ANALYSIS OF THE EFFECT OF EXCHANGE RATES ON INDONESIAN EXPORTS PERIOD OF 1982 – 2015

Izaac Tonny Matitaputty

Abstract

This study aims to see the development of exports in the country, to know how the exchange rate (exchange rate) and economic growth (GDP) affect the export conducted and to know how much time it will take to get back to the initial balance if the economy experiences shocks.

The method used in this research was Cointegration Test and Error Correction Model Engle-Granger. The results showed that there was a long-term relationship (cointegration) between independent variables and dependent variables. Taken together through the F test and the partial test through t test, independent variables significantly affected Indonesian exports.

Keywords: Exchange, Export, Growth, Cointegration, Error Correction Models

1.1 Introduction

International trade is an activity of buying and selling goods and services among countries including export and import. This sale and purchase transaction is based on the needs owned and different ownership of natural resources that exists in each country.

Foreign trade today is very important because it deals with the orientation of development that is targeting people in other countries to be the market of domestic products and also related to the procurement of capital goods to spur the domestic industry. For the purpose of this foreign trade well, many countries seek to free trade in which goods, capital flows and labor can move freely without any obstacles in the process of trade while applicable international trade policy will occur with barriers/ restrictions on free trade .

However, for some countries, free trade is felt unfair (unfair trade) because this gives more profits to the trading partner countries. This applies equally to countries that have weaker power gaining so in order to overcome them then these countries have to set their own trade policies to achieve fair trade for their country.

One of the things that is considered unfair to a country that has a weak bergaining power is the value of the currency owned. For a country with a weak currency, when it has to trade with a stronger currency, its position is disadvantageous. This is because a country with a weak currency can not attach the same value and satisfaction to the goods that they bought at the exchange rate that is applicable. On this basis then the authors are interested to examine the concerns of exchange rates and economic growth in relation to Indonesian government exports.

1.2 Theoretical Basis

Export

Export can be interpreted as total sales of goods that can be produced by a country, then traded to other countries in order to get foreign exchange. A country may export the goods it produces to another country which can not produce the goods produced by the exporting country (Lipsey 1995), or export is trading by selling goods domestically abroad. Since exports come from domestic production sold/ used by overseas residents, then exports are injections into the income stream as well as investment. Therefore, income generated by the production process can be used to purchase goods and services domestically (C) or out of the income stream as savings (S) or the purchase of goods from abroad (M). Export-import activities provide many benefits for the state and society, such as, to meet the needs of society, to increase the income due to the increase of foreign exchange, to increase the people's economy and to encourage the development of industries.

Economic Development

In general, economic growth is defined as an improvement in the ability of an economy to produce goods and services. Economic growth can also be used as an indicator to see the economic development that occurs in a country. Economic growth indicates the extent to which the economic activities will result in additional income for a given period of time. Because basically economic activity is a process of using the factors of production to produce output, which in turn will generate the flow of remuneration against the use of production factors owned by the community. In other words, economic growth refers more to quantitative change and is usually measured by using Gross Domestic Product (GDP) data or the total market value of final goods and services (final goods and services) generated from an economy over a period of time (usually one year).

The theories of economic growth include:

1. Classical growth theory

The core of this theory talks about the population that affects economic growth

with the assumption of land, natural resources and fixed technology.

2. The growth theory of Harrod - Domar

The Harrod-Domar growth model was developed based on the experience of developed countries based on advanced capitalist economies and sought to evaluate the steady growth of developed countries with the conclusion that the increase in production could be absorbed by the market if the output growth rate equals the capital growth rate which is equal to the growth rate of the labor force.

3. Neo-Classical growth theory

The Neo-Classical growth model was developed by Solow-Swan, focusing on how population growth, capital accumulation, technological advances and output interact in the process of economic growth

4. Schumpeter's theory

The process of economic development according to Schumpeter is that the main factor causing economic development is the process of innovation, and the culprit is the innovator or entrepreneur (entrepreneur).

5. Rostow growth stage theory

Rostow made five stages reflecting the process of economic growth, among others: I. Traditional society, II. Prerequisites for take-off, III. Take off, IV. Towards adulthood and V. High consumption period

Exchange Rate

Exchange rate is the price of one country's currency against another country's currency (Obstfeld and Rogoff, 2000). According to (Raharjo, 2010) the rupiah exchange rate is the rupiah price against other currencies. Thus, the rupiah exchange rate is the value of one currency currency translated into another currency, such as the exchange rate of the rupiah against the US dollar, the rupiah exchange rate against the yen, and so on (as cited in Adiningsih Sri, 1998).

