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PALM OIL EXPORT MANAGEMENT AND DYNAMIC MACROECONOMIC

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Abstract
Economic growth is defined as the development of activities in the economy which results in increased goods and services to be produced and prosperity also increases. Indonesia's economic growth of 6 percent is certainly caused by various other economic activities, one of them is examined in this study is the export of crude palm oil (CPO) energy. But the export of palm oil energy is affected by macroeconomic behaviors, one of them is inflation, so this is interesting to investigating the dynamic effect of inflation and the export of palm oil energy on the economic growth in Indonesia. The data used is the time series data for 28 years. In the short and long-term analysis, inflation has a negative and significant effect on economic growth in Indonesia. In the short-term analysis of the export of palm oil energy and the positive effect was not significant, while in the long-term analysis of palm oil energy exports, a significant negative effect on economic growth in Indonesia. The data analysis method used is the Auto Regressive Distributed Lagged (ARDL).

JEL Classification Code: E2, E6, Q4, F6

Keywords: CPO, Energy, Export, Inflation, Economic Growth, ARDL

1. Introduction

Indonesia's economic growth of 6% in 2014 is certainly caused by various other economic activities, one of which is examined in this study is the export of palm oil energy. From table 1 below, it is clear that the drastic decline in palm oil energy exports from 2014 amounted to 19,000 trillion to 16,000 trillion in 2016. Besides that, the continued improvement in inflation from 8% in 2014 to 3% in 2016 did not give the direction of increasing economic growth. Significant.

Economic growth is defined as the development of activities in the economy which results in increased goods and services to be produced and prosperity also increases (Sukirno, 2002). High economic growth reaches 5% every year and is sustainable, which is the most important condition a necessity for the continuity of economic development and also to improve welfare (Tambunan, 2009). However, economic growth cannot be separated from several determinants such as inflation and exports.

One of the successes of economic development is successful in tackling inflation. Inflation is an economic problem that cannot be ignored because it can have a wide impact such as slowing economic growth and decreasing domestic exports, increasing prices which are described as a large rate of inflation can lead to a decrease in the purchasing power of the public and besides that inflation can have a direct impact on economic development in the long term and the short term (Ardila, 2012).

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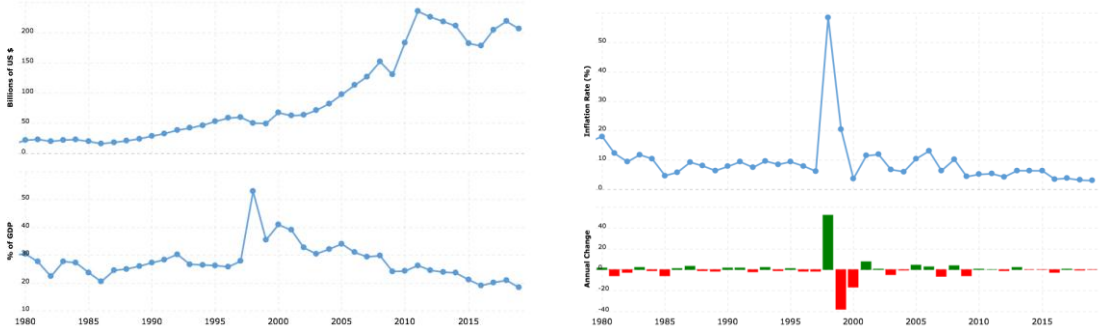
Not only inflation, but international trade is also a very important factor that contributes either directly or indirectly to efforts to increase economic growth in Indonesia. One of them is export activities, namely efforts to be able to sell our commodities to other countries or foreign nations by regulations that have been made by the government by expecting payments in foreign currency, as well as communicating in foreign languages (Ardila, 2012).

As for export commodities in the agricultural sector, which has become Indonesia's superiority, is the plantation sector, especially commodities Palm oil energy. Oil palm is a commodity from plantations that feed the country's foreign exchange and also absorbs a lot of labor. Besides, its role also helps the Indonesian economy which tends to increase every year when viewed from the development of palm oil energy exports (Aprina, 2014).

