India is bustling, filled with local exchanges, blockchain firms, and a community eager to dive into the digital currency wave. However, it's essential to tread carefully in this space (Finlaw.in. (2025))⁶. Cryptocurrencies can be highly unstable, and there's always the risk of scams and security issues to consider. While cryptocurrencies are legal in India, they aren't recognized as legal tender just yet this likely won't change until after 2024. What this means is that people can buy, hold, and transfer cryptocurrencies under certain conditions, but they cannot use them as a substitute for the Indian Rupee in everyday transactions(KYCHub.com(2025))⁷.Bitcoin played a dominant role in the cryptocurrency markets which are highly volatile and occupied a central position by strongly interconnected with other cryptocurrencies (Hardle et al (2019))¹ and acts as a dominant transmitter of risk and volatility (Javed, H., & Khan, N. (2024))² however the domination is not uniform over the time found varying & sensitive to market stress (Kammoun, W. M. (2025))³.

2. Literature Review:

Kammoun, W. M. (2025)⁴ examined the return and volatility spillover occurring among the major conventional cryptocurrencies using advanced time varying parameter (TVP – VAR) model combined with quantile regression technique and found that bitcoin & Ethereum are key transmitters of risk and volatility while stable coins like Tether absorbed volatility. And spillover intensity increased during the major crises period like covid19 & Russia – Ukraine war which highlighted the role pf uncertainty in cryptocurrency markets. **Widodo, I., & Soma, A. M. (2025)**⁵examined how the portfolio diversification combining the IT-based company stocks and cryptocurrencies affected investment risk & returns and found that traditional stock investments offer stable returns while cryptocurrencies due to high volatility and decentralization results in both high risk & high return potential. While diversification of portfolio combining both the traditional stock investment and cryptocurrencies offered a better return with balanced risk and overall improved performance of the investment portfolio. **Yang, Z. (2025)**⁶ developed a long-

⁶ <https://finlaw.in/blog/cryptocurrency-law-in-india-current-legal-status-and-regulatory-landscape-2025>.

⁷ <https://www.kychub.com/blog/cryptocurrency-regulations-in-india>.

only cryptocurrency portfolio strategy by using the neural network for ranking the assets based on relative performance and the study has converted the predicted ranks into portfolio weights and the approach achieved a superior returns and risk adjusted compared to the traditional strategy and highlighted the effectiveness of rank-based machine learning model in cryptocurrency portfolio management. **Javed, H., & Khan, N. (2024)**⁷ Investigated into the return & volatility transmission from bitcoin to seven other major cryptocurrencies by using the GARCH models and time varying correlations techniques like DCC & ADCC for period of 10 years (2011-2020) and provided a strong evidence that Bitcoin shocks has significantly influenced the return volatility of other cryptocurrencies highlighting the dominance of the Bitcoin across markets and also most of the cryptocurrencies exhibited the dynamic interdependence when examines using time varying conditional correlation. **Brini, A., & Lenz, J. (2024)**⁸ The paper investigated volatility dynamics in the crypto markets & compares it with the mature class assets i.e. equity using the high frequency data from 2020-2022. The study highlights that positive returns has increased the further volatility in the cryptocurrency at high frequency, which is quite opposite to classical financial theory and these effects is found statistically significant across all the major cryptocurrencies and these behaviors suggest that cryptocurrency is still in evolving asset class. **Tu, Y. (2024)**⁹ investigated into bitcoin prediction by adopting a comparative approach with transformer, light GBM, Random Forest and OLS regression models. Results indicated that traditional & tree-based models perform reasonably well during stable period but failed to capture the price movements and transformer model has outperformed others by effectively learning long term dependencies making it more suitable for volatile cryptocurrency markets. **Karkera, K. A. (2024)**¹⁰ has focused on risk and return analysis considering the Cryptocurrency as a potential investment avenue with a study of Bitcoin, Ethereum, Binance Coin, Solana, and Ripple and found that these offer high returns with significant volatility and risk. The Indian crypto currency market has potential for growth, but regulatory clarity and investor education are crucial for its development. Diversification across traditional assets and crypto currencies can optimize risk-adjusted returns for Indian investors. The research is needed to support policymakers in balancing innovation with investor protection to foster a stable and secure crypto currency ecosystem. **Shakanth das (2024)**¹¹, has pointed out that there is a greater awareness both in India and internationally about the risks and dangers associated with cryptocurrencies, as they are speculative and are traded without any underlying

