

## **The Impact of Global Financial Market Movements on Ethereum Prices: An Empirical Study 2021-2024**

Faturrachman Agung Satrio<sup>1)</sup>, Muhammad Febrian Arifin<sup>2)</sup>, Willa Fatika Sari<sup>3)</sup>

<sup>1,2,3</sup> Bangka Belitung University, Indonesia

Email: faturrachmanas@gmail.com<sup>1</sup>, muhammadfebrian846@gmail.com<sup>2</sup>, willa@ubb.ac.id<sup>3</sup>

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**Abstract:** *This study analyzes the influence of Bitcoin prices, the S&P 500 index, and gold prices on Ethereum prices during the 2021–2024 period. The method used was a quantitative approach with multiple linear regression. The results show that Bitcoin prices have a significant influence on Ethereum ( $\beta = 0.036$ ;  $t = 5.746$ ; sig. 0.000), while the S&P 500 index ( $\beta = -0.194$ ; sig. 0.600) and gold prices ( $\beta = 1.548$ ; sig. 0.210) do not. The simultaneous test yielded an F-value of 21.617 with a sig. 0.000, indicating that all three variables jointly influence Ethereum. The  $R^2$  value of 0.890 indicates that 89% of Ethereum's price changes can be explained by these three variables. These findings confirm that Ethereum's movements are more influenced by Bitcoin than other global market instruments.*

**Abstrak :** *Studi ini menganalisis pengaruh harga Bitcoin, indeks S&P 500, dan harga emas terhadap harga Ethereum selama periode 2021–2024. Metode yang digunakan adalah pendekatan kuantitatif dengan regresi linier berganda. Hasil menunjukkan bahwa harga Bitcoin memiliki pengaruh signifikan terhadap Ethereum ( $\beta = 0,036$ ;  $t = 5,746$ ; sig. 0,000), sedangkan indeks S&P 500 ( $\beta = -0,194$ ; sig. 0,600) dan harga emas ( $\beta = 1,548$ ; sig. 0,210) tidak berpengaruh. Uji simultan menghasilkan nilai F sebesar 21,617 dengan sig. 0,000, yang menunjukkan bahwa ketiga variabel tersebut secara bersama-sama memengaruhi Ethereum. Nilai  $R^2$  sebesar 0,890 menunjukkan bahwa 89% perubahan harga Ethereum dapat dijelaskan oleh ketiga variabel tersebut. Temuan ini menegaskan bahwa pergerakan Ethereum lebih dipengaruhi oleh Bitcoin daripada instrumen pasar global lainnya.*

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**Keywords:** *Ethereum, Bitcoin, S&P 500 Index, Gold Price, Crypto Assets, Global Markets.*

### **INTRODUCTION**

Digital technology's quick development has completely changed the global financial system, especially with regard to investment operations. Cryptocurrencies are decentralised digital assets that facilitate peer-to-peer transactions without the need for financial intermediaries thanks to blockchain technology (Nakamoto, n.d.). Because of their high potential return, liquidity, and technological advancement, cryptocurrencies are becoming more and more popular, which has increased investment options. Additionally, investors' increased interest in digital assets as a component of contemporary investment portfolios is reflected in the expanding number of cryptocurrency investment options (Maulana et al., 2025). Consequently, despite their high investment risk, cryptocurrencies have grown in importance within the global financial sector (Jyanthi et al., 2025; Rahma et al., 2025).

Ethereum has become the second-biggest cryptocurrency after Bitcoin in terms of market capitalisation. Ethereum strengthens its position as a blockchain platform and an investment asset by offering smart contract technology that supports decentralised applications (dApps), decentralised finance (DeFi), and non-fungible tokens (NFTs), in contrast to Bitcoin, which mainly serves as a digital currency (Velmurugan et al., 2025). Ethereum is still very unstable despite its growing popularity and technological advantages. Cryptocurrency price swings are influenced by fundamental causes, market sentiment, and technological advancements (Hendreo, 2023). Ethereum prices rose dramatically in 2021, fell precipitously during the 2022 crypto winter, and then gradually rebounded during 2023 and 2024. These variations show that a number of internal and external factors affect Ethereum prices, which makes them a crucial topic for more research.

