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MULTIPLE LINEAR REGRESSION ANALYSIS OF THE EFFECT OF EXPORTS AND IMPORTS ON INDONESIAN FOREIGN EXCHANGE RESERVES 2005-2021

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ABSTRACT: Foreign exchange reserves can be an important indicator to see how far a country can carry out international trade and to show the strength and weakness of a country's economic fundamentals. The size of the foreign exchange reserves is influenced by several factors, one of which is export and import activities. This study aims to identify the effect of exports and imports on the position of Indonesia's foreign exchange reserves. The data used is secondary data originating from the Central Bureau of Statistics and Bank Indonesia. The object used in this study is the country of Indonesia with DateTime *Series* namely 17 years from 2005 to 2021. This study uses a quantitative approach with the method of multiple linear regression analysis. Based on the regression results it is known that the value of exports has a positive and significant effect on Indonesia's foreign exchange reserves, this is indicated by a sig value of 0.000 <0.050. Meanwhile, imports have a negative and insignificant effect on Indonesia's foreign exchange reserves, this is indicated by the Sig value of 0.567. sig value 0.567 > 0.050. Export and Import variables jointly affect Indonesia's Foreign Exchange Reserves. This can be seen from the results of the analysis of significance value (Sig.) 0.00 <0.050.

1. INTRODUCTION

Indonesia is a developing country, and Indonesia adheres to an open economic system. In an open economic system, relations between one country and another, both bilateral and multilateral will create transactional activities. This transactional relationship requires a means of payment in the form of foreign exchange taken from the Foreign Exchange Reserves. Foreign Exchange Reserves are defined as several foreign currencies reserved by the central bank (Bank Indonesia) for development financing purposes and foreign obligations such as import financing and another financing to foreign parties.

The country's Foreign Exchange Reserves are obtained from trading activities between countries. Trade between countries occurs because a country is unable to meet its needs, namely producing goods or services due to limited and scarce resources, both natural resources

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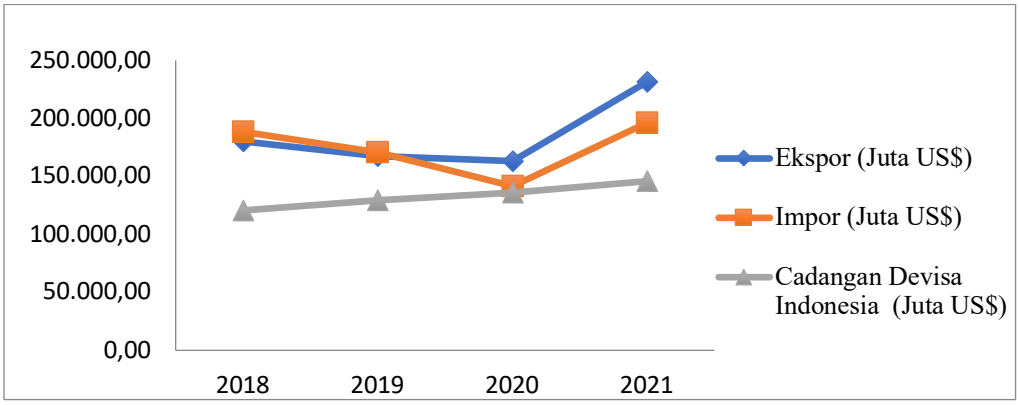
and human resources so this can encourage a country to carry out trade known as export and export activities. Import. With the export activity, the government earns income in the form of foreign exchange. The more export activities, the greater the foreign exchange earned by the country. Apart from exports, import activities have an impact on the economy of a country and its people. To protect weak domestic producers, a country usually limits the amount (quota) of imports.