assets and at high prices. Blockchain technology is used in Central Bank Digital Currency (CBDC), to develop these products without corresponding liabilities. However, compared to two years, there is a greater amount of realism in the cryptocurrency market". **Lavanya, N. D et al. (2024)¹²**, examined the risk and return performance of crypto currencies (Bitcoin, Ripple, Binance, Cardano, and Ethereum), focusing on transactions on the block chain from 2017 to 2023 and found that there is weak positive correlation between independent and dependent variables. The study suggested that crypto currency returns are predictably influenced by momentum and investor attention and supply-related factors like mining costs, price-to-dividend ratio, or realized volatility may not be effective in predicting returns. **Shaktikanta Das (2023)¹³**, as a Governor of Reserve Bank of India, expressed that crypto is neither an asset nor a financial product, but it is a form of gambling. He alarmed that if 20% of transactions in the economy are conducted through cryptocurrencies issued by private companies, the monetary authority of the country will lose control over the money supply and transactions, which also leads to potential collapse of the global financial system. **Kozlovskiy et al (2022)¹⁴**, focused up on the chances of investors going bankrupt who are invested in Cryptocurrency and concluded that the best way for Cryptocurrency investors to protect themselves from bankruptcy following the alternate long and short investment strategies. **Chellasamy et al (2022)¹⁵**, aimed to estimate the risk and return of select crypto currencies and found that a significant growth rate has been recorded with a high risk-to-return ratio. The study concluded that crypto currencies are a recent occurrence with significant interest from investors and the public, driven by the future of blockchain technology. **Hardle et al (2019)¹⁶**, focused on an econometric analysis of the currently most liquid cryptocurrencies, which are highly volatile and subject to bubble-like behavior. This paper aimed to provide a high-level understanding of block chain technology behind cryptocurrencies. **Bouri, E., Roubaud, D. & Shahzad, S. J. H. (2019)¹⁷**, focused on the price jumps in the bitcoin and other major cryptocurrencies occur simultaneously implying the dynamics in the cryptocurrency markets. The authors have selected 12 major cryptocurrencies including Bitcoin, Litecoin, Ripple and others and found out that there is a significant jump across all the cryptocurrencies and highlights that the trading volumes are closely associated with the price jumps and the co-jump behavior has reduced the diversification in the cryptocurrency portfolio. **Yi, S., Xu, Z., & Wang, G. (2018)¹⁸**, examined the volatility connectedness and spillover effect applying the volatility spillover index methods and network analysis to study the interconnectedness among the various

cryptocurrencies and found that over all volatility connectedness increased overtime especially during the market turbulence and mentioned bitcoin is not dominant consistently and other cryptocurrencies also emerged as net volatility transmitters.

2.1. Research Gap:

Based on the literature review conducted for the present study it highlights the cryptocurrency are highly volatile, strongly interconnected and bitcoin occupied a central position in effecting the market dynamics. Most of the studies has focused on significant returns and spillovers among the various cryptocurrencies further studies have provided the evidences that bitcoin has acted as a dominant transmitter of shocks both return and volatility, but studies have limited attention towards the risk adjusted performance and validating the role of bitcoin as benchmark. This gap has motivated for joint assessment of bot risk adjusted performance and benchmark role of bitcoin and further techniques like M^2 (Modigliani-Modigliani) performance evaluation and OLS Regression has very limited application in cryptocurrency literature applying these techniques provide a robust performance evaluation in highly volatile cryptocurrency markets.

