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Covid 19 Has a Significant Impact or Not on the Movement of the Rupiah Exchange Rate Through a Predictive Approach

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Abstract
On March 2, 2020, the government announced that COVID-19 had begun to enter Indonesia. Covid 19 is slowly starting to have a negative effect, where sufferers begin to increase starting March 2 - May 4 2020 as many as 11,192 positive cases and 8452 deaths (Haryanto, 2020). At the end of 2020, data COVID-19 in Indonesia as of December 20, 2020 had increased by 15.53% for the number of active cases (Covid19, 2021). The increase in Covid data was due to an increase in positive cases with the addition of 6982 cases nationally. This is getting worse with the increase in positive cases of Covid-19 in January 2021 is 11287 cases, so that if nationally percentage there are 16.02% active cases. The data that is also of concern from this COVID-19 case is the death data, where at the end of December 2020 it was reported that the death data reached 19,880 cases, and in January 2021 it increased by 2.86% to 25,987 cases (Covid19, 2021). Another impact to watch out for is an increase in interest in the US dollar, which is getting bigger and will result in worse economic conditions compared to the 2008 crisis.). The condition of uncertainty is a factor in the fluctuating exchange rate of the rupiah and foreign stock indices. So it becomes an important concern for the government in formulating policies. Therefore, it is necessary to analyze the effect of the pandemic on the rupiah exchange rate, and foreign stock indexes on the JCI condition. The results of the research conducted, there are several results that can be analyzed. Based on testing of the model, the F test statistic is 131.3 with an opportunity value of 2.2e-16. The opportunity value of 2.2e-16 has a value that is smaller than (5%), so it can be interpreted that the independent variable on the JCI fluctuating is quite significant as implied in the coefficient of the Covid-19 variable. The variable value of the increase in COVID-19 cases in Indonesia is negative, stating that if every increase in COVID-19 cases in Indonesia by 1 case can reduce the JCI by 0.128%.
Keywords: *the effect of covid 19, the effect of the JCI, the impact of foreign stock indices*

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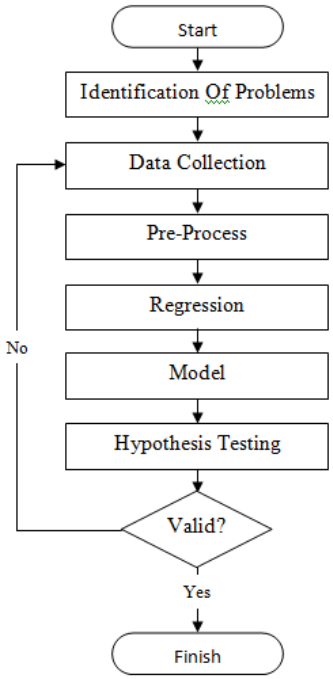
I. INTRODUCTION

At the end of 2020, data on COVID-19 in Indonesia as of December 20, 2020 had increased by 15.53% for the number of active cases (Covid19, 2021). The increase in Covid data was due to an increase in positive cases with the addition of 6982 cases nationally. This is getting worse with the increase in positive cases of Covid-19 in January 2021 is 11287 cases, so that if nationally percentage there are 16.02% active cases. The data that is also of concern from this COVID-19 case is the death data, where at the end of December 2020 it was reported that the death data reached 19,880 cases, and in January 2021 it increased by 2.86% to 25,987 cases (Covid19, 2021). The addition and death toll of COVID-19 cases always brings concern to all parties, not only citizens who always try to take care of themselves, but also economic actors in the business world. The government always asks citizens to maintain health protocols, including washing hands, maintaining distance, and wearing masks. However, the implementation of the rules from the center to the regions is still not implemented in a strict and fully supervised manner (Pati, 2020). This resulted in the continued increase in positive cases in January 2021 to 1,024,298 cases. This problem is a form of uncertainty also for economic actors and the business world. The indication is the weakening of the rupiah exchange rate against the US$ by -12.4% in the period March 2 to April 16, 2020 (pandemic period) (Haryanto, 2020). This also happened in December with the value of the rupiah closed corrected 0, 02% or 2.5 points to Rp. 14,110 per US dollar in the

last session of the third week of December 2020. This condition will further worsen the Indonesian economy. This must also be a concern for the government. If the COVID-19 outbreak still cannot be handled thoroughly, it can cause panic in the economic sector again, and it is possible that it will last longer. Other impacts that must be watched out for are an increase in interest in the US dollar, which is getting bigger and will result in worse economic conditions than the 2008 crisis (Amri, 2020), Weakening of Indonesia's economic growth (Pitaloka, 2020) through the exchange rate of the rupiah against the dollar become important for policy makers. Therefore, it is necessary to analyze the influence of the pandemic condition on the rupiah exchange rate, whether it has an effect or there are other influences.