Factors affecting exchange rates (exchange rates) include:

a) Differential rates of inflation between two countries

b) Differences in interest rates between the two countries

c) Trade balance

d) Public Debt (Public Debt)

e) Ratio of export and import prices

f) Political and economic stability

1.3 Previous Research

Research conducted by (Aristotelous, 2001) in english is related to exchange rate volatility and exchange rate regime to export to united states by using model of general equation of gravity of observation period 1889 - 1999. The result of research showed that exchange rate volatility did not influence to export volume of english to the US and the exchange rate regime has no impact on exports.

Likewise, Eichengreen and Gupta (2011) examined the real exchange rate, the growth of exports of goods and services. The results showed that for developing countries, the increase in exports was from exports of natural resource goods while for developed countries, the increase in exports was supported by exports of services to other countries with the condition of the real exchange rate prevailing in trading partner countries which would benefit the country with high exchange rate.

Ari Mulianta Ginting (2013) examined the rupiah exchange rate on Indonesia's export performance using data from 2005 quarter I to 2012 quarter III using Error Correction Model (ECM). In the period of 2005-2012 Indonesian exports in general showed a positive development despite the decline in the period 2008-2009 and 2012 especially to countries of destination Europe and America. This shows that Indonesia's exports need to be targeted to targeted countries or new targets. The study found that long-term and short-term exchange rates had a negative and significant effect on Indonesian exports. This shows the

importance of exchange rate policy to trigger an increase in Indonesian exports.

1.3 Analysis Method

The estimation model which was used in this research used Error Corraction Models Engle, R. F. and C. W. J. Granger (1987) using the following stages of analysis:

1. Stationary test
   Stationary conditions when meeting the following assumptions:
   Average = $E(\Delta y_t) = E(\alpha_0 + \varepsilon_t) = \alpha_0$
   Variance = $Var(\Delta y_t) = E(\Delta y_t - \alpha_0)^2 = E(\varepsilon_t)^2 = \sigma^2$
   Covariance = $\gamma k = E[(\Delta y_t - \alpha_0)(\Delta y_{t-s} - \alpha_0)] = E(\varepsilon_t \varepsilon_{t-s}) = 0$

2. Johansen co integration Test
   The number of cointegration equations will show the number of linear combinations between stationary variables.

3. *Error Corraction Models* (ECM)
   The ECM model to be estimated is as follows:

$$DEks_t = \beta_0 + \beta_1 DKurs_t + \beta_2 DPDB_t + \beta_3 ECT_{t-1} + e_t$$

4. Classic assumption test
   - Normality test
   - Heteoskedastisitas test
   - Auto corelation test
   - Multi colinierity test
5. Significant test t, F, R^2

1.4 Analysis results and discussion

- **Stationary test**
  Generally economic variables are non-stationary while time series analysis methods require/ assume stationarity of the series used. Therefore, stationarity test is required in this study using unit root test with Augmented Dickey Fuller method and Phillips Perron test as follows (Granger, C. W. J. and Newbold, P. 1974):

Tabel 1.1
Stationary test

Variable	ADF	PP
Export		
Without constant and trend	5.309395	1.261167
Constant	3.234395	-1.576220
Constant and trend	1.451881	-3.787341*
Exchange rate		
Without constant and trend	0.151911	0.291957
Constant	-3.313193*	-3.308990*
Constant and trend	-3.535388*	-3.606320
PDB		
Without constant and trend	3.685356*	3.811624
Constant	-1.632077	-1.203672
Constant and trend	-2.613979	-3.115272*

Note : * significant 10%; ** significant 5%; *** significant 1%

From the estimation result shown in table 1.1, it can be seen that all variables are not stationary, so it is necessary to remove unit roots or root unit that is to test ADF and PP on first derivative, which can be seen on tabel 1.2

- **Non stationary data transformation in the form of *first difference***

Table 1.2
ADF and PP test in the form of *first difference*

Variabel	ADF	PP
Export		
Without constant and trend	-5.601137***	-9.152077***
Constant	-7.172595***	-8.612971***
Constant and trend	-8.238637***	-9.141383***
Exchange rate		
Without constant and trend	-3.552161***	-7.297665***
Constant	-5.814277***	-7.726435***
Constant and trend	-3.625919***	-8.120147***
PDB		
Without constant and trend	-3.872730***	-4.421245***
Constant	-4.728125***	-4.418041***
Constant and trend	-3.713204**	-6.363968***

Note : * significant 10%; ** significant 5%; *** significant 1%

The result of integration test shows that all research variables are stationary in the first different form and can be further tested in the form of cointegration test.