In terms of agriculture, palm oil energy is a very important industry in the country of Indonesia which has contributed between 1.5 - 2.5 percent of the total gross domestic product (GDP). Nearly 70% of oil palm plantations are located on Sumatra, where the industry dates back to the Dutch colonial era. Most of the remainder - about 30% - is on the island of Borneo. The theory says that economic growth can be influenced by several factors such as inflation and exports. More clearly, the conditions for these variables can be seen in the following graph;



Source: Statistics Indonesia, 2020

Graph 1. Data on Inflation, Export of CPO Energy, and Economic Growth

In the graph above, it can be seen that problems related to inflation from 2014 to 2016 experienced fluctuating conditions. In theory, a decrease in the inflation rate will increase the rate of economic growth, and vice versa if the inflation rate increases, the economic growth will decline (Utomo, 2013). However, what happened in Indonesia in 2014 the inflation rate was 8.36 percent of economic growth, it was getting better at 5.94 percent, while in 2015 the inflation rate was low to 3.35 percent but economic growth also fell, namely 4.79 percent.

From the other side, we can see that the export of palm oil energy in Indonesia from 2014 to 2016 has decreased from year to year. In theory, it is said that if exports increase, economic growth will also increase. However, what happened in Indonesia in 2015, palm oil energy exports amounted to 16,943,095 billion of low economic growth of

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4.79 percent. Meanwhile, in 2016 palm oil energy exports amounted to 16,020,548 billion, but the economic growth increased by 5.02 percent.

Where the purpose of this study is to determine the effect of inflation and palm oil energy exports in the short and long term on economic growth in Indonesia.

2. Literature Review

Economic Growth

Economic growth is increasing in the long-term capacity of a country concerned to provide various economic goods to its population which has been determined by the progress or some adjustments of technology, institutions, and ideology to the various demands of existing conditions (Simon Kuznetz in Todaro, 2004).

Economic growth is a process of increasing per capita output in the long run. Economic growth is related to increased output per capita where two sides require more attention, namely the total output side (GDP) and the population side. Output per capita is the total output divided by the population (Boediono, 1999). Economic growth is an increase in the long-term capacity of a country to provide various types of goods and services to its residents (Yunitasari, 2007).

Inflation

Inflation is an economic condition in which the price level and some general costs rise; such as the increase in fuel prices, rice prices, labor wages, and car prices, many capital equipments are not used in the production process (Zakaria, 2009). The financial theory states that the inflation rate is reflected by the Consumer Price Index which represents the magnitude of the overall price movement of goods and services which in turn will affect the stock market or capital market (Geetha, et al. 2011).

Baele et al. (2007) states that there is a movement of return on bonds and stocks caused by several factors of interest rates, inflation, economic growth, and dividend payments. Based on the theories stated above, the conclusion can be drawn if inflation is the increase in the price of goods and services continuously in a certain period.

Export

Export is an activity to sell products of domestic goods and services to foreign countries through ports throughout the Republic of Indonesia, both commercial and non-commercial (Zakaria, 2009). Exports are a very important factor in stimulating the economic growth of a country. Exports will increase the consumption capacity of a country, increase world output and provide access to scarce resources and there will be many potential international markets for various export products without which many poor countries will not be able to develop economic activities and national life (Levialdi, 2020)

Exports can help all countries to carry out development efforts through the promotion and strengthening of many economic sectors which have comparative advantages in the form of availability of certain production factors in abundance and efficiency

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advantages (labor productivity). Besides, exports can help almost all countries take profits from their economies of scale (Todaro, 2006).

Crude Palm oil energy

Crude palm oil energy is the commodity most main of the plantation sector and one of the most superior commodities in Indonesia, it is because of the contribution of oil palm on foreign exchange earnings and market opportunities development as well as employment. CPO Energy has a very important role in the macroeconomy in Indonesia. This can be seen from the large contribution of oil palm to the value of GDP, absorption of labor to the creation of foreign exchange (Aprina, 2014).