Data regarding the development of Indonesia's exports, imports, and foreign exchange reserves for 2018-2021 can be seen in Figure 1 :



Source: Bank Indonesia, Badan Pusat Statistik, (2021)

Figure 1. Development of Exports, Imports, and Indonesia's Foreign Exchange Reserves

Figure 1. shows the development of Indonesia's exports, imports, and foreign exchange reserves from 2018-2021. exports, imports, and foreign exchange reserves fluctuate every year. According to Bank Indonesia (2021), in 2019 and 2020 exports decreased due to the weakening global economy due to the Covid-19 pandemic which caused a decrease in the absorption capacity of trading partner countries, while imports increased due to strong domestic demand. Then in 2021 Indonesia's export value will increase significantly because the global economy has increased due to the country starting to be able to control Covid-19. The foreign exchange reserves increased mainly due to the issuance of global sukuk and the results of the government's oil and gas exports as well as an increase in foreign exchange bank deposits at Bank Indonesia.

These various obstacles can be overcome by identifying which factors affect Indonesia's foreign exchange reserves (cadev). Then some of these factors are investigated which factors have a significant effect on Indonesia's foreign exchange reserves using multiple linear regression analysis. Multiple linear regression analysis is one of the data analyzes used in statistics for forecasting, as well as examining the relationship of a dependent variable with two or more independent variables [1].

In the multiple linear regression analysis, it discusses the relationship pattern of several variables in the model, how is the direct influence of the independent variables on the dependent variable. Using the multiple linear regression analysis method is intended to make it easier to find out whether exports and imports affect Indonesia's foreign exchange reserves.

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Based on this description, the researcher is interested in conducting research with the title**"Multiple Linear Regression Analysis on the Influence of Exports and Imports on Indonesia's Foreign Exchange Reserves for 2005-2021".**

2. LITERATURE RIVIEW

2.1 Regression Multiple Linier

Is an analysis using a regression equation that describes the relationship between more than one independent variable ($X_1,\ X_2,\ X_3$ ... X_P) and one dependent variable [2]. In multiple regression, all independent variables are included in the simultaneous regression calculation. Thus, a regression equation is obtained to predict the dependent variable by simultaneously entering a series of independent variables. The regression equation produces constants and regression coefficients for each independent variable [3]. The relationship between the two variables can be expressed by the following equation:

$$Y = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_P X_{Pi}$$

2.2 Export

Export is a trading system carried out by individuals or business entities and institutions that aim to carry out a trade (trading) between countries. Exports are a factor in increasing a country's economic growth [4]. Exports will directly affect national income. However, the opposite relationship does not always apply, that is, an increase in national income does not necessarily increase exports because national income can increase as a result of an increase in household spending, corporate investment, government spending, and the replacement of imported goods with domestically made goods [5].

2.3 Import

According to Purwaning Astuti & Juniwati Ayuningtyas (2018), imports are inflows of goods and services into a country's market, which can be used for consumption purposes as well as domestically produced capital goods. According to the Law of the Republic of Indonesia, Import is an activity of entering goods into the customs area [7]. The import process is generally an activity of entering goods and services from other countries into the country. Large-scale imports of goods usually require the participation of customs in the country of origin of the sender or recipient.

2.4 Foreign Exchange Reserves

According to Irawati (2018), Foreign Exchange Reserves are defined as liquid foreign financial assets controlled by the monetary authority which are always ready to be used to finance the balance of payments. The main reason for a country to hold foreign exchange reserves is to finance international obligations and reduce unpredictable imbalances in international payments, for example, due to the actions of international speculators. The size of the amount of Foreign Exchange Reserves is influenced by several factors, one of which is Export and Import activities [5].

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3. METHODOLOGY

The research method is a scientific way to obtain data with specific purposes and uses [9]. The method applied in this research after *the fact which* means after the fact, with secondary data collection. Ex-post facto research examines causal relationships that are not manipulated or treated by the researcher. Cause-and-effect research is carried out on programs, activities, or events that have taken place or have occurred [10]. Data collection techniques used in this study are observation and documentation. The data were obtained from Bank Indonesia and the Central Bureau of Statistics. The data needed in this research are Exports, Imports, and Indonesia's Foreign Exchange Reserves for 2005-2021.

