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Cryptocurrency Hedging as an Alternative Investment in Digital Era

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ABSTRACT

This research analyzes cryptocurrencies as hedging in an attractive investment for investors with expectations. However cryptocurrencies are still much riskier than equities or commodities. Investors are attracted by the dynamics of cryptocurrencies which show that they are very similar to gold and forex investing. Some of the things that become a problem of this uncertainty will certainly give rise to investment risk which if investors do not protect their assets by diversifying their portfolios will result in sizable losses for investors. Therefore, investors need to hedge or what is known as hedging for assets owned to minimize risk. The very rapid development of cryptocurrency today makes it an alternative to protect asset values both in normal and non-normal economic times such as during the Covid 19 pandemic, wars, natural disasters and others. which will be analyzed in this study. The operational variables in this study (1) The independent variable is the JCI (Rupiah), namely the Composite Stock Price Index, which describes the movement of stock prices in Indonesia as a whole. (2) The dependent variable is Bitcoin (Rupiah) which is a cryptocurrency which is a cryptocurrency. This type of research is quantitative and data processing to produce hypotheses in this study uses the Eviews 11 application.

Keywords: *Cryptocurrency, Bitcoin, Hedging, Investment Return*

INTRODUCTION

Cryptocurrencies is a digital online cash system that works without third party confirmation which makes it possible (and the drawbacks) to carry out monetary transactions directly between users without going through an official financial institution (Nasution et al. 2019). Fluctuations in the Santa capital market affect investor behavior in investing because capital market analysis does not only look at numbers, but looks at economic (external) aspects. Investors tend to be risk averse or even moderate investors, so investors will choose to withdraw their funds from the capital market and then invest the funds are in safe haven investment schemes or instruments or investments that have a low level of risk such as gold or bonds.

Sometimes investors are the type of risk taker, they do not rule out the possibility that investors will transfer their funds to cryptocurrency when the economy is not normal, such as the Covid-19 pandemic, war, and other external things that can experience very significant price increases. which affect the volatility of stock prices and the Indonesian stock market. Uncertainty arises in line with stock price movements that are influenced by various sentiments circulating in the market. This uncertainty will certainly lead to investment risk which if investors do not protect their assets by diversifying their portfolios will result in sizable losses for investors. Therefore, investors need to hedge or what is known as hedging for assets owned to minimize risk. The very rapid development of cryptocurrency today makes it an alternative to protect the value of assets that will be analyzed in this study.

METHOD

This study uses a quantitative approach. Based on the objectives that have been stated, this study aims to analyze the ability of cryptocurrencies, especially bitcoin, to hedge in the Indonesian stock market which is distinguished in two conditions, namely normal and abnormal economic conditions.

Population and Sample

The population in this study is the daily closing price of bitcoin and the Jakarta Composite Index (IHSG) for the period January 1 2018 to December 31 2022, a total of 600 observational data for each variable under normal economic conditions and 600 data for each variable under abnormal economic conditions.

Sampling research using saturated sampling technique. The samples in this study are 600 bitcoin daily closing price data, 600 daily closing price data for the JCI for the period January 1 2018 to December 31 2019 for normal economic conditions and 600 crypto currency daily closing price data. bitcoin, 600 JCI daily closing price data for the period 01 January 2020 to 31 December 2021 for abnormal economic conditions.

Data analysis technique

Data analysis using multiple linear regression analysis. The test consists of: descriptive statistical analysis, classic assumption test, Augmented-Dickey Fuller unit root test, Granger Causality test, and hypothesis testing using the GARCH Model.

RESULT AND DISCUSSION

Descriptive Statistical Analysis

In table 3.1 it can be seen that the mean or average return value of Bitcoin (BC) during normal times before the covid 19 pandemic was -0.000201 and the maximum value was 0.140000 and the minimum value was -0.282000. The standard deviation value is 0.036434 greater than the mean value, which means that the BC return value has a variety and is not similar to the mean value. The difference between the average value and the maximum and minimum values indicates that returns in normal times have high volatility.