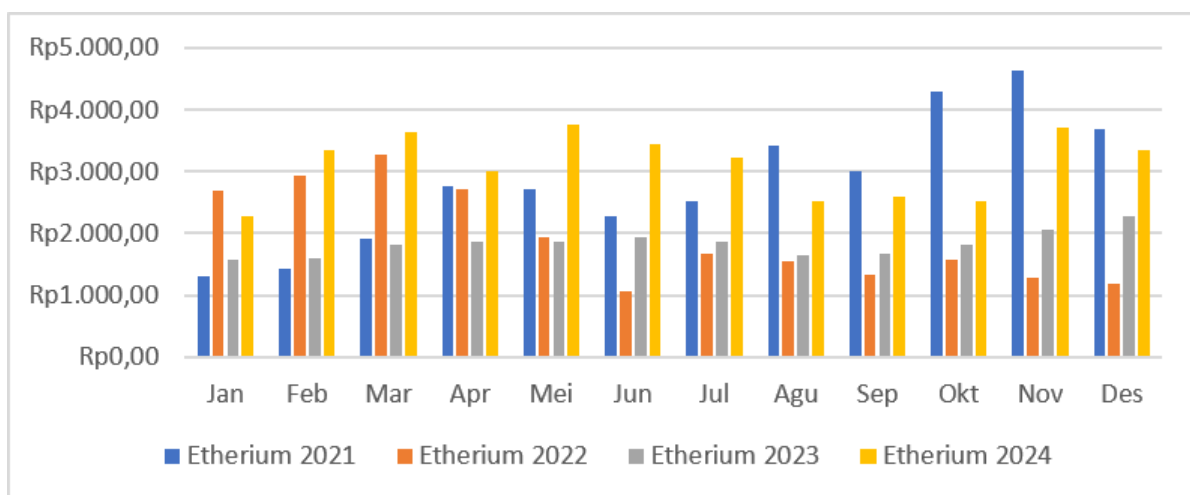


Figure 1. Ethereum Price Development 2021-2024 (In Rupiah)

Source: Investing.com, (2026)

Figure 1 illustrates how the price of Ethereum changed dramatically during the course of the observation period. During the 2021 cryptocurrency bull market, Ethereum's price reached its highest point. It subsequently had a sharp drop during the 2022 crypto winter before gradually increasing in 2023 and 2024. These fluctuations demonstrate how a variety of internal and external factors influence Ethereum pricing, making the cryptocurrency market incredibly volatile and vulnerable to changes in the global economy (Anugrah, 2026). The necessity for empirical studies that take into account both crypto-market leadership and external macroeconomic influences is highlighted by the fact that Ethereum's price fluctuations coincide with significant changes in global financial conditions, indicating that Ethereum cannot be examined in isolation from more general market dynamics.

One of the primary internal factors influencing Ethereum is Bitcoin price movements. As the first and largest cryptocurrency, Bitcoin serves as the benchmark for the digital asset market and significantly affects the price dynamics of other cryptocurrencies. The cryptocurrency market is characterized by high volatility, with price movements influenced by investor behavior and rapidly changing market information (Robiyanto & Djari, 2021). Kumar et al. (2025) found strong financial linkages between Bitcoin and Ethereum, indicating that Bitcoin price changes are closely associated with Ethereum movements. Consistent with the Spillover Effect Theory, shocks in Bitcoin can spread to Ethereum through investor sentiment and capital flows (Azhari et al., 2025). This relationship is further supported by Zhao (2023) and Sünbül (2024), who identified Bitcoin as the primary driver of cryptocurrency price movements and volatility.

