RESEARCH ARTICLE

THE ROLES OF CRUDE PALM OIL (CPO) COMMODITIES IN INDONESIAN ECONOMY GRANGER CAUSALITY ANALYSIS APPROACH

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ARTICLE INFO	ABSTRACT

Crude palm oil (CPO) commodity is one of Indonesia's main commodities to contribute to foreign exchange earnings from exports in global markets. The objective of this research is to describe the correlation between various variables that influence the role of CPO commodity in Indonesian economy. The variables in this research are total world product, CPO price, CPO production, CPO export, trade exchange rate (ToT) and exchange rate. The research method used is Granger Causality method to know the correlation between variables in the research and explain its implication in the framework of economic theory in the context of Indonesian economy. The data were taken from several credible sources such as BPS (the Central Statistics Agency) and Bank Indonesia from the first quarter of 2004 until the third quarter of 2016. The results of this study indicate that some variables have correlation which are CPO exports to CPO price, CPO production to CPO export, CPO export to CPO production, CPO production to world total product (world's GDP), CPO production to CPO price and exchange rate to trade exchange rate (ToT). The conclusion of the results of this research shows that the CPO commodity affects the Indonesian economy through its influence on the related economic variables. Based on this study, the recommendation is that it is necessary to formulate an integrated policy that can improve the productivity of CPO commodities and to create a conducive economic climate through macro-economic stability in order to enhance the role of the CPO commodity for Indonesia's economic growth.

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INTRODUCTION

Crude palm oil (CPO) is Indonesia's main export commodity as one of the main sources of foreign exchange. Indonesia is one of the largest palm oil (CPO) producing countries in the world besides Malaysia to meet the increasing world's demand for palm oil. Demand for palm oil (CPO) continues to increase both for domestic and world along with increased need for raw materials of food industry, health, beauty equipment, etc. With its geographical condition, Indonesia which is located in the tropical area allows to continue in increasing the palm oil production through palm oil plantations in Sumatra and Kalimantan. Massive investments which are made to open plantations and palm oil processing industries can improve regional as well as national economic growth through job creation and linkages with other related industries. Indonesia is a country that has a major role in influencing the regional and global economy because of the economic potential possessed, including in the context of the economic potential of CPO commodities. With the increasing CPO production and growing CPO demand, the role of the Indonesian economy is becoming increasingly taken into account in the world

economic arena as well as the potential of natural resources owned and also the large population. Indonesia is a country with many economic potentials and also faces considerable challenges both in regional and global contexts. The following table shows some Indonesian macroeconomic indicators:

The table above shows that Indonesia's economic growth is measured from the growth of GDP value whose growth is relatively fixed with a rate of growth of about 5%. While the price stability condition as measured by the size of the Consumer Price Index (CPI) shows a relatively low number that is lower than 5%. The macroeconomic condition that needs attention is related to the government's debt which is quite high at 27% of the GDP value in 2015. Psychological figures under 30% are still considered safe. However, by looking at the increasing trend, it needs to get serious attention because it will affect the stability and sustainable development in the long run. Other conditions that also need attention are the high unemployment and poverty rate that have the potential to cause social vulnerability when not addressed seriously. While the record amount of foreign exchange reserves shows a promising figure which is US$ 116.4 billion in 2016 increased from the previous amount of US$ 105.9 billion in 2015.

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Theoretical Framework

The roles of CPO commodity in Indonesian economy can be explained by using the approach of national income analysis and balance of payments. The analysis of national income with the production approach shows that the higher the CPO commodity production the higher the economic growth of a country will be through the creation of economic added value of CPO commodity. The higher production of CPO, the higher its role in stimulating economic growth through job creation and economic linkages between sectors both backward linkages and *forward linkages*. The overview of the development of CPO role in economic growth can be explained through the analysis model of *Production Possibility Frontiers* (PPF) with the following picture:
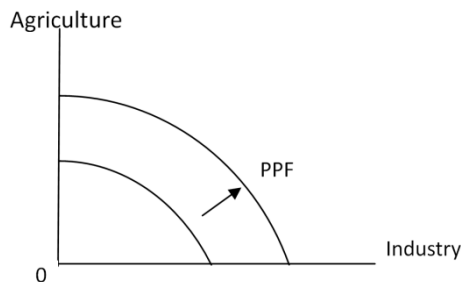
The contribution of exports commodity in the economy of a country can also be explained by its effect on the current account which will eventually strengthen the size of the foreign exchange reserves. The effect of exports in the context of national income can also be explained through the formulation of the national income equation with the expenditure approach as follows:

