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Green resolution and resilience of palm oil exports in Indonesia: Strengthening local value chains

Randi Mamola, Herdis Herdiansyah

ABSTRACT

This study examines the scarcity of palm oil in Indonesia's CPO oil food commodity and the government's conservative steps through green resolution policies and strengthening local value chains. The validation of green economy resolution variable indicators in this study is green financing and local value chains in CPO exports as measured by product prices and production values. In addition to these variables, household consumption expenditure is the control variable used as a determining variable for CPO export levels. The research data uses data from the 2013Q1 to 2022Q4 time series. The research methodology describes the ARDL model for testing long-run effects and the ECM method for observing the economy's acceleration towards equilibrium during short-term shocks. The results showed that the long-term correlation between green financing resolution, product prices, and production value significantly affected the level of CPO exports at a significance level of 5% (p <0.05). However, the variable household consumption expenditure is not significant to the level of CPO exports in the long run at a significance of 5% (p <0.05). Then the short-term correlation shows that the green financing resolution variables, product prices, production values, and household consumption expenditures significantly affect the level of CPO exports at a significance of 5% (p <0.05).

Keywords: green resolution, export CPO, local value chain, local food security, ARDL-ECM

INTRODUCTION

Technological advances and world trade liberalization gave rise to a paradigm of global society in the structure of the international economy **[4]**. The revealed meaning of global society in the world economy has been formed from the events of the global economic crisis in several countries, thus creating the effects of negative and positive conditions on economic development in developed and developing countries **[6]**. Overcoming the future crisis of an increasingly deteriorating economy, world leaders began forming alliances for G20 policy governance to boost the world economy through global trade **[8]**. The current news is that the G20 member countries are jointly promoting prioritized structural policies to promote comprehensive and sustainable economic growth. Economic development planning agencies towards a sustainable system are carried out through conferences and diplomacy in several countries that focus on leading to mutually beneficial trade engagement **[11]**. If reflecting on these regulations, now the whole world is starting to establish a green economy approach as a framework for international trade cooperation **[26]**.

The green resolution application model is a policy strategy step that does not rely on environmental technology to meet needs but reduces scarcity to create a conventional and socially just economy **[7]**. Indonesia, which is a member country of the G20, has begun enforcing green resolutions as an agency for increasing inclusive and sustainable economic growth. Various economic recovery efforts have been prioritized in building green economy resolution consisting of green trading markets, green financing, and green entrepreneurship **[27]**. On the other hand, Indonesia's economic approach is still classified as an extractive and short-term economy **[34]**. That is,

economic activity does not pay attention to the quality of natural resources and the environment, so this has an impact on the scarcity of natural resources.

The case of the phenomenon of production flows and international trade law does not apply to the system in Indonesia, which is currently involved by the scarcity of palm oil, which is a food need in society. Statistical centre data reports Indonesia is listed as the highest palm oil supplying country in ASEAN as evidenced by the level of CPO export in Indonesia worth US$73 billion with total export reaching 9.88% in export destination countries, namely India, China, the European Union, and the United States (US). The interpretation of CPO export growth in Indonesia for three export destination countries from 2013Q1 to 2022Q4, except for 2013 to 2016, CPO export experienced a significant rate (Figure 1). During this period, Indonesia applied additional quotas for CPO production in the US and the European Union. Thus the movement in the rate of CPO export was caused by the high level of demand in the two export countries. Then, since the 2017 period, Indonesia has been faced with intense competition in distributing CPO commodities and changing distribution data to fluctuations. Moreover, the existence of CPOs in the realm of competition, which is quite strong between Malaysia and Thailand, Indonesia must decline due to negligence caused by the scarcity of domestic palm oil (Figure 2). Given this deficit, the Indonesian government must continuously strengthen the palm oil plantation sector by strengthening local value output as a priority for food production.

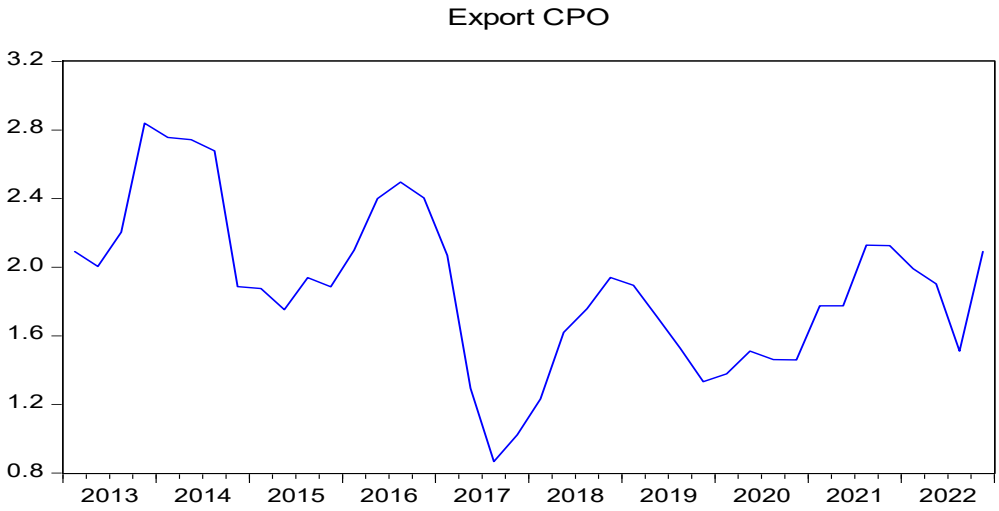

Figure 1 Indonesia CPO export growth rate (2013Q1-2022Q4).