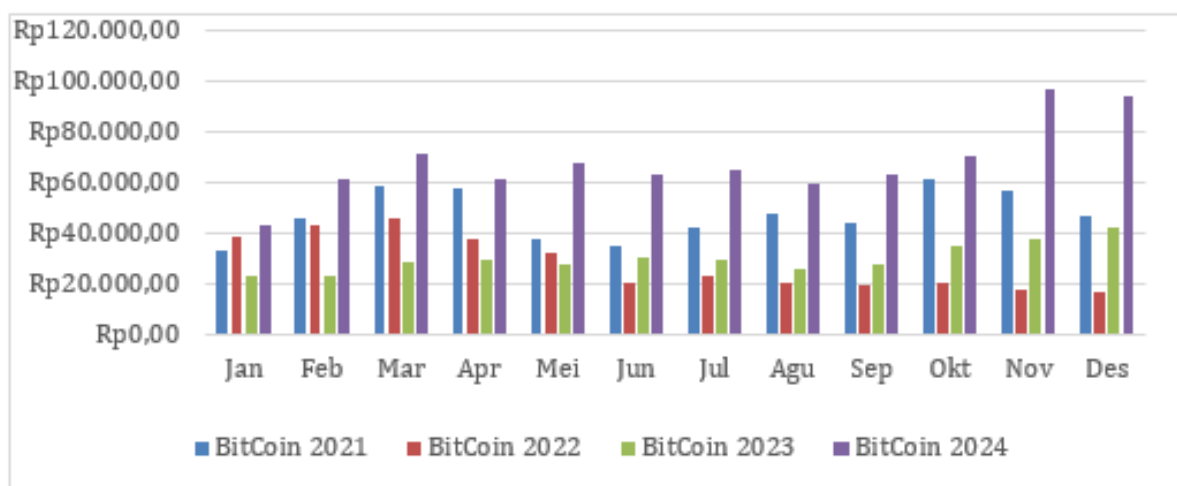


Figure 2. Bitcoin Price Development 2021-2024 (In Rupiah)

Source: Investing.com, (2026)

Figure 2 illustrates how the price of Bitcoin and Ethereum changed in tandem during the study period. Both cryptocurrencies had tremendous growth in 2021, significant corrections in 2022, and a steady recovery in 2023 and 2024. These similarities suggest that Ethereum price dynamics are still heavily influenced by Bitcoin, supporting the idea that shifts in the leading cryptocurrency are mirrored in other cryptocurrency assets. The spillover effect theory, which holds that dominant assets send price and volatility signals to linked assets within the same market ecosystem, is supported by the remarkable synchronisation between Bitcoin and Ethereum price movements.

Ethereum prices may be impacted by changes in international financial markets in addition to variables unique to cryptocurrencies. The Standard & Poor's 500 (S&P 500) Index, which tracks the performance of 500 of the top publicly traded corporations in the US, is one significant indicator. The S&P 500, one of the main stock market indices in the world, represents investor confidence, expectations

for economic growth, and risk tolerance. Investors may modify their investment portfolios, including allocations to alternative assets like cryptocurrencies, in response to shifts in the performance of the stock market (Yavuz et al., 2022). The S&P 500 Index's price evolution from 2021 to 2024 is depicted in Figure 3, which offers a visual view of both the index's trends and Ethereum's price fluctuations.

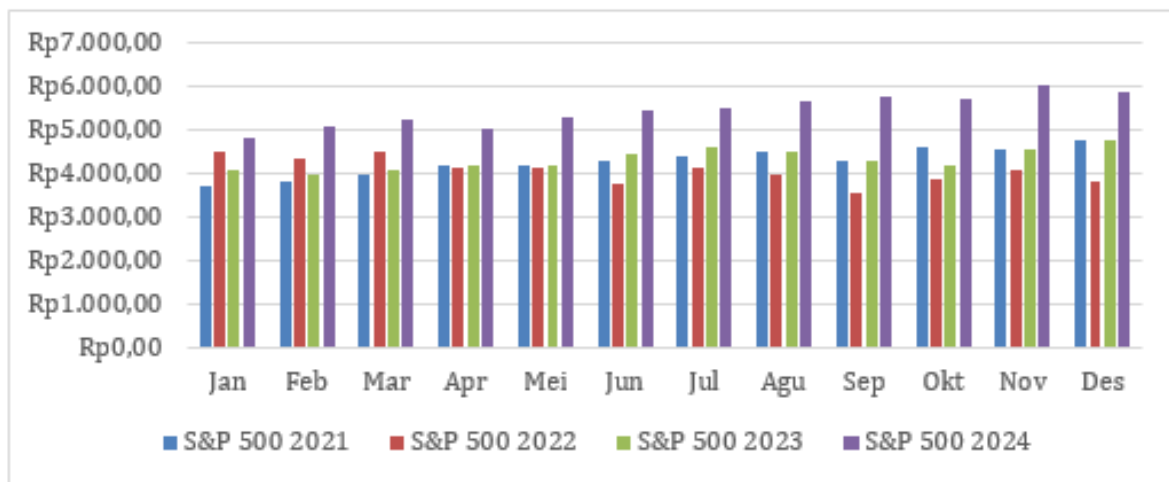


Figure 3. S&P 500 Stock Index Price Development 2021-2024 (In Rupiah)

Source: Investing.com, (2026)

Figure 3 shows that the S&P 500 typically had an upward trend during the study period, despite several market corrections. This chart demonstrates how financial markets around the world are progressively recovering from economic uncertainty. Therefore, changes in the stock market's performance could affect investors' inclination to buy riskier assets, such as cryptocurrencies like Ethereum. Investor risk appetite tends to rise when stock markets show durability and steady growth, which may fuel demand for high-volatility assets like Ethereum, which are frequently seen as speculative vehicles in diversified portfolios.

