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## The Determinants of Cryptocurrency Returns

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### ABSTRACT

This study examines the determinants of cryptocurrency returns, namely Trading Volume, Price Volatility, and Market Capitalization. This study uses Bitcoin, Ethereum, Tether, USD Coin, and BNB, which are the Top 5 largest Cryptocurrency Market Capitalizations in 2022. The testing method used in this study is a panel data regression analysis. The results of this study prove that Trading Volume and Price Volatility have a significant and positive effect on Cryptocurrency Returns. In contrast, Market Capitalization does not substantially impact Cryptocurrency Returns. If investors want to earn high returns, then it is advisable to choose cryptocurrencies with high trading volume and high price volatility. But keep in mind, with high price volatility can also mean a greater risk of the coin.

**Keywords** : Cryptocurrency; Trading Volume; Price Volatility; Market Capitalization; Return

### ABSTRAK

*Penelitian ini bertujuan untuk menguji berbagai factor penentu imbal hasil cryptocurrency yaitu Volume Perdagangan, Volatilitas Harga dan Market Capitalization. Studi ini menggunakan Bitcoin, Ethereum, Tether, USD Coin, dan BNB yang merupakan Top 5 Market Capitalization Cryptocurrency terbesar tahun 2022. Metode pengujian yang dilakukan dalam penelitian ini yaitu uji analisis regresi data panel. Hasil dari penelitian ini membuktikan bahwa Volume Perdagangan dan Volatilitas Harga berpengaruh signifikan dan positif terhadap Return Cryptocurrency, sedangkan Market Capitalization tidak memiliki pengaruh yang signifikan terhadap Return Cryptocurrency. Jika investor ingin mendapatkan return yang tinggi, maka disarankan untuk memilih cryptocurrency yang memiliki Volume Perdagangan dan Volatilitas Harga yang tinggi. Namun yang perlu diingat adalah, dengan tingginya Volatilitas Harga berarti pula tingginya risiko koin crypto tersebut.*

**Kata Kunci** : Mata uang kripto; Volume Perdagangan; Volatilitas Harga; Kapitalisasi pasar; Pengembalian

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## INTRODUCTION

Technology development has begun to impact other sectors, including the financial industry. The combined result of financial services and technology is called Financial Technology or FinTech (Bank Indonesia, 2018). One of these developments is the form of investment trading transactions which are starting to use fast methods via mobile phones and/or mobile trading applications. Technological developments in the financial world have also given rise to many new types of investment from previously only mutual funds, stocks, gold, bonds, time deposits, and others (Hadijah, 2021). In 2009 digital currencies began to appear, or what we now call Cryptocurrency, which was the idea of Satoshi Nakamoto (CNN, 2021).

Trends in cryptocurrency in Indonesia began to occur in 2021, as can be seen from the increase in its users, which reached 85% from the previous 4 million to 7.2 million as of July (Safitri, 2022). The price of one of the cryptocurrencies that have the largest market capitalization, Bitcoin, has also increased drastically. One coin in June 2019 for IDR 160,488,000 increased by 430% within 6 months to IDR 850,769,984. (Afifah & Juwita, 2022). Based on Commodity Futures Trading Regulatory Agency Regulation Number 7 of 2020, until now, only 229 types of cryptocurrencies have been permitted to be traded officially in Indonesia (Pratomo, 2022).

Cryptocurrency is one type of digital currency circulating in the world. Cryptocurrency is a virtual or digital asset used to purchase goods and services (Sihombing, Rizky, & Sadalia, 2021). Cryptocurrency, in theory, is a currency immune to government interference because it does not originate and is created in any country (Raharjo, 2020). The concept of cryptocurrency was initially a currency controlled by a code and not by a country's central authority. Several types of cryptocurrencies are actively traded at this time such as Bitcoin, Ethereum, Tether, USD Coin, and BNB (Biczok, 2018). Those coins represent 75% of market capitalization.

