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THE ANALYSIS OF FACTORS AFFECTING CPO EXPORT PRICE OF INDONESIA

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ABSTRACT: *This study aims to determine and analyze the influences of world crude oil price shocks, world soybean oil prices, world CPO prices, palm oil TBS prices and the exchange rate of rupiah/US dollar towards the transmission on CPO export prices of Indonesia. This study uses quantitative analysis model with the approach of vector autogression model (VAR) which includes three main analysis tools namely Granger causality test, impulse response function (IRF) and forecast error decomposition of variance (FEDV). The variables which are used in this research are world petroleum price, world soybean oil price, CPO price of Rotterdam, CPO export price of Indonesia, fresh fruit bunch price and real exchange rate (real exchange rate). From Granger Causality test result, The price transmission process takes place the plot as follows: world crude oil prices significantly influence the CPO price of world (Rotterdam) which will significantly influence the world soybean oil prices and so on have a significant influence on the value of the real exchange rate which will influence the price of fresh fruit bunches and ultimately have a significant influence on CPO price export of Indonesia. From the estimation result of VAR model, there are significant influences of world crude oil price shocks, world soybean oil prices, world CPO prices, palm oil TBS prices and rupiah/US dollar exchange rates simultaneously to the transmission on CPO export prices of Indonesia. Based on analysis of Impulse response and variance decomposition, in the first period, one hundred percent average variability of CPO export price growth is significantly explained by the average growth of CPO export prices itself. In the subsequent period, the average variability of CPO export price growth is significantly explained by the average growth of CPO export price itself as well as other variables.*

KEYWORDS: Petroleum Price, Soybean Oil Price, CPO export price, TBS, Real Exchange Rate, VAR, Granger causality, impulse response function, variance decomposition, Price Transmission

INTRODUCTION

Crude palm oil (CPO) is one of the alternative energy which is used as a substitute for petroleum, biodiesel energy. This will certainly influence the demand for world CPO. The good prospect in world trade is a source of foreign exchange for the government. Since 1984, palm oil exports of Indonesia have stabilized and continue to increase over the next few years. CPO production of Indonesia in 2015 reaches 32.5 million tons with export volume reaching 26.4 million tons with export value of US $ 18.6 billion (See Table 1).

Fluctuations in CPO export prices will influence the prices at producer level and will ultimately influence CPO offerings. This price transmission will continue to influence the price of TBS at farmer level. In an era of increasingly open world trade, the fluctuations in CPO prices in

world markets can influence domestic prices. The study result of Aji (2010) shows that the price correlation between soybean oil and CPO of Rotterdam have a big influence on CPO export price of Indonesia, domestic cooking oil price and TBS price. This is also confirmed by Hafizah's research (2009) which states that the market of Rotterdam is a reference for the markets of Indonesia and Malaysia. CPO price formation in Indonesia is strongly influenced by the market of Rotterdam. Table 1 CPO Production, CPO Volume and CPO Export Value of Indonesia in the Year 2008-2015

Year	Product (million tons)	Volume Export (million tons)	Export Value ($US Milyar)
2008	19.2	15.1	15.6
2009	19.4	17.1	10.0
2010	21.8	17.1	16.4
2011	23.5	17.6	20.2
2012	26.5	18.2	21.6
2013	30.0	22.4	20.6
2014	31.5	21.7	21.1
2015	32.5	26.4	18.6
Growth (%)	7.81	8.31	2.54

source: Indonesian Palm Oil Producers Association (Gapki) & Indonesian Ministry of Agriculture, 2016

On the other hand, Indonesia as the main producer of CPO besides Malaysia, it should be able to influence the change of CPO stock in the world market. In 1998, when Indonesia and Malaysia prefer to allocate CPO for domestic demand, the volume of CPO which is traded in the world market is reduced, while the demand for CPO remains high. As a result, the price of CPO in May 1998 soars to USD 700. It increases about 40% of the CPO price in the late 1997. But from the research of Aji (2010), the influence of CPO export prices of Indonesia, domestic cooking oil prices and TBS prices to CPO price of Rotterdam has not been large since Indonesia is still referring to the CPO price of Rotterdam.