3.1 Data Processing (Analysis)

This study uses data analysis techniques for multiple linear regression, namely adding independent variable data. The data used is quantitative. The analysis carried out is as follows:

3.1.1 Classical Assumption Test

The classical assumption test is a statistical requirement that must be carried out in a based multiple linear regression analysis ordinary *least square.* In OLS there is only one dependent variable, while there is more than one independent variable. According to Sugiono (2018), to determine the accuracy of the model, it is necessary to test several classic assumptions, namely, the normality test, heteroscedasticity test, multicollinearity test, and autocorrelation test.

1. Normality Test

Conduct a normality test to determine whether the dependent variable is an independent variable or both are normally distributed, approaching, or not normally distributed. a good Regression model must be normally distributed or nearly normal. check whether the data is normally distributed to explain the distribution of data through P-P plotting. If the data model extends around the area line and follows the diagonal direction, the regression is following the assumption of normality. The normality test can also be complete or not complete Based on the graph, for example, by the Kolmogrov-Smirnov test [9]. The guidelines used in the normality test of this study are as follows**:**

- H_0: Normal Distribution, if the significance value (probability/ asymp. Sig. (2-tailed)) > 0.05 then H_0 accepted and if,
- Ha: The distribution is not normal, if the significance value (probability/ asymp. Sig. (2-tailed)) > 0.05 then H_0 rejected.

2. Heteroscedasticity Test

Perform heteroscedasticity testing to find out whether it is in the regression model from the observed residual to another observed inequality of variance [11]. If the variance from one observation to another is constant, it is called homology, and for different variants, it is called

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heteroscedasticity. A good model is no heteroscedasticity. In this study, see if a Heteroscedasticity regression model is using the graphical method by looking at certain patterns on the Scatterplot chart [9]. The principles used in reading the Scatterplot graph in this study are:

1. If the dots form a wide wave pattern which then narrows, then there is a symptom of heteroscedasticity there. This condition is called "Ha".
2. Conversely, if the dots spread without a clear pattern at the top and bottom or around the number 0, then there is no symptom of heteroscedasticity. This condition is called "H_0".

3. Multicollinearity Test

Multicollinearity testing is the occurrence of a linear relationship between the independent variables in the linear regression model. The linear relationship of independent variables can appear in the form of perfect linearity relations and imperfect linear relationships. Multicollinearity testing is to detect the presence of multicollinearity by looking at the correlation coefficient between the independent variables and the variance inflation factor or VIF (variance inflation factors) by comparing if VIF > 10 then there is an indication of a multicollinearity problem if VIF < 10 then there is no indication of multicollinearity [9].

4. Autocorrelation

Autocorrelation test to see the situation where in the regression model there is a correlation between the residuals in the t period with the residuals in the previous period (t-1). A good regression model is one without autocorrelation. The autocorrelation test can be carried out with the Durbin Watson (DW) test [12].

3.1.2 Multiple Linear Regression Test

Multiple linear regression aims to find out the linear relationship of how many dependent variables there are between them, commonly referred to as X_1, X_2,X_3, etc. And the dependent variable is called Y [9]. The functional relationship between the independent variables and the dependent variable is denoted as follows:

$$\mathbf{Y = a + b_1 X_1 + b_2 X_2 + ...+bnXn}$$

Keterangan :

Y	: Indonesia's Foreign Exchange Reserves
X_1	: Export
X_2	: Import
a	: constant (value of Y" when X_1, X_2.....Xn = 0)
b	: regression coefficient (increasing or decreasing value)

If the coefficient b shows a one-way relationship, it will be positive (+) between the independent variable and the dependent variable. This means that any increase in the independent variable will cause the dependent variable to increase, and vice versa, if the

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independent variable decreases, the coefficient b If it shows a relationship in the opposite direction, will be negative (-) between the independent variable and the dependent variable.