II. RESEARCH METHODS

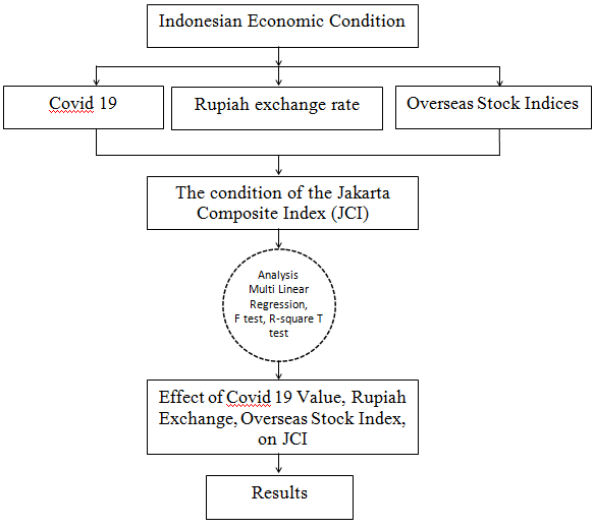
In this study, several stages of work were carried out, is problem identification, data collection, data preprocessing, determining the dependent and independent variables, the linear regression model used, and to determine the effect of the variables used using the F test and T test. The research design can be seen in the picture. 2.1.



Picture 2.1 Research Design Flowchart

2.1. Condition Analysis

The spread of covid 19 until now February 2021 is still experiencing an increasing trend, both from positive cases to cases of death are still increasing (Covid19.go.id, 2021). This condition always has an impact on all sectors, especially the business sector. As a result, business actors panicked and resulted in a decline in production, demand, decreased purchasing power, production capacity, and income. Panic is not only experienced by the business world, the government is also experiencing the same condition. With the occurrence of panic in all sectors, it will also have an impact on the wheels of the economy that triggers the crisis. One of the causes for the emergence of crisis conditions is the exchange rate of the rupiah which has depreciated against the dollar, and in conditions of the covid 19 outbreak, the government will experience the same conditions if the government is not vigilant and implements policies to stimulate the economy during the covid 19 pandemic. According to Haryanto (2020) on In times of crisis, global investors are more interested in keeping their wealth in safe assets and avoiding risky assets such as stocks. In addition to the depreciation of the rupiah against foreign currencies, global stocks also experienced a decline, including the JCI.



Picture 2.2 Condition Analysis Block

2.2. Data Source

The data used in this study are secondary data sources. According to Sugiyono (2015) secondary data sources are sources that do not directly provide data to data collectors, for example through other people or through documents. The data object used is divided into 3 data, the first is the covid 19 data, the second is the stock value fluctuation data, and the rupiah exchange rate. The processed data was obtained through covid19.go.id, kaggle.com, id.investing.com, and idx.co.id.

Table 2.1 Stock Price Data

Date	JCI	HANG SENG	NAS - DAQ	FTSE 100	SHANG - HAI
01/03/20	5499	26147	8576	6463	3035
08/03/20	4908	24033	7875	5366	2887
15/03/20	4195	22805	6880	5191	2746
22/03/20	4546	23484	7502	5510	2772
29/03/20	4623	23236	7373	5416	2764
05/04/20	4649	24300	8154	5843	2797
12/04/20	4635	24380	8650	5787	2838
19/04/20	4496	23831	8635	5752	2809
26/04/20	4716	24644	8605	5763	2860
03/05/20	4597	24230	9121	5936	2895
10/05/20	4508	23797	9015	5800	2868
17/05/20	4546	22930	9325	5993	2814
24/05/20	4754	22961	9490	6077	2852
31/05/20	4948	24770	9814	6484	2931
07/06/20	4880	24301	9589	6105	2920
14/06/20	4942	24644	9946	6293	2968
21/06/20	4904	24550	9757	6159	2980
28/06/20	4974	25373	10208	6157	3153
05/07/20	5031	25727	10617	6095	3383
12/07/20	5080	25089	10503	6290	3214
19/07/20	5083	24705	10363	6124	3197
26/07/20	5150	24595	10745	5898	3310
02/08/20	5144	24532	11011	6032	3354
09/08/20	5248	25183	11019	6090	3360
16/08/20	5273	25114	11312	6002	3381
23/08/20	5347	25422	11696	5964	3404
30/08/20	5240	24695	11313	5799	3355
06/09/20	5017	24503	10854	6032	3260