Indonesia as the main producer of CPO should be able to control world crude palm oil prices to control the stability of rupiah real exchange rate. Aprina Research (2014) examines the influence of world CPO prices on the development of rupiah real exchange rate. The results show that the increase of CPO price causes the rupiah real exchange rate to increase. This is also supported by the research of Ashfahany and Priyatna (2015) who find the evidence that monthly CPO prices influence the Rupiah and Ringgit exchange rates.

Global climate change has resulted in a decrease in the supply of soybean oil due to drought in Brazil and Argentina, which is the world's largest supplier of soybean oil. This condition illustrates an imbalance between supply and demand. The supply is declining while the demand for soybean oil remains high. World demand turns to Crude Palm Oil (CPO) as the substitution of soybean oil because it is considered to have a fairly affordable price compared to other substitution commodities. Liu's (2008) research on the relation of biofuel price in the markets of the European Union, USA and Brazil in 2008 indicates a one-way causal relationship occurring from the United States and Brazil as a major oil producer to the EU as the producer of canola oil and the consumer of soybean oil and CPO. Each of these vegetable oil prices is influenced by the price of the previous month and the price of other vegetable oils the previous month. CPO is a canola oil substitution.

Increasing world demand for CPO causes CPO price developments tend to increase. The sharp increase of CPO price has occurred since 2006, from USD400 per ton to USD1200 per ton in 2008 (Depperin 2009). This increase is related to the use of CPO as biofuel due to petroleum prices increasing. There is a restriction of petroleum production by producer countries causes the supply in the world market decline. Consequently, petroleum-consuming countries are looking for alternative fuels for petroleum. Campiche, *et al.* (2007) examines whether there is the incidence of agricultural commodity prices increase in relation to the changes in the world's petroleum price increase in 2007. The variables which are used in are petroleum prices, corn prices, sugar prices, soybean prices, soybean oil prices and CPO prices. In period 2006-2007, it is only the price of soybean and corn which are cointegrated with the price of petroleum. In period 2003-2006, the price of oil soybean and CPO are negatively correlated with the price of petroleum.

The food crisis and the world energy crisis have had an impact on the competition for the use of vegetable oils for food consumption and biofuel alternative fuels. Soybean oil, which initially dominates the share of the world's vegetable oil consumption, its position is replaced by CPO as a substitute, so that the decline in supply of soybean oil has an impact on CPO price increase. Likewise, the limitation of petroleum production causes the price to increase, so that the petroleum alternative replacement fuel which is relatively cheaper is seek. Therefore, as one of the biofuel sources, the movement of CPO prices in the Rotterdam market is related to the movement of petroleum prices.

CPO price of Rotterdam is the world reference price. As a result, the fluctuations in the CPO market of Rotterdam can influence Indonesia as the world's largest producer of CPO. Similarly, the expansion of land and increased production of oil palm TBS can also influence the price of TBS at the farm level which will ultimately influence the continuity of domestic and export CPO supply. The issue of CPO exports is related to the foreign trade aspect, the role of rupiah exchange rate against US dollar will influence the CPO export price of Indonesia. Considering the above, the purpose of this study is to know and analyze the influence of world crude oil price shocks, world soybean oil price, world CPO price, palm oil TBS price and rupiah/US dollar exchange rate against CPO export price of Indonesia.

DATA AND METHODOLOGY

The data which is used in this research is monthly data from year 2005-2014. The data include the following variables:

PMBt = World petroleum price t month;

PMKt = World soybean oil price t month;

PROTt = CPO price of Rotterdam t month;

PINAt = CPO export price of Indonesia t month;

PTBSt = Fresh fruit bunches price t month;

KURSt = Exchange Rate (Rp/$ US) t month

The model of analysis in this study uses multivariate vector autogression (VAR) which is generally stated as follows:

In which: ***Y***t = Vector of endogenous variables in the model ie PMBt; PMKt; PROTt; PINAt; PTBSt; KURSt; ***A***t = Parameter matrix and ***k***= Order of VAR model.