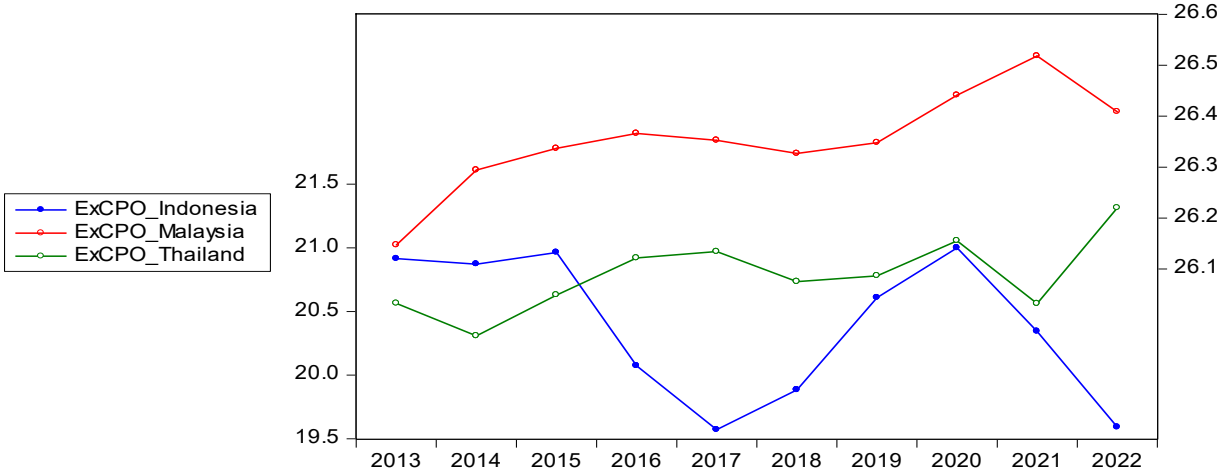

Figure 2 Comparison export of CPO in Indonesia, Malaysia, & Thailand (Current US$).

As the largest palm oil food-producing country in ASEAN after Thailand and Malaysia, Indonesia prioritizes meeting consumption levels and production values, which are continuously increasing, so that palm oil export opportunities in Indonesia can potentially increase the growth rate of the economic sector. Even though CPO production in Indonesia has increased annually, CPO export in 2022 has decreased by US$4.03 billion or 11.4% **[15]**. This condition is caused by a scarcity that causes soaring palm oil prices in society, so the government

requires intervention policies and regulations to maintain the availability of palm oil food by stopping export to several destination countries. The cessation of export activities in Indonesia does not allow the distribution of palm oil food consumption in society to increase as well. Prices soared because of the high world market demand is a view of supremacy in the eyes of Indonesia, especially the government, to stabilize domestic palm oil food prices.

There are various discussions of studies conducted by other researchers to reveal the determinants that affect the export of palm oil (CPO). The research hypothesis **[23]** states that the development of financing to support the integration of environmental resources affects the increase in the contribution of CPO food export in Indonesia. Then, the relationship to the hypothesis of the research experiment by **[32]** explains that price and production value determine changes in the CPO export rate structure. The country will export its products to add value to the product's price towards trade openness and meet domestic needs for the goods it produces. As with the study of absolute or absolute advantage, trade theory is related to state profits as a producer of goods or services in the specialization of fulfilling domestic needs and the trade value chain.

Based on the phenomena described, this study explores how strong green financing resolutions are in facilitating the reinforcement local value chain of palm oil food export in Indonesia. The urgency of this research provides an interesting discussion because there are two topics. First, the existence of CPO production tends to be exploitative, so the efficiency of palm oil production has not considered environmental elements and the empowerment of local production. Second, Indonesia is the largest CPO exporting country in ASEAN, experiencing a scarcity of the food commodity palm oil, which causes the price of palm oil to soar.

Scientific Hypothesis

The scarcity of priority food sectors such as palm oil is a crucial issue for policymakers, given their significant contribution to increasing economic growth in Indonesia. International cooperation ties motivated Indonesia to join in sparking green resolution talks by focusing on principles of the local value chain in domestic food production. Strong suspicions regarding the theory of international trade law and the empirical study of **[9]**, researchers formulate a hypothetical framework for this research in long-term and short-term analysis with the following variable criteria:

H1: Increasing the resolution of green financing will have a negative impact on CPO export in the long term and the short term.