The price of gold is another external factor taken into account in this study. Because investors prefer to transfer their investments toward gold during difficult economic times, gold has long been recognised as a safe-haven asset. Gold acts as a buffer against market risk and typically offers less volatility than cryptocurrencies (Kusuma & Setyari, 2024). As a result, shifts in the price of gold may have an impact on how portfolios are allocated and indirectly affect the demand for digital assets, such as Ethereum (Ichsani & Pamungkas, 2022). The evolution of gold prices from 2021 to 2024 is shown in Figure 4, which provides information about both the dynamics of the cryptocurrency market and the behaviour of this traditional asset.

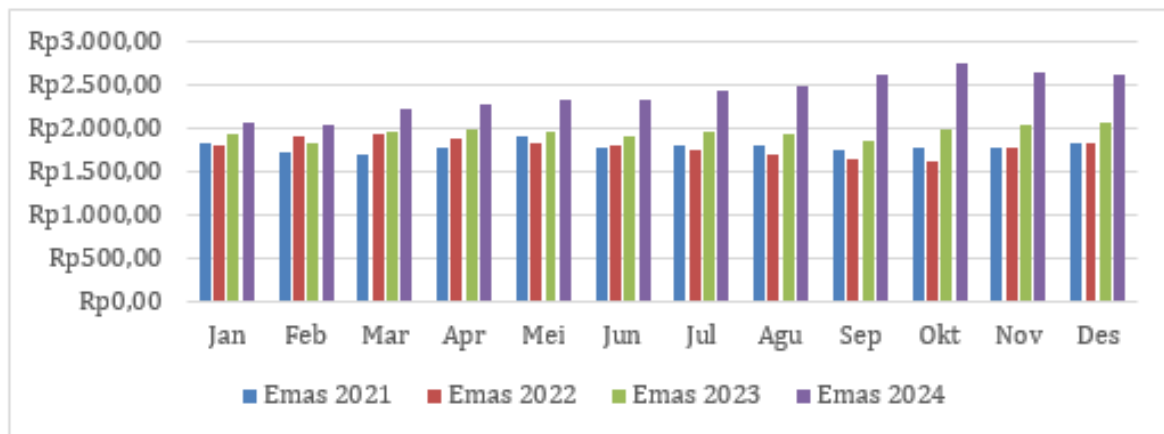


Figure 4. Gold Price Development 2021-2024 (In Rupiah)

Source: Investing.com, (2026)

Over the course of the observation period, gold prices showed a comparatively steady increasing tendency, as seen in Figure 4. In times of global uncertainty, investors tend to favour safer investment vehicles, which is reflected in this movement. Gold is also a significant external element in understanding changes in Ethereum pricing since it may affect the distribution of capital between traditional and digital assets.

The factors influencing cryptocurrency pricing have been examined in a number of earlier research, but the empirical results are still mixed. According to Kumar et al. (2025), Ethereum price fluctuations are significantly influenced by Bitcoin. In a similar vein, Hertanto et al. (2024) discovered that Ethereum and other cryptocurrencies are impacted by Bitcoin and a number of international financial factors. On the other hand, Nakagawa and Sakemoto (2022) came to the conclusion that Ethereum is more heavily impacted by cryptocurrency market uncertainty than by external financial market factors. Additionally, Ichsani and Pamungkas (2022) proposed that gold and cryptocurrencies have different investing characteristics, while Yavuz et al. (2022) reported that the link between conventional financial assets and cryptocurrencies vary depending on market conditions.

These contradictory results show that it is still unclear how external global financial indices and internal cryptocurrency factors affect Ethereum prices. The majority of earlier research looked at these factors independently or concentrated on various time periods. Thus, by concurrently analysing the impact of Bitcoin prices, the S&P 500 Index, and gold prices on Ethereum prices during the 2021–2024 period, this study offers a more thorough insight. Major events in the global financial markets and cryptocurrency markets, such as the post-pandemic recovery and shifting investor behaviour, are captured during this time (Kumar & Paramjeet, 2025).

Based on these factors, the study's objective is to examine the partial and simultaneous effects of gold prices, the S&P 500 Index, and Bitcoin prices on Ethereum prices between 2021 and 2024. In

addition to offering useful insights for investors, financial In the world of economics, gold has a long history. Gold has been a currency used in exchange for goods even before the invention of paper money and commodities. When banks wanted to print money, they even had to protect it with gold. Gold has become a safe investment instrument today. When global turmoil creates uncertainty, people tend to turn to gold as an investment instrument because it is considered safer and more stable than other types of investments (Narani & Rikumahu, 2019). Due to the very different characteristics of these two instruments, with crypto being highly volatile and gold being more stable, gold is often associated with crypto price movements.