The VAR model estimate procedure consists of: (1) unit root test which is used in many studies is Augmented Dickey-Fuller (ADF) test model, (2) lag optimal length determination. This test is useful to eliminate the problem of autocorrelation in the VAR system. Determination of lag optimal length in this study mainly uses Akaike Information Criterion (AIC). Having obtained the lag optimal length, it is necessary to test the stability of the VAR system. A VAR system is said to be stable (stationary) if all of its roots have a smaller modulus than one and all are located within a unit circle; (3) cointegration test which in this study using Johansen cointegration test

The VAR model includes three main analytical tools: (1) Granger causality test is to see the possible causality relationship between the variables to be used in the research model; (2) Impulse Response Function (IRF) shows how the response of each endogenous variable at over time to the shock of the variable itself and other endogenous variables. IRF results are very sensitive to the ordering of variables that are used in the calculations which in this study is based on cholesky factorization; (3) Forecast Error Decomposition of Variance (FEDV) is conducted to provide information on how the dynamic relationship between variables which are analyzed. In addition, FEVD is done to see how big the influence of random shock of a particular variable to endogenous variables. FEVD produces information about the relative importance of each random innovation (random innovation structural disturbance) or how strongly the composition of a particular variable role over another.

RESULTS AND DISCUSSION

The Testing of Unit Root (*Unit Root Test*)

Table 2 Unit root test using Augmented Dickey-Fuller (ADF)

Level		1th Difference	
Variabell	Prob.	Variabel	Prob.
LKURS	0.6037	D(LKURS)	0.0215
LPINA	0.0317	D(LPINA)	0.0000
LPMB	0.6408	D(LPMB)	0.0009
LPMK	0.1366	D(LPMK)	0.0002
LPROT	0.0382	D(LPROT)	0.0167
LPTBS	0.0347	D(LPTBS)	0.0075

From Table 2, the unit root testing of first difference data shows that all research variables have an ADF probability value that is smaller than the 5 percent alpha testing level. This means that all research variables have stationary on the first difference so that the variables can be said to be integrated in degrees 1 or I (1).

Test of Cointegration

Based on Table 3, it can be seen that the Max-Eigen statistic value on r = 0 is smaller than the critical value with Value Probability > 0.05. This result shows that among the six variables in this study, there is no cointegration at the 5 percent significance level. The results of cointegration indicate that among the six variables, they do not have a relationship of stability/balance and the similarity of movement in the long term.

Table 3 Cointegration Testing Results

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.234988	31.07218	40.07757	0.3563
At most 1	0.228395	30.07676	33.87687	0.1330
At most 2	0.137743	17.19147	27.58434	0.5635
At most 3	0.118910	14.68502	21.13162	0.3116
At most 4	0.060362	7.222273	14.26460	0.4632
At most 5	0.039977	4.732622	3.841466	0.0296

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-values

Determination of Lag Optimal

Based on Table 4, the criteria of LR, FPE and AIC are order 5 while the criteria of SC chooses order 1 and HQ chooses order 2. Thus in this study the lag optimal length to be used is 5. The implication of all research variables which are used in the equation influence each other not only in the same period but those variables which are interrelated to five previous periods.

Table 4 Lag Optimal Length Based on Multiple Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	1634.044	NA	1.23e-20	-28.81494	-28.67012	-28.75617
1	1973.459	636.7793	5.74e-23	-34.18512	-33.17140*	-33.77376
2	2037.535	113.4090	3.51e-23	-34.68204	-32.79942	-33.91809*
3	2067.244	49.42682	3.98e-23	-34.57069	-31.81917	-33.45415
4	2138.303	110.6753	2.19e-23	-35.19120	-31.57077	-33.72207
5	2190.003	75.03394*	1.73e-23*	-35.46908*	-30.97975	-33.64735
6	2223.624	45.22438	1.93e-23	-35.42697	-30.06873	-33.25265