Generally, investors analyze the fundamental factors as a consideration for investing in financial assets such as stocks, bonds, and mutual funds. Fundamental analysis can usually be seen from the company's financial ratios. In cryptocurrency, investors cannot carry out the common fundamental analysis since cryptocurrencies do not have financial performance ratios like corporate financial performance. In the case of cryptocurrencies, the performance can usually be seen from the price and volume of cryptocurrencies and their market capitalization (Spurr & Ausloos, 2020). Apart from that, the most used analysis in cryptocurrencies is technical analysis. Technical Analysis was born from the ideas of Charles Dow and his partner Edward Jones (Rhea, 2018). Price changes when buying and selling cryptocurrency assets can be interpreted as returns or losses. These price movements are usually influenced by trading volume and transaction frequency. Besides that, the price movement can also be seen based on volatility and market capitalization (Sihombing, Rizky, & Sadalia, 2021) (Situmeang & Muharram, 2015).

Volume is a way to see cryptocurrency's liquidity level (Sihombing, et al., 2021). When a coin has a low volume, investors will have to wait longer to sell, and it may be challenging to find buyers at the current market price. Volatility is a statistical measure of

price fluctuations over a certain period (Firmansyah, 2006). The higher the volatility, the higher the price uncertainty for the asset. This reflects the higher risk with the expectation of a higher return. Market capitalization is a measure that shows the value of these assets in the market (Sihombing, et al., 2021).

The world's first and most popular cryptocurrency is Bitcoin, launched in early 2009 by an unknown developer named Satoshi Nakamoto (Spenkelink, 2014). As the world's first cryptocurrency, Bitcoin (BTC) remains the number one choice for cryptocurrency investors, taking up the most considerable portion of the cryptocurrency market capitalization. Bitcoin enters the top 5 largest cryptocurrency market capitalization by contributing 41% of the total population. Bitcoin's price, volume, and volatility have fluctuated. At the end of 2020, the Bitcoin price was around IDR 90 million, and it reached its highest price in November 2021, which reached IDR 900 million. The highest trading volume from Bitcoin occurred in February 2021, when it touched IDR 1,138T, and trading volume the lowest was in February 2022, when it touched IDR 350T. The highest price volatility from Bitcoin occurred in January 2021, when it touched 10.2%, and price volatility was lowest in April 2022, when it touched 3.6%.

Ethereum was initially launched on July 30, 2015, by a young Russian-Canadian developer Vitalik Buterin to take Blockchain technology to the next level. Ethereum is included in the top 5 largest cryptocurrency market capitalization, contributing 18.55% of the total population. At the end of 2020, the price of Ethereum was around IDR 1 million, and it reached its highest price in November 2021, which reached IDR 60 million. On trading volume, Ethereum hit its highest in May 2021, touching IDR 697T, and the lowest was in March 2022, which touched IDR 202T. The highest price volatility occurred in May 2021, when it touched 9.9%, and the price volatility was lowest in April 2022, when it touched 4.2%.

Tether (USDT) is a cryptocurrency officially issued by Tether Limited in Hong Kong. The owner of Bitfinex also controls tether. Like any cryptocurrency, Tether's price, volume, and volatility experienced fluctuations. At the end of 2020, the Tether price was around IDR 13,000 and reached its highest price in March 2020, which reached IDR 16,000. The highest trading volume occurred in May 2021, which touched IDR 2,221T, and the lowest trading volume was in July 2021, which touched 712T. Price volatility of Tether hit its peak in November 2021, which touched 0.4%, and lowest in June 2022, which touched 0.0%. Tether is included in the top 5 largest cryptocurrency market capitalization, contributing 6.21% of the total market capitalization.

USD Coin (USDC) is a coin pegged to the US Dollar. USD Coin is regulated by a consortium called Center, which was founded by Circle and consists of members of cryptocurrency exchange Coinbase and bitcoin mining company Bitmain. At the end of 2020, the USD Coin price was around IDR 13,000 and reached its highest price in March 2020, which reached IDR 16,000. USD Coin also has a trading volume; the highest occurred in July 2022, when it touched IDR 92T, and the lowest was in December 2020, when it touched IDR 10T. The highest price volatility occurred in November 2021, which touched 3.6%, and the lowest in May 2021, which touched 0.0%. USD Coin is included in the top 5

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largest cryptocurrency market capitalization, contributing 5.08% of the total market capitalization.