H2: An increase in product prices will positively impact CPO export in the long term and the short term.

H3: An increase in production value will positively impact CPO export in the long term and the short term.

H4: An increase in household consumption expenditure will positively impact CPO export in the long term and the short term.

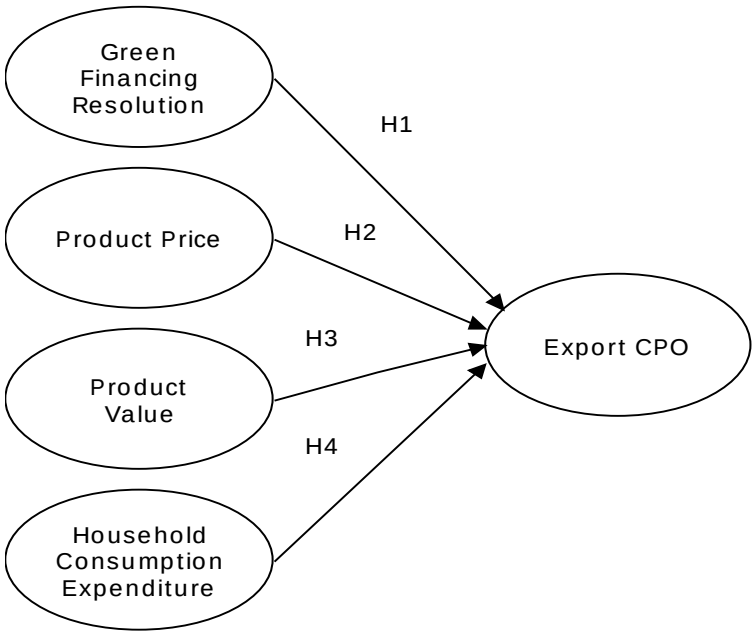

Figure 3 Research hypothesis.

MATERIAL AND METHODOLOGY

Description of the Experiment

The focus or scope that becomes the research study variable raised is the CPO export level variable in Indonesia as the dependent variable to the independent variable, namely green financing resolution, product prices, and production value. While the control variable in this study, namely household consumption expenditure. This type of research method is a quantitative method that is processed using time series analysis, which is a type of data analysis by predicting annual data from 2013:Q1 to 2022:Q4 in Indonesia.

In addition, this research defines data operationalization as an additional econometric estimate that captures the structure of various empirical studies descriptively (Table 1). By understanding the characteristics of the status variable, the researcher obtains accurate information from the type of data source to be processed and processes the output of the linear regression estimation, which will be discussed according to the hypothesis stated in the researcher's frame of mind.

Table 1 Data operationalization.

Variable Determinants	Symbol	Description	Empirical study
Export CPO	EXCP	Export transfers commodity products produced by service providers or state agencies to consumers and competitors in other companies. The level of commodity export volume on the world market has factored in increasing export performance, namely domestic production, international product prices, and consumption value.	**[24]**, **[31]**
Green financing resolution	GF	Green financing resolution refers to financial investment to finance green development projects, environmental preservation, and policies that drive the economy toward a sustainable system. The definition of green financing resolution in Indonesia is defined as government support in carrying out sustainable growth in financial services and is a combination of economic, social, and environmental actors.	**[3]**, **[5]**
Product price	PC	Product prices in international trade mean the transaction value of the exchange of goods and services between exporters and importers based on agreements between countries. The high and low value of the price of export commodity products depends on the quantity and quality of goods produced by looking at competition factors and price stability.	**[19]**, **[28]**
Production value	PV	Production value is a series of formations of output value through the stages of a combination of input sources that aim to increase the value of production benefits for the use of goods and services. The physical characteristics of production value must rely on resources such as the labour force, capital, and natural elements (soil, minerals, and natural materials).	**[21]**, **[29]**

Table 1 Cont.

Household consumption expenditure	HCE	The measure of household consumption expenditure is a measure of the value of community welfare indicators, both individually and socially, which show the stages of aggregate economic growth. A stable consumption expenditure ratio indicates that the level of income earned by household actors is higher, and vice versa; if the income disparity increases, it will have consequences for low purchasing power in household consumption expenditures.	**[17]**, **[18]**

Data

The data compilation method in this research uses a series of secondary report sources. Secondary data is collected by searching the legal basis, writings, news, and research related to the selected topic **[14]**. In addition, data collected in this research was obtained from the Central Bureau of Statistics, the Indonesian Family Life Survey (IFLS), and the Ministry of Environment, as well as other supporting data cited from literature studies, books, and previous research. The stages of data analysis in this research used ARDL and ECM regression through a series of stationarity tests (Unit Root).

Statistical Analysis

ARDL is an econometric testing tool that assumes that the variables studied will affect the variables themselves in the previous year **[2]**. The stages of testing the ARDL are the same as the ECM model test, which lies in analysing the data stationarity test, the optimal lag test, the cointegration test, and ARDL linear regression **[10]**. The optimal lag length used for regression estimation is based on the stationarity level criteria **[2]**. According to **[10]**, if the estimated lag length displays a level different value for the regression model, this lag length result will be chosen to determine the ARDL regression model. The specifications for the results of ARDL and ECM processing in this study, our analysis uses the input application of the Eviews 9 statistical software.