$$Y = C + I + G + (X-M)$$

From the above formulation it can be seen that an increase in exports will increase national income through its effect on the trade balance. If the trade balance has a surplus it will be able to boost economic growth and vice versa. In the context of international trade, the effect of commodity exports is not only determined by domestic economic factors but also influenced by external economic factors such as exchange rate, trade exchange rate (ToT), inflation rate, interest rate, etc.

MATERIALS AND METHODS

Data Types and Data Sources

The data used in this research is secondary data taken from credible data source i.e. Bank Indonesia and the Central Statistics Agency (BPS). The data included CPO export data (million tons), CPO price (US dollar), CPO production (million tons), rupiah exchange rate against US dollar, world total product value (World's GDP in billions of US dollars) and trade exchange rate (ToT). The selection of the variables in the study were based on a theoretical framework and previous research that the roles of CPO palm oil are determined by these variables.

Granger Causality Test

The analysis of the roles of palm oil (CPO) commodity in the Indonesian economy using Granger Causality analysis method explains how the correlation of reciprocal linkages between variables in the research. The interpretation of Granger causality analysis can be seen from the significance of the correlation between two variables. If the value of α (level of significant) indicates the probability value of <5%, it means that there is a causal correlation between the variables studied. However, if the value of α (level of significance) indicates the probability value of >5%, it means that there is no causal correlation between variables studied.

RESULT AND DISCUSSION

Research result and discussion on the roles of palm oil (CPO) commodity in Indonesian economy begins with the descriptive analysis as shown in the following Table:

Table 1. Macroeconomic Indicators of the Indonesian Economy (%, year to year)

Economic Indicators	Year				
	2013	2014	2015	2016	2017
Gross Domestic Product (%)	5.6	5	4.8	5	5.3
Consumer Price Index (%)	8.4	8.4	3.4	3	4
Government Debt (% of GDP)	28.7	24.7	27	-	-
Exchange Rate (Rupiahs to US Dollars)	11,563	11,800	13,389	13,300	13,300
Current Account Balance (% to GDP)	-3,3	-3.1	-2.1	-1,8	-2,3
Total Population (million)	250	253	255	258	260
Poverty (% of population)	11.5	11	11.1	10.9	-
Unemployment (% labor)	6.3	5.9	6.2	5.6	-
Foreign Exchange Reserves (US $ billions)	99.8	111.9	105.9	116.4	-

Source: Bank Indonesia, 2017

The descriptive analysis in Table 2 above explains that the value of Indonesian CPO exports is in average of 7,721,173 billion US dollars with maximum value of 26,400,000 billion US dollars and minimum of 142,660 billion US dollars. Total world's average output is 5,974,008 billion US dollars with maximum value of 10,794.58 billion US dollars and minimum of 2,441.092 billion US dollars. The price of CPO average value is 489.4531 US dollars with maximum value of 1,076.5 US dollars and minimum of 212.38 US dollars. The average exchange rate variable (ToT) value is 113.3511 with maximum value of 182.55 and minimum is 66.32. The exchange rate variable shows the average value of Rp. 5792,225 per US dollar with maximum value of Rp. 13,389.41 per US dollar and minimum of Rp. 631.76 per US dollar. While the CPO production variable shows an average value of 9,822,054 tons with maximum value of 30,948,931 tons and minimum value of 800,060 tons. Below is shown Granger causality test results on the variables studied variables including the CPO export, CPO price, CPO production, world total value (world GDP), and the exchange rate of rupiah against the US dollar and trade exchange rate (ToT). Below is shown Granger causality test results on the variables studied:

Table 2 below describes the Granger causality test results on the variables studied i.e. CPO exports, CPO prices, CPO production, trade exchange rate (TOT), exchange rate and world total product value (World GDP). Granger causality test results showed that the total world output (World's GDP) affect on the world's CPO exports but not vice versa although with the value of α (level of significant). This is understandable given the world market is the mainstay for Indonesian CPO commodities mainly to India, China, the Netherlands and Singapore.