2.2. Research Objectives:

- 1) To assess the performance of selected cryptocurrencies using M^2 (Modigliani-Modigliani) risk adjusted returns considering bitcoin as benchmark.
- 2) To examine the impact of Bitcoin (benchmark) on the returns of alternate cryptocurrencies using OLS (ordinary least square) regression analysis.
- 3) To determine the degree of independence exhibited by the various cryptocurrencies in relation to Bitcoin (benchmark) based on the return dynamics.

2.3. Hypothesis:

Based on literature review from the Econometric perspective, if the Bitcoin functions as a benchmark, then its returns should significantly impact the returns of other cryptocurrencies to test this relationship the study has employed OLS Regression model, and the following hypothesis was framed to assess the impact of the returns of the Bitcoin on the selected alternate cryptocurrencies.

H₀: There is no statistically significant Impact of Bitcoin returns on the returns of Alternative cryptocurrencies.

H₁: There is a statistically significant Impact of Bitcoin returns on the returns of Alternative Cryptocurrencies.

3. Methodology:

3.1. Data sources:

The required data has been collected from websites like CoinMarketCap, Cryptorank.io and various other relevant crypto exchange platforms for a period of last eight years, i.e., from 2018 to 2025 relating to the performance of various cryptocurrencies. The list of alternative cryptocurrencies in order to compare with the Bitcoin was selected based on their market capitalization and market share and the period of time of existence in the market.

3.2. Tools and Techniques used:

3.2.1. Modigliani – Modigliani (M^2) Measure:

The collected has been processed using the MS excel by applying the technique of M^2 (Modigliani-Modigliani) Risk adjusted returns considering the Bitcoin as benchmark and taking US Federal reserve interest rate as Risk free rate.

$$M^2 = R_f + S \times \sigma_M$$

Where: R_f = Risk-free rate; S = Sharpe ratio; σ_M = standard deviation of the benchmark (Bitcoin).

3.2.2. Ordinary Least Square (OLS) Regression:

To find out the impact of Bitcoin (bench mark) up on the various selected cryptocurrencies and also to find out the degree of independence exhibited by various selected cryptocurrencies up on the Bitcoin (bench mark) Ordinary least square (OLS) Regression was employed using the E-Views software and before proceeding to the regression analysis unit root test was conducted to check for the stationarity of the time series data of the various cryptocurrencies Augmented dickey fuller (ADF) test was applied and the data which was found non-stationary for some cryptocurrencies at given level and indicating unit root test but after applying the first difference all the series achieved stationarity at 5% significance level and proceeded with OLS.

$$R_{i,t} = \alpha + \beta R_{BTC,t} + \varepsilon_t$$

Were:

$R_{i,t}$ = Return of the selected cryptocurrency 'I' at the time 't'.

$R_{BTC,t}$ = Return of the Bitcoin (benchmark) at the time 't'.

α = Constant term (Intercept)

β = Regression coefficient indicating the impact of the sensitivity of the cryptocurrency 'i' to Bitcoin return.

ε_t = Error term representing the unexplained variation.

4. Data Analysis and Findings:

4.1. Performance Comparison using the M² (Modigliani Modigliani) Risk-Adjusted Returns:

Table 1: Comparison of Risk adjusted BTC Returns and Various Alternative Cryptocurrencies

Cryptocurrency	Average Returns (%)	Benchmark (BTC)	Volatility (STD D)	Sharpe Ratio	Risk Free Rate (%)	M ² Value
BNB	40.27	13.00	64.45	-0.73	2.41	54.39
Cardano	-8.92	13.00	33.98	1.78	2.41	111.12
ChainLink	35.03	13.00	41.38	1.78	2.41	127.12
Ethereum Classic	9.68	13.00	31.77	0.16	2.41	28.03
Ethereum	12.86	13.00	28.89	0.03	2.41	12.40
Litecoin	3.71	13.00	30.70	-0.08	2.41	4.16
Monero	2.19	13.00	26.98	-1.47	2.41	-27.67
Stellar	-89.03	13.00	58.65	-0.65	2.41	-3.88
Tron	2.19	13.00	22.98	-0.09	2.41	0.92
XRP	7.74	13.00	29.92	0.36	2.41	30.12

*Authors own calculation based on the available data sources.