13/09/20	5059	24455	10793	6007	3338
20/09/20	4946	23235	10914	5843	3219
27/09/20	4927	23459	11075	5902	3218
04/10/20	5054	24119	11580	6017	3272
11/10/20	5103	24387	11672	5920	3336
18/10/20	5112	24919	11548	5860	3278
25/10/20	5128	24107	10912	5577	3225
11/1/20	5336	25713	11895	5910	3312
08/11/20	5461	26157	11829	6316	3310
15/11/20	5572	26452	11855	6351	3378
22/11/20	5783	26895	12206	6368	3408
29/11/20	5810	26836	12464	6550	3445
06/12/20	5938	26506	12378	6547	3347
13/12/20	6104	26499	12756	6529	3395
20/12/20	6009	26387	12805	6502	3397
27/12/20	5979	27231	12888	6461	3473
03/01/21	6258	27878	13202	6873	3570
10/01/21	6373	28574	12999	6736	3566
17/01/21	6307	29448	13543	6695	3607
24/01/21	5862	28284	13071	6407	3483
31/01/21	6152	29289	13856	6489	3496
07/02/21	6223	30174	14095	6590	3655
14/02/21	6232	30645	13874	6624	3696
21/02/21	6242	28980	13192	6483	3509
28/02/21	6259	29098	12920	6631	3502
07/03/21	6358	28740	13320	6761	3453
14/03/21	6356	28991	13215	6709	3405
21/03/21	6196	28336	13139	6741	3364
28/03/21	6011	28939	13480	6737	3484

Table 2.2 Covid 19 data

Date	INDO - NESIA	CHINA	SPAIN	USA
01/03/20	0	80026	2859	75
08/03/20	6	80735	12154	541
15/03/20	117	80860	53120	3830
22/03/20	514	81093	112441	36050
29/03/20	1285	81439	155746	149554
05/04/20	2273	81708	185870	353082
12/04/20	4241	82160	207180	580323
19/04/20	6575	82735	220740	788734
26/04/20	8882	82827	228517	1007244
03/05/20	11192	82877	233369	1210754
10/05/20	14032	82901	235703	1394233
17/05/20	17514	82947	239287	1559818
24/05/20	22271	82974	242849	1723047
31/05/20	26473	83001	246078	1877660
07/06/20	30514	83030	248491	2012622
14/06/20	38277	83132	250858	2190245
21/06/20	45891	83378	252878	2387419
28/06/20	54010	83500	255320	2670525
05/07/20	63749	83553	258666	3035269
12/07/20	75699	83594	265152	3468027
19/07/20	86521	83660	277383	3958916
26/07/20	98778	83830	293580	4445788
02/08/20	111455	84385	316306	4898842
09/08/20	125396	84619	347676	5293037
16/08/20	139549	84827	390146	5664609

23/08/20	153535	84951	443902	5973487
30/08/20	172053	85031	505192	6277774
06/09/20	194109	85122	572532	6575988
13/09/20	218382	85184	645208	6829885
20/09/20	244676	85279	720949	7123733
27/09/20	275213	85351	791250	7418097
4/10/20	303498	85450	857467	7728630
11/10/20	333449	85557	938468	8081107
18/10/20	361867	85672	1038944	8490667
25/10/20	389712	85790	1178185	8982434
11/10/20	412784	85997	1318189	9573119
8/11/20	437716	86212	1443443	10366897
15/11/20	467113	86338	1542784	11448903
22/11/20	497668	86431	1614878	12684214
29/11/20	534266	86512	1668345	13849719
06/12/20	575796	86619	1716275	15274363
13/12/20	617820	86725	1771678	16816272
20/12/20	664930	86829	1838951	18363550
27/12/20	713365	86955	1910108	19680834
03/01/21	765350	87117	2009975	21221552
10/01/21	828026	87433	2178262	22993827
17/01/21	907929	88227	2385257	24556975
24/01/21	989262	88991	2562431	25787509
31/01/21	1078314	89522	2737377	26853439
07/02/21	1157837	89692	2894869	27678174
14/02/21	1217468	89763	2996795	28343479
21/02/21	1278653	89831	3066391	28830093
28/02/21	1334634	89893	3117551	29319591
07/03/21	1379662	89975	3156249	29742944
14/03/21	1419455	90044	3190578	30132479
21/03/21	1460184	90099	3224383	30532038
28/03/21	1490004	90145	3249283	31055155