According to the Spillover Effect theory, financial assets with market linkages can be affected by price changes. Investors often rely on Bitcoin as the digital asset with the largest market capitalization in the cryptocurrency ecosystem. Due to their close relationship in the crypto market, changes in the prices of Bitcoin and Ethereum are usually followed by changes in the price of Ethereum. This suggests that, through the spillover effect mechanism, Bitcoin's movements can influence market sentiment and capital flows into Ethereum. According to Zhao's (2023) research, Bitcoin's role as a market leader influences the movements of altcoins, such as Ethereum. Consequently, the higher the price of Bitcoin, the greater the likelihood that the price of Ethereum will also rise.

The S&P 500 Index is a key indicator of the state of the US stock market and is often used to gauge investor sentiment toward risky assets. Shifts in this index can influence how investor portfolios are distributed between the stock market and alternative assets, such as cryptocurrencies. Investor optimism about the economy typically increases when the S&P 500 Index rises, which can increase demand for risky assets like Ethereum. Conversely, a decline in the index can influence investment preferences and increase investor caution. Research by Hertanto et al. (2024) found that, although the impact is smaller than Bitcoin, the S&P 500 Index has a positive correlation with Ethereum. Therefore, changes in the S&P 500 Index may impact the price of Ethereum.

The gold price is a global financial market indicator often used as a safe-haven asset during times of economic uncertainty. Changes in gold prices can influence investors' decisions regarding the allocation of their investment funds, including between conventional assets and digital assets like Ethereum. When gold prices rise, some investors tend to shift their investments to safer assets, potentially decreasing demand for riskier assets, including Ethereum. Conversely, when gold's attractiveness declines, investors may shift to assets with potentially higher returns, such as cryptocurrencies. Research by Warsito (2019) indicates that the relationship between gold and Ethereum prices is relatively weak compared to the relationship between Bitcoin and Ethereum, while Ichسانی and Pamungkas (2022) explain that gold and cryptocurrencies have different investment characteristics, so

investor responses to the two assets are not always synchronous. Therefore, changes in gold prices are suspected of influencing Ethereum price movements.

The price of Ethereum is influenced by various factors originating from both the cryptocurrency market and the global financial market. Bitcoin, as the crypto asset with the largest market capitalization, acts as a market leader, capable of influencing the price movements of other crypto assets through the spillover effect mechanism. On the other hand, the S&P 500 index reflects global stock market conditions and investor sentiment toward risky assets, while the price of gold represents a safe haven asset that is often an alternative investment during times of economic uncertainty. The combination of these three variables can influence investors' decisions in allocating their portfolios, potentially impacting Ethereum's price. Research by Hertanto et al. (2024) shows that Bitcoin, the S&P 500 index, and global financial market indicators are related to crypto asset price movements, although the degree of influence of each variable varies. Therefore, simultaneous testing is necessary to determine the extent of the influence of Bitcoin, the S&P 500 index, and gold prices on Ethereum.

According to previous theory and research, financial markets can influence the price of Ethereum. In this study, internal factors are represented by the price of Bitcoin, the crypto asset with the largest market share. Meanwhile, external factors are represented by the S&P 500 index, which indicates global stock market conditions, and the price of gold, a security. This relationship suggests that the price movements of Bitcoin, the S&P 500 index, and gold can partially or simultaneously influence the price of Ethereum.

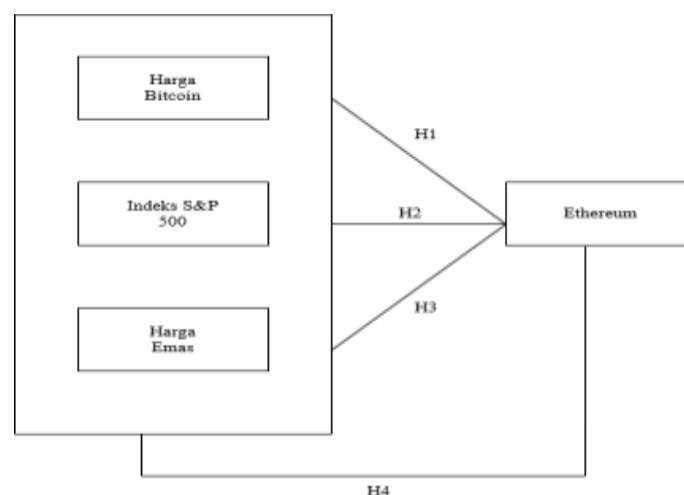


Figure 4. Theoretical Framework

Source: Various Previous Research Journals, Modified by Researcher, 2026

This research focuses on the relationship between the independent variables, consisting of the Bitcoin price, the S&P 500 index, and the gold price, and the dependent variable, the Ethereum price. The Bitcoin price was chosen because of its dominant role in the cryptocurrency ecosystem, while the

