Comparative Analysis of The Performance of Bitcoin, Stocks, and Gold as Alternative Investments

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Abstract. The objective of this research is to examine and analyze the performance comparison among Bitcoin cryptocurrency, stocks, and gold. This study employs a quantitative research approach utilizing a comparative method. The population consists of the monthly closing prices of Bitcoin, LQ45 stocks, and gold from 2018 to 2023, totaling 180 data points. A saturated sampling technique is applied in this research. The study utilizes time series data, relying on secondary data sources. Data analysis is conducted using Microsoft Excel, applying relevant formulas for each variable. The data is further processed using SPSS, specifically employing the ANOVA test. The findings reveal significant differences in returns and risks among Bitcoin, stocks, and gold. Additionally, the performance metrics—measured by the Sharpe, Treynor, and Jensen methods—also indicate notable differences among these three asset classes.

Keywords: *Investment, Cryptocurrency, Bitcoin, Stock, Gold, Return, Risk, Perfomance*

INTRODUCTION

In this digital era, everyone has various investment options as alternatives in determining their portfolio or resources for current and future consumption. The Financial Services Authority (OJK) describes investment as a form of capital placement that is usually carried out over the long term and aims to procure complete assets or purchase shares and other securities to gain profit. The increasingly favorable investment climate becomes an added value for investors who now have many investment instruments to choose from, such as stocks, gold, and even cryptocurrency. Cryptocurrency is a virtual coin system that functions like a standard currency, allowing users to make virtual payments for goods and services without relying on a trusted central authority (Farell, 2015). One of the most popular types of cryptocurrency is Bitcoin. According to Farell (2015), Bitcoin has taken the digital coin market a step further by decentralizing the currency and freeing it from the power of hierarchical structures. Bitcoin uses peer-to-peer network technology, where each user can receive and make transactions without any third-party intermediaries.

Besides Bitcoin, other popular investment alternatives include stocks and gold. Stocks are one of the investment instruments that attract public attention due to their higher return potential compared to bonds and mutual funds. The benefits of investing in stocks can come in the form of capital gains and dividends received by investors upon placing their capital. However, investors must still consider the risks involved in stock investment, such as capital loss and liquidation risk.

According to a study by Mahessara and Kartawinata (2018), Bitcoin is considered a better investment alternative by investors because of its high return, although it also carries high risk. Moreover, Bitcoin has shown good performance when measured using the Sharpe, Treynor, and Jensen methods. Similarly, according to Nurcahya (2019), Bitcoin and stocks have higher returns and risks compared to gold. Adiyono (2021) states that Bitcoin has very high returns and risks compared to other investment instruments. Meanwhile, research by Liu & Tsyvinski (2018), which compared three types of cryptocurrencies—Bitcoin, Ethereum, and Ripple—with stocks, forex, and precious metals, indicates that these three cryptocurrencies differ significantly from stocks, forex, and precious metals.

Additionally, research conducted by Lumbantobing and Sadalia (2021) found

differences in performance among cryptocurrency, stock, and gold investment instruments when measured using the Sharpe and Jensen methods. According to Lumbantobing and Sadalia (2021), there is no significant difference in the returns of gold, stocks, and Bitcoin. However, there is a significant difference in terms of risk and portfolio performance. Meiyura & Azib (2020) conducted a study on Bitcoin and gold and stated that there are differences in return and risk between Bitcoin and gold.

Based on the explanations above, the hypotheses proposed in this study are as follows:

H1: There is a significant difference in the returns of bitcoin, stocks, and gold.

H2: There is a significant difference in the risks of bitcoin, stocks, and gold.

H3: There is a significant difference in the performance of bitcoin, stocks, and gold as measured by the Sharpe method.

H4: There is a significant difference in the performance of bitcoin, stocks, and gold as measured by the Treynor method.

H5: There is a significant difference in the performance of bitcoin, stocks, and gold as measured by the Jensen method.sen method.

The objectives of this study are to analyze whether there aare significant differences in the returns of bitcoin, stocks, and gold; to analyze whether there are significant differences in the risks of bitcoin, stocks, and gold; to analyze whether there are significant differences in the performance of bitcoin, stocks, and gold as measured by the Sharpe method; to analyze whether there are significant differences in the performance of bitcoin, stocks, and gold as measured by the Treynor method; and to analyze whether there are significant differences in the

performance of bitcoin, stocks, and gold as measured by the Jensen method.

The theoretical framework in this research includes signal theory, portfolio theory, investment, investment objectives, cryptocurrency, bitcoin, stocks, gold, return, risk, and portfolio performance.