The formulation of the time series in this study is to examine the influence of green financing resolution variables, product prices, and production values, as well as control variables that affect the level of CPO export in Indonesia, namely household consumption expenditure. Based on the variables to be studied, the model or regression equation can be written as follows:

$$\mathrm{EXCP_t} = \beta_0 + \beta_1 \mathrm{GF_t} + \beta_2 \mathrm{PC_t} + \beta_3 \mathrm{PV_t} + \beta_4 \mathrm{HCE_t} + \mu_t \quad (1)$$

After testing several series of stationary and optimal lag tests, the above model can be converted into an equation analysis of the ARDL model as follows **[6]**:

$$\Delta \mathrm{LnEXCP_t} = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \, \Delta \mathrm{LnEXCP_{t-i}} + \sum_{i=1}^{p} \alpha_2 \, \Delta \mathrm{LnGF_{t-i}} + \sum_{i=1}^{p} \alpha_3 \, \Delta \mathrm{LnPC_{t-i}} + \sum_{i=1}^{p} \alpha_4 \, \Delta \mathrm{LnPV_{t-i}} + \sum_{i=1}^{p} \alpha_5 \, \Delta \mathrm{LnHCE_{t-i}} + \beta_1 \mathrm{LnEXCP_{t-i}} + \beta_2 \mathrm{LnGF_{t-i}} + \beta_3 \mathrm{LnPC_{t-i}} + \beta_4 \mathrm{LnPV_{t-i}} + \beta_5 \mathrm{LnHCE_{t-i}} + \mu_t \quad (2)$$

Where:
$LnEXCP$ = CPO export; $LnGF$ = Green financing resolution; $LnPC$ = Price product; $LnPV$ = Production value; $LnHCE$ = Household consumption expenditure; $\alpha_1 - \alpha_5$ = Short-term estimation coefficient; $\beta_1 - \beta_5$ = Coefficient of long-run estimation.

Test the initial stages of the (ARDL) analysis processing procedure starting from the bound cointegration test, namely carrying out an equation model test using the ordinary least square method, which aims to simultaneously provide short-term and long-term results **[2]**. Statistical F-test test is a test to analyze long-term correlation regarding the estimator variable being tested **[2]**.

Results of regression testing of model equations that have a long-term relationship, there is an explanation for verification of the error rate of the results listed in the short-term model **[16]**. The purpose of testing the ECM model analysis in a model is to see whether the model that has been analyzed in the long-term model has an effect or not on the variable **[16]**. In other words, the ECM test is an analysis stage to check for error correction from the previous variable **[20]**. Furthermore, the ECM test is carried out after testing the long-term model to determine the cointegration and influence between variables in the short term with the following model equation **[13]**:

$$\Delta \mathrm{LnEXCP}_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \, \Delta \mathrm{LnEXCPO}_{t-i} + \sum_{i=1}^{p} \alpha_2 \, \Delta \mathrm{LnGF}_{t-i} + \sum_{i=1}^{p} \alpha_3 \, \Delta \mathrm{LnPC}_{t-i} + \sum_{i=1}^{p} \alpha_4 \, \Delta \mathrm{LnPV}_{t-i} + \sum_{i=1}^{p} \alpha_5 \, \Delta \mathrm{LnHCE}_{t-i} + \theta \mathrm{ECT}_{t-i} + \mu_t \quad (3)$$

Where:
θECT_{t-i} = Variable Error Correction (residual) of the previous period.

The coefficient value of the ECM model displays the degree of quick suitability for the balance between long-term and short-term economies constrained by shocks **[20]**. The variable values of the ARDL and ECM models have valid criteria for seeing the level of significance of a variable equation and the correlation of cointegration values between the dependent and independent variables **[16]**.

RESULTS AND DISCUSSION

Selection of the ARDL and ECM Models: The selection of model variables analyzed by this study were independent variables, namely green financing resolution, product prices, and production value, as well as household consumption expenditure as a control variable. The dependent variable data in this research is the level of CPO export. Testing the estimation of the ARDL and ECM models analyzes the long-term and short-term equations between the relationship between the independent and dependent variables **[2]**, **[10]**, **[16]**. Before determining the selection of ARDL and ECM models, a step testing process is needed, namely the unit root test (stationarity) **[11]**. The stationarity test is a test on a time series model that is useful for knowing whether or not the estimated data is affected by the problem of unit roots. If the results of the estimation of the data obtained contain unit roots, it is stated that the data is not stationary, so the estimated data is spurious.

The spurious regression model in the time series analysis equation is a type of regression that looks at the relationship and influence between the dependent and independent variables, which shows significant results in terms of probability, but the magnitude value diagnosis does not display a regression coefficient that matches the residual value **[2]**, **[10]**, **[11]**. The step to avoid the problem of coaxing correlation in estimating the variables to be studied is through a stationarity test (unit root test) which is used to estimate whether the regression is stationary or not. The absolute completeness requirements for stationarity testing using the Augmented Dickey-Fuller test method are explained in the following table:

Table 2 The results of the level stationarity test.

