Study on Indonesia Crude Palm Oil Exports to Six Main Destination Countries 2000-2021

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Abstract

This study aims to assess the impact and factors influencing Indonesian CPO exports to six main destination countries from 2000 to 2021. The variables analyzed include real GDP per capita in the destination countries, inflation rates in these countries, and international CPO prices over the same period. The analysis employs a Random Effect Model (REM) processed using Eviews-10. The urgency of this study is to evaluate the circumstances of the EU's deforestation law by examining the contribution of Indonesian CPO exports. The results indicate that real GDP per capita, inflation, and international CPO prices significantly affect the export value of CPO to these six countries during 2000-2021.

Keywords: CPO exports, GDP per capita, inflation, international CPO prices

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1. INTRODUCTION

In 2021, from January to December, Indonesia's export value reached US$ 231.54 billion, an increase of 41.88 percent compared to the previous period (Kemenkeu, 2023). Figure 1 shows two types of export and import production: oil and gas and non-oil and gas.

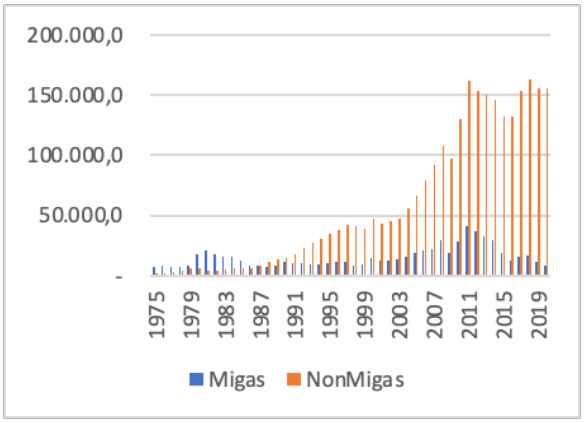

Figure 1. Indonesian Export Value 2000-2021 (Million US$).
Source: BPS RI (Processed, 2022).

In 1987, non-oil and gas exports began to rise and surpassed oil and gas exports in Indonesia's international trade. This shift marked a significant change from when oil and gas exports dominated the previous year. From 1987 to 2021, despite the overall increase in non-oil and gas exports, there have been fluctuations in both sectors. Between 2000 and 2021, the average annual growth rate for Indonesian oil and gas exports was 4.81 percent, while for non-oil and gas exports, it was 9.08 percent.

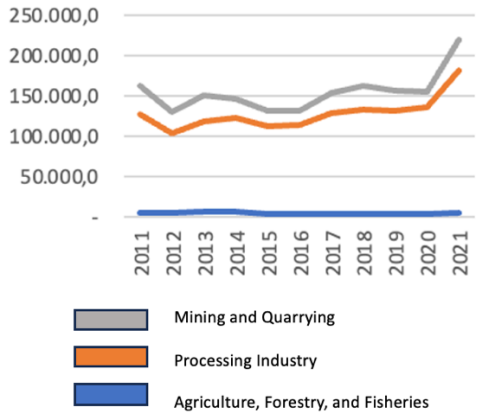

Figure 2. FOB Value (US$) of Indonesian Non-Oil and Gas Exports.
Source: BPS RI (Processed, 2022).

Figure 2 shows that the agriculture, forestry, and fisheries sectors make the smallest contribution to non-oil and gas exports, with an average of 2.28 percent. The mining and other sectors have experienced significant growth, making substantial contributions to non-oil and gas exports from 2011 to 2021. Not only the mining and other sectors but also the processing industry make a very large contribution to non-oil and gas exports. In the same year, there was also an increase in palm oil commodities in non-oil and gas processing industries, amounting to a growth of 55.10 percent, equivalent to a value of US$ 28,606.0 million in 2021. This marked an increase compared to the preceding year, where the growth was 18.43 percent, reaching US$ 18,444.0 million. Palm oil commodity is a non-oil and gas export that makes the largest contribution among the processing industry commodity

groups. Palm is the 87th most traded commodity in the world, with a total trade of US$ 27.3 billion in 2021.

The results of the Revealed Comparative Advantage and Trade Specialization Index calculations show that Indonesia's comparative competitiveness is the highest among other large exporters or producers, and Indonesia's exports are at the maturity stage (Latifah and Kadir, 2021) where palm oil also has a big role for economic growth where the GDP produced by a country can be a benchmark for a country's economic growth by increasing or decreasing.