Binance Coins (BNB) is a cryptocurrency issued by Binance Exchange. Although it contributes only 4.54% of the total market capitalization, the prices, volumes, and volatility of BNB during 2020-2022 also experienced fluctuations. At the end of 2020, the BNB price was around IDR 190,000, reaching its highest price in May 2021, which reached IDR 9 million. Meanwhile, the highest trading volume occurred in April 2021, which touched IDR 86T, and the lowest in December 2020, which touched 5T. BNB has price volatility; the highest occurred in February 2021, which touched 19.3%, and the lowest was in March 2022, which touched 4%.

Research conducted by Niawaradila et al. (2021) shows that volume positively affects returns. Yusra (2019) has different results from that of Niawaradila et al. (2021), where the volume variable does not affect returns. Nasution and Halim (2016) stated that price volatility has a positive effect on returns. These results differ from the research conducted by Dimitrios and Theodore (2011), which states that price volatility harms return. This is because when prices experience extreme increases and decreases during trading, the closing price does not increase or decrease from the previous closing price, which is due to public interest only at certain times. Niawaradila et al. (2021) show that market capitalization positively affects returns. In contrast, Yusra (2019) mentioned that the market capitalization variable does not affect returns.

Based on these conflicting results, the authors are interested in conducting further research with cryptocurrencies as research objects. Several previous studies that have been discussed previously only observed the effect of trading volume, price volatility, and market capitalization on stock returns. Only a few studies in Indonesia have focused on cryptocurrencies. Currently, cryptocurrencies are starting to develop and attract the attention of investors. This study uses Bitcoin, Ethereum, Tether, USD Coin, and BNB, as the top 5 market caps.

## RESEARCH METHOD

### Return

Return is one of the goals of investors in investing. Return itself is known as financial return; in the simplest terms, it is the value of funds generated or lost from an investment over a certain period. Return on investment or return can be expressed in nominal terms as the change in the value of the currency invested over time (Hakim, 2010). In other words, return is the result of the nominal amount obtained from an investment, so it becomes one factor that motivates investors to invest. The return can be measured by calculating the price change relative to the initial price (Juwita, et al., 2022), which can be seen in Formula 1.

$$\text{Return Cryptocurrency: } (\text{Current Price} - \text{Previous Price}) / \text{Current Price} \quad (1)$$

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## Trading Volume

One of the factors that affect returns is trading volume. Trading volume is the number of assets traded at a certain time (Halim & Hidayat, 2000). Trading volume can be a way to assess the level of liquidity or how liquid cryptocurrency is to be traded. High liquidity refers to the ease with which it can be bought or sold in the market and converted into cash. Cryptocurrency assets with high trading volume can also have an impact on returns. In calculating trading volume, the formula used according to CoinMarketCap (2022), can be seen in Formula 2.

$$\text{Trading Volume} = \text{Current Price} \times \text{Actively Traded Coins} \quad (2)$$

## Price Volatility

Another factor that affects returns is price volatility. Price volatility is a measure that states how much the price of an asset fluctuates within a certain period (Nasution & Halim, 2016). The greater the volatility of the price of an asset, the more volatile the asset's price. An asset with high volatility has large fluctuations, so it often experiences drastic decreases or very significant price increases. Investors generally call these assets a high risk (Situmeang & Muharam, 2015). According to Tandelin (2001), volatility (return variation) describes the risk and the expected return or reward.