gold price and the S&P 500 index were used to reflect the state of the global financial market. The relationship between these variables was then analyzed to determine the extent of each variable's influence on the Ethereum price during the research period.

Based on the theoretical basis, previous research, and the conceptual framework presented, it is possible that financial markets internally and externally influence the price of Ethereum. Ethereum's price movements are thought to be influenced by the price of Bitcoin, the cryptocurrency with the largest market capitalization. The price of gold and the S&P 500 index, which serve as a proxy for global financial markets, are also thought to influence the price of Ethereum. Consequently, the research hypothesis is formulated as follows.

H1: The price of Bitcoin has a significant effect on the price of Ethereum.

H2: The price of the S&P 500 Index has a significant effect on the price of Ethereum.

H3: The price of gold has a significant effect on the price of Ethereum.

H4: The price of Bitcoin, the S&P 500 Index, and the price of gold simultaneously have a significant effect on the price of Ethereum.

## **METHOD**

Secondary data for the period 2021–2024 obtained from Investing.com was used in the form of a monthly time series covering the prices of Bitcoin, the S&P 500 index, gold prices, and Ethereum prices. This secondary data was chosen because it is easily accessible, effective, and has a high level of reliability (Kusumah, 2022). The analysis was conducted using multiple linear regression to examine how the prices of Bitcoin, the S&P 500 index, and gold impact the price of Ethereum, both partially and simultaneously. The direction of the relationship, the level of significance, and the contribution of each independent variable to the dependent variable can be demonstrated numerically through this model.

## **RESULTS AND DISCUSSION**

Descriptive statistics provide an overview of how the prices of Bitcoin, the S&P 500 index, gold, and Ethereum have evolved from 2021 to 2024. Bitcoin and Ethereum exhibit higher volatility compared to conventional instruments such as gold and stock indices. This suggests that, compared to conventional financial indicators, investor sentiment and dynamics in the digital market have a greater influence on the movement of crypto assets. A study by Yavuz et al. (2022) suggests that the relationship between cryptocurrencies and conventional assets tends to be different and characterized by higher risk and volatility. Research by Zhao (2023) also explains that factors within the crypto market, particularly



Bitcoin and investor sentiment, have a greater influence on Ethereum's movement. Descriptive statistics for the study variables are presented in the following table.

Table 1. Descriptive Statistical Analysis

|                           | N  | Minimum  | Maksimum | Mean       | Deviasi Standar |
|---------------------------|----|----------|----------|------------|-----------------|
| Bitcoin 2021              | 12 | 33108,10 | 61309,60 | 47005,0833 | 9675,94638      |
| Bitcoin 2022              | 12 | 16537,40 | 45525,00 | 27795,8083 | 10805,13249     |
| Bitcoin 2023              | 12 | 23125,10 | 42272,50 | 29869,9000 | 5745,86763      |
| Bitcoin 2024              | 12 | 42580,50 | 96405,70 | 67757,7500 | 14665,48313     |
| Emas 2021                 | 12 | 1707,01  | 1906,36  | 1791,6658  | 53.60181        |
| Emas 2022                 | 12 | 1633,12  | 1937,23  | 1795,2950  | 94.98983        |
| Emas 2023                 | 12 | 1827,15  | 2062,59  | 1952,3108  | 67.57722        |
| Emas 2024                 | 12 | 2043,24  | 2743,80  | 2407,8200  | 230.78582       |
| Indeks S&P 500 tahun 2021 | 12 | 3714,24  | 4766,18  | 4278,7500  | 322.98831       |
| Indeks S&P 500 tahun 2022 | 12 | 3585,62  | 4530,41  | 4077,6550  | 291.51692       |
| Indeks S&P 500 tahun 2023 | 12 | 3970,15  | 4769,83  | 4322,6542  | 247.44183       |
| S&P 500 tahun 2024        | 12 | 4845,65  | 6032,38  | 5460,2158  | 364.55016       |
| Ethereum 2021             | 12 | 1312,73  | 4628,90  | 2830,2000  | 1044.93924      |
| Ethereum 2022             | 12 | 1069,05  | 3282,35  | 1938,0425  | 762.65567       |
| Ethereum 2023             | 12 | 1585,27  | 2281,90  | 1834,1158  | 199.57936       |
| Ethereum 2024             | 12 | 2283,14  | 3762,66  | 3116,0992  | 517.56672       |
| Valid N (Listwise)        | 12 |          |          |            |                 |

