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The Effect of Exchange and Dow Jones Industrial Average (DJIA) on the Jakarta Composite Index (JCI) when the Downtrend Happened Due to the Covid-19 Pandemic

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Abstract
This study analyzes the effect of the Exchange Rate and the Dow Jones Industrial Average on the Jakarta Composite Index during a downtrend due to the COVID-19 pandemic. The impulse response function was used to analyze the permanent effects on an exogenous shock variable on one of them. The study results prove a significant effect of the exchange rate on the Jakarta Composite Index. The same result showed that the most the weakening of the exchange rate of the Rupiah, the Jakarta Composite Index tends to fall. Besides, the Dow Jones Industrial Average harms the Jakarta Composite Index. In the long run, the response given by the Jakarta Composite Index showed a negative level. The USD/IDR exchange rate weakening was very influential on the Jakarta Composite Index. Otherwise, the weakening of the Rupiah exchange rate has led to the decrease of the Jakarta Composite Index. Monetary authorities should reckon on the stock price movements to control the stability of monetary exchange.
Keywords: Jakarta Composite Index, Dow Jones Industrial Average, exchange rate, COVID-19, monetary policies.
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1.Introduction

Entitled Black Swan Event by Renjen(2020) and close to the one that caused the SARS (Severe Acute Respiratory Syndrome) epidemic, which killed 774 people worldwide in 2002-2003 (Park, 2020), the COVID-19, result of the disease caused by severe acute respiratory syndrome coronavirus SARS-COV-2(Singhal 2020), has had a detrimental effect on global health systems with a ripple effect on all aspects of human life. The pandemic is much more than a health crisis and an unprecedented socioeconomic crisis, putting pressure on each country's effects. It has devastating social, economic, and political impacts which will leave deep scars which, no doubt, will be slow to emerge. The April 2020 global financial stability has reported that efforts to fight the crisis are causing historically unprecedented economic and financial repercussions worldwide. Unlike the 2008 financial crisis, the current crisis has generated enormous uncertainty in the world. Oskoui (2020) emphasized a disruption of global production chains, a sharp slowdown in economic activity and a collapse of major financial markets.

The current situation of the various world markets is unique. Nicola et al.(2020) has shown its implications on primary sectors; it combines a shock to the level of aggregate demand and a shock to the level of aggregate global supply. According to the International Monetary Fund (2020), the prices of risky assets have fallen sharply: at the height of the recent divestiture, risky assets suffered losses at least equivalent to half of the losses suffered in 2008 and 2009. Tensions have also arisen in major short-term funding markets, including the global dollar market. Umar & Gubareva, 2020 has demonstrated the panic selling induced by the pandemic on financial markets. The impact of panic selling caused all global stock exchanges to decline without leaving behind the Dow Jones Industrial Average (DJIA).

The pandemic that has hit the whole world has caused uncertainty for the Indonesian economy(Halimatussadiah *et al.* 2020). Nugroho & Robiyanto(2021) prove that Rupiah had a weak rate against the Dollar during the pandemic. The same author affirmed that Gold return volatility has positively affected the JCI volatility and the USD against IDR volatility. As a result of this increased volatility, market liquidity deteriorated sharply, including in markets generally perceived to be very active, which caused asset prices to fluctuate sharply. However, against the dollar, the currency still depreciated. The reduction in the country's economic activity and the government's relaxed monetary policy could have resulted in a weakening of the Rupiah. The lowest level occurred on June 17, 1998, when the rupiah was at Rp 16,650 per US dollar. At the close of March 23, 2020, referring to Bloomberg, the rupiah in the spot market was already at the level of Rp. 16,575 per US dollar. Besides, the pandemic had an impact on the decline in the Jakarta Composite Index(Liu *et al.* 2020). Rahmayani & Oktavilia(2020) reviewed the Indonesia stock market; the Jakarta Composite Index has experienced the lowest decline of 2,388 points (37.91%) from January 2020 of 6,299 to the closing price of March 2020 of 3,911.

Research on the factors that affect the Jakarta Composite Index (JCI) has been conducted with mixed results. Rahmalia(2021), who analyze the impact of inflation, rupiah exchange rates, and GDP growth on the JCI,

showed that both variables do not imply the JCI. Otherwise, the GDP growth and exchange rates had a significant effect on the JCI. In contrast, the study of Bella et al.(2021) using the same components showed that inflation negatively influences the Stock Price Index. Ismawati assessed through multiple regression analysis the change in the Jakarta Composite Index during the COVID-19 pandemic. The results indicated that the Jakarta Composite Index has positively decreased. Besides, inflation and the Dow Jones Index have different impacts on the Jakarta Composite Index.

The research conducted by Robiyanto(2018) showed that the Rupiah/US dollar exchange rate had a significant adverse effect on the Joint Stock Price Index. The result from Damajanti (2018) study proves the significant effect of the rupiah exchange on the CSPI, but the Dow Jones Index has no significant effect on the CSPI.

