Analysis Of Causality Exchange Rate and Export Value In Indonesia (Empirical Study in 1997-2020)

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Abstract

This study aims to analyze the causal relationship between the exchange rate and export value in Indonesia using time series data from 1997 to 2020. The analytical method that will be used in this research is the Granger Causality Test approach. The instruments used are the data normality test, the stationary test, the optimal lag test, and the Granger causality test. Based on the results of the research that has been done, it shows that from the output of the cointegration test in table 4.3 above, the trace statistic is 9.016078, which is smaller than the critical value (5%), which is 15.49471, and Prob. 0.3639 is less than 5 percent, whereas for the output of the Granger causality test above, at lag 1, it is known that the probability value (Prob.) of the relationship between export value and exchange rate is 0.4953; this result is greater than the significance level of 5 percent, so that from the output of the From these results, it can be concluded that there is no causal relationship between export values and exchange rates. So it can be concluded that if the exchange rate depreciates against foreign currencies, the export value will increase because Indonesia's export commodities compete in international markets, but on the contrary, it will reduce. In addition, based on observations and causality analysis from the results of data processing, it shows that there has been a one-way relationship between the exchange rate and the export value, meaning that the exchange rate will affect the export value but will, on the contrary, affect the export value. According to the results of the Granger Causality Test, the export value has no effect on the exchange rate.

Keywords: Export value, Exchange rate, Causality granger

INTRODUCTION

When it comes to funding widespread development that aims to improve a country's standard of living, international trade is a crucial aspect. Export value and exchange rate are just two of many elements that affect international trade. International trade greatly influences the economic growth and development of a country because they compete with each other in the international market (Rinaldi et al., 2017). Benefits of international trade are in the form of increased state revenues, increased investment, and the extent of employment (Wulandari & Zuhri, 2019). This trade can be carried out by groups with groups, individuals with individuals, the government of a country with the government of another country, or individuals with groups, individuals with the government, and groups with the government of a country (Wijaya, 2021). This international trade will lead to differences in the currencies used between the countries concerned. As a result of differences in currencies between exporting and importing countries, it creates a difference in currency exchange rates

(Pridayanti, 2014). The foreign exchange rate, or exchange rate, is a key component of any free market economy. Furthermore, the level of commodity prices in the international market is compared to domestic commodity prices, and the exchange rate of a country's currency (domestic currency) against other countries' (foreign currency) shows an indicator of the competitiveness of the national economy in the international market. In this way, the stability of a country's economy can be gauged by looking at its exchange rate. In the economy, the currency exchange rate is a real indicator that can be assessed in a transparent manner of what has happened in the country (Pradesyah, 2017). In addition, according to Levi in (Idawati, 2017) the difference in the exchange rate of a country is in principle determined by the amount of demand and supply of the currency. According to Chou in (Agustin & Anis, 2021) the exchange rate will fluctuate indicating the amount of volatility indicating that the movement of the exchange rate is appreciating or depreciating. These conditions are influenced by economic and non-economic factors. Below is a graph of the exchange rate of the rupiah against the US dollar from 1997 to 2020 :
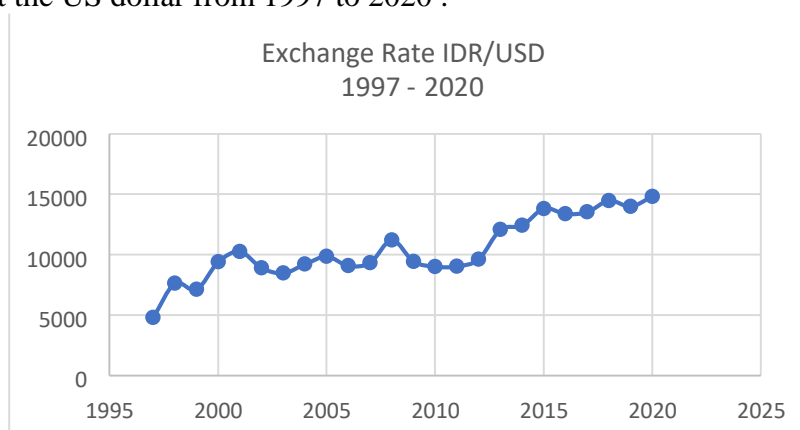
Source: PACIFIC Exchange Rate Service (processed)

Figure 1. Export Value of Indonesia 1997 - 2020

As can be seen in the above graph, the rupiah exchange rate tends to climb continually, which means that the rupiah depreciates against the US dollar, with the rupiah hitting its lowest point of Rp 15,731.6 per US dollar in April 2020. In theory, however, it explains that the value of exports increases when the value of the local currency decreases versus foreign currencies.