METHOD

This research is a quantitative comparative study. It utilizes time series data obtained from secondary sources. The population used in this study consists of the monthly closing prices of Bitcoin, LQ45 stocks, and gold from 2018 to 2023, totaling 180 data points.

The sampling method used in this research is the saturated sampling method. The data obtained were calculated using Microsoft Excel based on the formulas for each research variable. The data were then processed using SPSS software through an ANOVA test. However, before conducting the hypothesis test, classical assumption tests—namely, the normality test and the homogeneity test—must be carried out. If the assumptions of normality or homogeneity are not met, the hypothesis test will be conducted using a non-parametric statistical method, namely the Kruskal-Wallis test.

RESULT AND DISCUSSION
Descriptive Analysis

The descriptive analysis results include the minimum score, maximum score, mean, and standard deviation of the return and risk data, as well as the performance of Bitcoin, stocks, and gold as measured by the Sharpe method, Treynor method, and Jensen method from 2018 to 2023. Table 1 Result Descriptive Analysis from 2018 to 2023.

Table 1
Result Descriptive Analysis

Model	N	Minimum	Maksimum	Rata-rata	Standar Deviasi
Return bitcoin	60	-0,01396	0,01818	0,00329	0,00751
Return saham	60	-0,02486	0,01359	0,00015	0,00621
Return emas	60	-0,01400	0,01796	0,00155	0,00669
Risk bitcoin	60	-1,78755	-1,03263	-1,43349	0,16535
Risk saham	60	-1,92249	-0,85189	-1,57229	0,18558
Risk emas	60	-1,97326	-1,17656	-1,53596	0,14034
Kinerja *bitcoin* metode Sharpe	60	-3,55451	-0,25677	-1,30286	0,69125
Kinerja saham metode Sharpe	60	-3,85902	-0,05158	-1,83369	0,83599
Kinerja emas metode *Sharpe*	60	-4,21223	-0,01112	-1,63307	0,73899
Kinerja *bitcoin* metode Treynor	60	-0,44325	0,73992	0,02277	0,19914
Kinerja saham metode Treynor	60	-0,89423	0,29095	-0,14552	0,17514
Kinerja emas metode *Treynor*	60	-0,42419	0,26162	-0,15426	0,14373
Kinerja *bitcoin* metode Jensen	60	-0,02866	0,01629	-0,00498	0,00751
Kinerja saham metode Jensen	60	-0,05452	-0,01485	-0,03243	0,00793
Kinerja emas metode *Jensen*	60	-0,04786	-0,01232	-0,03337	0,00846

Data diolah : SPSS 26 for windows

Based on Table 4.1, the following 15 general descriptions are presented:

1. Bitcoin return has a minimum score of -0.01396, a maximum of 0.01818, a mean of 0.00329, and a standard deviation of 0.00751. The standard deviation being greater than the mean indicates high variability in bitcoin return data.
2. Stock return has a minimum score of -0.02486, a maximum of 0.01359, a mean of 0.00015, and a standard deviation of 0.00621. This indicates high variability in stock return data.
3. Gold return has a minimum score of -0.01400, a maximum of 0.01796, a mean of 0.00155, and a standard deviation of 0.00669. The standard deviation being lower than the mean indicates less variability in gold return data.
4. Bitcoin risk has a minimum score of -1.78755, a maximum of -1.03263, a mean of -1.43349, and a standard deviation of 0.16535, indicating high variability in bitcoin risk data.
5. Stock risk has a minimum score of -1.92249, a maximum of -0.85189, a mean of -1.57229, and a standard deviation of 0.18558, indicating high variability.
6. Gold risk has a minimum score of -1.97326, a maximum of -1.17656, a mean of -1.53596, and a standard deviation of 0.14034, also showing high variability.
7. Bitcoin performance using the Sharpe method has a minimum

of -3.55451, a maximum of -0.25677, a mean of -1.30286, and a standard deviation of 0.69125, indicating high variability.

8. Stock performance using the Sharpe method has a minimum of -3.85902, a maximum of -0.05158, a mean of -1.83369, and a standard deviation of 0.83599, indicating high variability.

9. Gold performance using the Sharpe method has a minimum of -4.21223, a maximum of -0.01112, a mean of -1.63307, and a standard deviation of 0.73899, also indicating high variability.

10. Bitcoin performance using the Treynor method has a minimum of -0.44325, a maximum of 0.73992, a mean of 0.02277, and a standard deviation of 0.19914, indicating high variability.

11. Stock performance using the Treynor method has a minimum of -0.89423, a maximum of 0.29095, a mean of -0.14552, and a standard deviation of 0.17514, indicating high variability.