This research is interested to know the effect of macro variables (the Exchange Rate and the Dow Jones Industrial Average) on the Jakarta Composite Index during a downtrend due to the COVID-19 pandemic. Besides that, it is also to find out indicators of macro variables that have a dominant influence on the Jakarta Composite Index.

2.Variable description

2.1. Jakarta Composite Index (CSPI or JCI)

The Jakarta Composite Index is a composite of the stock prices of listed companies that trade on the Indonesia Stock Exchange. The Jakarta Composite Index is used to measure all stocks' combined performance on the stock exchange(Jogiyanto, 2014).

The formula used to calculate the JCI is as follows:

$$\text{JCI} = \frac{\text{Market value}}{\text{Basic value}} \text{ x } 100$$

2.2. Exchange rate

The exchange rate is the ratio of the value of a country's currency to foreign currencies (Hasibuan, 2005). In the monetary approach, the currency exchange rate is defined as the price at which foreign currency is traded against the domestic currency, and that price is related to the supply and demand for money. The exchange rate is one indicator that affects activity in the stock market and money market because investors tend to be careful when making investments.

2.3. Dow Jones Industrial Average (DJIA)

The Dow Jones Industrial Average, commonly called the Dow Jones Index, is a stock market index founded in 1982 by the editor of The Wall Street Journal and the founder of Dow Jones & Company, Charles Dow. Tandelilin(2010) stated that the Dow Jones Industrial Average is the world's most extensive average stock index. Therefore, the Dow Jones Industrial Average movement can affect almost all world stock indexes, including the JCI. The influence of the Dow Jones Industrial Average on the JCI is expected to be positive, in the sense that the increase in the Dow Jones Industrial Average will result in an increase in the JCI on the Indonesia Stock Exchange.

3. RESEARCH METHOD

The study uses quantitative data types using three research variables: one dependent variable and two independent variables. The dependent variable used is the Jakarta Composite Index (JCI), and the independent variables are the Exchange Rate and the Dow Jones Industrial Average (DJIA).

The study analyses daily data from January 2, 2020 to April 30, 2020. The modeling of time series requires that the latter be stationary. In other words, the series has no trend, no cycle, and no seasonality. To avoid these fallacious estimates, the economists proceed to the stationarities of the chronological series. The first step is to test the stationarity of the data, and if all data are stationary at the level, then the ordinary VAR model can be continued, whereas if all the data are stationary at the first difference level, the model that must be used is the first difference VAR or VECM if there is cointegration.

4. RESULTS AND DISCUSSION

4.1. Result on unit root test

The first step in this research is to test whether the data is stationary or not using the unit root test. In addition, the unit root test is used to determine the VAR model that will be used in the study. The unit root test in this study used the Augmented Dickey-Fuller (ADF) method. If the data used is not stationary at the level, then the data must be changed to the first difference to get stationary data, then the VAR model will be combined with the error correction model to become Cointegrated VAR or commonly known as the Vector Error Correction Model. The results of the unit root test are presented in Table 1.

Table 1. Results of the unit root test at the first difference level

Variable	T-statistic ADF	Critical Value MacKinnon	P-Value	Conclusion
Jakarta Composite Index (JCI)	-7.732463	-3.514426	0.0000	Stationary
		-2.898145		
		-2.586351		
Exchange rate	-3.353740	-3.515536	0.0157	Stationary
		-2.898623		
		-2.586605		
Oil Price	-7.245246	-3.515536	0.0000	Stationary
		-2.898623		
		-2.586605		
Dow Jones Industrial Average (*DJIA*)	-12.48662	-3.514426	0.0001	Stationary
		-2.898145		
		-2.586351		

Note:
* Stationary at 1% level
** Stationary at 5% level
*** Stationary at 10% level
Source: Data processed using Eviews 10

4.2. Optimum Lag Determination

The most crucial thing in this VAR test is finding the optimal lag specification to provide the best predictive power. The choice of lag length is crucial because it can affect the acceptance and rejection of the null hypothesis, lead to estimation bias, and result in inaccurate predictions. The selection of the optimal lag length in the VAR model is mainly to avoid serial correlations between error terms and endogenous variables in the model, which can cause the estimator to be inconsistent.

The determination of lag can use several approaches, namely Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), and Schwarz Information Criterion (SC). This study uses the Akaike Information Criterion (AIC) to choose the optimum lag (Table 2).

Table 2: Optimal Lag Selection

Lag	*Akaike Information Criterion* (AIC)
1	-18.60669
2	-18.56609
3	-18.75295*
4	-18.56609
5	-18.54607

The calculation of the AIC value for each lag shows that the minimum AIC value is obtained during lag 3 for the variables that affect the Jakarta Composite Index (JCI) during a downtrend.

4.3. Johansen Cointegration Test

The purpose of the cointegration test in this study is to determine whether the group of variables that are not stationary at these levels meet the requirements of the integration process, namely where all variables are stationary at the same degree, namely degree 1.

