COMPARATIVE ANALYSIS OF THE PERFORMANCE OF BITCOIN CRYPTOASSET, GOLD, AND APPLE INC. STOCKS AS INVESTMENT ALTERNATIVES
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ABSTRACT

This research aims to compare the performance of three investment instruments Bitcoin, gold, and Apple Inc. stocks, which are often considered as alternative hedges against inflation and global economic uncertainty. The research employs a quantitative method with a descriptive-comparative approach, using secondary data in the form of monthly closing prices of the three assets from February 1, 2015, to February 1, 2025, totaling 363 observations. Investment performance is measured by calculating return and risk using standard deviation. Normality and homogeneity tests were applied to determine the appropriate statistical analysis, followed by ANOVA or Kruskal-Wallis tests. The findings indicate significant differences in the performance of the three instruments. Bitcoin offers the highest potential return but is accompanied by the highest risk. Gold tends to be more stable with the lowest level of risk, while Apple Inc. stocks offer a balanced combination of return and risk. These results can serve as a reference for investors to align their investment choices with their respective risk profiles.

Keywords: Bitcoin, Gold, Apple Inc. Stock, Return, Risk, Investment

ABSTRAK

Penelitian ini bertujuan untuk membandingkan kinerja tiga instrumen investasi yaitu Bitcoin, emas, dan saham Apple Inc., yang sering dianggap sebagai lindung nilai alternatif terhadap inflasi dan ketidakpastian ekonomi global. Penelitian ini menggunakan metode kuantitatif dengan pendekatan deskriptif-komparatif, menggunakan data sekunder berupa harga penutupan bulanan dari ketiga aset tersebut dari 1 Februari 2015 hingga 1 Februari 2025, dengan total 363 observasi. Kinerja investasi diukur dengan menghitung pengembalian dan risiko menggunakan deviasi standar. Uji normalitas dan homogenitas diterapkan untuk menentukan analisis statistik yang tepat, diikuti dengan uji ANOVA atau Kruskal-Wallis. Temuan menunjukkan perbedaan signifikan dalam kinerja ketiga instrumen tersebut. Bitcoin menawarkan potensi pengembalian tertinggi tetapi disertai dengan risiko tertinggi. Emas cenderung lebih stabil dengan tingkat risiko terendah, sementara saham Apple Inc. menawarkan kombinasi yang seimbang antara imbal hasil dan risiko. Hasil ini dapat menjadi referensi bagi para investor untuk menyelaraskan pilihan investasi mereka dengan profil risiko masing-masing.

Kata kunci: Bitcoin, Emas, Saham Apple Inc., Pengembalian, Risiko, Investasi

1. INTRODUCTION

In recent years, global economic uncertainty and rising inflation have become major challenges in financial management, both for individuals and institutions. In Indonesia, the inflation rate has shown an upward trend, reaching 5.51% in 2022 compared to just 1.87% in the previous year. This condition raises concerns about the declining purchasing power of the public and highlights the growing need for investment strategies that can provide value protection against inflation.

Figure 1: Indonesia Inflation Rate, 2014–2024
Source: Bank Indonesia – www.bi.go.id (2025)

This phenomenon has encouraged investors, particularly from the younger generation, to seek investment instruments that not only offer high returns but are also relatively safe in the long term. In this context, assets such as Bitcoin, gold, and Apple Inc. stocks have drawn considerable attention due to their unique characteristics. Bitcoin is known for its high volatility and substantial return potential. Gold has long served as a hedge against inflation. Meanwhile, Apple Inc. stocks, representing the global technology sector, are considered to offer stable performance and promising growth.

Although these three instruments are frequently discussed in the investment landscape, studies that directly compare the return and risk performance of all three over an extended period remain limited. Most prior research tends to focus on two asset types (such as gold and Bitcoin) or compares cryptocurrencies with stock markets in general, without considering specific stocks that represent particular sectors. This indicates a significant research gap that warrants further exploration.