According to Amalia et al. (2018), Gross Domestic Product (GDP) is an important factor in measuring a country's economic strength, which reads the potential direction of further market movements. When a country experiences growth, the country's ability to trade is greater. Another factor affecting palm oil exports is inflation. Inflation is a tendency for prices to rise continuously in general. Inflation occurs because people live beyond their economic capacity. This creates a demand that is greater than the quantity of goods available. Also, international palm prices have a positive impact on the export value of palm oil. When the price of palm oil increases, the value of palm oil production will also increase, where this is the case will affect the value of a country's palm oil exports (Purnamasari and Japlani, 2018).

2. LITERATURE REVIEW

According to Kotler and Armstrong (2010), another factor influencing palm oil exports is international prices, where price is the sum of the values given by consumers to obtain the desired product or service. Price is used as the main force by which producers measure market share and profits. A change in price will result in a percentage change in the profit that producers get. Where this research also proves that international palm oil price factors have a positive and significant effect on the value of Indonesian palm oil exports (Wicaksono, 2018).

Several studies regarding the export of Indonesian palm oil to other countries have been carried out before. Kaban's (2017) research conducted research on Indonesian palm oil exports from 2009–2014 to the international market using a random effect model. This study showed that international palm oil prices positively affected the value of palm oil exports in 6 destination countries. Meanwhile, the real GDP per capita of the export destination countries for palm oil is not significant and has a positive effect on the export value of palm oil. The export destinations to six countries in this study are China, Singapore, Malaysia, India, the Netherlands, and Myanmar. Torres' research (2017) was conducted to determine the effect of world export prices, India's real per capita income, the Rupiah-US Dollar exchange rate, and palm oil production on the value of Indonesian palm oil exports to India. The data used in this study are time series data from 2001-2005 using the Ordinary Least Square (OLS) method. The results showed that the export price variable for Indonesian palm oil had a significant positive relationship with the supply of palm oil exports to India.

Paramartha and Setyari's (2020) research was conducted to analyze the effect of production, exchange rates, and inflation on the export value of Indonesian palm oil. This study uses multiple linear regression analysis, and the data used is

secondary data. The results of this study indicate that inflation has a negative and insignificant effect on Indonesian palm oil exports, which is also shown in this research that inflation has a negative and significant effect on the value of Indonesian palm oil exports and the real gross domestic product (GDP) per capita of export destination countries has a positive and significant effect on the value of Indonesian palm oil exports (Wong et al., 2020).

Crude Palm Oil (CPO) is crucial for Indonesia's economy, contributing significantly to GDP and rural development through job creation and infrastructure improvements (Sawit Watch, 2020; Naylor et al., 2018). However, the industry faces significant environmental issues, such as deforestation and biodiversity loss (Fitriani & Murdiyarso, 2017). Regulatory frameworks aim to address these challenges, but their effectiveness is debated (Abidin et al., 2019). Future prospects for CPO exports hinge on balancing economic growth with sustainable practices to meet increasing global demand while mitigating environmental impacts (Koesmaryono & Harsono, 2021).

3. METHODOLOGY

3.1. Data dan Data Source

This study used secondary data in the form of panel data from 2000 to 2021, with main destination countries sourced from BPS RI in 2022. The dependent variable used in this study is the export value of Indonesian palm oil products. In contrast, the independent variables used are the destination country's real gross domestic product (GDP) per capita, the international price of palm oil, and the destination country's inflation sourced by World Bank (2022).

3.2. Research Model

To see the international price of palm oil, real GDP per capita of the main export destination countries, and inflation of the main export destination countries in the six main destination countries affect the export value of Indonesian palm oil, the model will be estimated as follows:

$$LEkspor_{int} = f(LDGP_{nt}, Inf_{nt} LHI_{nt})$$

Based on the function above, the econometric equation model is created as follows:

$$LEkspor_{ijt} = \beta_0 + \beta_1 LogDGP_{nt} + \beta_2 Inf_{nt} + \beta_3 LogHI_{nt} + e_{ijt}$$

Where:

LEkspor = Logarithm of Indonesia Export Value of Palm Oil Indonesia (US$)
LogGDP = Logarithm of Gross Domestic Product Per Capita Real to 6 countries (US$)
Inf = Logarithm of Inflation of 6 destination countries (%)
LogHI = International price logarithm of palm oil
I = Indonesia
n = Cina, India, Bangladesh, Italia, Jerman, Myanmar

t = 2000 – 2021
j = Distance
e_{it} = Error
β_0 = Intercept
$\beta_1\beta_2\beta_3$ = Regression coefficient

3.3. Analysis Tool

Research using the random effect model (REM) is an approach used in panel data analysis within econometrics. Panel data involves observations on a number of individuals, firms, or other entities over a specific period. This model is used to analyze panel data when unobserved effects potentially influence the dependent variable and can be considered random. REM doesn't require a classic assumption test because it already uses the GLS method, where the problems contained in it, such as multicollinearity, heteroscedasticity, and autocorrelation, have been resolved by this method (Widarjono, 2018). Multicollinearity tests can be done in several ways, such as Variance Inflation Factor (VIF), tolerance, Durbin Watson test, auxiliary regression, client detection methods, and partial methods between independent variables (Widarjono, 2018, p. 101 - 110). In this study, the multicollinearity test used is the partial correlation between independent variables. The following is the multicollinearity test hypothesis.

A heteroscedasticity test was carried out to test whether, in the regression model, there is an inequality of residual variance between one observation and another. If the variance of the residuals between one observation and another is different, then it contains heteroscedasticity. However, if, on the contrary, the variance of the residuals between one observation and another is the same, then there is no heteroscedasticity. The criterion of the Glesjer model is that if the probability value of the independent variable > the level of significance, then Ho is not rejected.

The statistical test consists of a determination efficiency test, joint regression coefficient test (F test), and partial regression coefficient test (t-test).

1. If the F-value > F-table and the F statistic value < 0.01, then it is rejected and accepted. This means that the real GDP per capita of the destination country, inflation, and international prices affect the export value of palm oil.
2. If the F-value < F-table and the value of the F statistic > 0.01, then it is accepted and rejected. This means that the real GDP per capita of the destination country, inflation, and international prices do not affect the exports.

According to Hidayat (2013), the t-test is used to determine the significant level of the independent variables influencing the dependent variable. The t-test can be done by making a comparison between the two. Then, a significant level of 1% is carried out with the following criteria:

1. If the calculated t-value < t-table and p-value > 0.01, then H_0 accepted and H_1 rejected. This means that the real GDP per capita of the destination

country, inflation, and international prices do not affect the export value of palm oil.

2. If the calculated t-value < t-table and p-value < 0.01, then H_0 is rejected and H_1 accepted. This means that the real GDP per capita of the destination country, inflation, and international prices affect the export value of palm oil.

4. RESULT AND DISCUSSION

In the data panel, there are four estimation models that can be used, namely the Common Effect Model (ECM), Fixed Effect Model (FEM), Random Effect Model (REM) and Lagrange Multiplier (LM). To find the right model for this study, researchers need to use several tests, such as the Chow and Hausman tests.

Table 1. Classic Assumption Test

Variable	Coefficient	Standard Deviation	t-stat	Prob
Indonesian Export Value of Palm Oil Indonesia	-73333177	89298799	-0.821211	0.0000
Gross Domestic Product per Capita	-388.0503	1519.882	-0.255316	0.5792
Inflation of 6 destination countries	0.275662	0.051216	5.382345	0.0000
International Price of Palm Oil	368584.5	108327	3.402517	0.0000
Cross Section F				0.0000
Cross Section Chi-Square				0.0000
Cross Section Random				0.0292
Breusch-Pagan				497.3909 (0.0000)

Source: Data processed (2023).

Based on the estimation results in Table 2 show that the probability value of the chi-square cross-section is 0.0000, which is less than = 1% (0.0000 <0.01), so it is rejected. Therefore, the best model is the Fixed Effect Model.

Based on the estimation results in the table above, the probability value of the cross-section is 0.0000, which shows that it is less than 1%. Therefore, the null hypothesis is rejected. Therefore, the best model to use for this regression model is fixed effect.

The estimation results in Table 4 obtained a one-sided cross-section probability value of 0.000, which was less than = 1% (0.0000 <0.01), so it was rejected. So, the best model to use is the random effect.