Several factors affect the exchange rate. The factors that cause changes in the exchange rate are explained by Sukirno in (Amri & Ramdani, 2020), namely: 1) Changes in consumer tastes, 2) Changes in prices of exported and imported goods, 3) Inflation, 4) Changes in interest rates, and 5) Economic growth. Bank Indonesia classifies factors that affect demand for foreign exchange into 3, namely: import payments, capital outflows, and speculative activities. Exchange rates can be divided into two categories: the nominal exchange rate and the real exchange rate. A stable exchange rate is one that is relatively stable, either increasing or decreasing, and if it changes, it does not fluctuate too much so that it causes a large shock or shock to a country's economy (Kaligis, 2017). Stable exchange rates have an impact on economic conditions which tend to also be stable (Usvawati, 2022).

Another factor of international trade is the export factor. Export is an economic activity selling domestic products to foreign markets (Hafifah, 2018). The exports of a country's goods are a source of foreign exchange that must be enhanced. Where all countries are vying to increase their export commodities to other countries. Empirical Analysis of the Relationship Between Exports, Imports, Exchange Rates, and Economic Growth in Indonesia (Sormin, 2019). Export is one of the main components in accelerating Indonesia's development process, so increasing export activities for products with high added value is very important to increase total output (Hasmarini & Murtiningsih, 2017). A high number of

exports also causes the workforce in a country to be fully absorbed so that unemployment decreases and increases the country's per capita income so that purchasing power increases (Sedyaningrum & Nuzula, 2016). Thus, increasing export activities for products with high added value is very important to increase total output. High added value is intended so that a country, especially Indonesia, does not prohibit the export of raw materials to other countries, so the Indonesian state should export finished products that have high commodity values in addition to absorbing jobs. Below is presented the value of Indonesia's commodity exports as follows:

Data Source: wordbank.org (processed)

Figure 2. Export Value of Indonesia 1997 - 2020

The graph showing the growth in export value in Indonesia from 1997 to 2020 shows that the country go through some ups and downs along the way. Based on historical data, it appears that Indonesia's export value has been on the rise, when the peak of the increase in the value of exports was in 2011. But when viewed from the exchange rate in 2011, this was the opposite of the export value, namely. In that year, the rupiah depreciated against the US dollar. This is in line with the theory that explains that if a country's currency (domestic currency) depreciates against other countries' currencies (foreign currency), it will be inversely proportional to the export value, which will increase the export value. This is because the country's export commodities will be competitive in the international market or in foreign countries where the price is cheaper. Research conducted by (Sormin, 2019) stated that the results of the estimation of this study used the Granger Causality Test. The results of the export test show that there is no causal relationship between exports and the exchange rate, where the probability value is $0.3395 > 0.05$, meaning that exports do not affect the exchange rate. And the results of the exchange rate test show that there is a causal relationship to exports where the probability value is $0.0014 < 0.05$, meaning that the exchange rate affects exports. So it can be concluded that there is no reciprocal relationship between exports and the exchange rate, but only a one-way relationship between the exchange rate and exports. Based on the explanation above, the purpose of this study is to analyze whether there is a causal effect or a reciprocal relationship and mutual influence between the exchange rate and the value of Indonesian exports for the period 1997 to 2020.

METHOD

Research conducted using secondary data is a quantitative time series (Sugiyono, 2016) from 1997 to 2020. The data sources are obtained from several sources on the websites of Bank Indonesia and the World Bank.

The analytical method that will be used in this study is to use the Granger Causality Test approach which aims to see and observe whether there is a reciprocal relationship

(twoway relationship) in the short term between the exchange rate and the value of exports or vice versa. Before estimating the Granger Causality Test method and so that the research results are Best Linear Unbias and Estimator (BLUE) then several stages of statistical testing will be carried out first and the methods to be used are as follows :

First Stage: Data Normality Test Stage, The normality test is intended so that the research data to be used is normally distributed. The method that will be used for this purpose is to use the Jarque-Bera (JB) test.

H0: Data are normally distributed.

H1: Data are not normally distributed.

If the probability is greater than the alpha (α), then accept (no reject) H0.

Second Stage: Stationary Test Stage, this test is used on time series data that has a long time range where all data must be stationary. A stationary test or unit root test is used to determine whether the mean and variance values have been constant or stable over time or the data moves stable and converges without fluctuations, this test is a consistency test on time series data. In addition, the stationary test aims to determine the order of integration at what level or level the time series data can become stationary. The method used is the Augmented Dickey-Fuller test (ADF-test).