This research aims to address that gap by analyzing and comparing the performance of Bitcoin, gold, and Apple Inc. stocks over a ten-year period, from February 2015 to February 2025. The study adopts a quantitative approach using a descriptive-comparative method, with a total of 363 monthly price observations from the three instruments. Return and risk were calculated using standard deviation, and comparisons among the instruments were statistically tested using the Kruskal-Wallis method.

Table 2: Minimum, Maximum, and Average Values of Return and Risk for
Investment Instruments

	Return			Risk		
	Minimun	Maximum	Average	Minimum	Maximum	Average
Bitcoin	-37.32%	70.38%	7.19%	0.0033	0.5101	0.1633
Gold	-8.19%	10.90%	0.75%	0.0008	0.1057	0.0327
Apple Inc. Stock	-18.40%	21.44%	2.04%	0.0001	0.2241	0.0626

Source: Processed Data (Excel), investing.com (2025)

The results of this research are expected to provide practical contributions for investors in formulating investment strategies that align with their risk profiles. In addition, from a theoretical standpoint, this study enriches the literature on the comparative performance of conventional and digital assets, particularly in the context of long-term value protection against inflation.

2.   LITERATURE REVIEW

Investment Theory

Investment refers to the allocation of funds into an asset with the expectation of generating future returns. According to Syahyunan (2015), "Investment is a current sacrifice made with the expectation of obtaining future benefits." The primary goal of investment is to increase asset value and achieve capital growth. In this context, investors can choose from a wide range of investment instruments, such as stocks, bonds, gold, and cryptocurrencies/cryptoassets. Each of these instruments has different characteristics and levels of risk, making it essential for investors to have a comprehensive understanding of each option.

Stocks are financial instruments that represent ownership in a company. By purchasing stocks, investors are entitled to a share of the company's profits, typically distributed in the form of dividends. On the other hand, bonds are debt securities issued by governments or corporations to raise capital, and bondholders receive periodic interest payments until maturity.

Gold, as one of the traditional investment instruments, is often considered a safe haven asset due to its ability to preserve value during times of economic uncertainty. According to Widiawati (2020), "Gold has long been regarded as a safe investment choice, especially in times of economic uncertainty."

Cryptoassets, particularly Bitcoin, have emerged as modern investment instruments offering high return potential but also accompanied by significant risks.

Performance Theory

Performance refers to the extent to which an individual, group, or organization achieves predetermined objectives. It is a critical aspect across various fields, including business, management, and finance. Performance evaluation is conducted to assess the

effectiveness and efficiency of resource management and the achievement of established goals.

According to S. Sibarani and R.D. Marviana (2021), "Performance evaluation is essentially a key factor in developing an organization effectively and efficiently, as it leads to better policies or programs concerning the human resources within the organization." A thorough performance evaluation enables organizations to identify their strengths and weaknesses, thus allowing for continuous improvement. Consequently, the strategies implemented can be more closely aligned with the organization's vision and mission and better equipped to respond to external challenges.

Investment Performance

Investment performance is measured using various metrics, the most common of which are Return on Investment (ROI) and risk. ROI measures the profit earned from an investment relative to the cost of the investment. This metric is crucial for evaluating investment effectiveness and aiding decision-making. According to Bambang Riyanto (2009), "ROI is the rate of return on an investment that shows the ability of the invested capital in total assets to generate net profit."

Investment risk refers to the likelihood of losses or results that do not meet expectations. Each investment instrument carries a different level of risk, and understanding these risks is vital for investors. According to Prabowo, H., & Sari, D. (2021), "Risk can be defined as the uncertainty of investment outcomes, and investors must consider this risk in decision-making." In this context, investors need to evaluate the risks associated with each instrument, including Bitcoin, Gold, and Apple Inc. Stocks, to make informed decisions.

Inflation and Its Impact on Investments

Inflation is the general increase in the prices of goods and services within an economy. High inflation can reduce the purchasing power of the public and affect the real value of investment returns. In this context, investors need to consider how inflation can impact their investment decisions. According to Mankiw (2016), "Inflation can erode the real value of assets, making it important for investors to consider its impact."