No.	Variable	Level		Description
		ADF	MacKinnon Critical Limit (5%)	
1.	LnEXCP	-2.771384	-2.941145	Not stationary
2.	LnGF	-5.040588	-2.938987	Stationary
3.	LnPC	-1.775495	-2.938987	Not stationary
4.	LnPV	-1.978861	-2.941145	Not stationary
5.	LnHCE	-1.511987	-2.943427	Not stationary

Note: Source – Eviews 9.0 data processing.

Based on the results of the stationarity test (unit root) (Table 1), all variables are at levels. Variables that do not pass the stationary test at the level are CPO export, product prices, production values, and household consumption expenditures. These three variables can be seen from the statistical values, which show the absolute value of ADF is lower than the critical value (MacKinnon = 5%). The difference in the stationarity value of the green financing resolution variable at the level has the largest ADF absolute statistical degree compared to the

critical scale (MacKinnon = 5%); it is concluded that the level of observation of the green financing resolution variable data indicates stationary. Stationary results that vary across the test factors require further stationary experiments at the 1st difference with the details below:

Table 3 Stationarity test results at the 1st difference level.

No.	Variable	Level		Description
		ADF	MacKinnon Critical Limit (5%)	
1.	LnEXCP	-4.322076	-2.941145	Stationary
2.	LnGF	-3.454610	-2.941145	Stationary
3.	LnPC	-6.650760	-2.941145	Stationary
4.	LnPV	-10.74242	-2.941145	Stationary
5.	LnHCE	-7.473374	-2.943427	Stationary

Note: Source – Eviews 9.0 data processing.

After verifying the stationarity test values at the 1st difference on all research variables (Table 2), it is known that they meet the standard stationarity. The variables as a whole have estimated regression values which show that the ADF stationary test has a large difference from its critical limit (MacKinnon = 5%). This means that there are no unit root tests, and all research equations pass the stationarity test.

Estimation of the Long-Term Model (ARDL) and Short-Term Model (ECM): Since the value has been generated by the unit root test (stationarity), the estimation equation can be continued through long-term analysis. The method that must be considered to determine the best estimation criteria for the ARDL and ECM models is stationarity at the level. The ARDL model automatically determines its model by weighting the best stationary test based on the level 1st difference value. The long-term estimation results of ARDL are as follows:

Table 4 ARDL long-term model estimation with 1st difference value.

Regression coefficient				
Variables	**Coefficient**	**Std. Error**	**T-statistics**	**Prob.**
D(LnEXCP(-1),-2)	0.779773	0.189834	4.107655	0.0007**
D(LnGF(-1)	13.305137	4.427599	3.005046	0.0076**
D(LnPC(-2)	2.219864	1.493220	1.486629	0.0040**
D(LnPV(-1),-3)	-0.039756	0.019273	-2.062728	0.0054**
D(LnHCE)	-0.152002	0.305549	-0.497471	0.6249**
CointEq(-1)	-1.263935	0.224449	-5.631271	0.0000**
Cointeq = LnEXCP - (-4.5049*LnGF + 5.3742*LnPC + 0.0775*LnP – 0.1203*LnHCE -0.6583)				

Note: Source – Eviews 9.0 data processing. *** p <0.01, ** p <0.05, * p <0.1.

Table 5 Long-Term model coefficients.

Variable regression	Coefficient	Std. Error	T-statistics	Prob.
LnGF	-4.504930	0.751797	-5.992214	0.0000**
LnPC	5.374187	0.906346	5.929510	0.0000**
LnPV	0.077517	0.025279	3.066459	0.0066**
LnHCE	-0.120261	0.245727	-0.489409	0.6305**
C	-0.658267	0.980034	-0.671678	0.5103**
R^2	0.907573			
F-stat	10.39691			
Prob (F-stat)	0.000004**			

Note: Source – Eviews 9.0 data processing. *** p <0.01, ** p <0.05, * p <0.1.

Data processing above (Table 4), the estimation of the ARDL model uses level 1st difference value. The endogenous variable studied was the level of CPO export, while the exogenous variables consisted of green financing resolution, product prices, production value, and household consumption expenditure. This model uses a significance level of 5% (p <0.05) with the long-term ARDL method, which analyses that the t-statistic test for green financing resolution, product prices, and production value has a higher t-statistic than the t-table (1.6883). However, the household consumption expenditure has a lower t-statistic than the t-table (1.6883). A simultaneous test of 0.00004 means that the simultaneous impact of exogenous variables can affect the level of CPO export. These results concluded that the variable green financing resolution, product prices, and production value had a relevant effect on the level of CPO export in the long term.

The balance of the economy is not only observed by long-term relationships but must explore the impact on the economic side in the short term. Short-term relationships show fast-growing economic conditions and restore long-term balance if you experience a shock in the short-term **[14]**. The research variables in the estimation of the ECM short-term model through unit root testing (stationarity) are as follows:

Table 6 ECM short-term model estimation with 1st difference.