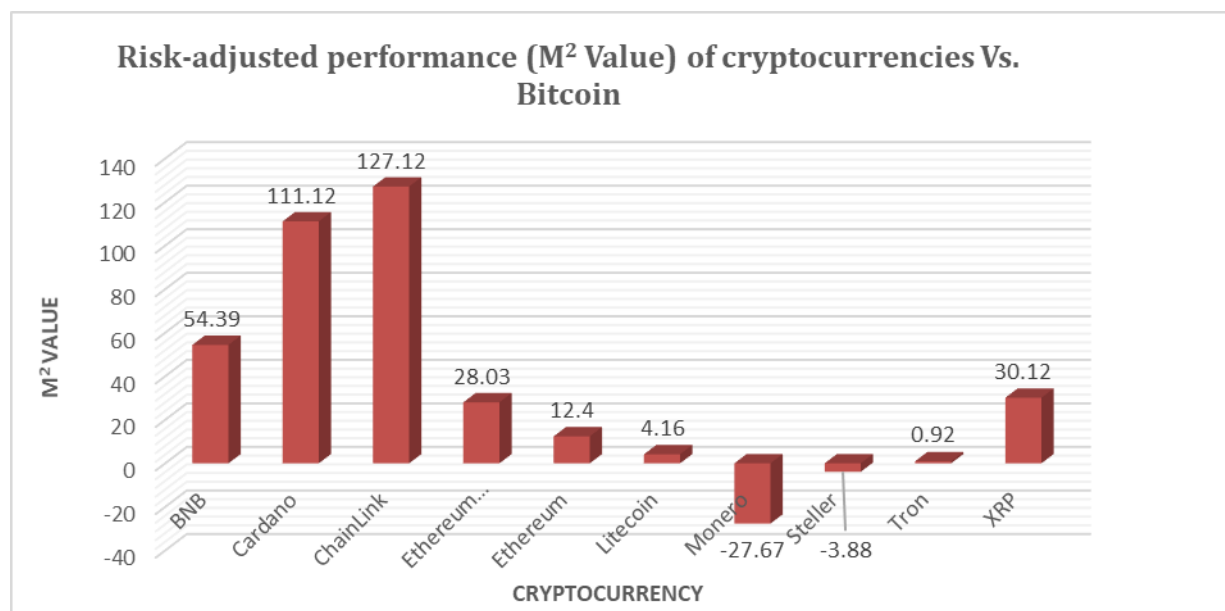
Source: <https://cryptorank.io/https://coinmarketcap.com>.

The Modigliani-Modigliani M² risk-adjusted return was applied in order to evaluate the performance of selected cryptocurrencies considering the bitcoin as a benchmark and US Federal reserve interest rate as risk-free rate of return and the M² measure was adjusted the Sharpe ratio in to percentage allowing the direct comparison with benchmark(bitcoin).The cryptocurrency that has higher M² reflects superior risk-adjusted performance and those with a lower or negative M² value indicates underperformance in comparison to benchmark.

From the results of M² analysis conducted for various selected cryptocurrencies Chainlink (M² = 127.12) has the higher risk adjusted performance reflecting that it has outperformed the Bitcoin this indicates chain link has greater consistency of returns per unit of risk undertaken,

making it an attractive option for the investors. Followed by Cardano ($M^2 = 111.12$) has also outperformed significantly well, also highlights itself as an alternative for the bitcoin reflecting a robust efficiency of converting risk in returns. Further BNB ($M^2 = 54.39$) has also showed a positive risk adjusted returns and outperformed the bitcoin indicating that it has higher returns with manageable levels of volatility. Similarly, XRP ($M^2 = 30.12$) and Ethereum classic ($M^2 = 28.03$) have a good positive M^2 indicating their performance is reasonably well in comparison to benchmark and sustained better than average market efficiency when adjusted for volatility. In contrast, cryptocurrencies like Ethereum ($M^2 = 12.40$) and Litecoin ($M^2 = 4.16$) have reflected relatively lower M^2 values though they have achieved the returns above the risk-free rate and performance remained close to bitcoin highlighting their limited capacity of generating excess returns.