Table 2. Descriptive Analysis of Palm Oil (CPO) Commodity

Indicator	Variables					
	CPO export	World Total	CPO Price	ToT	Exchange rate	CPO Production
Mean	7,721,173	5974.008	489.4531	113.3511	5792.225	9,822,054
Median	3,470,568	5361.836	416.81	105.28	7855.15	5,930,415
Maximum	26,400,000	10794.58	1076.5	182.55	13389.41	30,948,931
Minimum	142,660	2441.092	212.38	66.32	631.76	800,060
Standard Deviation	8,629,371	2674.995	218.3522	29.618	4195.738	9,390,277

Source: Primary Data

Table 2. Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_DUNIA does not Granger Cause EKSPOR__CPO	33	2.96744	0.0678
EKSPOR__CPO does not Granger Cause GDP_DUNIA		0.82024	0.4506
HARGA_CPO does not Granger Cause EKSPOR__CPO	33	0.34639	0.7102
EKSPOR__CPO does not Granger Cause HARGA_CPO		4.43290	0.0213
PRODUKSI_CPO does not Granger Cause EKSPOR__CPO	33	4.25353	0.0244
EKSPOR__CPO does not Granger Cause PRODUKSI_CPO		3.35833	0.0493
PRODUKSI_CPO does not Granger Cause GDP_DUNIA	33	5.11177	0.0128
GDP_DUNIA does not Granger Cause PRODUKSI_CPO		1.69793	0.2014
PRODUKSI_CPO does not Granger Cause HARGA_CPO	33	6.04180	0.0066
HARGA_CPO does not Granger Cause PRODUKSI_CPO		0.82213	0.4498
TOT does not Granger Cause KURS	33	0.51329	0.6040
KURS does not Granger Cause TOT		6.35520	0.0053

CPO palm oil demand in the world market continues to increase along with the increase of food industry, medicine, beauty industry whose raw material is from CPO. But not so contrary that CPO exports does not affect the total world value (World's GDP) because the economic value of CPO commodity is still relatively small compared with the value of other industrial commodities from developed countries in the US, European Union, and Japan (Najaf, 2017). The next figure explains that CPO exports affect the CPO price but not vice versa. We can understand this phenomenon considering that Indonesia is the world's largest CPO producer besides Malaysia. If the CPO export increases then it will affect the amount of CPO supply in the international market so that it will affect the CPO price in the world market. This phenomenon follows the law of the market that when there is an increase in supply it will increase the price and vice versa. The interesting thing about the results of Granger causality test is that CPO price does not affect the CPO export which means that the nature of CPO export is inelastic because it is not affected by the degree of the price level. This situation is understandable considering there are several factors influencing CPO export besides the price which are domestic demand for CPO, palm oil crop production, rupiah exchange rate and trade exchange rate (ToT) (Chuangchild, 2012). Other Granger causality analysis results show that CPO production has an effect on CPO exports and vice versa that CPO exports affect CPO production. This economic phenomenon can be understood easily given the great demand for CPO to meet the demand for exports which will automatically boost increased CPO production. It is also vice versa that CPO production will tend to increase the export of CPO in addition also to meet the needs of CPO demand for domestic industries. The causal correlation between CPO production and CPO exports shows a fact that CPO producers are more emphasizing CPO production to meet export demand than domestic demand. This situation is understandable when considering that the CPO price in the world market is more profitable than domestic demand. This empirical findings become important information for the government to control the CPO export so that the need for CPO to support the domestic industry is not lacking. It is necessary to formulate the right policy to control price stability