In Table 3.1 Descriptive Statistics of Research Variables, it is known that the average IHSG return value at normal before the Covid-19 pandemic was 0.0000095 with a maximum value of 0.024000 and a minimum value of -0.035000. The standard deviation value is 0.037143 which is greater than the mean value, the IHSG return value has various variations and is not similar to the average value. The difference between the average value and the maximum and minimum values indicates that the JCI return has a fluctuating movement, in normal conditions before the Covid-19 pandemic the JCI had high volatility.

Table 3.1 Descriptive Statistics of Research Variables

	NORMAL B.C	JCI NORMAL	PANDEMIC BC	JCI PANDEMIC
Means	-0.000201	0.0000095	0.003134	0.000127
Minimum	-0.282000	-0.035000	-0.351000	-0.063000
Maximum	0.140000	0.024000	0.203000	0.112000
std. Dev	0.037437	0.007143	0.037950	0.010785
Observations	700	700	700	700

It can be seen in table 3.1 during the Covid-19 pandemic the mean or average return for BC was 0.003134, the maximum value was 0.203000 and the minimum value was -0.351000. The standard deviation value is 0.037950, this value is greater than the mean value, this indicates that the BC return value varied differently from the mean/average value during the Covid-19 pandemic during the crisis.

Furthermore, during the Covid-19 pandemic, the average value of the JCI return was 0.000127 with a maximum value of 0.112000 and a minimum value of 0.063000. The

standard deviation value is 0.010785, this value is greater than the mean value, indicating that the JCI return has a different value from the average value during the Covid-19 pandemic.

Classic Assumption Test

A. Normality test

The Normality Test is used to determine whether the data collected is normally distributed. The normality test uses the Jarque-Bera (JB) test. In detecting normally distributed data or not, it is done by comparing the Jarque-Bera probability value with the Alpha level, the significance usedα = 0.05.

Figure 3.1 Jarque-Berra Normality Test in Pre-Pandemic Conditions

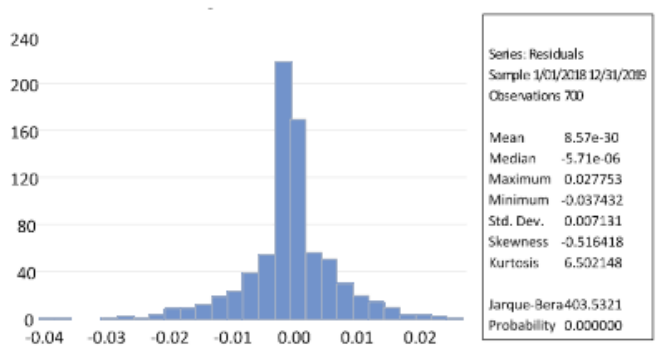
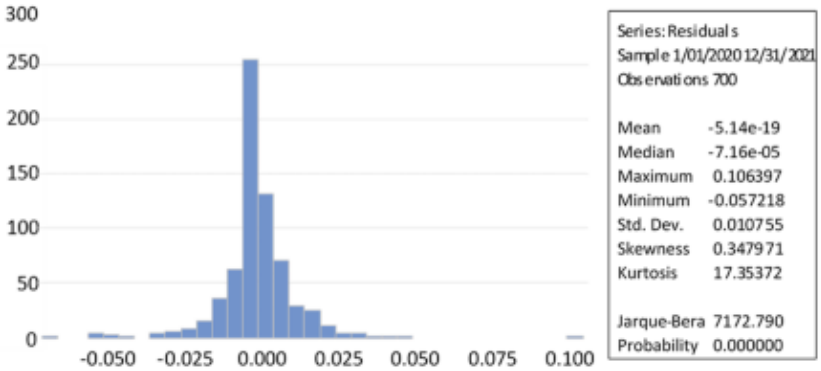


Figure 3.2 The Jarque-Berra Normality Test in the Conditions of the Covid-19 Pandemic



In Figure 3.2 the normality test with the Jarque-Berra chart is 7172,790 with a p-value of 0.000000 where the p-value is <0.05. Data on the conditions of the Covid-19 pandemic in this study are normally distributed t data.