2.3. Data Modeling

The purpose of data modeling is to see the relationship between attributes and classes in the data to be processed before entering the data testing process. According to Suharyadi and Purwanto (2004), linear regression analysis is linear regression to analyze the magnitude of the relationship and the influence of more than two independent variables. Meanwhile, according to Netter (1997) multiple linear regression is one of the statistical methods used to determine the functional relationship of a dependent variable with two or more independent variables. This model can be calculated by the following equation:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_nX_n \quad \text{... (9)}$$

2.3.1. Data Cleaning

The dataset on the number of Covid-19 cases and the stock price dataset obtained from the source is in the form of structured data, no noise, missing value, or inconsistent. So this greatly facilitates data preprocessing actions. In the dataset on the number of Covid-19 cases, there is one field that contains information about the name of the province and the name of the country of Indonesia. Because this research was made in the coverage area of the country, this dataset was given filtering treatment based on the name of the State of Indonesia. This means that only observation data based on the name of the State of Indonesia are processed for analysis.

2.3.2. Data Aggregation

In the data processing process, it is necessary to combine two datasets on the number of Covid-19 cases and stock price datasets into one combined dataset. This is done to facilitate data processing and analysis. The stages of merging the two datasets are as follows:

a. Make both datasets have the same number of observation data or rows. The dataset on the number of Covid-19 cases is daily cases from March 2020 to March 2021, while the stock price dataset is monthly cases from March 2020 to March 2021. From this difference, the dataset The number of Covid-19 cases is set according to the stock value dataset. That is, arrangements are made so that the number of Covid-19 cases to be per month by adding up the number of cases as much as 30 days per month.

b. Create a variable that shows the time (month) of both datasets at the same position.

A variable that shows the time (month) of the Covid-19 dataset in a vertical position. While the variable that shows the time (month) on the non-oil and gas export dataset is in a horizontal position. To facilitate processing, the non-oil and gas export dataset is adjusted to the Covid-19 dataset. This variable is made vertical by using the transform settings.

2.3.3. Identification of Variables

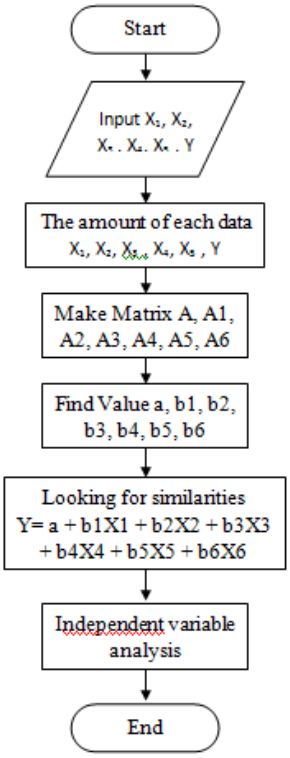
There are 8 variables used in this study. So there are 8 variables to be analyzed. The results of regression analysis with predictor variables of HANG SENG stock value (X1), NASDAQ stock value (X2), FTSE 100 stock value (X3), SHANGHAI stock value (X4), number of COVID-19 cases in Indonesia (X5), number of COVID cases -19 in China (X6), the number of COVID-19 cases in Spain (X7), the number of COVID-19 cases in America (X8) to the JCI value response variable (Y) are shown in the following table:

Table 2.3 Combined Stock Data and Covid 19

Y	X1	X2	X3	X4	X5	X6	X7	X8
5499	26147	8576	6463	3035	0	80026	2859	75
4908	24033	7875	5366	2887	6	80735	12154	541
4195	22805	6880	5191	2746	117	80860	53120	3830
4546	23484	7502	5510	2772	514	81093	112441	36050
4623	23236	7373	5416	2764	1285	81439	155746	149554
4649	24300	8154	5843	2797	2273	81708	185870	353082
4635	24380	8650	5787	2838	4241	82160	207180	580323
4496	23831	8635	5752	2809	6575	82735	220740	788734
4716	24644	8605	5763	2860	8882	82827	228517	1007244
4597	24230	9121	5936	2895	11192	82877	233369	1210754
4508	23797	9015	5800	2868	14032	82901	235703	1394233
6011	28939	13480	6737	3484	1490004	90145	3249283	31055155
305083	1468714	631424	351557	184248	23859944	4862528	64818518	609297172

Table 3.3 contains 57 data for each variable. The variable data contained in each column is summed so that it will be used later in finding values in the calculations of b and a.