The formula of price volatility according to Hashemijoo's theory in Anatassia and Firnanti's (2014), can be seen in Formula 3.

$$PV = \sqrt{\left(\frac{Hi - Li}{\frac{Hi + Li}{2}}\right)^2} \quad (3)$$

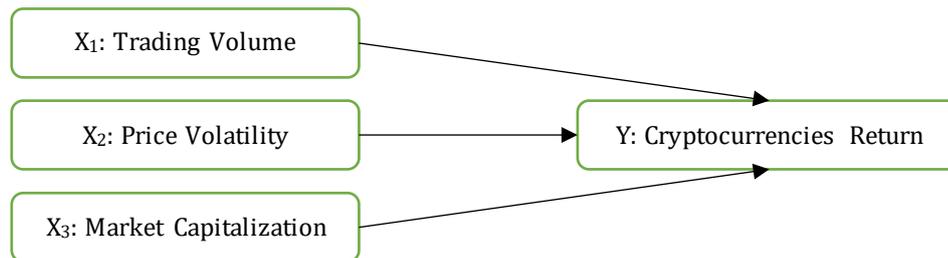
Where PV is price volatility, Hi is the highest price in period t, and Li is the lowest price in period t.

## Market Capitalization

Market capitalization is a factor that is often used as an investment choice and one of the factors that affect returns. Market capitalization is a measure that shows the value of these assets in the market calculated by multiplying the current price of the original cryptocurrency coin by the circulating supply of coins. (Sihombing, Rizky, & Sadalia, 2021). Market capitalization is the most apparent financial statistic in cryptocurrency fundamental research (Luxmana & Oktafiyani, 2022). The higher the market capitalization of cryptocurrency, the higher the asset value of the crypto. In calculating market capitalization in cryptocurrency, the formula used according to Luxmana and Oktafiyani (2022), can be seen in Formula 4.

$$\text{Market Capitalization} = \text{Price} \times \text{Total Number Of Coins Circulating} \quad (4)$$

## Research Hypothesis



Source: Processed data, 2023

**Figure 1. Research Framework**

Based on Figure 1., the research framework in this study is to examine the effect of trading volume, price volatility, and market capitalization on cryptocurrency returns. The hypothesis development of this research is explained below.

[H<sub>1</sub>] Trading Volume Has a Positive and Significant Effect on Cryptocurrency Returns. High volume reflects interest and liquidity levels (Sihombing, Rizky, & Sadalia, 2021). The higher the volume, the higher the buying and selling transactions. This is very good because it will be easy to resell the assets we have to make a profit, as in the research by Niwaradila et al. (2021) and Nasution and Halim (2016) stated that trading volume has a positive effect on returns.

[H<sub>2</sub>] Price Volatility Has a Significant Positive Effect on Cryptocurrency Returns. Price volatility is a form of crypto price movement. The rise and fall of price volatility is in line with the rise and fall of crypto prices. If the price goes up, the volatility will also go up; when the price goes up, the return will also go up or be positive. This is in line with Nasution and Halim (2016) and Wijaya and Meirisa (2019), where price volatility positively affects returns.

[H<sub>3</sub>] Market Capitalization Has a Significant Positive Influence on Cryptocurrency Returns. One of the reasons for the increase in market capitalization is the increasing price. When prices rise, market capitalization will also increase, which causes returns to increase or be positive. Market capitalization also positively affects returns, as in research by Niwaradila et al. (2021). Coins with large market capitalization are more in demand, so they will raise prices and generate returns.

## Panel Data Regression Analysis

In this study, panel data regression analysis was used because the data in this study consisted of cross-section and time series data called panel data. The stages of testing in this study are the Best Model Test, Classical Assumption Test, Hypothesis Test, and Coefficient of Determination.

The sampling period starts from December 17, 2020 – August 3, 2022, starting from Bappepti regulations regarding the officialization of cryptocurrency trading until the final period for starting sample testing. The data source in this study comes from historical cryptocurrency trading data taken from CoinMarketCap.com daily.

## RESULT AND DISCUSSION

### Descriptive Analysis

The results of the descriptive analysis (see Table 1) show that the minimum value of the return is -32.9% and the maximum value is 70.4% owned by BNB. The minimum value in trading volume is IDR 5T, and the maximum is IDR. 4,970T belongs to BNB and Bitcoin respectively. On price volatility, the minimum value is 0.00%, and the maximum value is 80.7%, owned by USD Coin. Finally, the minimum value of market capitalization is IDR 46T, and the maximum value is IDR 18,300T for USD Coin and Bitcoin. As we can see from the data in Table 1., all variables have high deviations and are interesting to study.