Economic Growth

Economic growth is a process of increasing per capita output in the long run. This definition contains three main points, namely per capita output, process, and long term. The process of showing the dynamic development of the economy from year to year, per capita output linking aspects of total output and aspects of population, and in the long run shows the trend of economic changes in a certain period driven by internal changes in the economy. Salim (1998) defines economic growth as the development of activities in the economy which results in increased goods and services obtained and the prosperity of the community will also increase. Based on the data obtained, the movement of economic growth from 1988-2016 can be seen in figure 1.

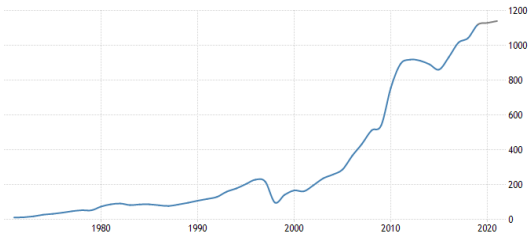

Figure 1. Economic Growth Development

Source: Bank Indonesia, (2020).

Inflation Rate Development

Inflation is an increase in the price of an item continuously and can reduce economic growth in a country. One of the consequences of inflation is an increase in demand which will cause prices to increase due to constant supply so that the price of goods in Indonesia becomes more expensive. The inflation rate is an economic phenomenon that often occurs in the economy of a country (Wildan, 2021). Inflation will become a serious economic problem when inflation occurs for a long time and inflation is high. Based on the data obtained, the movement of the inflation rate from 1988-2016 can be seen in Figure 2.

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Figure 2. Development of Inflation Rate

Source: Bank Indonesia, (2020)

Based on the figure we can see that the growth rate of inflation in the country of Indonesia is very varied and fluctuated from a high of 1998, while the lowest was in 1999. The high rate of inflation in Indonesia will make use of the public consumption of goods and services will need in the country decreased. The cause of high inflation in Indonesia is due to an increase in demand which causes prices to increase due to constant supply so that the price of goods in Indonesia becomes more expensive. If the inflation rate continues to soar this will hinder the process of development and Indonesian economic growth (Wildan, 2021).

Crude Palm oil energy Export

Export is a transaction in which the sale of goods and services from Indonesia to foreign countries which then led to payment from the buyer that there is abroad. Oil palm is the main commodity from the plantation sector and is also one of the most superior commodities in the country of Indonesia due to the contribution of palm oil energy to market development opportunities, foreign exchange earnings, and employment. So, the increasing export of palm oil energy will help accelerate the development process and economic growth in the country of Indonesia. Based on the data obtained, the movement of palm oil energy exports for the period 1988-2016 can be seen in Figure 3.

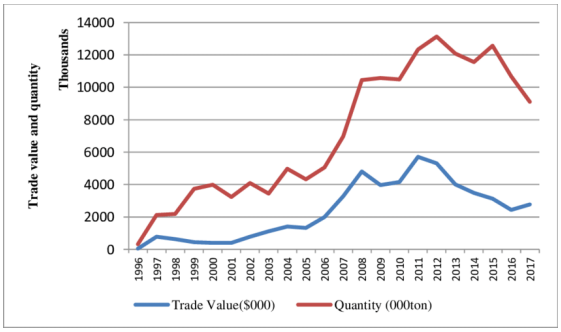

Figure 3. CPO Energy Export Trend

Source: Statistics Indonesia, (2020)

Based on Figure 3, we can see palm oil energy exports from 1996 to 2001 has a condition that fluctuates. This is due to economic problems that cause the Indonesian economy to become unstable. This decline in exports certainly resulted in weakening economic growth in Indonesia. However, in the following years from 2002-2007, palm oil

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energy exports have increased from year to year. However, from 2008 to 2016 again experienced fluctuating conditions which caused economic growth to become unstable.

3. Research Methods

Data and sources of data research is an important factor to become considerations that determine the method of data collection. The data used in this study are secondary data with the type of time series data from 1988-2016. These data are collected from the Statistics Indonesia.