Description: * indicates lag order selected by the criterion

Analysis of Granger Causality

Table 5 Granger Causality Test with lag optimal 5

Variabel Pemprediksi	DLPINA	DLPTBS	DLKURS	DLPMK	DLPROT	DLPMB
DLPINA		0.0445**	0.0715*	0.0028**	0.0000**	0.4485
DLPTBS	0.0794*		0.0765*	0.0011**	0.0000**	0.4251
DLKURS	0.1682	0.3035		0.0016**	0.0523*	0.1075
DLPMK	0.6920	0.4262	0.0956*		0.0066**	0.1413
DLPROT	0.0875*	0.0186**	0.0057**	0.0278**		0.0879*
DLPMB	0.9228	0.8108	0.5532	0.2147	0.0735*	

Description: ** significant at α = 5% * significant at α = 10%

on Granger Causality test results in Table 5, the relationship between variables can be described as follows:

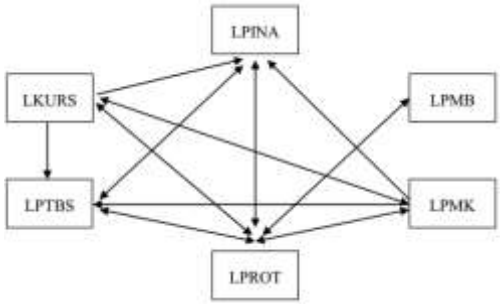


Figure 1 Causality Relationship between Variables of Granger Causality Test Results

Based on Figure 1 then Cholesky Ordering to be used in analysis of response impulse has the following possibilities:

(1) LPMB ↔ LPROT ↔ LPMK ↔ LKURS → LPTBS ↔ LPINA; atau

(2) LPMB↔ LPROT ↔ LKURS ↔ LPMK → LPTBS ↔ LPINA.

Analysis of Vector Autoregression

As previously mentioned, there are three research variables that have been stationary at the same level and all have stationary on the first difference so that all variables can be said to be integrated in degrees 1 or I (1). Furthermore, in the cointegration test there is no evidence of cointegration among the six variables at the level. According to Enders (2004), if there is a cointegration relationship between the research variables, the estimation is done with VECM, whereas if there is no cointegration among the above variables, the estimation is done by VAR difference (VARD).

Estimation result of Vector Autoregression Estimates Difference (VARD) with endogenous

variable DLPINA and Cholesky Ordering DLPMB ↔ DLPROT ↔ DLPMK ↔ DLKURS → DLPTBS ↔ DLPINA as follows:[.....] is the t statistic

Lag	DLPINA	DLPTBS	DLKURS	DLPMK	DLPROT	DLPMB	C
(-1)	0.791507 [3.49831]	-0.104942 [-0.57779]	0.552749 [2.41921]	0.268546 [1.63709]	0.731761 [5.29109]	-0.085706 [-1.09826]	0.001711 [1.11794]
(-2)	-0.425826 [-1.78089]	0.256039 [1.47279]	0.001115 [0.00395]	-0.500403 [-2.30556]	-0.22529 [-1.47761]	0.084913 [0.80753]	
(-3)	0.661946 [2.66909]	-0.507463 [-2.72844]	-0.318476 [-1.12478]	0.120296 [0.49741]	-0.012878 [-0.08398]	-0.096359 [-0.90526]	
(-4)	-0.629761 [-2.50089]	0.235209 [1.22940]	-0.08888 [-0.30141]	-0.325066 [-1.34809]	0.135475 [0.92646]	0.048957 [0.44944]	
(-5)	-0.089671 [-0.39519]	0.170339 [0.91194]	0.176770 [0.69258]	0.195416 [1.16985]	0.179601 [1.21036]	-0.079511 [-1.03172]	

R-squared	0.932344	Schwarz SC	-4.711050
Adj. R-squared	0.907891	Mean dependent	0.005036
Sum sq. resids	0.016562	S.D. dependent	0.046544
S.E. equation	0.014126		
F-statistic	38.12672		
Log likelihood	341.9409		
Akaike AIC	-5.455104		

From the result of VAR model estimation above, it is obtained F-statistic = 38.13 which is bigger than F-table $_{\alpha=5\%;df1=30;\ df2=89}$ = 1.587. This means that simultaneously the independent variables in equation 4.1 above have a significant influence on the average growth to CPO export price of Indonesia (DLPINA) at the level of testing α = 5 percent.