Third stage: Determining the Optimum Lag Length Stage, the optimum lag test is needed to see the behavior and relationships of variables in the short term, where this stage is used to determine the optimal lag length. Optimum lag length can use several methods, namely Akaike Information Criterion (AIC), Schwarz Information Criterion (SCI), Hannan Information Criterion, or Likelihood Ratio (LR). Determinants of the right lag length will produce residuals that are free from autocorrelation and heteroscedastic problems (Gujarati, 2009)

Fourth Stage: Granger Causality Test Stage (Granger Causality test), this test is used to determine the relationship between the two variables which is the main purpose of research, whether the two variables have a one-way relationship or can occur in two directions and influence each other or are used to determine the causal relationship between variables to be tested for a reciprocal relationship (two-way). The two variables used are dependent. This method uses the Engel-Granger Causality Test

RESULTS AND DISCUSSION

The first stage of statistical testing is to find out whether the variable data used in the study, namely export value and exchange rate, are normal with the normality test. The results obtained from this test using the Jarque Berra test are as follows:

Tabel 1. Normality Test

No.	Variabel	Hasil	JB	Prob.	Keterangan
	**Normality Test Against Model Variables**				
1	Exchange Rate	Normal	1.824530	0.401614	Prob. Lebih besar dari α = 0.05
2	Export Value	Normal	0.605285	0.738863	Prob.Lebih besar dari α= 0.05

Source : Output Eviews 10.0 (processed)

Exchange Rate
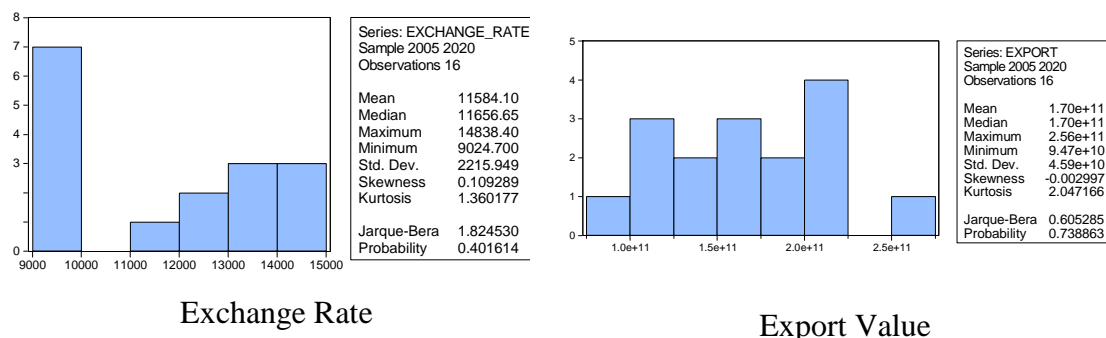
Export Value

From the results of the normality test output in table 1 above, it shows that the two data variables, namely export value and exchange rate, have shown normal distribution, this can be seen from the probability (Prob.) above 0.05 so that it can be continued to the next statistical.

Stationary Test

Test Statistical test stage The next is a stationary test using a unit root test. The results of the unit root test output using the ADF-test for the two research variables used can be obtained as follows:

Table 2. Unit Root Test Results (ADF-Test)

Variabel	Level		First Difference	
	Prob.	**Information**	**Prob.**	**Information**
Exchange Rate	0.8733	No Stasioner	0.0068	Stasioner
Export Value	0.8297	No Stasioner	0.0010	Stasioner

Source : Output Eviews 10.0 (processed)

From the results of the unit root test output in table 2 above, it shows that the two data exchange rate and export value variables are stationary at the first difference, so the test will proceed to the next stage of the cointegration test.

Cointegration Test

Below, the output results of the cointegration test are shown as follows:

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.364024	0.364024	15.49471	0.3639
At most 1	0.174207	2.679752	3.841466	0.1016

Trace test indicates no cointegration at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-value

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen	0.05 Statistic Critical Value	Prob.**
None	0.364024	6.336326	14.26460	0.5704
At most 1	0.174207	2.679752	3.841466	0.1016

Max-eigenvalue test indicates no cointegration at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-value

From the results of the cointegration test output in table 4.3 above, the trace statistic of 9.016078 is smaller than the critical value (5%) which is 15.49471, and Prob. 0.3639 is less than 5 percent. In addition, to strengthen the results of this cointegration test, we can also see the results of the Maximum Eigenvalue Statistics with a result of 6.336326 which is smaller than the critical value of 5 percent. of 14,26460 and Prob. 0.5704 is greater than 5 percent. From this result, we can conclude that there is no cointegration between the two export value and exchange rate variables. This shows that there is no long-term relationship equilibrium between export value and exchange rate in this study, only a short-term relationship.