Definition of Operational Variable

The operationalization of variables is an indication of how the variables in the study are measured. To clarify and facilitate an understanding of the variables to be analyzed in this study, it is necessary to formulate the operationalization of the variables as follows:

1. Inflation (INF), which is an increase in the price of goods and services continuously and is expressed in percent (%).

2. Export (EX) is the process of exchanging goods and services between one country with other countries with specific purposes and deal together are expressed in units of billion rupiahs.

3. Economic Growth (EG), which is a process of changing economic conditions in a country on an ongoing basis towards a better condition during a certain year and expressed in percentage (%).

Data analysis method

After the data is collected from the results of data collection, then the writer determines the data analysis technique which is a method that will be used to process research data which aims to obtain a conclusion in this study. The data analysis method used is the ARDL (Auto-Regressive Distributed Lag) model. ARDL model is a combination of AR (Auto-Regressive) and DL (Distributed Lag) models. AR model is a model that uses one or more past data from the dependent variable. While the DL model is a regression model that involves data at present and the past (lag) from the independent variables (Gujarati & Porter, 2012). In this study, the authors used the ARDL model which can be interpreted as a model that uses time data in the past and the present which consists of independent variables and the dependent variable. ARDL (Auto-Regressive Distributed Lag) is a dynamic model in econometrics.

This is a linear regression model that takes into account the short and long term effects of the dependent variable on a unit change in the value of the explanatory variable Salim (2017). There are several advantages of the ARDL (Auto-Regressive Distributed Lag) model, including:

ARDL does not emphasize the stationary level of the data (if the VAR and VECM models require that it be stationary in the same order) even so, ARDL also cannot use stationary data in the form of a 2nd difference. ARDL does not emphasize that the variables are cointegrated in the same order (must be at the level and first difference,

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must not be at the second difference level). ARDL does not mind the small number of samples/observations.

In ARDL estimation, to see whether the dependent variable affects the independent variable and vice versa, it can be seen by comparing the estimated t- statistical value with the t- table value. If the t- statistic value is greater than the t- table value, it can be said that the dependent variable affects the independent variable (Wildan, 2021).

The ARDL equation is as follows:

Short term test

$$\Delta PE_t = \alpha_{0i} + \sum_{i=1}^{n} \alpha 1i \Delta EG + \sum_{t-1}^{n} \alpha 2i \Delta INF + \sum_{t-1}^{n} \alpha 3i \Delta EX + \varepsilon_{1t}$$

Ho: $\alpha_{1i} = \alpha_{2i} = \alpha_{3i} = 0$

Ha: $\alpha_{1i} \neq \alpha_{2i} \neq \alpha_{3i} \neq 0$

Where α_{1i}, α_{2i} and α_{3i} are short-term dynamic coefficients, namely the speed of balance adjustment.

The long-run ARDL equation is as follows:

$$DEG_t = b_{0i} + \beta_{11} EG_{t-1} + \beta_{21} Inf_{t-1} + \beta_{31} Ex_{t-1} + \varepsilon_{1t}$$

Ho: β1i = β2i = β3i = 0

Ha: β1i ≠ β2i ≠ β3i ≠ 0

Where β1i, β2i and β3i are long-term dynamic coefficients.

Info:

EG = Economic Growth

Inf = Inflation

Ex = Export of CPO Energy

4. Discussion

Research Result

Data Stationarity Test

In applying or processing time-series data, the stationarity of the series used is indicated. The goal is to obtain a stable average value so that the regression model that will be obtained has a reliable estimation capability and avoids the emergence of sharp regression.

To find the data time series are used stationary or not used unit root test using the Philips- Perron (PP). If the test at the level shows the data is not stationary, then testing will be carried out at the first difference level to see the feasibility of the model used as research, namely ARDL (Auto-Regressive Distributed Lag). Stationary or not will be

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seen from the probability value (Critical Value) compared at the alpha level (1%, 5%, or 10%).