4.1. T-Test

The t-test was conducted to determine the effect of the independent variables partially on the dependent variable. The following are the random effect model estimation results for each independent variable.

Table 2. Final Result

Variable	Coefficient	Std. Error	t-statistics	Prob.
C	-16.01649	3.643909	-4.395414	0.0000
LogGDP	0.817819	0.142660	5.732625	0.0000
LogHI	1.962945	0.162021	12.11541	0.0000
Inf	-0.027127	0.009457	-2.868381	0.0048
R-Squared	0.727906	**Durbin-Watson**		0.533682
Adjusted R-Squared	0.721529			

Source: Data processed (2023).

4.2. Discussion

Panel data itself is a combination of data from time series and cross-section. The cross-section data was taken from 6 destination countries for Indonesia's palm oil exports: India, China, Bangladesh, Italy, Germany, and Myanmar. In contrast, the time series data were taken from 2000 – 2021.

The discussion and economic interpretation of Indonesia's palm oil exports to the six main destination countries for 2000 – 2021 uses a random effect model. Based on the results of the t-test, it was found that Real GDP per Capita and International Palm Prices had a positive effect on the value of Indonesian palm oil exports to the six main destination countries in 2000 – 2021 and differed from Inflation, which had a negative and significant effect.

The coefficient value of Real Gross Domestic Product per Capita is based on the estimation results of the random effect model of 0.817819, which means that if every GDP per Capita of the destination country increases by 1 percent, it will increase the export value of Indonesian palm oil by 0.82% (ceteris paribus). This result is in line with the hypothesis proposed and in line with the results of Juli et al. (2017), where GDP has a positive influence on the export value of palm oil, so the higher the economic growth of a country export of palm oil.

Based on the estimation results of the random effect model in Table 4 for the international palm oil price variable, a coefficient value of 1.962945 is obtained. This means that when there is an increase in the international price of palm oil by 1 percent, the export value of Indonesian palm oil will increase by 1.96 percent (ceteris paribus). This is in line with the hypothesis put forward and in line with the results of Alatas' research (2015), which is that international palm prices have a positive impact on the export value of palm oil. When the price of palm oil increases, the value of palm oil production will also increase, where this is the case will affect the value of a country's palm oil exports.

Based on the estimation results of the random effect model in Table 4 for the inflation variable, a coefficient value of -0.027127 is obtained. This means that when there is an increase in inflation of 1 percent, the export value of Indonesian palm oil decreases by 2.71 percent (ceteris paribus). This is in line with the hypothesis put

forward and in line with the results of research by Purnamasari and Japlani (2018) that inflation has a negative and significant effect on the export value of palm oil, where if inflation decreases, the export value of palm oil increases.

5. CONCLUSION

Based on the results of an analysis conducted by researchers on the development of Indonesia's palm oil exports to six destination countries, namely, India, China, Bangladesh, Italy, Germany, and Myanmar, it can be concluded that India and China share the market share of Indonesian palm oil exports in 2000 - 2021. Based on the results of the panel data regression analysis, several points can be concluded as follows:

1. The real gross domestic product (GDP) per capita of export destination countries has a positive and significant influence on the export value of Indonesian palm oil to the six destination countries in 2000 – 2021.
2. International palm prices have a positive and significant effect on the export value of Indonesian palm oil to the six main destination countries in 2000 – 2021.
3. Inflation has a negative and significant effect on the export value of Indonesian palm oil to the six main destination countries in 2000 – 2021.

Based on the results of an analysis conducted by researchers on the development of Indonesian palm oil exports to six countries, the suggestions that can be given are as follows:

1. The Indonesian government ought to consider the economic conditions of destination countries, including but not limited to India, Myanmar, Bangladesh, China, Italy, and Germany, as these factors significantly influence the volume of exported palm oil from Indonesia.
2. The Indonesian government is expected to pay more attention to Indonesia's palm oil exports and try to control the price of palm oil as the largest palm oil producer in the world.
3. Exporters in Indonesia should pay more attention to the inflation rate in Indonesia.
4. For further research, it is expected to be able to examine the export value of Indonesian palm oil with other variables, such as the consumer price index and exchange rates, with a longer observation period.

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