12. Gold performance using the Treynor method has a minimum of -0.42419, a maximum of 0.26162, a mean of -0.15426, and a standard deviation of 0.14373, indicating high variability.

13. Bitcoin performance using the Jensen method has a minimum of -0.02866, a maximum of 0.01629, a mean of -0.00498, and a standard deviation of 0.00751, indicating high variability.

14. Stock performance using the Jensen method has a minimum of -0.05452, a maximum of -0.01485, a mean of -0.03243, and a standard deviation of 0.00793, indicating high variability.

15. Gold performance using the Jensen method has a minimum of -0.04786, a maximum of -0.01232, a mean of -0.03337, and a standard deviation of 0.00846, indicating high variability.

Normality Test of the Data

Table 2 shows that the Sig. values for all types of research data are greater than 0.05. Based on the normality test criteria, data are considered normally distributed if the Sig. value is greater than 0.05. This indicates that the distribution of return and risk data, as well as the performance of Bitcoin, stocks, and gold measured using the Sharpe, Treynor, and Jensen methods, are normally distributed.

Table 2
Result Normality Test

Jenis Data	Kolmogorov–Smirnov			Keterangan
	Statistic	df	Sig.	
Return bitcoin	0,108	60	0,080	Normal
Return saham	0,089	60	0,200	Normal
Return emas	0,069	60	0,200	Normal
Risk bitcoin	0,058	60	0,200	Normal
Risk saham	0,111	60	0,062	Normal
Risk emas	0,108	60	0,081	Normal
Kinerja bitcoin metode Sharpe	0,112	60	0,061	Normal
Kinerja saham metode Sharpe	0,098	60	0,200	Normal
Kinerja emas metode Sharpe	0,078	60	0,200	Normal
Kinerja bitcoin metode Treynor	0,101	60	0,200	Normal
Kinerja saham metode Treynor	0,089	60	0,200	Normal
Kinerja emas metode Treynor	0,061	60	0,200	Normal
Kinerja bitcoin metode Jensen	0,060	60	0,200	Normal
Kinerja saham metode Jensen	0,068	60	0,200	Normal
Kinerja emas metode Jensen	0,069	60	0,200	Normal

Data diolah : Output SPSS 26 for windows

Homogeneity of Variance Test

Based on Table 3, the results of the homogeneity of variance test for the return, risk, and performance groups of Bitcoin, stocks, and gold—measured using the Sharpe method, Treynor method, and Jensen method—show a Sig. value > 0.05. This indicates that the variances in each data group (return, risk, and performance of Bitcoin, stocks, and gold as measured by the Sharpe, Treynor, and Jensen methods) are equal (homogeneous).

Table 3
Result Hemogeneity Variance Test

Levene's Test of Equality of Error Variances					
Kelompok data	Levene Statistic	df1	df2	Sig.	Keputusan
Return	2,528	2	177	0,083	Varians Homogen
Risk	1,668	2	177	0,192	Varians Homogen
Kinerja metode Sharpe	1,605	2	177	0,204	Varians Homogen
Kinerja metode Treynor	2,825	2	177	0,062	Varians Homogen
Kinerja metode Jensen	1,062	2	177	0,348	Varians Homogen

Data diolah : Output SPSS 26 for windows

Hypothesis Testing

First Hypothesis Testing (H1)

The first hypothesis testing in this study uses the ANOVA test to determine whether there are significant differences between the returns of Bitcoin, stocks, and gold. Based on the data in Table 4, the significance value is 0.043. This result shows that Sig. < 0.05, which means there is a significant difference between the returns of Bitcoin, stocks, and gold. From these results, it can be concluded that there is a significant difference between the returns of Bitcoin, stocks, and gold from 2018 to 2023.

Table 4
Result ANOVA Test for Hypotesis Testing One

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0,000	2	0,000	3,193	0,043
Within Groups	0,008	177	0,000		
Total	0,009	179			

Data diolah : Output SPSS 26 for windows

Hypothesis Testing Two (H2)

Based on the data in Table 5, it is shown that the significance value (Sig.) is 0.000. This result indicates that Sig. < 0.05, which means there is a significant difference between the risks of Bitcoin, stocks, and gold. From these results, it can be concluded that there is a significant difference in the risks of Bitcoin, stocks, and gold from 2018 to 2023.