Variable regression	Coefficient	Std. Error	T-statistics	Prob.
LnGF	-1.638781	2.762418	-2.593241	0.0078**
LnPC	0.681698	1.836647	2.371164	0.0133**
LnPV	0.310150	1.320553	2.493850	0.0253**
LnHCE	0.503407	1.243436	2.013993	0.0089**
ECT(-1)	-0.248661	1.205716	-2.208756	0.0368**
R^2	0.973673			
F-stat	48.74385			
Prob (F-stat)	0.000000**			

Note: Source – Eviews 9.0 data processing. ***p <0.01, ** p <0.05, * p <0.1

The regression model error correction model (ECM) of -0.248661. The ECT probability is 0.0368 at a significance limit of 5% (p <0.05), meaning that the absolute value for obtaining economic balance in the short-term model is valid or meets the residual standard. The development of variables in the short-term estimation (ECM) proves individually to have a significant coefficient at 5%, which states that the t-statistical test for all independent variables is very high from the t-table (1.68830). The simultaneous test analysis also meets the criteria because of the Prob. (F-statistic) is 0.00000, meaning that the simultaneous equation in all independent variables influences the dependent. Based on these results, it was concluded that green financing resolution variables product prices, production values, and household consumption expenditures significantly influence the level of CPO export in the short-term.

The Contribution Diagnosis of Green Financing Resolution and CPO Export in the Long-Term and Short Term: The contribution impact to the resolution of green financing has the consistency to reach equilibrium in the long term, which is estimated to be around 2.4 quarters or around 4.3 months (Figure 3). So far, the contribution of the long-term response to the resolution of green financing in Indonesia has met the requirements for reducing the CPO export quota, which encourages food commodity resilience, anti-exploitation, and is environmentally friendly **[27]**. On the other hand, a review of green financing resolution can adapt to instruments for strengthening local food production or local value chain which provide priority food security supplies such as palm oil in the short-term **[9]**.

The short-term estimation findings also adjust for the same results as the long-term and show that green financing resolution produces a negative and significant effect. The results specifically explain that a 1% increase in green financing resolution policies impacts reducing the standard deviation of around 0.7517 and 2.7624 to the ratio of the average CPO export level in Indonesia. This finding is in line with previous empirical results, namely, among others, **[9]**, **[12]**, and **[25]**.

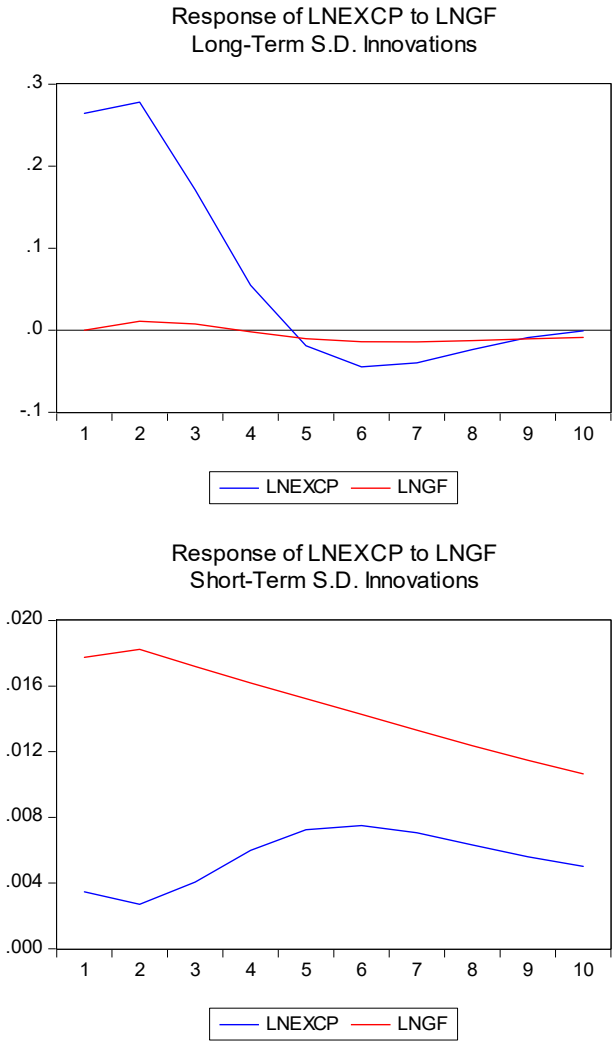

Figure 4 Diagnosis of green financing resolution responses to CPO export in Indonesia period 2013Q1-2022Q4. Source: Processed data.