One way to protect assets from inflation is by investing in instruments that have a higher growth potential than the inflation rate, such as stocks and gold. Gold, for example, is often seen as a hedge against inflation because its value tends to rise as the prices of goods and services increase. On the other hand, stocks of companies with strong fundamentals, such as Apple, can also offer higher returns than inflation.

Global Economic Uncertainty

Global economic uncertainty can arise from various factors, including changes in monetary policy, political instability, and economic crises. This uncertainty creates challenges for investors in predicting the performance of various investment instruments. In such situations, investors need to adjust their investment strategies to mitigate risk. According to Sari (2020), "Economic uncertainty can influence investment decisions and trigger market volatility. Additionally, a solid understanding of market conditions and fundamental analysis of each instrument is crucial in investment decision-making."

Cryptoasset: Bitcoin

Bitcoin is the first cryptoasset introduced in 2009 by an individual or group using the pseudonym Satoshi Nakamoto. As a form of digital currency, Bitcoin operates on blockchain technology, allowing transactions to be conducted securely and transparently without intermediaries. Bitcoin is known for its high risk, offering the potential for significant gains but also substantial losses. According to Lumbantobing and Sadalia (2021), "Bitcoin has emerged as an asset attracting investor attention, but it also brings risks that cannot be ignored."

With the increasing adoption of Bitcoin as an investment tool, many studies have compared its performance with traditional instruments such as stocks and gold. Some studies suggest that Bitcoin can serve as an effective portfolio diversifier, although its risks are higher.

An anonymous programmer or group of programmers, known as Satoshi Nakamoto, developed Bitcoin in 2008, and since then, it has been widely used. Satoshi referred to it as "Electronic Peer-to-Peer Cash System" and described the concept in an innovative way. Due to its decentralized nature, Bitcoin does not rely on central servers or authorities within the network. This concept is similar to a peer-to-peer network that allows users to interact directly.

The consensus principle underlying Bitcoin aims to create a transaction system that does not require a central authority, and this can be verified through the use of digital signatures for each transaction (Nakamoto, 2008). Although electronic currencies (e-coins) have a tradeable nominal value, digital coins function as digital signatures currently used and have potential for future use.

Gold

Gold has long been considered a safe investment instrument, especially in unstable economic conditions. As a physical asset, gold has intrinsic value and is often used as a hedge against inflation. Long-term gold performance shows a tendency to increase, especially when economic uncertainty rises. According to Widiawira and Akbar (2022), "Gold has a unique characteristic as an asset that can protect value in times of uncertainty."

Investing in gold can be done in various ways, including physical purchases, investments in gold mutual funds, or through futures contracts. Although gold does not provide returns in the form of interest or dividends, its stable selling value makes it an attractive option for investors seeking to protect their assets.

Apple Stocks

According to LD Junaidi & LH Siregar (2021), stock prices in the capital market always change according to market conditions. Unstable economic and political conditions are aspects that cause stock prices to rise and fall unexpectedly, along with fluctuations in interest rates and exchange rates.

Apple Inc. (AAPL) stock is one of the most traded stocks in the global stock market. As a leading technology company, Apple has strong fundamentals and a history of consistent growth. The performance of Apple stocks often serves as an indicator of the overall health of the technology market. According to Prabowo and Sari (2021), "Apple

stocks have shown outstanding performance, making it an attractive investment option for many investors."