B. Autocorrelation Test

The autocorrelation test in normal times before the Covid-19 pandemic using Durbin-Watson based on the table is 1.756713. Furthermore, in the table of values for dL and dU at T = 700 and k = 2, the values for dL = 1.87297 and dU = 1.87869. Then the value 4 – 1.756713 = 2.243287

Table 3.2 Normal Period Durbin Watson Autocorrelation Test

Durbin-Watson stat	1.756713

Autocorrelation detection is d = 2.243287 > dU: 1.87869, so there is no positive autocorrelation. In other words, there is no high autocorrelation in the residuals.Furthermore, the Autocorrelation test during the Covid-19 pandemic using Durbin-Watson based on the table was 1.326618. Furthermore, in the table of values for dL and dU at T = 700 and k = 2, the values for dL = 1.87297 and dU = 1.87869. Furthermore, the value 4 – 1.326618 = 2.673382 Autocorrelation detection is d = 2.673382 > dU: 1.87869, so there is no positive autocorrelation. In other words, there is no high autocorrelation in the residuals.\

Table 3.3 Durbin Watson Autocorrelation Test during the Pandemic

Durbin-Watson stat	1.326618

C. Heteroscedasticity Test

This test is to determine whether there is deviation from the classical assumption of heteroscedasticity, namely the variance of the residuals for all observations in the regression model. The condition that must be met in the regression model is the absence of heteroscedasticity symptoms. This test uses the Breusch-Pagan (BP) test, if the Chi-square probability value is > 0.05, it means that there are no symptoms of heteroscedasticity.

Table 3.4 Heteroscedasticity Test

F-statistic	12.57082	Prob. F(2.697)	0.0000
Obs*R-squared	20.83572	Prob. Chi-Square(2)	0.0000

F-statistic	14.18118	Prob. F(2.696)	0.0000
Obs*R-squared	26.38814	Prob. Chi-Square(2)	0.0000

Based on table 3.4 it can be seen in the Breusch-Pagan (BP) test, divided as follows:

a. At the timenormal before the covid-19 pandemic, the Chi-square probability value was 0.0000 <0.05, which means there are symptoms of heteroscedasticity.
b. In normal times during the Covid-19 pandemic, the Chi-square probability value is 0.0000 <0.05, which means there are symptoms of heteroscedasticity.

D. Multicollinearity Test

The multicollinearity test is used to test the regression model whether a correlation is found between the independent variables or the independent variables. Test by paying attention to the Variance Inflation Factor (VIF) value. If there are no symptoms of multicollinearity if the centered VIF value < 10.

Table 3.5 Multicollinearity Test

Variable	Coefficent Variance	Uncentered VIF	Centered VIF
C	7.04E-08	1.000539	NA
BC	0.000146	2.474237	2.474061

Variable	Coefficent Variance	Uncentered VIF	Centered VIF
C	1.57E-07	1.008427	NA
BC	0.000442	2.582191	2.571775

It can be seen in the table that, the Variance Inflation Factor (VIF) of Bitcoin (BC) before the pandemic was 2.474061 < 10 and during the pandemic it was 2.571775 < 10 meaning that the two Bitcoin variables both before the pandemic and after the pandemic had no symptoms of multicollinearity.