In the long term, green financing resolutions have a support obligation for economic sustainability, especially international trade **[35]**. Export marketing activities that are not supported by the reconstruction of the use of natural resources and are only limited to economic benefits, on the contrary, cause scarcity due to exploitation without thinking about resilience and sustainability in the future **[34]**. The relationship between green financing resolution in the short-term can control green investment to reduce unhealthy export. This means that export activities are limited according to the capacity of the local production chain, which aims to minimize dependence on imported oil by tightening the resilience of palm oil production to reduce the scarcity of domestic demand **[25]**. The level of CPO export is high and is not matched by stock availability and production balance, so in the short term, polemics will emerge regarding the disparity in consumption output **[23]**. Green financing resolution from a collective perspective of the production chain can finance the acceleration of local palm oil food production security that is environmentally friendly and sustainable **[3]**.

The Contributions Diagnosis of Local Value Chain and CPO Export in the Long-Term and Short-Term: The quality precision of strengthening the local value chain is determined by how much domestic production is produced in meeting the availability of distribution of goods and services in the producing areas **[4]**. For example, the food production capacity of crude palm oil is converted into finished or ready-to-use goods, which will be distributed in the form of CPO marketing to various countries. The high demand for palm oil food supply indicates that the contribution of CPO export in Indonesia has significantly brought the dynamics of the production line into the circulation of the temporal trade subsystem **[29]**. In line with the comparative trade theory, the local value chain is an interaction factor influenced by product prices and production values to achieve an equilibrium level of the trade balance [6]. Household consumption expenditure also plays an important role in moderating local value chain interactions on the resilience of CPO export **[30]**.

Based on the aggregate level, the diagnosis of the contribution of green financing resolution and strengthening of local value chains to the value chain indicators, namely product price and production value, shows a significant contribution both in the short and long-term, except for household consumption expenditure in the short term which does not show a significant diagnosis. In short, the implications of green financing resolutions facilitate sustainability activities to reduce imported oil food production and finance responses to developing local value chain indicators in encouraging CPO export resilience, as shown in the following graph in Figure 4.

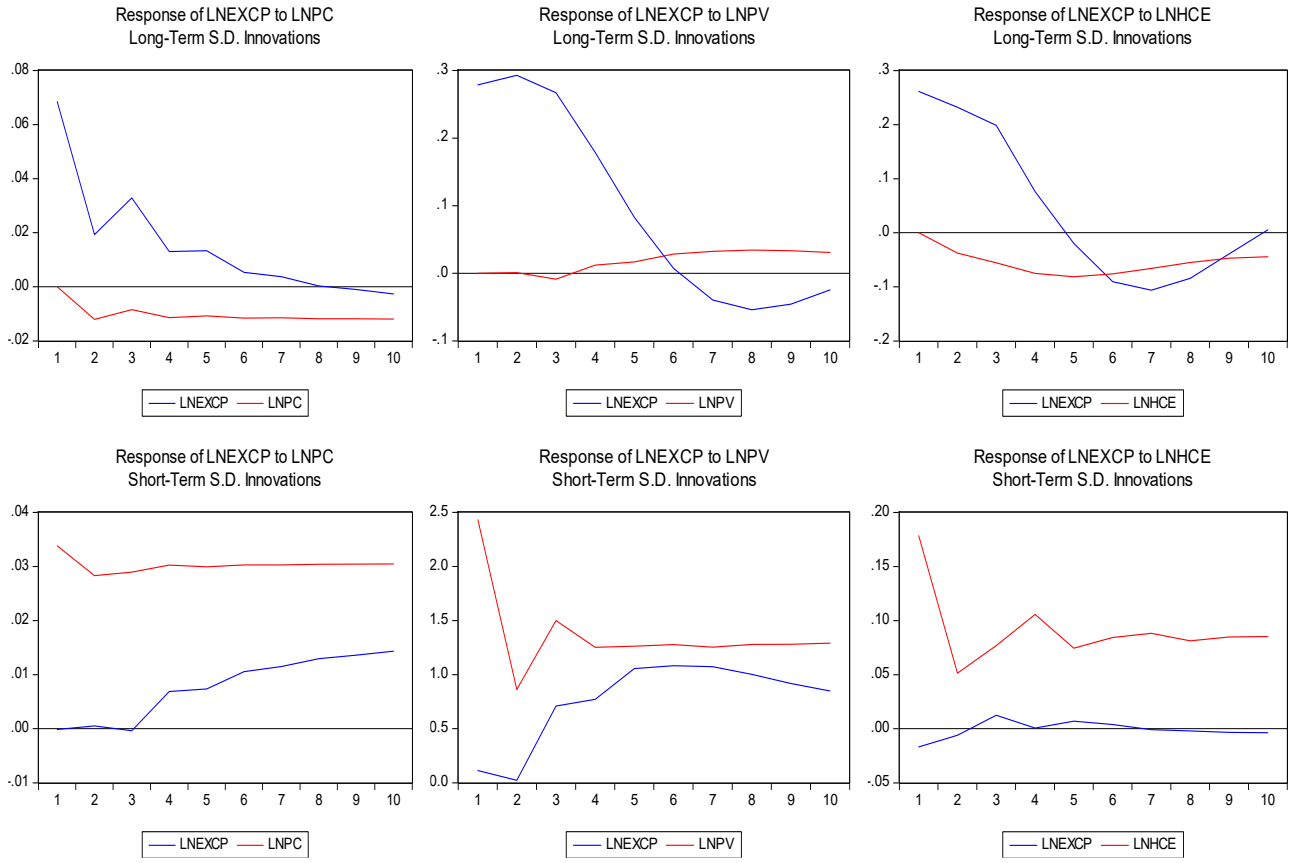

Figure 5 Diagnosis of local value chain response to CPO export in Indonesia period 2013Q1-2022Q4. Note: Source – Processed data.