Source: Processed using SPSS, (2026)

All research variables experienced changes during the 2021–2024 period, as shown in the descriptive statistics table. Compared to other variables, Bitcoin and Ethereum had the highest levels of volatility. Significant average price changes occurred annually. Meanwhile, increases in gold prices and the S&P 500 index tended to follow a more consistent trend. The increase in the S&P 500 index indicates the growth of the US stock market, while the increase in gold prices demonstrates its role as a hedge against global uncertainty. Overall, these findings indicate that each variable experienced changes during the research period.

Multiple regression analysis is a statistical technique used to estimate a dependent variable (Y) based on two or more independent variables simultaneously (X1, X2,..., Xn). The goal is to determine the magnitude of the influence of each independent variable on the dependent variable. Furthermore, the goal is to create a mathematical equation that shows this relationship. The following table displays data from a multiple regression analysis.

Table 2. Model Feasibility Test

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,943 <sup>a</sup> | ,890     | ,849              | 104.38528                  | 2.085         |

Source: Processed using SPSS, (2026)

Regression results show that Ethereum is simultaneously influenced by Bitcoin, the S&P 500, and gold ( $F = 21.617$ ; significance 0.000), with  $R^2 = 0.890$ . This is consistent with the market dependence theory, which states that financial instruments worldwide are correlated with each other, although their impacts vary. While Ethereum is not completely independent, its dynamics are more influenced by factors within cryptocurrencies.

The ANOVA test is a statistical technique used to determine whether there is a statistically significant difference between the means of three or more groups. This test also helps determine whether observed differences in the data are the result of random variation or represent true differences. The following table displays the ANOVA test data.

Table 3. F Test (ANOVA – F Test)

| Model     | Sum of Squares | df | Mean Square | F      | Sig.              |
|-----------|----------------|----|-------------|--------|-------------------|
| 1 Regresi | 706619,657     | 3  | 235.539.886 | 21.617 | ,000 <sup>b</sup> |
| Residual  | 87170,286      | 8  | 10896.286   |        |                   |
| Total     | 793789,943     | 11 |             |        |                   |

Source: Processed using SPSS, (2026)

The F-test results show an F-value of 21.617 with a significance level of 0.000 ( $<0.05$ ). This indicates that the price of gold, the S&P 500 index, and the price of Bitcoin simultaneously influence the price of Ethereum. In other words, these three independent variables can simultaneously explain changes in the price of Ethereum during the study. This indicates that the regression model used to predict Ethereum price movements is feasible.

The one-sample t-test is used to determine whether a difference is significant. This is done by comparing the mean of one sample with a predetermined (hypothetical) population mean. The following table displays the t-test data.

Table 4. t-Test (Coefficient – Partial)

| Model        | Unstandardized B | Coefficients Std.Error | T      | Sig. |
|--------------|------------------|------------------------|--------|------|
| 1 (Constant) | -1327.497        | 1.181.565              | -1.124 | ,294 |
| Mean_BitCoin | ,036             | ,006                   | 5.746  | ,000 |
| Mean_S&P 500 | -,194            | ,355                   | -,547  | ,600 |
| Mean_Emas    | 1.548            | 1.136                  | 1.363  | ,210 |

Source: Processed using SPSS, (2026)

The t-test results show that Bitcoin has a positive and significant influence on the price of Ethereum with a coefficient value of 0.036, a t-value of 5.746, and a significance level of 0.000 ( $<0.05$ ). In contrast, the S&P 500 index has a coefficient of -0.194 with a t-value of -0.547 and a significance level of 0.600 ( $>0.05$ ), so it does not have a significant influence on the price of Ethereum. Similarly,

the price of gold has a coefficient of 1.548, a t-value of 1.363, and a significance level of 0.210 ( $>0.05$ ), indicating that its influence on the price of Ethereum is also insignificant. Thus, it can be concluded that only Bitcoin has a significant influence on the price of Ethereum, while the S&P 500 and gold prices did not have a significant influence during the study period.