2.4. Design of Multiple Linear Regression Method



Picture 2.3 Multiple Linear Process Flowchart

In the case study analysis design with the chosen theme, initialization of the data obtained and collected is carried out first. Then determine the dependent and independent variables from the data. After getting the initialization results, the next step is to add up each column of the dependent and independent variables. Then, create a matrix A, A1, A2, A3, A4, A5, A6 from the previously added data. Determine the determinant of the matrix that has been made, where the value of the determinant of the six matrices is obtained using the sarrus method. Next, find the values of a, b1, b2, b3, b4, b5, b6 which are used to find the Multiple Linear Regression equation. Next, enter the values of a, b1, b2, b3, b4, b5, and b6 in the Multiple Linear Regression equation.

2.5. Classical Assumption Test

In this research, secondary data is used, so to meet the requirements determined before testing the hypothesis through the t test and F test, it is necessary to test some of the classical assumptions used, namely normality, multicollinearity, autocorrelation, and heteroscedasticity which can be explained in detail as follows:

a. Normality test

Normality test aims to test whether the sample used has a normal distribution or not. In the linear regression model, this assumption is indicated by the error value which is normally distributed.

b. Multicollinearity Test

The multicollinearity test was used to test whether the regression model found a correlation between the independent variables. If there is a correlation between the independent variables, it is called a multicollinearity problem. When there is multicollinearity between independent variables, one of the independent variables must be removed from the model. Variance Inflation Factor (VIF) and Tolerance are ways to determine the occurrence of multicollinearity in a regression model. According to Santoso (2012) the VIF and Tolerance equations are as follows:

$$\text{VIF} = \frac{1}{\text{Tolerance}} \quad \text{atau} \quad \text{Tolerance} = \frac{1}{\text{VIF}} \qquad .. (1)$$

2.6. F . Test

After all the data assumptions have been met, then it can be tested using multiple linear regression. The stages of testing in the multiple linear regression analysis can be described as follows:

a. Simultaneous Analysis

This test is used to determine whether all independent variables simultaneously have a significant effect on the dependent variable. The steps in the F test are as follows:

1) Determining the test hypothesis

Ho: all independent variables have no significant effect simultaneously (simultaneously) on the dependent variable.

H1: all independent variables have a significant effect simultaneously (simultaneously) on the dependent variable.

2) Determining the level of significance

The expected level of significance is with the risk of error α= 5% or 95% confidence interval with degrees of freedom (k-1) and (nk), where n is the number of observations and k is the independent variable.

3) Calculate the value of F count, with the F test formula as follows: The F test formula is as follows (Hasan, 2002: 125):

$$F = \frac{MS_{regresi}}{MS_{residual}}$$

Information :

MSregression = SSregression / df regression

MSresidual = SSresidual / df residual

MS = Mean Square, SS = Sum of Square

df = degrees of freedom

In this case, the provisions apply, if F count > F table with a significance value < alpha 0.05, then Ho is rejected or in other words the fluctuation of the dependent variable is influenced by the independent variable. This means that the independent variable has a significant effect simultaneously on the dependent variable, so the model is feasible to use. On the other side, if F count < F table with a significance value > alpha 0.05, then Ho is accepted or the rise and fall of the dependent variable is not influenced by the independent variable. This means that the independent variable does not have a significant effect simultaneously on the dependent variable, so the model is not feasible to use.

4) Partial Test (t Test)

The t test is used to test how far the independent variable partially has a significant effect on the dependent variable. The steps in the t-test are as follows:

a) Determining the test hypothesis

Ho: the independent variable has no partial effect on the dependent variable.

H1: the independent variable has a partial effect on the dependent variable.

b) Determining the level of significance

The expected level of significance is at the real level α= 5% or 95% confidence interval with a degree of freedom of nk, where n is the number of observations and k is the independent variable including the intercept (constant).

c) Calculate the value of t count, with the t-test formula as follows:

$$t = \frac{b_i}{sb_i}, \text{ where } i=1,2,3.$$

Information:

bi : regression coefficient of each independent variable

sbi : standard residual (error) of each regression coefficient

The criteria for decision making whether or not a null hypothesis is accepted (H0) is to compare t count with t table. When t count>t table or –t count>- t table or the resulting significance value of t is less than 0.05 then reject Ho. This means that the measured independent variable has a partially significant effect on the dependent variable. On the other side, if t count < t table or –t count < -t table or the resulting significance value of t is greater than 0.05 then accept Ho. This means that the independent variable does not have a significant effect partially on the dependent variable.