Figure1: Depicting the M^2 Values of Various Alternative Cryptocurrencies in Comparison to Bitcoin.



*Authors own calculation based on the available data sources.

Source: <https://cryptorank.io/https://coinmarketcap.com>.

TRON ($M^2 = 0.92$) also reflected relatively very low M^2 value indicating that they neither outperformed nor underperformed the bitcoin when adjusted for the risk. On the other hand, Monero ($M^2 = -27.67$) and Steller ($M^2 = -3.88$) reported a negative M^2 value reflecting the underperformance compared to bitcoin and investors though have undertaken higher risk but does

not get compensated with the proper returns further Steller has extremely negative average returns (-89.03%) state high volatility and very weak performance efficiency.

4.2. Stationarity Test (Augment Dickey Fuller Test):

To ensure the normality of the time series data related to returns of various cryptocurrencies, normality test was conducted using the ADF (Augment dickey fuller test) was conducted and was found to be not stationary for some cryptocurrencies indicating the Unit root test and then first level of difference was applied at 5% significance level.

Table 2: Result of Stationarity of Data.

Cryptocurrency	Test Stat (ADF)	p-value	5% Critical value	Stationarity
Bitcoin	-5.792	0.0001	-2.986	Stationary
BNB	-5.351	0.0002	-2.991	Stationary
Cardano	-2.984	0.0497	-2.981	Stationary
ChainLink	-0.498	0.0048	-3.259	Stationary
Ethereum Classic	-5.455	0.0002	-2.986	Stationary
Ethereum	-4.377	0.0023	-2.991	Stationary
Litecoin	-3.100	0.0390	-2.981	Stationary
Monero	-5.106	0.0004	-2.986	Stationary
Steller	-5.046	0.0004	-2.986	Stationary
Tron	-5.106	0.0004	-2.986	Stationary
XRP	-6.575	0.0000	-2.986	Stationary

*Authors own calculation based on the available data sources.

Source: <https://cryptorank.io/><https://coinmarketcap.com>.

The results of the test indicated that the ADF statistics of the returns of the various cryptocurrencies were more negative than the required critical value, i.e., 0.05. Hence, the presence of the null hypothesis is rejected stating that the data related to the returns of various cryptocurrencies is stationary and ensuring the absence of spurious relationship in the data and can proceed further with econometric analysis like OLS regression.

4.3. OLS Regression:

The ordinary least square (OLS) regression model was used to study the impact of the Bitcoin (benchmark) on the selected alternate cryptocurrencies. The result of the regression has reflected that the bitcoin has a significant influence on some cryptocurrencies and also insignificant or

weaker relationship with few cryptocurrencies. The result of the test has shown that for BNB the coefficient values of 0.006 with a p-value of 0.000 indicates a strong positive relation stating the one unit rise in bitcoin has resulted in an increase of 0.006 unit of BNB which indicates that BNB closely follows the bitcoin and behaves as a correlated asset within the eco system of cryptocurrency. Further, Ethereum (coefficient = 0.045, $p = 0.000$) and Entereum classic (coefficient = $2.37E-06$, $p = 0.000$) also shows a significant and positive relationship and move in tandem with the performance of bitcoin indicating a strong investor sentiment and trading pattern of bitcoin influence these assets. The result also aligns with a notion of Ethereum and its derivatives Ethereum classic share a strong linkage with Bitcoin. The result of the regression analysis Monero (coefficient = 0.002, $p = 0.0065$), Steller (coefficient = $4.00E-04$, $p = 0.000$), TRON (coefficient = $2.80E-03$, $p = 0.0065$) and XRP (coefficient = $2.77E-05$, $p = 0.0003$) shows a statistically significant coefficient that implies a positive influence of the bitcoin returns and the performance of the alternative cryptocurrencies is largely influenced by the bitcoin market performance which reaffirms the role of bitcoin as a market leader in a broader crypto spectrum.