Investing in Apple stocks offers the potential for high returns, especially with ongoing product innovation and market expansion. However, like any investment, Apple stocks also carry risks, including price fluctuations that can be influenced by market conditions and company performance.
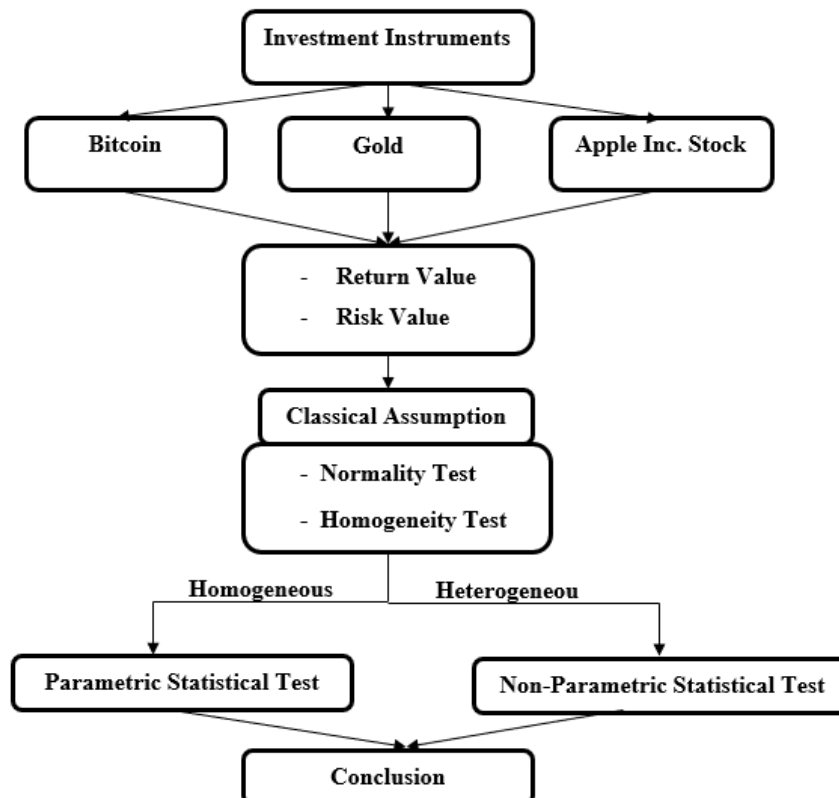

Figure 2: Conceptual Framework

3.   DATA AND RESEARCH TECHNIQUE ANALISYS

This study uses a quantitative approach with a descriptive-comparative method, aiming to compare the performance of three investment instruments: Bitcoin, gold, and Apple Inc. stocks in terms of return and risk. The research is conducted to determine the significant differences between these three instruments over the same period.

Type and Source of Data

The data used is secondary data, consisting of monthly closing prices of Bitcoin, gold, and Apple Inc. stocks from February 1, 2015, to February 1, 2025. The data is obtained from financial data provider websites such as Google Finance and Investing.com. The total data analyzed consists of 363 observations, with 121 data points for each instrument.

Table 2: Total Investment Instrument Data Used in the Study

Object	Monthly Closing Price (1 Feb 2015 – 1 Feb 2025)
Bitcoin	121
Gold	121
Apple Inc. Stock	121
Total	363

Source: Processed Excel Data, investing.com (2025).

Data Collection Technique

Data was collected through the documentation method by downloading the monthly closing prices of each investment instrument from trusted online platforms. The data was then organized in Microsoft Excel format for statistical analysis purposes.

Data Analysis Technique

Data analysis was conducted in several stages:

1. **Calculation of Return and Risk**
   a) The return was calculated using the formula:

$$R_{t=} \frac{P_{t} - P_{t-1}}{P_{t-1}}$$

   Where:

   - Rt   = Return in month t during the observation period
   - Pt   = Price in month t during the observation period
   - Pt−1   = Price in the month before t

   b) Risk is measured using the standard deviation of the return for each instrument.

2. **Classical Assumption Test**
   The data is tested for normality using the Shapiro-Wilk test and for variance homogeneity using the Levene test to determine whether the data meets the requirements for parametric analysis.

3. **Comparative Test**
   a. If the normality and homogeneity assumptions are met, ANOVA is used.
   b. If the assumptions are not met, the Kruskal-Wallis test is used to compare the return and risk among the three instruments.