III. DISCUSSION

3.1. Variable Identification

There are 8 variables used in this study. So there are 8 variables to be analyzed. The results of regression analysis with predictor variables of HANG SENG stock value (X1), NASDAQ stock value (X2), FTSE 100 stock value (X3), SHANGHAI stock value (X4), number of COVID-19 cases in Indonesia (X5), number of COVID cases -19 in China (X6), the number of COVID-19 cases in Spain (X7), the number of COVID-19 cases in America (X8) to the JCI value response variable (Y) are shown in the following table:

Table 3.1 Results of Regression Modeling

	Esti-mate	Std. Error	t value	Pr(>|t|)	VIF value
(Intercept)	4.39E+02	8.75E+02	0.502	0.618232	-
HANG SENG (X1)	1.47E-01	2.59E-02	5.659	8.80E-07	7.6674
NASDAQ (X2)	1.43E-01	5.65E-02	2,532	0.014738	28.6784
FTSE 100 (X3)	-7.34E-02	1.55E-01	-0.475	0.637235	9.7054
SHANGHAI (X4)	-3.78E-02	2.73E-01	-0.138	0.890661	13.8086
INDONESIA (X5)	2.22E-03	2.88E-03	0.77	0.445111	12.1272
CHINA (X6)	-7.89E-03	1.33E-01	-0.06	0.952775	1.6218
SPAIN (X7)	-1.66E-03	8.28E-04	-2.01	0.050219	4.8491
USA (X8)	2.71E-04	7.56E-05	3.587	0.000795	3.2978

Based on the table above, not all variables are significant in influencing the JCI value. The models formed are:

$$Y = 439 + 0.1470\,X1 + 0.143\,X2 - 0.0734\,X3 - 0.0378\,X4 + 0.0022\,X5 - 0.0079\,X6 - 0.0017\,X7$$

3.2. Assumption Test

The formed model will be tested for assumptions, namely non multicollinearity, residual normality, non autocorrelation, and homoscedasticity.

a. Non Multicollinearity

Based on the table above, there are variables that have a VIF value of more than 10 so it can be said that the remainder does not meet the non-multicollinearity assumption. For this reason, it is necessary to treat the presence of multicollinearity. In this case, the handling will be done by eliminating the variable that has the highest VIF value. After eliminating the NASDAQ variable, regression modeling was carried out again for the other variables.

Table 3.2 Results of Analysis of VIF Ideal Value Variables

	Esti-mate	Std. Error	t value	Pr(>|t|)	VIF value
(Intercept)	-9.77 E+02	7.10 E+02	-1.375	0.17537	-
HANG SENG (X1)	1.35 E-01	2.69 E-02	5.005	7.94 E-06	7.4003
FTSE 100 (X3)	1.52 E-01	1.33 E-01	1.141	0.25963	6.4859
SHANGHAI (X4)	5.4 E-01	1.57 E-01	3.459	0.00115	4.0909
INDONESIA (X5)	5.29 E-03	2.76 E-03	1,919	0.06097	4.7911
CHINA (X6)	-9.26 E-02	1.35 E-01	-0.685	0.49674	9.9782
SPAIN (X7)	-1.44 E-03	8.68 E-04	-1.653	0.10493	1.5284
USA (X8)	2.29 E-04	7.77 E-05	2,941	0.00503	3.1354

After eliminating the NASDAQ variable, the multicollinearity test was carried out again. From the results of the multicollinearity test, it was found that the VIF value for all variables had a value of less than 10, so it can be said that the non-multicollinearity assumption was met.

b. Residual Normality

The remainder obtained from the formed model will be tested whether it is normally distributed or not. The test used in this study is the Kolmogrov-Smirnov test. The results of the Kolmogrov Smirnov test can be seen in the following table. The hypothesis used is

H_0: residual spread normally

H_1: residuals don't spread normally

Lilliefors (Kolmogorov-Smirnov) normality test

data: reg$residuals

D = 0.11738, p-value = 0.05259

Based on the results of the Kolmogorov-Smirnov test, the p-value is 0.05259 > 0.05 so it is accepted and it can be concluded that the residuals are normally distributed.H_0

c. Homoscedasticity

This assumption is used to see if the residual variance is homogeneous. The test used is the Breusch Pagan LM test. The hypothesis used is