Long-term information is obtained by determining the cointegration rank to determine how many equations can explain the entire existing system. Cointegration testing criteria in this study are based on trace statistics. If the value of the trace statistic is greater than the critical value of 5 percent, then the alternative hypothesis stating the number of cointegrations is accepted so that it can be seen how many equations are cointegrated in the system. This test is to determine whether there is a long-term effect for the variables that we will examine. If it is proven that there is cointegration, then the VECM stage can be continued. However, if it is not proven, then VECM cannot be continued.

Table 3. Johansen Cointegration Test Results

Hypothesis CE	Trace Statistic	Critical value	Prob	Max-Eigen Statistic	Critical Value	Prob
None	57.65288	29.79707	0.0000	28.21597	21.13162	0.0043
At Most 1	29.43691	15.49471	0.0002	21.61600	14.26460	0.0029
At Most 2	7.820913	3.841466	0.0052	7.820913	3.841466	0.0052
Information	Sign 5%*	3- Cointegration		Sign 5%*	3- Cointegration	

Based on the table above, it can be seen that the trace statistic and maximum eigenvalue at r = 0 are more

significant than the critical value with a significance level of 1% and 5%. The null hypothesis states that no cointegration is rejected, and the alternative hypothesis that there is no cointegration cannot be rejected. Thus, the cointegration test results indicate that the JCI, Exchange rate, and DJIA movements have a relationship of stability/balance and similarity of movements in the long term. In other words, all variables tend to adjust to each other in each short-run period to reach their long-run equilibrium.

4.4. Impulse Response Function

The Impulse response function serves to see the dynamic response of a dependent variable if it gets a particular shock or an independent variable innovation of one standard deviation. This response indicates the effect of a shock on the dependent variable on the independent variable. Fundamentally, in this analysis, the positive or negative response of a variable to other variables will be known. The response in the long term is usually quite significant and tends to change. In the long term, the response tends to be consistent and continues to shrink. The results of the analysis will be presented in graphical form (Figure 1).

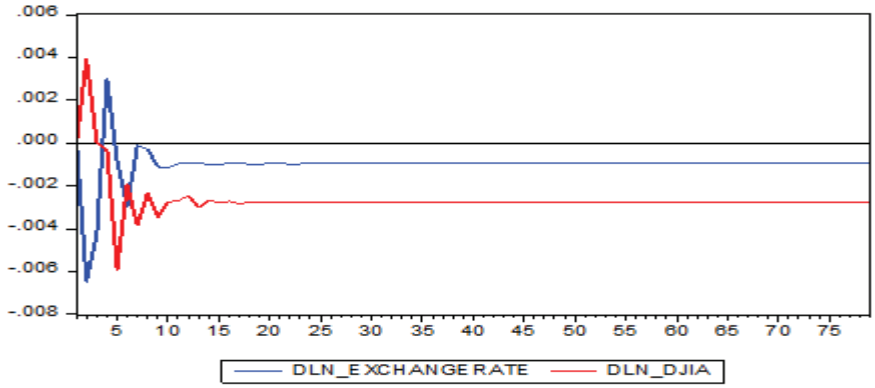

Figure 1: Response to DLN_JCI to innovations using Cholesky (d. f. adjusted) Factors

The Impulse Response Graph of the Jakarta Composite Index shows that the exchange rate shock at the beginning of the period was responded negatively by 6% by the Jakarta Composite Index. However, in the 3rd period to the 4th period, it showed a positive response of 3%. After the 5th period, the response given by the Jakarta Composite Index showed a negative 3-1% range until the end of the period.

The Dow Jones Industrial Average increase responded positively by 4% by the Jakarta Composite Index at the beginning of the period. After the 4th period, the Jakarta Composite Index response to the Dow Jones Industrial Average increase responded negatively in the range of 1-6% until the end of the period.

The USD/IDR exchange rate weakening was very influential on the Jakarta Composite Index. Otherwise, the weakening of the Rupiah exchange rate leads to the decrease of the JCI. The Dow Jones Industrial Average was weakening hurt the Jakarta Composite Index. During the COVID-19 pandemic, the Dow Jones Industrial Average influence was the strongest in influencing the decline in the Jakarta Composite Index during a downtrend and followed by the exchange rate.

5. Conclusion

During the Covid-19 pandemic, the Dow Jones Industrial Average influence most strongly affected the decline in the Jakarta Composite Index when there was a downtrend and followed by the exchange rate. The weakening of the USD/IDR exchange rate harmed the JCI. A drastic and uncontrollable weakening of the exchange rate would cause difficulties for companies with debt in foreign currency. Companies will have difficulty paying their debts. A decrease in company performance would be a result. The decline in the company's performance will make investors consider selling the company's shares more than buying, causing the JCI to fall. The decline in the Dow Jones Industrial Average will harm the JCI. The weakening of the American stock market, the Dow Jones Industrial Average, will impact the decline in stock market indexes throughout the world, including the Indonesian stock market. Therefore, efforts are needed from the monetary authorities to maintain the stability of the Rupiah exchange rate so that stock price movements are controlled.

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