Table 1. Unit Root Test Results

Hypothesis	Adj. t-Stat	Prob.*
EG	-12.49416	0.0000
INF	-20.66737	0.0000
EX	-4.841896	0.0032

Source: Data Processing Results, 2020

Based on Table 1, it can be explained that the unit root test results are at a significance level 5 percent of variables PE, INF, and EX are stationary on the first difference. Because the variables PE, INF, and EX have a probability value PP that is smaller than the alpha test level of 5 percent. Thus the variables PE, INF, and EX are stationary at the first difference.

Based on the results of the stationarity test, the Auto Regressive Distributed Lagged (ARDL) model is a suitable method for use in this study.

Determination of Optimal Lag

The selection of the optimal lag in this study is based on the Vector Autoregression (VAR) method. In determining the optimal lag, the values of Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan- Quin Criterion (HQ) are used. The optimal lag length selected based on the above criteria is shown in Table below.

Table 2. Optimal Lag Length Based on Several Criterions

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-619.7163	NA	2.16+16	46.12714	46.27112	46.16995
1	-578.7226	69.84123*	2.04e+15*	43.75723*	44.33316*	43.92848*
2	-574.3062	6.542808	2.95e+15	44.09675	45.10463	44.39645

Source: Data Processing Results, 2020

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Based on Table 2, the VAR Lag Order Selection Criteria outputs LR, FPE, AIC, SC, and HQ to choose lag order 1 is determined as the optimal lag to be used in estimating the general ARDL equation. The purpose of the optimal lag in this study is that all research variables used in the equation influence each other until the previous three periods

Cointegration Test

The cointegration test is carried out to see whether or not there is a long-term relationship between the independent and dependent variables, this test is a continuation of the unit-roots test and the degree of integration test (Hasanudin, 2020).

Cointegration testing is carried out using bound tests. The requirement for decision making in the cointegration test using the bounds test is to compare the F-statistic value with the critical value of the lower bound (I0 Bound) and the upper bounds (I1 Bound). If the F-statistic value is greater than the upper bound critical value, then Ha is accepted (Ha = There is cointegration between variables), whereas if the F-statistic value is smaller than the critical value, Ho is accepted (Ho = No cointegration between variables). and if the F-statistic is between the upper and lower bound then conclusions cannot be drawn. To find out the results of the cointegration test using the bounds test method, it can be seen in Table 3.

Table 3. Cointegration Bounds Testing Results

Dependent/ Independent Variable	F-statistics value	Level of confidence (5%)		Conclusion
		I0 Bound	I1 Bound	
EG, INF, EX	4.923016	3.79	4.85	Accept Ha

Source: Data Processing Results, 2020

Based on Table 3, the results of cointegration testing using the bound test method at the 5% level of confidence are obtained, namely, the variables PE (as the dependent variable), INF, and EX (as independent variables) have long-term cointegration because they have an F-Statistical value bigger than the value critical of the upper bound, namely 4.923016>4.85.

Research Results for Short Term Relationships

After conducting the cointegration test, it can be seen that there is a short-term relationship between the INF and EX variables on the PE variable, so the next step is to estimate the short-term coefficient using the ARDL model. To see the effect of inflation and palm oil energy exports on economic growth in Indonesia, it can be seen in Table 4.

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Table 4. Short Run ARDL Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EG(-1)	0.099996	0.069834	1.431903	0.1656
INF	-0.262915	0.020296	-12.95425	0.0000
EX	1.96E-07	1.40E-07	1.400760	0.1746
EX(-1)	-2.75E-07	1.42E-07	-1.940997	0.0646
C	7.661909	0.582414	13.15544	0.0000
R-squared	0.892703	Mean dependent var		4.962857
Adjusted R- squared	0.874042	S.D. dependent var		3.863675
S.E. of regression	1.371239	Akaike info criterion		3.629739
Sum squared resid	43.24682	Schwarz criterion		3.867633
Log likelihood	-45.81635	Hannan-Quinn criter.		3.702466
F-statistic	47.83936	Durbin-Watson stat		1.578067
Prob(F-statistic)	0.000000			

Source: Data Processing Results, 2020

Based on the results of short-term testing using the ARDL model in table 4, it can be formulated as follows.