H_0: there are no signs of heteroscedasticity

H_1: there are signs of heteroscedasticity

studentized Breusch-Pagan test

data: reg

BP = 16,327, df = 7, p-value = 0.02229

Based on the test results above, the probability value of the Breusch Pagan LM-Test test is 0.02229 <0.05, so it is rejected. Therefore, it can be concluded that the remainder does not meet the assumption of homoscedasticity. To overcome the symptoms of heteroscedasticity to the remainder, a transformation is carried out using a logarithmic transformation. After the data is transformed, the test is carried out again for the presence of heteroscedasticity in the remainder, the following results are obtained:H_0

studentized Breusch-Pagan test

data: reg

BP = 7.7787, df = 7, p-value = 0.3525

Based on the test results above, obtained a pelung value of 0.3525> 0.05 so that it is accepted. Therefore, it can be concluded that the remainder fulfills the assumption of homoscedasticity.H_0

d. Non Autocorrelation

This assumption is used to see whether the residuals obtained from the model are correlated with each other. The test used is the Durbin Watson test. The criteria used are if the Durbin Watson test statistic is around number 2, it means that the model formed meets the non-autocorrelation assumption. The hypotheses used are:

H_0: there is no autocorrelation

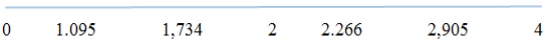
H_1: there is autocorrelation

Durbin-Watson test

data: reg

DW = 1.6136, p-value = 0.01001

In this test, it can be seen that the statistical value of the Durbin Watson test is equal to 1.6136 which is around the lower value of dl or dl < d < du, so it cannot be ascertained whether there is an autocorrelation with the remainder.



So we need another method to test the presence or absence of autocorrelation. The method used to test the autocorrelation is a non-parametric method in the form of a run test.

Runs Test

	Unstandardized Residual
Test Value	-.00359
Cases < Test Value	28
Cases >= Test Value	28
Total Cases	56
Number of Runs	28
Z	-.270
asymp. Sig. (2-tailed)	.787

a. median

Value on Asymp. Sig. (2-tailed) has a value greater than (0.787 > 0.05) which indicates that there is no autocorrelation in the residuals α.

After testing the assumptions, the final regression model is obtained as follows:

e. Identification of Assumption Results

After testing the assumptions, the final regression model is obtained as follows:

Based on the table above, not all variables are significant in influencing the JCI value. The models formed are:

$$Y = -6.628 + 0.35X_1 + 0.462X_3 + 0.315X_4 - 0.128X_5 - 0.007X_6 + 0.206X_7 - 0.044X_8 + e$$

The interpretation of the above model is:

1) The constant value is -6.628, stating that if it is assumed that the values of all independent variables are constant, the JCI value is -6.628%

2) The value of the Hang Seng stock variable is positive, stating that if it is assumed that the other independent variables are constant, every 1% increase in Hang Seng shares can increase the JCI by 0.35.

3) The value of the FSTE 100 stock variable is positive, stating that if it is assumed that the other independent variables are constant, every 1% increase in the FSTE 100 stock can increase the JCI by 0.462% if it is assumed that the other independent variables are constant.

4) The value of the Shanghai stock variable is positive, stating that if it is assumed that the other independent variables are constant, every 1% increase in the Shanghai stock can increase the JCI by 0.315% if it is assumed that the other independent variables are constant.

5) The variable value of the increase in COVID-19 cases in Indonesia is negative, stating that if it is assumed that the other independent variables are constant, every increase in COVID-19 cases in Indonesia by 1 case can reduce the JCI by 0.128%.

6) The variable value of the increase in COVID-19 cases in China is negative, stating that if it is assumed that the other independent variables are constant, then every increase in COVID-19 cases in China by 1 case can reduce the JCI by 0.007%.

7) The variable value for the increase in COVID-19 cases in Spain is positive, stating that if it is assumed that the other independent variables are constant, then every increase in COVID-19 cases in Spain by 1 case can increase the JCI by 0.206%.

8) The variable value of the increase in COVID-19 cases in the USA is negative, stating that if it is assumed that the other independent variables are constant, then every increase in COVID-19 cases in the USA by 1 case can reduce the JCI by 0.044%.

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F	Sig.
		B	Std. Error	Beta				
1	(Constant)	-6,628	.899		-7.375	.000	131.3	2.2e-16
	HANG SENG	.443	.121	.305	3,653	.001		
	FSTE 100	.822	.160	.462	5.144	.000		
	SHANG-HAI	.431	.114	.315	3.766	.000		
	INDO-NESIA	-.008	.008	-128	-1.034	.306		
	CHINA	-.001	.006	-.007	-.172	.864		
	SPAIN	.018	.005	.206	3,730	.001		
	USA	-.004	.008	-.044	-.489	.627		

a. Dependent Variable: JCI

3.3. Simultaneous and Partial Tests

In the next stage, testing is carried out to determine the strength of the relationship between the dependent and independent variables simultaneously. It also means whether a regression model can be used to predict a dependent variable or not. The simultaneous test is carried out using the F test, with the hypotheses to be tested are:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$$