Table 3: Result of the Hypothesis carried out using the OLS Regression.

Dependent variable	Coefficient	Std. Error	t- statistic	p-value	Significance
BNB	0.006	0.0013	4.983	0.0000	Significant
Cardano	$2.02E-05$	$1.37E-05$	1.475	0.1526	Insignificant
ChainLink	-0.259	0.4657	-0.556	0.5865	Insignificant
Ethereum Classic	$2.37E-06$	$4.62E-07$	5.141	0.0000	Significant
Ethereum	0.045	0.0067	6.676	0.0000	Significant
Litecoin	0.001	0.0011	1.304	0.2039	Insignificant
Monero	0.002	0.0009	2.972	0.0065	Significant
Steller	$4.00E-04$	$7.32E-05$	5.532	0.0000	Significant
Tron	$2.80E-03$	0.0009	2.972	0.0065	Significant
XRP	$2.77E-05$	$6.65E-06$	4.166	0.0003	Significant

*Authors own calculation based on the available data sources.

Source: <https://cryptorank.io/https://coinmarketcap.com>.

However, in case of some of the cryptocurrencies like Cardano ($p = 0.1526$), Chainlink ($p = 0.5865$) and Litecoin ($p = 0.2039$), the result of the regression shows statistically insignificant coefficients indicating the returns of the bitcoin does not have an impact on these cryptocurrency and exhibits a degree of independence from the benchmark movement and are influenced by internal factors like investors base diversity, project specification and network activity and cryptocurrency appears to be a potential alternative to the market volatility of bitcoin. Overall, the findings from the regression analysis affirmed that majority of the cryptocurrencies selected shows a significant dependence upon the benchmark(bitcoin) returns which confirms the role of bitcoin as market leader and a key driving force influencing the price behavior across the digital assets.

5. Discussion and Investor Implications:

The findings of the study have provided valuable insights into the comparative analysis and relationship between bitcoin and other selected cryptocurrencies. The result of M^2 risk adjusted return analysis has shown that there is a considerable variation in performance of the cryptocurrencies. There are cryptocurrencies like chainlink (127.12), Cardano (111.12), BNB (54.39) have outperformed the bitcoin in terms of returns when adjusted for risk showing the superiority of compensation on the level of risk and are in line with the prior research documenting the domination of bitcoin (Bouri, E., Roubaud, D. & Shahzad, S. J. H. (2019). In contrast cryptocurrencies like Monero (-27.67), Steller (-3.80), and Litecoin (4.16) have shown a very low or negative performance in returns when adjusted for the risk showing their weaker efficiency which highlight that bitcoin always does not impact other cryptocurrencies in line with findings of previous researches (Yi, S., Xu, Z., & Wang, G. (2018). This type of diversity highlights the heterogenous profiles within the cryptocurrency eco system (Kammoun, W. M. (2025). Further, the result of OLS regression which was conducted to know the dependency of various cryptocurrencies on the Bitcoin (benchmark). The outcomes have shown statistically significant coefficients for cryptocurrencies like BNB ($p = 0.0000$), Ethereum classic ($p = 0.0000$), Ethereum (0.000), Monero (0.0015), Steller (0.000), TRON ($p = 0.0065$), and XRP ($p = 0.0003$), which highlights the strong and positive relation between the benchmark and other cryptocurrencies in line with finding of researches like (Javed, H., & Khan, N. (2024). In contrast cryptocurrencies like Cardano (0.1526), Chainlink (0.5865), and Litecoin (0.2039) proved to be

statistically insignificant and does not have dependency on the benchmark and performed independently with distinct drivers (Yi, S., Xu, Z., & Wang, G. (2018).