EG = 7.661909 -0.262915INF +0.000000 0196EX

The interpretation of the equation is as follows:

1. Constanta = 7.661909

If inflation and exports of palm oil energy are constant, economic growth will also be constant at 7.661909.

2. Coefficient inf = -0.262915

If inflation increases by 1 percent, economic growth will decline by 0.262915 percent.

3. Ex coefficient = 0.0000000196

If the oil exports of oil increased by 1 percent, the growth in the economy will increase by 0.0000000196.

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Research Results in Long-Term

After conducting the cointegration test, it can be seen that there is a long-term relationship between the INF and EX variables on the PE variable, so the next step is to estimate the long-term coefficient using the ARDL model. To determine the effect of inflation and palm oil energy exports on economic growth in Indonesia, it can be seen in Table 6.

Table 6. Cointegrating Test Results

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF)	-0.262915	0.020296	-12.954255	0.0000
D(EX)	0.000000	0.000000	1.400760	0.1746
CointEq(-1)	- 0.900004	0.069834	-12.887720	0.0000
Cointeq = PE - (-0.2921*INF -0.0000*EX + 8.5132)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.292127	0.029295	-9.971932	0.00
EX	-0.000000	0.000000	-2.010880	0.05
C	8.513193	0.567808	14.993097	0.00

Source: Data Processing Results, 2020.

Partial Evidence (t-test)

The t-test aims to determine whether the coefficients of each independent variable are partially significant or not on the dependent variable. In the t-test, the degree of freedom (df) must be determined which is obtained from the number of samples minus the number of regressors (variables). In this study, it was found that df = (nk) (29-3 = 26) at alpha 5% (0.05), the t-table value was 1.70562 or 1.70. If t-count is greater than t-table then accept Ha, which means that the independent variable partially affects the dependent variable, whereas if t-count is smaller than t-table then accept Ho, which means that the independent variable does not affect the dependent variable.

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Table 7. Partial Test Results

Dependent Variabel EG	t- Statistik	Prob.	t-table	Conclusion
Short Term				
	-			
D(INF)	12,95425	0,0000		Accept H1
			1,70	
D(EX)	1,400760	0,1746		Refuse H2
Long Term				
	-			
INF	9,971932	0,0000	1,70	Accept H3
	-			
EX	2,010880	0,0562		Refuse H4

Source: Data Processing Results, 2020

Based on Table above shows the short-term variable inflation, t-count is greater than t-table which is -12.95 > 1.70 then accept H1 which means the inflation variable. Partially it affects economic growth, while the palm oil energy export variable t-count is smaller than t-table which is 1.40<1.70, then reject H2, which means that the palm oil energy export variable partially does not affect economic growth.

In the long run, the inflation variable t-count is greater than t-table, namely -9.97>1.70, then accept H3, which means that the inflation variable partially affects economic growth. Likewise, the palm oil energy export variable t-count is greater than that

t-table namely -2.02>1.70 then accept H4, which means that the variable palm oil energy export partially affects economic growth.

Long Run ARDL Model Estimation

Based on the long-term test results using the ARDL model, it can be formulated as follows.

EG = 8.513193 -0.292127INF -0.000000EX

The interpretation of the equation is as follows:

1. Constanta = 8.513193

If inflation and exports of palm oil energy are constant, economic growth will also be constant at 8,513193 percent.

2. β1 = -0.292127

If inflation increases by 1 percent, economic growth will decline by 0.292127 percent.

3. β2 = -0.000000

If the oil exports of oil increased by 1 percent, the growth in the economy will decline by 0.000000 percent.

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Simultaneous

Based on the results of the tests carried out in table above, it can be seen that the F-statistic value is 47.83936 at the 5% confidence level, while the F-table V1 = nk (29-3 = 26) and V2 = k-1 (3-1 = 2) obtained a value of 3.37, then the F-statistic > F-table is 47.84 > 2.30. The conclusion of the hypothesis is accepting Ha which means simultaneously or together inflation and palm oil energy exports have a significant effect on economic growth in Indonesia.