Partially, based on equation 4.1 above, there is a significant positive influence on the average growth at CPO export price of Indonesia in the previous month (DLPINA (-1)) to the average growth at CPO export price of Indonesia (DLPINA) at the level of testing α = 5 percent . This result is in line with economic theory which states that one of the factors influencing demand is the price of the good itself. This is also in line with Liu's (2008) research that vegetable oil prices are influenced by their own prices in the previous month. The significant influence of DLPINA up to two months earlier shows that market participants not only consider the supply and demand that occur in the month, but also look at prices that have formed up to two months earlier.

Average growth of fresh fruit bunches (DLTBS) in the previous month do not significantly influence the average growth of CPO price in Indonesia. This is indicated by the amount of t statistical value which is not significant at the level of α = 5 percent. However, in the two months and three months earlier there is a significant influence on the average growth of CPO price in Indonesia at the level of α = 5 percent. This indicates that CPO exporters have been paying attention

to information on average growth of TBS prices up to three months earlier in exporting CPO.

Average growth of exchange rate (DLKURS) in the previous month significantly influence the average growth of CPO price in Indonesia at the level of α = 5 percent. However, in the two months to five months before the influence is not significant to the average growth of CPO price in Indonesia at the level of α = 5 percent. This shows that CPO exporters have been paying attention to the information on the average growth of previous exchange rate in the CPO export.

The average growth of soybean oil price (DLPMK) up to two months earlier has a significant influence on average growth of CPO price in Indonesia. This is indicated by the significant t statistical value at the level of α = 5 percent. In theory, the price of substitute goods is one of the factors that influence the demand of a good. An item becomes a substitution of other goods if it has the same function and or the same content. This is also in line with the research of Purwanto (2002) that palm oil and soybean oil has substitutionary relationships. The research result of Aji (2010) shows a positive but insignificant relationship between changes in soybean oil price growth in the previous month and the change in CPO export price growth in Indonesia.

The average CPO price of Rotterdam in previous month has a positive and significant influence on average growth of CPO price in Indonesia. This is indicated by the significant t statistical value at the level of α = 5 percent. This is in line with the research of Hafizah's (2009) that Rotterdam forward market is a reference market for Indonesian spot market. This means that the changes in the market of Rotterdam will be followed by the market of Indonesia. The significance of average growth to CPO export price in Indonesia is influenced by the average growth of CPO price in Rotterdam in the previous month indicating that CPO exporters in Indonesia in exporting CPO take into account the average growth of CPO price in Rotterdam in the previous month. This is also reinforced by the research results of Aji (2010) indicates a positive and significant relationship between average growth of CPO price in Rotterdam in the previous month with the average growth of CPO export prices in Indonesia.

The average growth of petroleum price (DLPMB) up to previous five months has no significant influence on the change of CPO price in Indonesia. This is indicated by the amount of t statistical value which is not significant at the level of α = 5 percent. This finding is in line with the research of Arianto (2008) ie between the CPO price and petroleum prices does not occur consistency correlation. This finding is also corroborated by the research results of Aji (2010) where the VECM estimation result indicates a negative but not significant relationship between the changes in the growth of petroleum price in the previous month and the change in the growth of CPO export price in Indonesia.