The OLS regression results reflect the dominance of Bitcoin as benchmark in crypto ecosystem particularly the coins like Ethereum, BNB, Stellar, TRON, and XRP which are significantly dependent on the Bitcoin. It is required for the investors to recognize benchmark as a key market driver in consistent with Bouri, E., Roubaud, D. & Shahzad, S. J. H. (2019) and Investors are advised to diversify their crypto investments by adding the coins like Cardano, chainlink and BNB alongside the Bitcoin in their portfolio which helps to overcome the market volatility and optimize the risk- return ratio observed by Widodo, I., & Soma, A. M. (2025) further It is also suggested that investors should not depend solely on raw returns but also consider volatility and systematic risk before making the investment decisions which helps them to suggest in highly volatile market like cryptocurrencies in line with (Kammoun, W. M. (2025) and Investors especially in India, where the market is still evolving must be very cautious and keep themselves aware of the regulatory environment, Government policies, Tax compliance and other requirements, which helps them to achieve sustainable returns in crypto investments (Widodo, I., & Soma, A. M. (2025) moreover Investors are advised to set their investment goals clear and decide on risk tolerance and also consider techniques like stop-loss and portfolio balancing to manage the losses. And also suggest the new Investor to invest in small amounts to get experience in the market dynamics (Lavanya, N. D et al. (2024).

6. Limitations and Future Scope of the Study:

The analysis is limited to a selected major cryptocurrency based on their market capitalization and market share, generalizing this result with border and rapidly evolving markets may limit and does not replicate smaller and emerging cryptocurrencies. Further using OLS Regression and M^2 performance may not capture the non-linear behavior, structural breaks and regime shift which are quite common in crypto markets and moreover the study solely depends on the historical data and does not involve regulatory developments and macroeconomic variable which could also possibly impact the returns. Future research can be extended by adding new emerging altcoins and stable coins, further using advanced econometric and machine learning techniques like GARCH family models, regime shift models, Treynor ratio Jensen's alpha and etc. Addition of macro-economic indicators like policy uncertainty and investor sentiments can provide deeper insights.

7. Conclusion:

The study has used a Modigliani-Modigliani (M^2) approach which offered a robust framework for evaluating the risk-adjusted performance of various cryptocurrencies in comparison to Bitcoin from 2018 to 2024. The results of this analysis indicate that cryptocurrencies such as BNB, Chainlink, and Ethereum exhibit consistently higher M^2 values, signifying superior returns following adjustments for volatility relative to Bitcoin. In stark contrast, assets including Stellar, Tron, and Monero demonstrate persistently low or negative M^2 scores, which reflect inadequate risk-reward profiles. Meanwhile, XRP and Litecoin present moderate M^2 values, indicating a mixed performance that remains relatively stable. This overall analysis emphasizes the necessity of assessing not only absolute returns but also the effectiveness of each asset in providing returns commensurate with the risks undertaken. Such evaluations yield critical insights for portfolio construction and risk management within the dynamic cryptocurrency landscape. Furthermore, a rigorous Ordinary Least Squares (OLS) regression analysis was performed to assess the influence of Bitcoin returns on selected cryptocurrencies. The results reveal a variable level of impact among the assets under consideration. Notably, Bitcoin was found to exert a statistically significant influence on the returns of BNB, Ethereum Classic, Ethereum, Monero, Stellar, TRON, and XRP, as indicated by positive coefficients and p-values below 0.05. This suggests that these cryptocurrencies are likely to move in parallel with Bitcoin and are closely correlated to its market dynamics. Conversely, the analysis found no significant influence on Cardano, Chainlink, and Litecoin, suggesting that these cryptocurrencies may be affected by distinct factors independent of Bitcoin's performance. Overall, these findings reinforce Bitcoin's role as a benchmark cryptocurrency, especially for major assets with a well-established market presence. Investors and analysts can utilize this relationship to enhance their assessments of portfolio risk and diversification strategies, particularly in contexts where Bitcoin's price movements act as a precursor to broader trends in the cryptocurrency market.

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