- **Cointegration test**

Table 1.3
Co integration test (Metode Johansen)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.689524	94.95061	77.74	85.78
At most 1 *	0.617649	59.87569	54.64	61.24
At most 2	0.387400	30.86341	34.55	40.49
At most 3	0.345825	15.05880	18.17	23.46
At most 4	0.066710	2.513478	3.74	6.40

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 2 cointegrating equation(s) at the 5% level
Trace test indicates 1 cointegrating equation(s) at the 1% level

From the above cointegration test results, it is concluded that there are at least two linear combinations between export variables and macroeconomic variables which indicate a long-term stability relationship among the variables in the research model so that further testing can be done in viewing the time needed to restore the initial balance when there is a shock in the economy to the level of exports in Indonesia.

- **Error Correction Model (ECM)**

The results of the Engle - Granger ECM model estimation are as follows:

D(Eks) = 0.07693 - 0.79118*D(Kurs) + 0 .53306*D(Y) - 1.61840*EC(-1)

(2,2333) (-1,9725)
(1,7854**)** (-3,8367)

R^2 = 0,685455
DW = 1,897630
F = 9,261550

Based on the calculation of Error Correction Models (ECM), the above model obtained values showing the balance of exports in the long run or ECT significant at the level of α 5%. This gives the sense that the model specifications used are valid and able to explain variations of bound variables.

The short-term coefficient value of the exchange rate of 0.79118 stems the meaning that if there is an increase in the rupiah exchange rate, exports will decrease by 79.11% while the coefficient of economic growth of 0.53306 means that if there is an increase in economic growth of one unit then the export will increase by 53.3% and a constant value of 0.07693 means that if the exchange rate and economic growth are equal to zero then exports will increase by 7%.

From the estimation, the value of coefficient of determination (R2) of 0.685455 showed that the variables included in the research model of exchange rate and economic growth can explain the variation of the dependent variable (export) of 68.54% and the rest influenced by other factors outside the research model.

- **Classic assumption test**

Heteroskedastisitas test

This test is performed to detect the non-constant variance of the disturbance variable (disturbance variable). To detect the symptoms of heteroskedastisitas this study used White test.

The hypothesis developed in the White test, namely:

Ho = No symptoms of heteroscedasticity
Ha = there are symptoms of heteroscedasticity

Decision-making criteria based on $\chi 2$ count compared to $\chi 2$ table. If the value of $\chi 2$ arithmetic> $\chi 2$ table then the conclusion is heteroskedastisitas occur in the model.

Table 1.4
Heteroskedastisity test

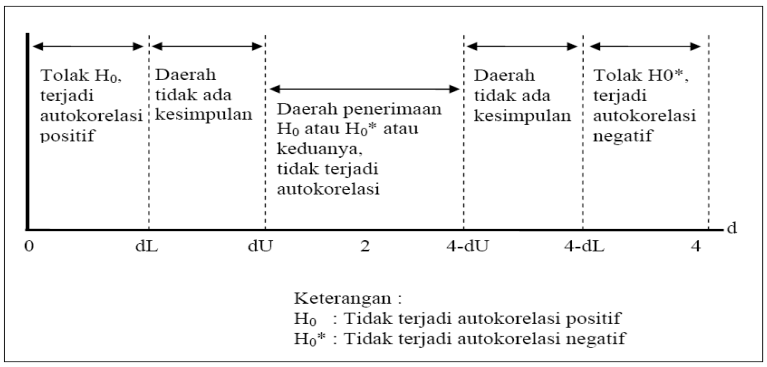
F-statistic	1.518664	Probability	0.001921
Obs*R-squared	5.215563	Probability	0.003169

From the above table, value $\chi 2$ count of 5.215563. and from the distribution table $\chi 2$ with degrees of freedom k = 2 and α 5% obtained value $\chi 2$ table of 5.55148 because the value of $\chi 2$ count <table then Ho conclusion is accepted, thus it can be said that there is no heterosedastisistas in the model.