The coefficient of determination R^2

Based on the results of the study states that the coefficient of determination for ARDL analysis is 0.874042. This shows that the ability of the model to explain the relationship between the independent variables, namely inflation and palm oil energy exports, is 0.874042 or 87.40 percent. While the remaining amount is 0.12 percent influenced by other variables outside of this research model.

Model Stability Test

Testing the structural stability of the model can be divided into two, CUSUM (cumulative sum) and CUSUMQ (cumulative sum of square). The following are the results of the CUSUM test with the economic growth variable as the dependent variable.

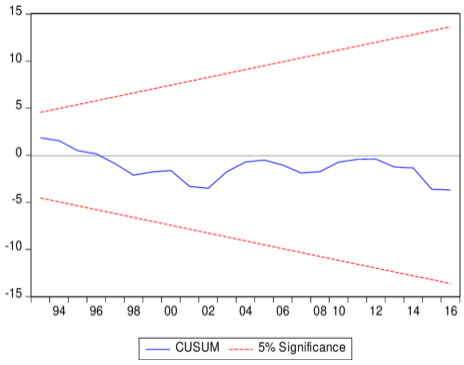

Figure 4. CUSUM Test

The results of the CUSUMQ test can be explained that the plot of the quantity Sr. is not above the boundary line at the 5% significant level, the plot form a linear line. Based on the results of the two model stability tests above, the conclusion can be drawn if the regression coefficient is stable.

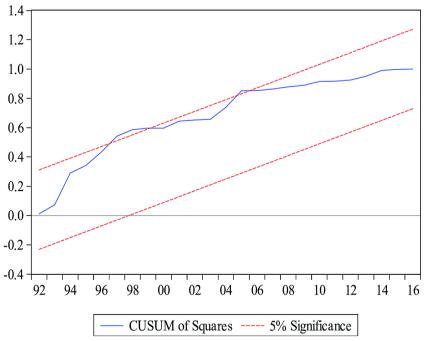

Figure 5. CUSUMQ Test

Based on the results of short-term research using the ARDL model, the inflation variable has a negative and significant effect on economic growth in Indonesia. By theory, an increase in price or an increase in inflation will result in a decrease in the rate of economic growth. The results of this test are by the opinion expressed by Dewi (2013) that inflation has a significant and negative effect on economic growth. And the palm oil energy export variable has a positive and insignificant effect on economic growth. The results of this test agree with the results of research conducted by Rosa (2016) that exports have a positive and insignificant effect on Indonesia's economic growth.

The value of ECT/CointEq (-1) is negative and significant, meaning that if there is a shock to the inflation variable and palm oil energy exports, the economic growth

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variable will take 3 months to adjust for imbalances in the long term. In other words, the ECT coefficient is negative and significant, meaning that economic growth is experiencing a short-term balance adjustment towards a long-term balance at a rate of 0.90 percent per month. In the long run, it shows that the inflation variable has a negative and significant effect on economic growth in Indonesia. The results of this analysis are by the opinion of Sutrisna and Putra (2017) which states that inflation has a negative and significant effect on economic growth. And the palm oil energy export variable has a negative and significant effect on economic growth in Indonesia. The results of this test agree with the results of research conducted by Asmara, Hutagaol, and Asbiantari (2016) that exports have a negative and significant effect on Indonesia's economic growth.

5. Conclusions

Based on the results of the research that has been done, it can be concluded that in the short and long-term analysis, inflation has a negative and significant effect on economic growth in Indonesia. Beside, in the short-term analysis of the export of palm oil energy and the positive effect was not significant, while in the long-term analysis of palm oil energy exports, a significant negative effect on economic growth in Indonesia.

The suggestions in this study are the Indonesian government is expected to make policies that can reduce the inflation rate so that it does not lead to hyperinflation through fiscal policy and monetary policy. And it should be able to maintain price stability and always strive to improve the quality and quantity of palm oil energy exports to increase economic growth in Indonesia. For researchers who carry out similar research topics, the authors suggest adding other variables that affect economic growth and using other research methods in analyzing data.

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