In regression models, a multicollinearity test is used to determine whether independent variables are strongly correlated with each other. If independent variables are strongly correlated with each other, this can compromise the validity of estimates (such as regression coefficients) and increase the variance of estimates, making interpretation of the analysis results more difficult. The following table displays the multicollinearity test data.

Table 5. Multicollinearity (Collinearity Statistics – Tolerance and VIF)

| Model        | Collinearity Tolerance | Statistics VIF |
|--------------|------------------------|----------------|
| 1 (Konstan)  |                        |                |
| Mean_BitCoin | 709                    | 1.411          |
| Mean_S&P 500 | ,255                   | 3.922          |
| Mean_Emas    | ,228                   | 4.384          |

Source: Processed using SPSS, (2026)

The VIF value is less than 10, and the tolerance for all variables is greater than 0.1 (Bitcoin = 1.411; S&P 500 = 3.922; Gold = 4.384). This shows that the regression model does not show multicollinearity problems. Therefore, the three independent variables can be used together in the model without causing estimation bias.

The residual is the difference between the predicted value and the observed value in a regression analysis. To determine how the predictor and response variables are related, the goal of linear regression is to calculate the residual = observed value - predicted value. The following table displays the residual test data.

Table 6. Residual Statistics

|                      | Minimum    | Maksimum  | Mean      | Deviasi Standar | N  |
|----------------------|------------|-----------|-----------|-----------------|----|
| Predicted value      | 2042.2242  | 2809.3994 | 2429.6144 | 253.45246       | 12 |
| Residual             | -141.14886 | 169.85251 | ,00000    | 89,02006        | 12 |
| Std. Predicted Value | -,1,528    | 1.498     | ,000      | 1.000           | 12 |
| Std. Residual        | -1.352     | 1.627     | ,000      | ,853            | 12 |

Source: Processed using SPSS (2026)

With a relatively normal distribution, the residual value has a minimum value of -141.148, a maximum value of 169.852, and a standard deviation of approximately 89.020. The average residual value is close to zero, indicating the validity of the regression model used.

With a coefficient of 0.036, a t-hitung of 5.746, and a significance of 0.000, uji t indicates that Bitcoin has a positive and significant impact on Ethereum. H1 states that the price of Ethereum is significantly impacted by Bitcoin. As the most popular cryptocurrency, Bitcoin is a market leader, thus Ethereum is more competitive. This supports the theory of the spillover effect, which states that an asset with a market connection may experience price fluctuation through information transmission and investor sentiment (Azhari et al., 2025). According to Zhao (2023), Sünbül (2024), and Kumar et al. (2025), there is a strong correlation between Bitcoin and Ethereum.

The index is represented by uji t with a coefficient of -0.194, a t-hitung of -0.547, and a significance of 0.600. The S&P 500 has little effect on Ethereum's price. The demonstration of H2 shows that the kripto market is not significantly impacted by the AS market. This is in line with Yavuz et al. (2022), who claim that the link between kripto and traditional asset varies according on market conditions. Additionally, according to Nakagawa and Sakemoto (2022), Ethereum is more impacted by the ketidakpastian of the kripto market than by outside variables.

The t-test shows that Ethereum is not significantly impacted by gold prices, with a coefficient of 1.548, a t-value of 1.363, and a significance level of 0.210. As a result, H3 is rejected, suggesting that Ethereum prices are not much influenced by gold as a safe-haven asset. This result is consistent with Ichsani and Pamungkas' (2022) explanation that investor reactions to cryptocurrencies and gold are not necessarily synchronised due to their varied investment characteristics. Kusuma and Setyari (2024) both pointed out that gold is more stable and serves as a hedge against market risk compared to Ethereum, which is incredibly volatile.

## CONCLUSION

This study found that Bitcoin had a positive and significant impact on Ethereum's price during 2021–2024, while the S&P 500 Index and gold prices showed no significant impact, suggesting that Ethereum's price movements are driven more by internal cryptocurrency market factors than external global financial indicators. Therefore, Bitcoin remains the primary reference for predicting Ethereum's price trend, with traditional assets such as stocks and gold serving only as supplementary information. However, this study is limited by its short observation period, limited variables, and the use of multiple linear regression, which may not capture nonlinear or long-term dynamics. Future research should extend the observation period, incorporate additional variables such as inflation, interest rates, exchange rates, transaction volume, and investor sentiment, and employ more sophisticated methods such as VAR, ECM, GARCH, or dynamic panel regression to produce more comprehensive and robust findings.

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