vs

H_1: there is at least one $0\beta_i$
Based on testing of the model, the F test statistic is 131.3 with an opportunity value of 2.2e-16. The opportunity value of 2.2e-16 has a value smaller than (5%), it was decided to reject H0, so it can be concluded that there is an influence between the independent variables on the dependent variable.
Partial testing is done by using the t test. The hypotheses used are:

$$H_0: \beta_i = 0 \quad \text{vs} \quad H_1: 0\beta_i$$

1) Based on the test of the HANG SENG stock price variable, the t-test statistic is 3.653 with an opportunity value of 0.001. The opportunity value of 0.001 is smaller than (5%), it was decided to reject H0, so it can be concluded that there is an influence between the Hang Seng stock price variable on the JCI.
2) Based on the test of the FSTE 100 stock price variable, the t-test statistic is 5.144 with an opportunity value of 0.000. The opportunity value of 0.000 is smaller than (5%), it was decided to reject H0, so it can be concluded that there is an influence between the FSTE 100 stock price variable on the JCI.
3) Based on the test of the Shanghai stock price variable, the t-test statistic is -1.304 with an opportunity value of 0.000. The opportunity value of 0.000 is smaller than (5%), it was decided to reject H0, so it can be concluded that there is an influence between the Shanghai stock price variable on the JCI.
4) Based on testing on the variable addition of Covid-19 cases in Indonesia, the t-test statistic was -0.172 with an opportunity value of 0.864. The probability value of 0.864 is greater than (5%), it was decided to accept H0, so it can be concluded that there is no influence between the variables of adding Covid-19 cases in Indonesia to the JCI.
5) Based on testing for the variable addition of Covid-19 cases in China, the t-test statistic was 3,653 with an opportunity value of 0.001. The probability value of 0.001 has a value greater than (5%), it was decided to accept H0, so it can be concluded that there is no effect between the variables of adding Covid-19 cases in China to the JCI.
6) Based on testing on the variable addition of Covid-19 cases in Spain, the t-test statistic was 3,730 with an opportunity value of 0.001. The probability value of 0.001 has a value smaller than (5%), it was decided to reject H0, so it can be concluded that there is an influence between the variables of adding Covid-19 cases in Spain to the JCI.
7) Based on testing on the variable addition of Covid-19 cases in the USA, the t-test statistic was -0.489 with an opportunity value of 0.627. The probability value of 0.627 has a value greater than (5%), it was decided to accept H0, so it can be concluded that there is no effect between the variables of adding Covid-19 cases in the USA to the JCI.
From the results of the partial test, it was found that the variables that significantly affected the JCI were the shares of HANG SENG, FSTE 100, SHANGHAI, and the number of additional Covid cases in Spain.

Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.975a	.950	.943	.02758

a. Predictors: (Constant), USA, CHINA, HANG_SENG, SPAIN, SHANGHAI, FSTE_100, INDONESIA
b. Dependent Variable: JCI.
From the regression model, it is found that the adjusted R2 value is 94.3%, so it can be stated that 94.3% the diversity of the JCI variable can be explained by the variables contained in the model. Meanwhile, 5.7% of the variability of the JCI variable was explained by other variables not included in the model.

IV. CONCLUSIONS AND SUGGESTIONS

4.1. Conclusion

Based on the research conducted, there are several conclusions that can be drawn, as follows:
1) The results of the analysis carried out using multiple linearity showed that the JCI variable was consistent with the assumption that every increase in Covid-19 or every 1% increase, it would have an impact on the weakening of the JCI.
2) It is different when the assumption test occurs in the Hang Seng, FTSE, and Shanghai stock price variables, the JCI value has increased for the three variables.
3) Covid cases that occur in other countries that always have an impact on the value of their country's shares also have an impact on the value of the joint stock.
4) The results of simultaneous and partial tests conducted on multiple linear equations showed that there was a positive effect on the JCI from the independent variables.

4.2. Suggestion

1) Efforts to further mitigate the spread of COVID-19 cases in the regions.

2) Re-tighten discipline in the community (such as PSBB or PPKM), in order to minimize the crowds that lead to the emergence of new clusters.
3) Modeling the use of big data in analyzing the distribution of health data and distribution among the community to find out positive conditions, people without symptoms, or those who are isoman.
4) Re-increasing the spraying of disinfectants at public facilities on a regular basis.
5) For the business world/real sector that is affected, provide financial assistance/business capital and loosen loan/installment interest.

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