Analysis Tools

Data processing is carried out using Microsoft Excel and SPSS version 30 for statistical calculations and hypothesis testing.

4. RESULT AND DISCUSSION

This study aims to compare the performance of three cryptoasset investment instruments: Bitcoin, gold, and Apple Inc. stocks based on return and risk over the period from February 1, 2015, to February 1, 2025. The data used consists of 363 observations of monthly closing prices, with 121 data points per instrument.

Return and Risk Analysis Results

The return calculation shows that Bitcoin has a higher average return compared to gold and Apple Inc. stocks. This finding reinforces Bitcoin's characteristic as a digital asset that offers the potential for substantial profits over a certain period. The high return performance of Bitcoin is driven by highly dynamic market volatility and is influenced by various factors, such as investor sentiment, government regulations, institutional adoption, and blockchain technology developments. In comparison to gold, which is more stable, and Apple Inc. stocks, which tend to follow the performance of the company and the global stock market, Bitcoin exhibits sharp price movements, both in increases and decreases, making it highly attractive to investors with an aggressive risk profile. However, this high average return must be viewed alongside its high risk level, so investors need to consider the trade-off between return and risk before choosing Bitcoin as their primary investment asset.
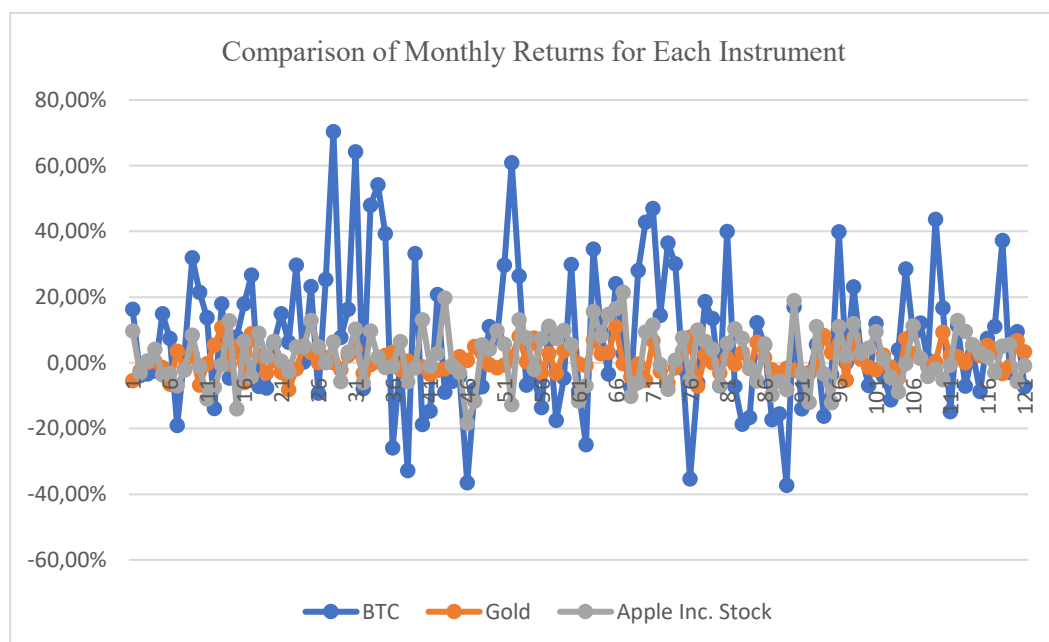

Figure 3: Comparison of Monthly Returns for Each Instrument

Source: Processed Excel Data, investing.com (2025).