Product prices were found to have a positive effect in the long-term and short-term on CPO export, and this means that an increase in this variable causes an increase in the local value chain system to support the resilience of palm oil export in Indonesia. Therefore, a 1% increase in product price has the power to change the response of local value chain indicators by 0.9064 to 1.8367%, which corresponds to research **[1]**, **[22]**, and **[28]**. Importing countries will consume palm oil food production from exporting countries if product price stability decreases, but the increasing consumption needs of other countries to consume CPO oil food make countries have to buy imported CPO oil products at a fixed price **[24]**. This advantage will be achieved if the exporting country can increase the value chain of local production and set a high price for exporting palm oil food commodities to importing countries.

The positive relationship between production value and export CPO in Indonesia is due to the demand shock effect, both in the long term and short term. Once the level of trade reaches balance, a higher productivity value of 1% encourages producing countries to increase output, or in other words, production values contribute to the export resilience response of 0.0253 to 1.3206%. The implication of strengthening the value of palm oil food production is a factor in forming the resilience of CPO export in Indonesia **[1]**. When the production value increases, the number of CPO export offers also increases and conversely **[28]**. Achieving local production values is no less important than increasing the production chain's capacity to market the palm oil industry. The success of the surplus to the stability of production value can be identified by strengthening local value chain innovation so that indicators of production value and the CPO export trade balance in Indonesia can reach the maximum balance point **[22]**.

The focus on long-term coefficient estimation shows that household consumption expenditure does not significantly affect CPO export in Indonesia with a negative significant. In contrast, the results of short-term

diagnostic specifications are positive and significant. The discussion stated that the reduction in household consumption expenditure in strengthening the local value chain resulted in a CPO export coefficient of 0.2457 to 1.2434%. Once observed, this response supports the findings of **[18]**, **[33]** with no significant effect because export trends do not only focus enough on the level of consumption in a country but also view the exchange rate as a measure of volatility in international trade. The fluctuating exchange rate causes the volume of CPO oil export prices to increase drastically, so importing countries experience a deficit due to high import tax rates **[19]**, **[22]**. This disturbance of exchange rate volatility fluctuations makes household consumption expenditures not correlate with CPO export in Indonesia **[18]**.

CONCLUSION

This study defines two parts of the analysis of independent and control variables in the long-term and short-term estimation using the ARDL and ECM approaches. The results of the processing of green financing resolution variables have a negative and significant effect on the level of CPO export, both in the long term and in the short term. This means that every increase in green financing resolution can reduce the limit for CPO export activities to tighten domestic oil demand. Then, the research direction consists of local value chain variables, namely product prices, production values, and household consumption expenditures, as control variables. The long-term and short-term approaches to the product price variable and production value positively affect the CPO export level, where when the product price and production value increase, the CPO export level also increases. These results have been consistent in supporting studies of previous empirical research results. Only household consumption expenditure has a negative and insignificant long-term effect. However, in the short term, household consumption expenditure positively and significantly affects the level of CPO export.

The results of this study resulted in several recommendations: first, regulation of the G20 cooperation in Indonesia, the role of the government needs to create intervention policies that focus on building a green economy structure in reducing the scarcity of natural resources, especially in the palm oil commodity. Apart from looking at export objectives, environmental empowerment of the palm oil production process is expected to change the export order, which is oriented towards excellence and competitiveness and can sustainably process local resources. Second, Indonesia is the highest CPO exporting producer in ASEAN and should be able to meet palm oil production in its own country. Through strengthening local added value, the downstream supply chain for palm oil production must rely on local raw materials and sustainable import substitution to support domestic production. With this strengthening, the government's role can restructure export policies to reduce scarcity, affecting the stability of palm oil commodity prices.

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Contact Address:

Randi Mamola, Universitas Sultan Ageng Tirtayasa, Faculty Economic and Bussines, Jl. Raya Palka Km. 03 Sindangsari. 42164, – Pabuaran District – Serang Regency – Banten Province – Indonesia,
Tel.: +62254 3204321
E-mail: randi.mamola2219@gmail.com
ORCID: https://orcid.org/0000-0002-9126-0144

***Herdis Herdiansyah,** Universitas Indonesia, School of Environmental Science, Environmental Science, Salemba Raya Street, no. 4, 10430, Jakarta, Indonesia**,**
Tel.: (021) 31930251
E-mail: herdis@ui.ac.id
ORCID: https://orcid.org/0000-0003-2684-3551

Corresponding author: *