Analysis of Impulse Response

Analysis of impulse response is done to determine the sensivity of change influence in an endogen variable to other endogen variable. The analysis results can show the current and future impacts of a variable shock on other endogenous variables. Figure 2 (a) shows the impact of the average growth change in CPO export price (DLPINA) by one standard deviation to the average growth change in CPO export price, using a 60 month time horizon. In the first month, average growth of CPO export rate is directly influenced positively by the average growth shock of CPO export price itself (DLPINA) by one standard deviation. In the second month until the fourth month the average growth shock of CPO export price (DLPINA) still responds positively to the change in average growth of CPO export price. Starting from the fifth month onwards, it experiences up and down movement and tends to balance after the 55th month.

Figure 2 (b) shows the impact of the average growth change of fresh fruit bunches price (DLPTBS) by a standard deviation to the average growth change of CPO export price, by using a 50 month time horizon. In the first month, average growth of CPO export price is unaffected by the average growth shock of fresh fruit bunches price (DLPTBS) by one standard deviation. In the second and third months the average growth shock of fresh fruit bunches price (DLPTBS) gives a negative response to the change in average growth of CPO export price. From the 4th month onwards, it experiences up and down movement and tends to balance after the 35th month.

figure 2

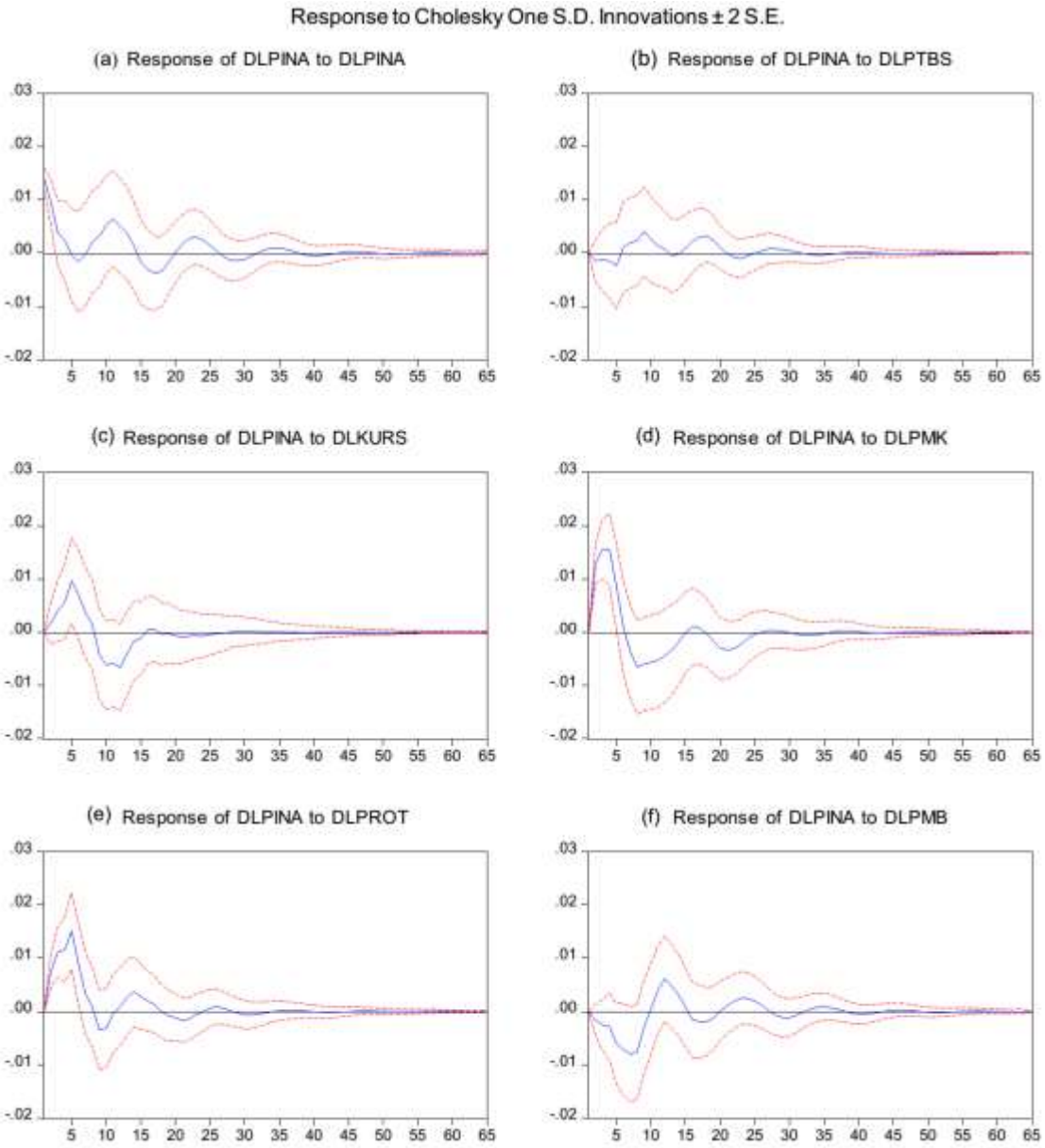


Figure 2 (c) shows the impact of changes in the average growth of real exchange rate (DLKURS) by one standard deviation to the change in the average growth of CPO export price, using a 50 month time horizon. In the first month, the average growth of CPO export

prices is not influenced by the average growth shock of real exchange rate (DLKURS) by one standard deviation. In the second month until the eighth month, the average growth shock of real exchange rate (DLKURS) gives a positive response to the change in the average growth of CPO export price. Beginning of the 9th month and onwards, it experiences up and down movement and tends to balance after the 35th month.