3.1.3 Hypothesis Test

1. Partial Test (T)

Partial testing (T) is to find out individually or separately whether there is a significant effect between several variables. Is the dependent variable meaningful? do the test By comparing T_{count} of each variable [9]. Standard decision-making is as follows:

a) If p-value < 0.05, then H_0 = accept, Ha rejected.
b) If p-value > 0.05, then H_0 = reject and Ha is accepted.

2. Simultaneous Test (F)

Simultaneous testing (F) is used to determine whether all the independent variables are together or have a positive and significant impact at the same time on the dependent variable [9]. Standard decision-making is as follows:

a) If the P-value < 0.05 significance level
b) If the P-value > Significance Level 0.05

3. Test the Coefficient of Determination (R^2)

The coefficient of determination (adjusted R^2) serves to indicate how far the independent variable can explain the dependent variable. If the coefficient of determination gets closer to 1, then the effect of the independent variable on the dependent variable is higher, this means that the independent variable provides almost all the information needed by the dependent variable. Conversely, if the coefficient value is small, it means that the independent variables are limited in providing the information needed to predict variations in the dependent variable [9]. If data that does not meet these classical assumptions are still modeled using this approach, there will be violations of assumptions which will result in the results obtained being far from expectations, inefficient, inconsistent, or even biased [13].

4. RESULTS AND DISCUSSION

4.1 Classical Assumption Test Results from

The classical assumption test is a statistical requirement that must be carried out in a based multiple linear regression analysis ordinary least square. In OLS there is only one dependent variable, while there is more than one independent variable.

4.1.1 Normality Test Results

Statistical analysis was performed using the Kolmogorov-Smirnov test. If the significant value is <0.05, the residual data distribution is not normal. If the significant value is > 0.05, the residual data is normally distributed.

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Table 1. Results of the One-Sample Kolmogrof-Smirnov Test Normality

Test Statistic	Asymp. Sig. (2-tailed)	Information
0,146	0,200	Data is normally distribused

Source: Data (Secondary) processed

Based on the results of table output above, values are generated significance **v**alue (probability/ asymp. Sig. (2-tailed)) of 0.200 > 0.05 then according to the existing guideline this shows the residuals are normally distributed, so the conclusion shows the data is normally distributed.

4.1.2 Heteroscedasticity Test Results

The heteroscedasticity test is designed to test whether there is an inequality of variance in the regression residual observed to other observations. Heteroscedasticity shows the diffusion of the independent variable . The regression model represents a high random distribution. In other words, there is no heteroscedasticity. to be able to test heteroscedasticity based on the following guidelines:

- ✓ The data points spread up and down or around the number 0
- ✓ Data points do not collect only above and below
- ✓ The distribution of data points is not patterned.

Results of the test heteroscedasticity using the scatterplot graph can be seen as follows:

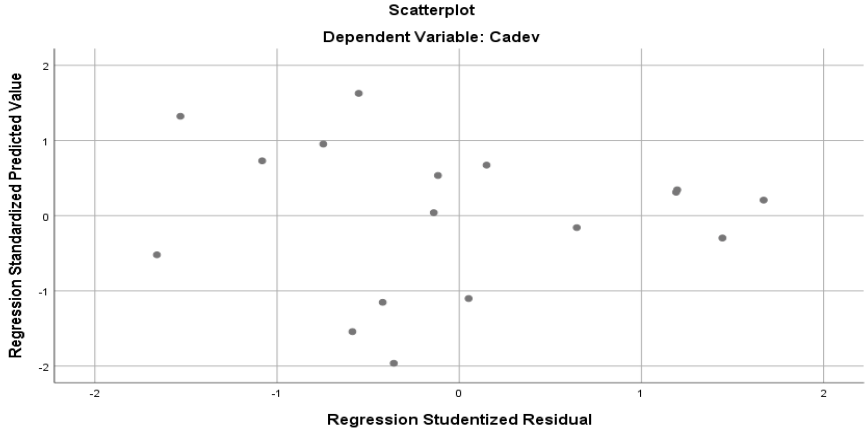

Figure 2. Scatterplot Heteroscedasticity Test Results

In the output Figgure scatterplot The test results above show that the data points spread upward and downward around the number 0, and spread randomly. This shows that the data has no symptoms of heteroscedasticity and it can be concluded that in this regression model, there is no heteroscedasticity.