Table 5
Result Anova Test for Hypotesis Testing Two

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0,622	2	0,311	11,446	0,000
Within Groups	4,807	177	0,027		
Total	5,429	179			

Data diolah : Output SPSS 26 for windows

Hypothesis Testing Three (H3)

Based on the data in Table 6, the significance value (Sig.) is 0.001. This result indicates that Sig. <0.05, which means there is a significant difference in the performance of Bitcoin, stocks, and gold as measured by the Sharpe method. From this result, it can be concluded that there is a

significant difference in the performance of Bitcoin, stocks, and gold as measured by the Sharpe method from 2018 to 2023.

Table 6
Result Anova Test for Hypothesis Testing Three

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8,621	2	4,311	7,506	0,001
Within Groups	101,646	177	0,574		
Total	110,267	179			

Data diolah : Output SPSS 26 for windows

Hypothesis Testing Four (H4)

Based on the data in Table 7, it is shown that the Sig. value is 0.000. This result indicates that Sig. <0.05, which means there is a significant difference in the performance of Bitcoin, stocks, and gold as measured by the Treynor method. From these results, it can be concluded that there is a significant difference in the performance of Bitcoin, stocks, and gold as measured by the Treynor method from 2018 to 2023.

Table 7
Result Anova Test for Hypothesis Testing Four

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,195	2	0,597	19,697	0,000
Within Groups	5,368	177	0,030		
Total	6,563	179			

Data diolah : Output SPSS 26 for windows

Hypothesis Testing Five (H5)

Based on the data in Table 8, it is shown that the significance value (Sig.) is 0.000. This result indicates that Sig. < 0.05, which means there is a significant difference in the performance of Bitcoin, stocks, and gold as measured by the Jensen method. From these results, it can be concluded that there is a significant difference in the performance of Bitcoin, stocks, and gold as measured by the Jensen method from 2018 to 2023.

Table 8
Result Anova Test for Hypothesis Testing Five

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0,031	2	0,016	245,509	0,000
Within Groups	0,011	177	0,000		
Total	0,042	179			

Data diolah : Output SPSS 26 for windows

DISCUSSION

The Relationship Between Return and Investment Instruments Based on the results of the ANOVA test, the F statistical test showed a significance value of 0.043. This significance value is smaller than $\alpha = 0.05$. Therefore, the first hypothesis (H1), which states that there is a significant difference between the returns of bitcoin, stocks, and gold from 2018 to 2023, can be accepted.

This research is supported by Nurcahya (2019), who stated that bitcoin and stocks have higher returns compared to futures instruments such as gold. According to Aves (2018), bitcoin is similar to both currency and commodities. Astaman (2018) stated that the price of bitcoin is influenced by demand and supply as well as public news, similar to stocks. According to the Indonesia Stock Exchange, stocks are securities that can be traded in the capital market, where shareholders can earn profits in the form of dividends and capital gains. This capital gain potential makes people consider bitcoin trading similar to stocks because both generate profit from price differences between selling and buying.

When comparing returns, this study found that bitcoin, stocks, and gold differ in the returns they offer to investors. This is what causes a significant difference in returns among bitcoin, stocks, and gold. Empirical studies supporting these findings include Meiyura and Azib (2020), who found significant differences in return and risk between bitcoin and gold. Similar results were also shown by Liu and Tsyvinski (2018), who found differences in returns between cryptocurrencies, stocks, and precious metals such as gold.

The Relationship Between Risk and Investment Instruments Based on the ANOVA test results, the F statistical test showed a significance value of 0.000. This significance value is smaller than $\alpha = 0.05$. Therefore, the second hypothesis (H2), which states that there is a significant difference between the risks of bitcoin, stocks, and gold from 2018 to 2023, can be accepted.

This research is supported by Nurcahya (2019), who stated that bitcoin and stocks have higher risk levels compared to futures instruments such as gold. Risk is the level of potential loss that may occur because the actual return obtained is not as expected (Jones, 2016). Every investment decision is related to return and risk, thus managing risk is crucial in making investments. Generally, the risks vary depending on the investment instrument. The higher the expected return, the greater the possible risk. Bitcoin lacks a physical form and is not yet legally accepted as a means of transaction, particularly in Indonesia. Stocks have a physical form and are supervised by the Capital Market Supervisory Agency and Financial Institution (BAPEPAM-LK), with price movement limits, making them less risky than bitcoin. Gold has a physical form, and its price fluctuation depends heavily on economic conditions and overall market situations, making it more stable compared to other investment instruments.

Empirical studies supporting these findings include Meiyura and Azib (2020), who found significant differences in return and risk between bitcoin and gold. Similar findings were also shown by Tsyvinski (2018), who stated that there are differences

in risk between cryptocurrencies, stocks, and precious metals.