Risk is measured using the standard deviation of monthly returns. The results show that Bitcoin has the highest standard deviation, followed by Apple Inc. stocks, while gold exhibits the lowest risk. These findings support the general perception that gold is the most stable asset, while Bitcoin tends to be volatile and carries high risk.
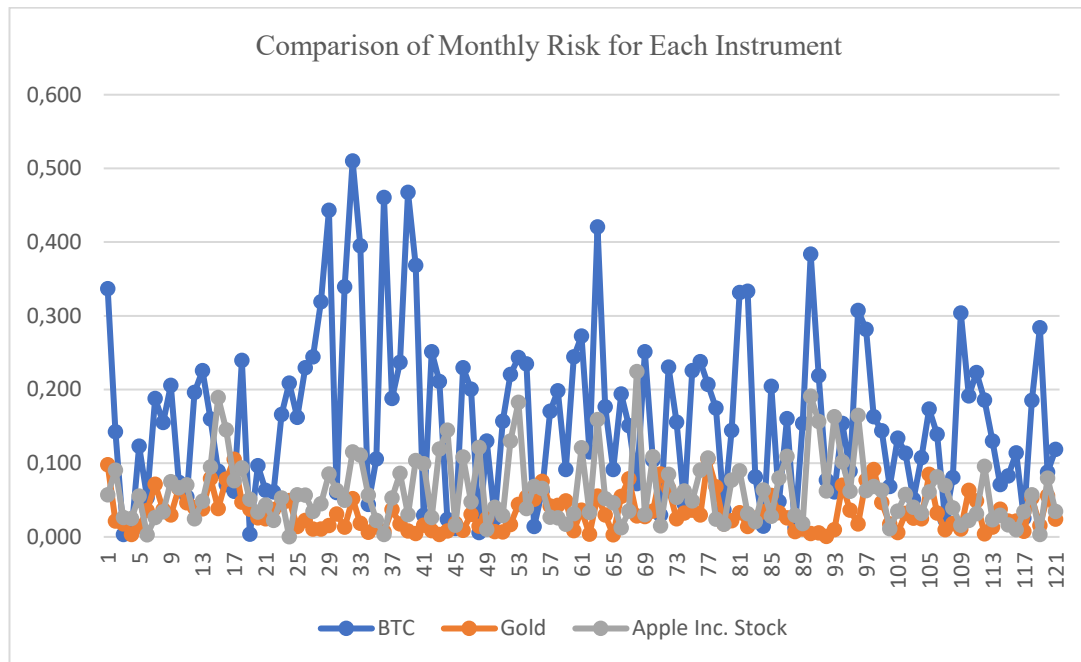

Figure 4: Comparison of Monthly Risk for Each Instrument
Source: Processed Excel Data, investing.com (2025)

Normality Test Results

Table 3: Normality Test Table

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Instrumen Investasi	Statistic	df	Sig.	Statistic	df	Sig.
Return	Bitcoin	.089	121	.019	.975	121	.022
	Emas	.073	121	.169	.985	121	.202
	Saham Apple Inc.	.056	121	.200[*]	.992	121	.762
Risk	Bitcoin	.077	121	.078	.944	121	<,001
	Emas	.109	121	.001	.911	121	<,001
	Saham Apple Inc.	.124	121	<,001	.901	121	<,001

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Processed SPSS Data (2025).

The normality test results using the Kolmogorov-Smirnov method show that the return data for Bitcoin is not normally distributed (sig. 0.019), while gold (0.169) and Apple Inc. stocks (0.200) are normally distributed. For risk, Bitcoin (0.078) and Apple Inc. stocks

(0.124) are considered normal, while gold (0.001) is not. Overall, some data is not normally distributed, particularly in the risk category, making the use of non-parametric methods such as the Kruskal-Wallis test relevant for further analysis.

Homogeneity Test Results

Table 4: Homogeneity Test Table

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Return	Based on Mean	95.853	2	360	<,001
	Based on Median	91.932	2	360	<,001
	Based on Median and with adjusted df	91.932	2	156.320	<,001
	Based on trimmed mean	94.601	2	360	<,001
Risk	Based on Mean	83.418	2	360	<,001
	Based on Median	78.929	2	360	<,001
	Based on Median and with adjusted df	78.929	2	182.566	<,001
	Based on trimmed mean	80.581	2	360	<,001

Source: Processed SPSS Data (2025).