Autocorelation

The test used to detect the presence or absence of autocorrelation is to use the Durbin-Watson (DW) test. The DW value of the next model estimate is compared with the known DW table of the Durbin-Watson table, where the number of explanatory variables (k) and the amount of data (n) in α = 5%.

Statistik d *Durbin-Watson*



Sumber : Gujarati, 2003; 469

Based on the test results it can be seen that the DW value of economic growth regression of 1.897630 lies in areas where there is no rejection of the null hypothesis (dl = 1.32, du = 1.57, 4-dl = 2.68, 4-du = 2, 43) or in other words there is no autocorrelation.

Similarly, if done with Serial Correlation Lagrange Multiplier Test (LM Test) in which the results indicate a number of probabilities that is not significant (> 0,05) so that it is free from autocorrelation problem.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.350772	Probability	0.707694
Obs*R-squared	0.908826	Probability	0.634821

Multicolinierity test

Multicollinearity test is used to test whether in the model there is perfect or near perfect correlation between free variable one with other free variable.
To detect the occurrence of multicollinearity in this research, partial correlation test will be used by doing partial regression by means of one free variable made as variable tied in turn, then the value of R2 generated is compared to the value of R on the main model estimation. If the main R2> R2 is partial then in the model there is no multicollinearity.

Table 1.5
Multicolinierity test results

Regression model	R^2
Main model	
DEkspor=f(DKurs,DY)	0.685455
Partial model	
DKurs=f(DY)	0.467063
DY=f(DKurs)	0.352285

Normality Test

One of the classical assumptions that must be met is that the residue in the linear regression equation is normally distributed. To know this, it is necessary to test the normality. In this case the test is Jarque-Bera Test. The result of Jarque-Bera test 0,065827 with probability is

equal to 0,967622 which is greater than α = 0.05 mean in which the residue in the equation is normally distributed..

Significant test

- **t Test**

From the results of testing data with Eviews, it can be obtained that value t arithmetic each variable and the probability are as follows:

Table 4.8
T Test Result

Variable	Counted t	Probability	t table α =5%	Conclusion
Dcurrency	-1.972515	0.0093	1.693889	Significant
DY	1.785460	0.0210	-1.693889	Significant
EC	-3.836741	0.0006	-1.693889	Significant

From the table above, it shows that the statistical value of t_{hit} is greater than the statistical value of t_{tab} and the probability value of each variable is less than the value of α 5% so it can be concluded that the independent variables (exchange rate and GDP) significantly affect the export. While the value of EC t-count is -3.836741 which is greater than the critical value, so by using the negative hypothesis test on one side, then Ho is rejected at 5% significant level. This means that ECT variables have a separately significant negative effect on exports in Indonesia.

- **F test**

Based on the results of the above ECM calculation, the calculated F value of 9.261550 with probability of 0,021713 can be obtained. The value of F table on the degree of freedom df denominator 33 and df numerator 2 is 3.284918. Because the value of F arithmetic is bigger than (>) F table then the conclusion H0 is rejected and Ha is accepted. Thus, all independent variables simultaneously significantly affect the dependent variable.

- ***Goodness of Fit* test (R^2)**

To see the quality of empirical model, coefficient of determination test (R2) is used. The value of the coefficient of determination measures how far the ability of the model in explaining the variation of the dependent variable and its effect in general. The greater the value of R2 (close to 1) means that the free variables provide almost all the information needed to predict the varied variables. From the results of ECM estimation above, R2 value of 0.685455 can be obtained which gives the sense that the model used is able to explain the variation of the dependent variable of 68.54% and the remaining 31.45% is explained by other factors outside the model.

1.5 Conclusion and Suggestion

 # Conclusion

Based on the results of research conducted, it can be concluded that the exchange rate effect on the export rate with the opposite direction means that if the exchange rate increases by one unit then the export will fall by 0.7911 and vice versa. While economic growth has a positive and significant effect on exports in Indonesia, meaning that if economic growth increases by one unit then exports will increase by 0.5330. The shortcomings in the short term will be corrected in less than a year in terms of the value of ECT.

 # Suggestion

Indonesian government needs to maintain the stability of the rupiah against foreign currencies, but it is still within the limits of fairness in order to keep export and import activities well.

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