Augmented root Unit Test - Dickey Fuller

The unit root test uses the Augmented Dickey - Fuller test, the condition is that if the Augmented Dicky-Fuller (ADF) t-statistic value is smaller than the test critical values or critical values, then the data can be said to be stationary. This test can be seen probability ≥ 0.05 then the data is not stationary, but if the probability < 0.05, then the data is stationary. The test is carried out at the first difference level and can be continued with the second difference if the data is not stationary

Table 3.6 Augmented-Dickey Fuller's Unit root test

Variable	Test		t-Statistic	Prob
IHSG	ADF Test Statistic		-27.32728	0,0000
	Test Critical Values	1% Level	-3.567082	
		5% Level	-2.776376	
		10% Level	-2.579913	
BC	ADF Test Statistic		-29.38537	0,0000
	Test Critical Values	1% Level	-3.358172	
		5% Level	-2.997199	
		10% Level	-2.589914	

Variable	Test		t-Statistic	Prob
IHSG	ADF Test Statistic		-26.28834	0,0000
	Test Critical Values	1% Level	-3.548190	
		5% Level	-2.776391	
		10% Level	-2.589927	
BC	ADF Test Statistic		-29.62157	0,0000
	Test Critical Values	1% Level	-3.548192	
		5% Level	-2.989175	
		10% Level	-2.679715	

Based on table 3.6, the ADF Test IHSG value before the covid 19 pandemic was -27.32728 <Critical Value level 1% (-3.567082), 5% (-2.776376) and 10% (-2.579913) seen in the probability value of 0.0000 <0.05 means the data return of the JCI is stationary. Furthermore, the ADF Test BC value before the Covid-19 pandemic was -29.38537 <Critical Value at the level of 1% (-3.58172), 5% (-2.997199) and 10% (-2.5589914) and probability value of 0.0000 <0.05 which means the data return BC is stationary.

Based on table 3.6 the ADF Test JCI value during the covid 19 pandemic was -26.28834 <Critical Value level 1% (-3.548190), 5% (-2.776391) and 10% (-2.589927) can be seen at a probability value of 0.0000 <0.05, it means that the JCI data return is stationary. Furthermore, the value of the ADF Test BC during the covid-19 pandemic was -29.62157 <Critical Value was good at the level of 1% (-3.548192), 5% (-2.989175) and 10% (-2.679715) and the value probability 0.0000 < 0.05 which means the data return BC is stationary.

Granger Causality Test

This test is to find out whether the variable has a one-way or two-way relationship.

Table 3.7 Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
BC does not Granger Cause IHSG	700	1.85265	0.1677
IHSG does not Granger Cause BC		1.38282	0.3917

Null Hypothesis:	Obs	F-Statistic	Prob.
BC does not Granger Cause IHSG	700	5.25713	0.1170
IHSG does not Granger Cause BC		0.84688	0.4836

From the table above the results of the Granger Causality test before the covid 19 pandemic above show that the probability level of the BC variable for the JCI variable is 0.1677 > 0.05 and the JCI variable for the BC variable is 0.3917 > 0.05, at the probability level both exceeded the 0.05 alpha level. So that the output indicates that there is no causality relationship between JCI returns and bitcoin returns. Furthermore, the results of the Granger Causality test during the covid 19 pandemic can be seen in the table above showing that the probability level of the BC variable for the JCI variable is 0.1170 > 0.05 and the JCI variable for the BC variable is 0.4836 > 0.05, at a level the probability of both exceeding the 0.05 alpha level.

Generalized Autoregressive Conditionally Heteroscedastic (GARCH) Test

The GARCH model is a model used in forecasting data that has heteroscedasticity problems. The GARCH model was chosen as the test method for creating the model

Table 3.8 GARCH Test Before the Covid-19 Pandemic

Variables	coefficient	std. Error	z-Statistics	Prob.
C	0.000137	0.000368	0.584263	0.7328
BC	-0.007235	0.007269	-0.875233	0.4312
C	0.0000613	0.00000412	15.28235	0.0000
RESID(-1)^2	0.312851	0.053997	5.281187	0.0000
GARCH(-1)	-0.181285	0.057534	-4.198698	0.0000

In the previous table, the GARCH model before the Covid 19 pandemic was formed based on the residual variance, as follows: JCI-BC$\sigma t2$ = 0.0000613 + 0.312851$\varepsilon t2{-}1$ − 0.181285$\sigma t2{-}1$