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4.1.3 Multicollinearity Test Results

The multicollinearity test is designed to test whether the regression model finds a correlation between the independent variables. The multicollinearity test is also designed to test whether the regression model finds a correlation between the independent variables. From the results of the multicollinearity test, it can be seen that the tolerance value of each independent variable is greater than 0.1, and the value of the Variance Inflation Factor (VIF). less than 10. So it can be concluded that there is no multicollinearity. The results of the multicollinearity test using the table can be as follows:

Table 2. Coefficients Multicollinearity Test Results

Model		Collinearity Statistics		Information
		Tolerance	VIF	
1	Export	.658	1.521	Multicollinearity does not occur
	Import	.658	1.521	

Source: Data (Secondary) processed

From the results of the Multicollinearity test, variable inflation factor (VIF) in the table above is an independent variable indicating the value of the variance inflation coefficient (VIF) of each variable does not exceed 10, which is an Export variable is 1,521 and Import is 1,521. In addition, the tolerance value of each variable is not less than 0.10, namely the Export variable is 0.658, and the Import variable is 0.658. Thus, it can be assumed that between the two variables, namely market revitalization, and market retribution, there is no multicollinearity between the independent variables in the regression model.

4.1.4 Autocorrelation Test Results

Autocorrelation arises because observations that are sequential all the time are related to one another. This problem arises because residual (confounding errors) are not independent of one observation to another. Autocorrelation test is only used for time series data, while for cross-section data, the data does not need to be tested for autocorrelation. A good regression model is a regression that is free from autocorrelation symptoms. In this study, the Durbin-Watson test was used with the following basic decision-making:

1. If d (Durbin Watson) is smaller than dL or greater than (4-dL) then the hypothesis is rejected, which means there is an autocorrelation.
2. If d (Durbin Watson) lies between dU and (4-dU), then the hypothesis is accepted that there is no autocorrelation.
3. If d (Durbin Watson) lies between dL and dU or between (4-dU) and (4-dL), it does not produce a definite conclusion.

The following are the results of the Autocorrelation test using the Durbin Watson test as follows:

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Table 3. Durbin Watson autocorrelation test results

Std. Error of the Estimate	Value Durbin-Watson	Information
19.531	1.941	There was no autocorrelation symptoms

Source: Data (Secondary) processed

Based on the output table above, it is known that the Dusbin-Watson value is 1.941. comparing the durbin-watson value at 5% significance with the formula (k;N) which produces values from the durbin-watson table dL 1.015 and dU 1.536. Durbin Watson's value (d) is 1,941 upper limit (dU), namely 1,536 and less than (4-du) 4-1,536: 2,464. So as the basis for decision-making in the Durbin-Watson test that there are no problems or symptoms of autocorrelation.

4.2 Multiple Linear Regression Test Results

The results of multiple linear regression analysis obtained after the data is processed with SPSS can be seen as follows:

Table 4. Test Results of Multiple Linear Regression Analysis Coefficients

		Unstandardized Coefficients	
Model		B	Std. Error
1	(Constant)	-30.038	23.584
	Export	.826	.159
	Import	-.008	.014

Source: Data (Secondary) processed

Based on the output table, the results of the analysis are shown in table 4. The results of the regression equation are as follows:

$$Y = -30.038 + 0.826X_1 + -0.008X_2$$

From the results can be explained as follows:

a. Constant (**α**) which has a negative value of -30,038, which means that if the export and import variables are equal to zero or are considered non-existent, then the consistent value of Indonesia's foreign exchange reserves variable is -30,038.
b. The regression coefficient of the export variable (β1) which has a positive value of 0.826 means that the export variable has a unidirectional influence on the variable of Indonesia's foreign exchange reserves. therefore, the export variable shows a direction that is positively correlated with the variable foreign exchange reserves of Indonesia.
c. The regression coefficient of the import variable (β2) has a negative value of -0.008, which means that if the import variable increases by 1 point (1%) then Indonesia's foreign exchange reserve variable will decrease by -0.008 therefore, the import variable shows a negative correlation with variable foreign exchange reserves of Indonesia.