**Table 1. Descriptive Analysis Results**

Variable	Means	Median	Maximum	Minimum	std. Dev.
Cryptocurrency Returns	0.0020	0.0000	0.7040	-0.3290	0.0415
Trading Volume	32.8528	33.2500	36.1400	29.2600	1.5482
Price Volatility	0.0434	0.0340	0.8070	0.0000	0.0538
Market Capitalization	34.9981	34.6300	37.4400	31.4600	1.3703

Source: Processed data, 2023

### Panel Data Regression Analysis Results

The first step to performing panel data regression is to test which of the three-panel data regression models, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), fits the data. Of the three tests in Table 2, it can be said that the best model that can be used in this study is FEM. With panel data regression analysis using the FEM model, the regression results obtained are as follows:

$$Y_{it} = -0.183528 + 0.002947 X_{1it} + 0.131885 X_{2it} + 0.002374 X_{3it} + \varepsilon_{it} \quad (6)$$

**Table 1 Model Selection Test Results**

Best Model Test	Probability	Hypothesis	Test results
Chow test	0.0000	Accept H0	<b>FEM</b>
Hausman test	0.0000	Accept H0	<b>FEM</b>
LM test	0.0000	Accept H0	<b>REM</b>

Source: Processed data, 2023

### Classical Assumption Test Results

The classical assumption test in this study consists of a multicollinearity test, a heteroscedasticity test, and an autocorrelation test. The author did not carry out the normality test because of the large amount of data so the assumptions of normality would be fulfilled (Gurajati & Porter, 2009).

### Multicollinearity Test

The results of the multicollinearity test shown in Table 3. found that all the correlations between the independent variables did not have a value of more than 0.8. This means that in this regression model, there is no multicollinearity, or in this model, there is no correlation between the independent variables.

**Table 2. Results of the Multicollinearity Test**

Variable	Trading Volume	Price Volatility	Market Cap
Trading Volume	1	-0.0139	0.5205
Price Volatility	-0.0139	1	0.2736
Market Cap	0.5205	0.2736	1

Source: Processed data, 2023

### Heteroscedasticity Test

The results of the heteroscedasticity test shown in Table 4. found a probability value for each independent variable, namely trading volume (X1) of 0.0801, price volatility (X2) of 0.1543, and market capitalization of 0.3150, which is greater than 0.05. In this model, there is no heteroscedasticity.

**Table 3. Results of the Heteroscedasticity Test**

Variable	C	std. Error	t-Statistics	Prob.
Trading Volume	0.0029	0.0016	1.7510	0.0801
Price Volatility	0.1318	0.0925	1.4250	0.1543
Market Cap	0.0023	0.0023	1.0050	0.315

Source: Processed data, 2023

### Autocorrelation Test

Based on Table 5., the calculated Durbin-Watson (DW) value of 2.0898 was greater than  $DU = 1.90209$  and smaller than the  $4-DU$  value (2.09791). The conclusion is no autocorrelation in this study.

**Table 4. Results of the Autocorrelation Test**

Autocorrelation	
DW	2.0898
DL	0.1890
DU	0.1902
4-DU	0.2097

Source: Processed data, 2023

### Hypothesis Test Results

Based on the hypothesis test as shown in Table 6., namely the t-test, it is known that the trading volume and price volatility variables have a prob value of  $< 0.05$  so H1 and H2 in this study are accepted. In contrast, the t-test results on the market capitalization variable have a prob value of  $> 0.05$ , so H3 is rejected. Based on the coefficient of determination ( $R^2$ ) value, which is equal to 0.4252, variations in trading volume, price volatility, and market capitalization variables can explain variations in the cryptocurrency return variable of 42.53%.