Determining the Optimum Lag

The next statistical test stage is to determine the optimal lag that will be used in the Causality Test so that the results will be optimal. The output results with Eviews are as follows:

VAR Lag Order Selection Criteria
Sample: 1997 2020
Included observations: 20

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-876.5489	NA	4.90e+35	87.85489	87.95447	87.87433
1	*-836.2382*	*68.52827**	*1.30e+34**	*84.22382**	*84.52254**	*84.28213**
2	-834.2173	3.031304	1.62e+34	84.42173	84.91960	84.51892
3	-831.6719	3.309086	1.95e+34	84.56719	85.26420	84.70325
4	-830.7592	1.003954	2.86e+34	84.87592	85.77208	85.05086

*indicates lag order selected by the criterion
LR   : sequential modified LR test statistic (each test at 5% level)
FPE   : Final prediction error
AIC   : Akaike information criterion
SC   : Schwarz information criterion
HQ   : Hannan-Quinn information criterion
From the output to determine the optimum lag above, the most optimal result to determine the lag is lag = 1, this can be seen from the results of the most optimal LR, FPE, AIC, SC, and HQ.

Granger Causality Tests
        After several stages of testing above, a causality test will be carried out, namely a causality test using the Granger Causality Test to determine whether there is a two-way or reciprocal relationship between the exchange rate and export value. The output results of this test are as follows:
Pairwise Granger Causality Tests
Sample: 1997 2020
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
D(EXPORT_VALUE) does not Granger Cause D(EXCHANGE_RATE)	22	0.48335	*0.4953*
D(EXCHANGE_RATE) does not Granger Cause D(EXPORT_VALUE)		11.5394	*0.0030*

        It can be seen from the results of the Granger causality test output above that in lag 1 it is known that the probability value (Prob.) of the relationship from the Export Value to the Exchange Rate is 0.4953, this result is greater than the significant level of 5 percent so that from this result it can be concluded that there is no relationship causality export value to the exchange rate. This means that export value does not affect exchange rate fluctuations. Then we see the opposite results from the exchange rate to the export value, the results show that there has been a causality relationship between the exchange rate and the export value, this can be seen from the probability value (Prob.) of 0.0030 which is smaller than the significant level of 5 percent, meaning that the exchange rate has an effect on export value. So from the output results and the information above, it can be concluded that there has been a one-way causality relationship between the exchange rate and export value and there is no reciprocal or two-way relationship.
        This is in line with the research conducted by (Hasmarini & Murtiningsih, 2017), who stated that the results of the estimation of this study used the Granger Causality Test. The results of the export test show that there is no causal relationship between exports and the

exchange rate, where the probability value is 0.3395 > 0.05, meaning that exports do not affect the exchange rate. And the results of the exchange rate test show that there is a causal relationship to exports where the probability value is 0.0014 <0.05, meaning that the exchange rate affects exports. So it can be concluded that there is no reciprocal relationship between exports and the exchange rate, but only a one-way relationship between the exchange rate and exports. Based on the explanation above, the purpose of this research is to analyze whether there is a causal influence, a reciprocal relationship, or a reciprocal influence between the exchange rate and the value of Indonesian exports from 1997 to 2020.

CONCLUSION

From the results of the research and the results of data processing above, a conclusion can be drawn, namely that fluctuations in the exchange rate greatly affect the export value. This can be proven from the data used in research from 1997 to 2020 showing that if the rupiah depreciates against the US dollar, there will be an increase in export value, this is because Indonesian export commodities will be competitive in the international market, will be cheaper, causing increase export values. On the other hand, if the rupiah appreciates against the US dollar, Indonesia's export value will decrease. exchange rate (domestic currency) against foreign currencies. Rupiah exchange rates. This means that the increase or decrease in the value of exports will not affect the exchange rate. So that the reciprocal or two-way relationship that occurs between the exchange rate and export value is not proven.

RECOMMENDATION

Since the variables of interest in this study are exports and currency rates, the authors suggest avenues for further research. In order to have a more full view of the study subject at hand, future studies will need to include additional factors or indicators.

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