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4.3 Hypothesis Test Results

4.3.1 Simultaneous Test Results (F)

Doing this simultaneous test (F) is to find out how significant the effect of the independent variable is on the dependent variable simultaneously. Or as an understanding of whether the regression model can be used to predict the dependent variable or not.

Table 5. Simultaneous Test Results (F)

Nilai F_{hitung}	Nilai Sig.	Probabilitas	Information
18.112	.000	0,05	Simultaneous

Source: Data (Secondary) processed

Based on the steps and the results of simultaneous hypothesis testing (F) on the output results above, a significance value (Sig.) 0.00 < Probability value of 0.05, it can be concluded that H_0 rejected and Ha accepted. This means that there is an influence between the export and import variables on Indonesia's foreign exchange reserves.

4.3.2 Partial Test Results (T)

Melakukan pengujian Parsial (T) ini untuk mengetahui seberapa berpengaruhnya variabel bebas terhadap variabel terikat secara individual atau parsial.

Table 6. Partial Test Results (T)

Model	Value Partial (T)	Sig.	
Ekspor	5,200	0,000	Siginificant
Impor	-0,586	0,567	Not siginificant

Source: Data (Secondary) processed

From the results of table 6. partial test (T) can be explained as follows:

1. The probability of the partial test results (T) of the export variable obtained a value of Sig 0.000. sig value 0.000 < 0.050, then decided to be Ho_1 experiencing Rejection and Ha_1 accepted, which means that exports have a positive and significant impact on Indonesia's foreign exchange reserves.
2. The probability of the partial test results (T) for the import variable obtained a Sig value of 0.567. sig value 0.567 > 0.050, then decided to be Ho_2 accepted and Ha_2 experience rejection, which means that imports have a negative impact and do not have a significant impact on Indonesia's foreign exchange reserves.

4.3.3 Coefficient of Determination Test Results (R^2)

Coefficient value (R^2) is used to measure how much change in the dependent variable can be explained by the independent variable. The results of the test for the coefficient of determination can be seen as follows:

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Table 7. Coefficient of Determination Test Results

Model	R	R Square	Adjusted R Square
1	.849	.721	.681

Source: Data (Secondary) processed

As can be seen from the table above, the magnitude of the influence of Indonesia's Foreign Exchange Reserves is exports and imports as measured by R^2 of 0.721. This means that the independent variables in the model can explain 72.1% of the dependent variable. The remaining 27.9% (100% - 72.1%) is explained by other variables, but not in this study.

5. CONCLUSION

Based on the research that has been done, it can be concluded that the export variable has a positive relationship to the Indonesian foreign exchange reserve variable as seen from the sig 0.000 <0.050, which means that exports have a positive and significant impact on Indonesia's foreign exchange reserves. The import variable has a negative direction toward the variable foreign exchange reserves of Indonesia as seen from the sig value of 0.567 > 0.050, which means that imports have a negative impact and do not have a significant impact on Indonesia's foreign exchange reserves. The export and import variables jointly affect Indonesia's foreign exchange reserves. This can be seen from the results of the analysis of the significance value (Sig.) 0.00 < Probability value 0.05, which means that there is an influence between the export and import variables on Indonesia's foreign exchange reserves. The export and import variables in the model can explain 72.1% of Indonesia's foreign exchange reserves. The remaining 27.9% (100% - 72.1%) is explained by other variables, but not in this study.

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