**Table 5. Panel Data Regression Results**

Variables	coefficient	std. Error	t-Statistics	Prob.
C	-0.1835	0.0658	-2.7886	<b>0.0053</b>
Trading Volume (X1)	0.0029	0.0014	2.1347	<b>0.0329</b>
Price Volatility (X2)	0.1319	0.0210	6.2877	<b>0.0000</b>
Market Capitalization (X3)	0.0024	0.0026	1.1011	<b>0.2710</b>
F-Statistic: 2.9204, Prob: 0.0000			R <sup>2</sup> : 0.4252	

Source: Processed data, 2023

### Effect of Trading Volume on Cryptocurrency Returns

The results of this study indicate that trading volume has a positive and significant effect on cryptocurrency returns. This is in line with Niawaradila et al. (2021), which states that increasing trading volume will increase cryptocurrency returns. According to Balcilar et al. (2017), volume can predict profit. The higher the trading volume, the higher the demand for a cryptocurrency. The high demand for the five types of cryptocurrencies in this study will increase the price so that the difference between the current and previous prices will be favorable or get a return.

Knowing if the trading volume has a positive and significant effect can be used for investors to see or determine what type of cryptocurrency to invest in. To get returns or profits, investors can see the trading volume of each crypto coin. If the trading volume is bigger, it can be estimated that the cryptocurrency returns will also increase.

### The Effect of Price Volatility on Cryptocurrency Returns

The results of this study indicate that price volatility has a positive and significant effect on cryptocurrency returns in line with research by Nasution & Halim (2016). This can imply that price movements or price volatility can be used as a basis for seeing cryptocurrency returns. According to Tandelin (2001), volatility (return variation) describes the risk and the expected return or reward. As in the theory of "High Risk, High Return," the higher the risk, the higher the profit that will be obtained. Price movements reflected in price volatility can also indicate that the cryptocurrency is in great demand, so it has high volatility. The high interest in a coin will increase the price and cause returns.

Knowing if price volatility has a positive and significant effect on cryptocurrency returns can be used as a way for investors to see or determine what type of cryptocurrency to invest in. To seek returns or profits, investors can see the price volatility, in addition to the trading volume previously mentioned for each crypto coin. If price volatility increases, it can be estimated that cryptocurrency returns will also increase.

### The Effect of Market Capitalization on Cryptocurrency Returns

The results of this study indicate that market capitalization has no significant effect on cryptocurrency returns, which is in line with Yusra (2019). Increasing market capitalization cannot be used as a reference for predicting cryptocurrency returns. The total supply of cryptocurrencies in circulation stays the same with price increases. In several cases, investors, especially traders, do not see market capitalization as a goal in choosing the type of crypto they want to invest in or buy. These traders only look at price trends or movements if the coin has a large market cap. In addition, the restriction on the

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sale of cryptocurrency also causes the price to be high, but the circulation of the supply of coins decreases, so the market capitalization has little effect.

## CONCLUSION

Based on the results of this study, it is known that trading volume has a positive and significant effect on cryptocurrency returns, where when trading volume increases, returns will also increase, and vice versa. This aligns with Niawaradila, Wiyono, & Maulida (2021). Price volatility also has a positive and significant effect on cryptocurrency returns, where when price volatility increases, returns will also increase, and vice versa. This is in line with Nasution & Halim (2016).

Meanwhile, market capitalization does not significantly affect cryptocurrency returns, whereas when market capitalization increases or decreases, returns do not experience a direct or reverse effect. This is in line with the research of Yusra (2019). If investors want to earn high returns, then it is advisable to choose cryptocurrencies with high trading volume and high price volatility. But keep in mind, with high price volatility can also mean a greater risk of the coin.

## RECOMMENDATION

Future researchers are expected to choose other types of independent variables that are not explained in this study, for example, other fundamental and technical analyses. Fundamental analysis that can be used such as project analysis of each type of coin. This information can be found in the cryptocurrency white paper.

Meanwhile, other variables can be taken in technical analysis, such as trend lines of crypto price movements that can predict further price movements. Advice that can be given to investors is to assess the fundamental and technical elements of the type of cryptocurrency they want to invest in. Like the results in this study, trading volume and price volatility can be used as a reference or basis for seeing the estimated profit you want to get.

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