The equation describes the movement of the variance of the residuals. The residual constant value is 0.0000613 > 0. The model shows that the significant coefficient seen in

the value of the probability variance equation is 0.0000 <0.05. The model formed can be used as an estimator when it can be used further to be analyzed with the ARCH effect, which can be seen in the following table

Table 3.9 ARCH Effect Testing Before the Covid 19 Pandemic

Heteroskedasticity Test: ARCH			
F-statistics	0.382427	Prob. F(2,697)	0.5536
Obs*R-squared	0.383262	Prob. Chi-Square	0.5523

Based on the table above, the Prob value is obtained. Chi-square 0.5523 > 0.05 it can be concluded that the GARCH model is free from the ARCH effect and is a feasible model and ready to be analyzed in the hypothesis. The Bitcoin return coefficient in the previous table has a negative value of -0.007235, this shows that bitcoin returns have a negative correlation with JCI returns, which means that every 1% increase in BTC returns will decrease 0.007235% JCI returns. Based on the Bitcoin return table, it has a probability level of 0.4312 > 0.05. These results show that bitcoin returns do not have a significant effect on JCI returns.

The results of the analysis show that the price movement of bitcoin before the Covid 19 pandemic, that its daily returns did not affect the return on the Jakarta Composite Index (IHSG). From this description, the hypothesis of this statement is: H1 Bitcoin has hedging capabilities against the stock market under normal circumstances, Hypothesis 1 is accepted.

Table 3.10 GARCH Test during the Covid-19 Pandemic

Variables	coefficient	std. Error	z-Statistics	Prob.
C	0.000392	0.000385	0.949427	0.4592
BC	0.001724	0.008794	2.187995	0.0468
C	0.00000575	0.0000096	5.58737	0.0000
RESID(-1)^2	0.127412	0.016275	7.871257	0.0000
GARCH(-1)	0.948397	0.021356	43.468850	0.0000

In the table above the GARCH model during the Covid 19 pandemic which was formed based on the residual variance, is the following equation: JCI-BC$\sigma t2$ = 0.00000575 + 0.127412$\varepsilon t2-1$ − 0.948397$\sigma t2-1$

The equation describes the movement of the variance of the residuals. The residual constant value is 0.00000575 > 0. The model shows that the significant coefficient seen in the value of the probability variance equation is 0.0000 <0.05. The model formed can be used as an estimator when it can be used further to be analyzed with the ARCH effect, which can be seen in the following table:

Table 3.11 ARCH Effect Testing during the Covid 19 Pandemic

Heteroskedasticity Test: ARCH

F-statistics	0.741175	Prob. F(1,739)	0.5376
Obs*R-squared	0.744362	Prob. Chi-Square	0.5379

Based on the table above, the Prob value is obtained. Chi-square 0.5379 > 0.05 it can be concluded that the GARCH model is free from the ARCH effect and is a feasible model and ready to be analyzed in the hypothesis. In the table it can be seen that the Bitcoin return coefficient has a positive value of 0.01724. This shows that bitcoin returns have a positive correlation with JCI returns, therefore a 1% increase in Bitcoin returns will add 0.01724% JCI returns. The table shows that BTC returns have a probability level of 0.0468 < 0.05. This shows that bitcoin returns have a significant influence on JCI returns.

Based on these results, it indicates that bitcoin price movements in crisis conditions, which are reflected in their daily returns, also affect the return on the Composite Stock Price Index (IHSG). H2 : Bitcoin does not have the ability to hedge against the stock market in abnormal economic conditions, Hypothesis 2 is rejected.

CONCLUSION

The conclusions in this study are:

1. Bitcoin has hedging capabilities against the stock market under normal circumstances, the first hypothesis is accepted.
2. Bitcoin has no ability to hedge against the stock market in abnormal economic

conditions. The second hypothesis is rejected.

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