Figure 2 (d) shows the impact to the change on the average growth of soybean oil price (DLPMK) by one standard deviation to the change on the average growth of CPO export price, by using a 50 month time horizon. In the first month, average growth of CPO export prices is influenced by the average growth shock of soybean oil price (DLPMK) by one standard deviation. However, in the second to sixth month the average growth shock of soybean oil price (DLPMB) gives a positive response to the change in average growth of CPO export price despite the decreasing response from the seventh month. Furthermore, the response shows a movement up and down tends to balance after the 47th month. Between soybean oil and CPO are substitute goods, where the increase in one good price can raise the other good price. Theoretically this condition is in accordance with the criteria of substitution goods that is proposed by Djojodipuro (1991). The results of this study are also in line with the research of Yu et al. (2006) states that the vegetable oil price in the world market responds to shocks that occur in one of the vegetable oil prices.

Figure 2 (e) shows the impact on change to average growth in CPO price of Rotterdam (DLPROT) at one standard deviation to the change on average growth of CPO export price, using a 50-month time horizon. In the first month, the average growth of CPO export price is not influenced by the average growth on CPO price of Rotterdam (DLPROT) at one standard deviation. But in the second until the eighth month, the average growth shock on CPO price of Rotterdam (DLPROT) gives a positive response to the change in average growth of CPO export price despite the response decreases from the ninth month. Furthermore, the response which is shown experiences up and down movement and tends to balance after the 35th month.

Figure 2 (f) shows the impact of the change in the average growth of petroleum price (DLPMB) by one standard deviation to the change on average growth of CPO export price, using the 50 month time horizon. In the first month, the average growth in CPO export prices is not influenced by the average growth shock of petroleum price (DLPMB) by one standard deviation. However, in the second to the ninth month, the average growth shock in petroleum price (DLPMB) gives a negative response to the change in average growth of CPO export price, but in the 10th month, it increases. Furthermore, the response which is shown up and down experiences movement and tends to balance after the 50th month.