The Levene's test results show that all significance values, both for return and risk, are below 0.001, indicating that the variances between groups are not homogeneous. Therefore, the assumption of homogeneity of variance is not met, and further statistical analysis needs to consider non-parametric methods to maintain the validity of the results.

Kruskal-Wallis Test Results

To determine whether there are significant differences and rankings among the three instruments in terms of return and risk, the Kruskal-Wallis test was performed because the data does not meet the assumptions of normality and homogeneity.

Table 5: Kruskal-Wallis Test Results

Test Statistics[a,b]

	Return	Risk
Kruskal-Wallis H	4.007	134.055
df	2	2
Asymp. Sig.	.135	<,001

a. Kruskal Wallis Test

b. Grouping Variable: Instrumen Investasi

Source: Processed SPSS Data (2025).

a) **Return**

The Kruskal-Wallis test results show no significant differences in the returns of the three instruments ($p > 0.05$). However, based on the mean rank values,

the highest return is held by Bitcoin (195.10), followed by Apple Inc. stocks (182.78), and gold (168.12). This indicates that, statistically, Bitcoin generated the highest return during the observation period.

b) **Risk**

The test results for risk show a significant difference ($p < 0.05$). Bitcoin again holds the highest mean rank for risk (264.18), confirming that this asset is the most volatile. Apple Inc. stocks have a mean rank of risk of 173.07, while gold has the lowest mean rank for risk at 108.76.

Table 6: Kruskal-Wallis Test Ranking Results

Ranks

	Instrumen Investasi	N	Mean Rank
Return	Bitcoin	121	195.10
	Emas	121	168.12
	Saham Apple Inc.	121	182.78
	Total	363	
Risk	Bitcoin	121	264.18
	Emas	121	108.76
	Saham Apple Inc.	121	173.07
	Total	363	

Source: Processed SPSS Data (2025).

Discussion

The results of this study are consistent with the findings of several previous studies that indicate Bitcoin offers high returns but comes with high risk (Mahessara & Kartawinata, 2018; Meiyura & Azib, 2020). Gold remains the preferred choice for conservative investors, given its stability in the face of global economic pressures. Apple Inc. stocks occupy a moderate position, with good growth potential but not as volatile as Bitcoin.

These findings provide important insights for investors to align their investment choices with their respective risk profiles. Aggressive investors may be drawn to Bitcoin for short-term gains, while moderate to conservative investors are more suited to stable stocks or gold.

5.   CONCLUSION

Based on the results of the study comparing the investment performance of Bitcoin, gold, and Apple Inc. stocks, it was found that there are significant differences in terms of return and risk among the three instruments. Bitcoin showed the highest return but also carried the highest risk, making it more suitable for investors with a high-risk tolerance. In contrast, gold showed the lowest return but offered the safest and most stable risk level, making it an ideal choice for conservative investors. Meanwhile, Apple Inc. stocks are

positioned in the middle, with a balance between competitive returns and moderate risk.

Overall, the results of this study highlight the importance of aligning investment choices with each investor's risk profile and financial goals. Amid global economic uncertainty and the threat of inflation, investors prioritizing safety tend to choose gold, while those seeking higher profits may opt for Bitcoin. Apple Inc. stocks provide an alternative for investors looking for a combination of growth and stability.

6.   RECOMMENDATION

Based on the findings of this study, it is recommended that investors carefully consider their risk profile before investing in any of the three instruments. For investors seeking high returns and willing to take on higher risks, Bitcoin may be an attractive option. However, it is important to remember that high volatility can also lead to significant losses.

On the other hand, for more conservative investors who prioritize stability, gold may be a safer choice. Gold has a long history as an asset that can preserve value during uncertain economic conditions. Apple Inc. stocks can serve as an alternative for investors seeking a balance between returns and risk, given the company's strong reputation and relatively stable performance.

Finally, it is advised that investors diversify their portfolios by combining various investment instruments to reduce overall risk and maximize potential returns.

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