The Relationship Between the Sharpe Method and Investment Instrument Performance Based on the ANOVA test results, the F statistical test showed a significance value of 0.001. This significance value is smaller than α = 0.05. Therefore, the third hypothesis (H3), which states that there is a significant difference between the performance of bitcoin, stocks, and gold as measured using the Sharpe method from 2018 to 2023, can be accepted.

This study is supported by Aves (2018), who stated that bitcoin, stocks, and gold have different performances when measured using the Sharpe method. The performance of bitcoin during the study period was very volatile and had a value that was significantly different compared to stocks and gold. This occurred due to the fluctuating returns over time, leading to higher return dispersion, unlike gold and stocks.

Empirical studies supporting these findings include Lumbantobing and Sadalia (2021), who found significant differences in the performance of stocks, cryptocurrency, and gold when measured using the Sharpe method. Similar findings were also shown by Sepdiana (2019), who found significant differences in the performance of stocks, cryptocurrency, and gold when measured using the Sharpe method.

The Relationship Between the Treynor Method and Investment Instrument Performance Based on the ANOVA test results, the F statistical test showed a significance value of 0.000. This significance value is smaller than α = 0.05. Therefore, the fourth hypothesis (H4), which states that there is a significant difference between the performance of bitcoin, stocks, and gold as measured using the Treynor method from 2018 to 20213, can be accepted.

This study is supported by Aves (2018), who stated that bitcoin, stocks, and gold have different performances when measured using the Treynor method. The Treynor method provides a composite measure of portfolio performance that also takes into account the risk of the chosen portfolio. The Treynor method states that there must be a risk component, which includes market fluctuations and fluctuations from individual securities.

From the descriptive analysis, bitcoin had the highest and lowest Treynor values compared to stocks and gold, although the difference was not too large. Based on the data, all three instruments had relatively similar performance when compared to their respective market risks. However, due to the fluctuating returns and more volatile beta values of cryptocurrency, bitcoin's Treynor value also showed high volatility, resulting in both the highest and lowest Treynor values among the three instruments.

Empirical studies supporting these findings include Hamdika et al. (2022), who stated that there are significant differences between bitcoin, stocks, and gold when measured using the Treynor performance metric.

The Relationship Between the Jensen Method and Investment Instrument Performance Based on the ANOVA test results, the F statistical test showed a significance value of 0.000. This significance value is smaller than α = 0.05. Therefore, the fifth hypothesis (H5), which states that there is a significant difference between the performance of bitcoin, stocks, and gold as measured using the Jensen method from 2018 to 2023, can be accepted.

This study is supported by Adiyono et al. (2021), who stated that the performance of each investment instrument—bitcoin, stocks, and gold—can vary when measured using the Jensen method. The research showed that bitcoin had the highest average value in performance when measured by the Jensen method compared to other investment instruments. This is due to bitcoin's highly

fluctuating returns, which nonetheless maintained strong performance as measured by the Jensen method. The higher the Jensen value, the better the performance of the investment instrument.

Measuring the performance of each investment instrument is important as a basis for investment decision-making for potential investors. The Jensen performance measure, developed by Michael C. Jensen, calculates the excess return of a portfolio beyond the expected return. The Jensen method is considered an improvement over the Treynor method. By applying this method across various investment instruments, a clearer comparison of performance can be observed.

Empirical studies supporting these findings include Lumbantobing and Sadalia (2021), who confirmed that there are performance differences measured using the Jensen method for bitcoin, stocks, and gold.

CONCLUSION

Based on the findings and discussions surrounding the research hypotheses, the following conclusions can be drawn:

1. There exists a significant disparity in the returns of bitcoin, stocks, and gold from 2018 to 2023. There is a notable difference in the risk profiles of bitcoin, stocks, and gold during the same period.
2. The performance of bitcoin, stocks, and gold, as assessed by the Sharpe ratio, shows significant variation from 2018 to 2023. A significant difference in performance, as evaluated by the Treynor ratio, is evident among bitcoin, stocks, and gold from 2018 to 2023.
3. The Jensen method also reveals a significant difference in the performance of bitcoin, stocks, and gold over the specified timeframe.

SUGGESTIONS

1. This research focuses solely on three investment vehicles: bitcoin, stocks, and gold. Future studies should consider incorporating additional investment options, such as mutual funds, Non-Fungible Tokens (NFTs), or other emerging assets.
2. Moreover, this study primarily compares the performance of bitcoin, stocks, and gold as alternative investments. Future research is encouraged to explore various performance measurement techniques to enhance the analysis.
3. Lastly, this study is confined to a specific timeframe. It is recommended that future research extend the duration of the study and include additional variables to yield more precise results and provide more comprehensive insights.

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