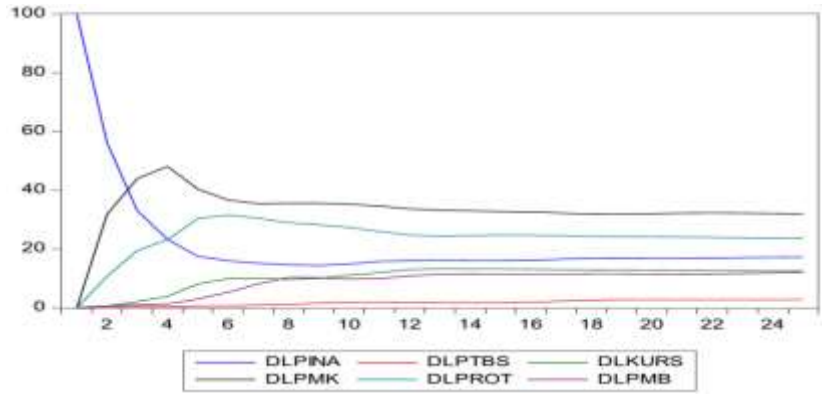
Analysis of Variance Decomposition

The analysis of variance decomposition describes the relative importance of every variable in the system due to the shock. This analysis is useful for predicting the percentage contribution of each particular variable in the system so that it will be known the source variation of the model which is formed. The results of the analysis can show how much the change to a variable which comes from itself and how much comes from the influence of other variables.

Table 6 Variance Decomposition of DLPINA

Period	S . E .	DLPINA	DLPTBS	DLKURS	DLPMK	DLPROT	DLPMB
1	0.014126	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.022848	56.21380	0.395202	0.583843	31.72601	10.59094	0.490207
3	0.030489	33.11596	0.395410	2.084804	43.98999	19.45378	0.960055
7	0.045678	15.17152	0.783919	10.05225	35.40710	30.47667	8.108541
11	0.050364	15.79018	1.846112	11.89430	34.61150	25.96224	9.895677
15	0.052729	15.99287	1.742009	13.17468	32.78673	24.76008	11.54363
19	0.053587	16.80533	2.758429	12.77997	31.89735	24.18935	11.56957
23	0.054301	17.05293	2.779218	12.51938	32.22827	23.76898	11.65121

Table 6 and Figure 3 show that in the first period of one hundred percent on the average growth variation in CPO export price is explained by the average growth in CPO export price itself. In the next period, 56.2 percent of the average growth variability of CPO export price is explained by average growth of CPO export price, 31.7 percent is explained by DLPMK, 10.6 percent is explained by DLPROT; 0.58 percent is explained by DLKURS and the remaining 0.4 percent is explained by DLPTBS and the remaining 0.49 percent is explained by DLPMB. Figure 4.19 illustrates the development of each variable role in explaining the average growth variability of CPO export price.



CONCLUSIONS

The results of the analysis and discussion that have been done in the previous chapter are concluded as follows:

1. The transmission process on CPO export prices of Indonesia is based on Cholesky Ordering which is obtained from Granger Causality test results. The transmission process will take place the flow as follows: The world crude oil price significantly influences the world price of CPO (Rotterdam) which will significantly influence the world soybean oil price and so on significantly influence the real exchange rate which will affect the fresh fruit bunches price and ultimately significantly influence on the CPO exports price of Indonesia.

2. Based on VAR estimation, there are significant influences of world crude oil price shocks, world soybean oil prices, world CPO prices, palm oil TBS prices and

rupiah/dollar exchange rates simultaneously to the transmission on CPO export prices of Indonesia.

3. Based on the analysis of Impulse response and variance decomposition, it is concluded that in the first period, one hundred percent of average growth variability of CPO export price significantly is explained by the average growth of CPO export prices itself. In the subsequent period, the average growth variability of CPO export price is significantly explained by the average growth of CPO export price itself as well as other variables.

RECOMMENDATIONS

With the dominant role of world CPO price, CPO exporters of Indonesia in cooperation with the government need to penetrate more intensive market to the countries other than Europe especially in South Asia, East Asia and China. With the wider market on CPO exports of Indonesia, Indonesia will have a bargaining position to influence the world CPO price.

It is necessary to diversify CPO into derivative products of high economic value, especially conversion into bio fuel so that it can overcome the needs of world crude oil as one input in domestic production process. The substitution of the world crude oil with bio fuel will at least reduce the negative influence of dependence on petroleum fuels in the domestic industry.

It is necessary the support from all elements, especially the government in maintaining monetary stability so as to maintain the stability of the real exchange rate which positively influences the fluctuation of CPO export prices in Indonesia.

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