and CPO production for the sustainability of domestic industry (Egwuma, 2016). Other empirical findings of Granger causality analysis is CPO production affects the amount of total world product (World's GDP) but not vice versa. This is an interesting note given the role of CPO commodity in determining the value of global products that can be traced through contributions to the sectors of the food and beverage industry, health equipment, beauty equipment, automotive industry, home appliance industry, etc. In the future, it is expected that the role of CPO commodity will increase in the context of the growing world economy. The next figure by using the following Granger causality analysis found that the both variables of trade exchange rate (ToT) and CPO commodity exports are not mutually influential. This condition is associated with the role of the CPO export in total export value of Indonesia's commodities in the international market which is still relatively small. In addition, CPO commodity has not been a major commodity in Indonesia's commodity exports structure resulting in less impact on the change from one another (Noriza, 2012). The table above shows that the variable of palm oil (CPO) production affect the change in CPO price but not vice versa. This economic phenomenon can be analyzed using the law of the market where the amount of supply of goods increases will lead to a decrease in prices and vice versa if the amount of supply of goods is reduced will result in an increase in commodity prices. On the Granger causality analysis above, it is also seen how the correlation between the variables of exchange rate with trade exchange rate (ToT) which shows that there is a causal correlation but not so for the opposite (Gharleghi, 2012).

Conclusion and Recommendation

The results of empirical findings on Granger causality analysis explain the role of crude palm oil (CPO) in the Indonesian economy. The role and contribution of palm oil commodities in the present and future will continue to increase in line with the increasing demand for CPO commodity to meet the needs of the food industry, beverages, health products, beauty products, etc. The role of CPO commodity in Indonesian economy can be known from its influence on some

macroeconomic variables namely trade exchange rate (ToT), and exchange rate of rupiah to US dollar. The roles of CPO commodity in this research are shown through the variation of CPO production, CPO export and CPO price. The roles of CPO commodity in addition to the effect on macroeconomic variables in the context of the domestic economy also affects the world economy. The results of this study revealed that the total value of the world product (World's GDP) affect on the degree of Indonesia's CPO export volume. Similarly, CPO production affects the total value of world production. By looking at the results of empirical research on economic causality of Indonesian CPO commodities, there are a few things to be considered namely:

i.   The government and the business community need to establish cooperation to increase palm oil production through improvements in the palm oil production sector and in the palm oil (CPO) processing sector

ii. The government and business community need to strengthen the CPO commodity processing industry structure from upstream to downstream industries through the development of related industries to increase the added value of CPO commodities and create jobs for the community

iii. The increasing of the role of CPO commodity through industrial development both in the context of backward linkages as industrial raw materials as well as forward linkages for the processing of raw materials as finished materials

iv. The government and business community need to involve communities around the plantation area for the management of palm oil plantations as a CPO production base with the principle of mutual cooperation and community welfare

v.   Governments and business community need to increase the diversification of CPO commodity production and CPO export destination countries to increase the revenue from the CPO export

vi. It is necessary to formulate a policy of maintaining a balance between increasing CPO production and environmental sustainability to create sustainable development through environmentally sustainable plantation patterns

REFERENCES

Behrooz Gharleghi *et al.* The Economic Importance of Crude Palm Oil (CPO) in Nigeria, International Journal of Management Sciences and Business Research, Vol. 2, Issue 1-ISSN 2226-8235

Firman, T, 1997, Land Conversion and Urban Development in the Northern Region of West Java, Indonesia, Urban Studies, 34 (7): 1027 – 1046

Henry Egwuma *et al.,* 2016. A Model Form The Palm Oil in Nigeria An Econometrics Approach, *International Journal of Food and Agricultural Economics,* ISSN 2147-8988, E-ISSN 2149, Vol. 4, No. 2.

Kantaporn Chuangchild *et al.,* 2012. Factors Affecting Palm Oil Price Based on Extreme Value Approach, International Journal of Marketing Studies, Vol. 4, No. 6, ISSN 1918-719A, E-ISSN 1918-7203

Noriza Binti Mohd Saad *et al.,* 2012. Performance of Crude Palm Oil and Crude Palm Kernel Oil Futures in Malaysia Derivation, *International Journal of Academic Research in Accounting, Finance and Management Sciences,* Vol. 2, Issue 4, ISSN 2225-8329

Rabia Najaf, 2017. Hedging Effectiveness of Crude Palm Oil (CPO) on The Performance of Stock Market Malaysia, *International Journal of Academic Research in Management and Business,* Volume 2, No. 1.

Sadoulet Elisabeth and Alain de Janvry, 1995. Quantitative Development Policy Analysis, The John Hopkins University Press, Baltimore.

West and Cho, 1995. "The Predictive Ability of Several Models of Exchange Rate Volatility", *Journal of Econometrics*, 69, pp. 367-391.

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