

The Impact of Nontariff Trade Policy of European Union Crude Palm Oil Import on Indonesia, Malaysia, and the Rest of the World Economy: An Analysis in GTAP Framework

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Abstract

Indonesia and Malaysia are the largest producers and exporters of palm oil in the world vegetable oil market. Palm oil and its derivative products are the highest contributors to foreign exchange in 2018. This study aims to analyze the impact of the European Union import non-tariff trade policies on the Indonesian and Malaysian economies. The analysis uses the Computable General Equilibrium (CGE) model of world trade on the Global Trade Analysis Project (GTAP) program. The results of this study found that the non-tariff import policy by the European Union had a negative impact on the economies of Indonesia and Malaysia. Moreover, the policy also has a negative impact on countries in Southeast Asia and the European Union. This shows that the enactment of non-tariff import trade policies for Indonesian and Malaysian palm oil products has a global impact.

Keywords: crude palm oil; non-tariff trade policy; GTAP Model; CGE

JEL Classification: F13; O13; F47

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1. Introduction

Palm oil is one of the most consumed and produced oils in the world. Palm oil is generally cheaper, easier to produce, and very stable, it is used for various foods, cosmetics, hygiene products, and can also be used as a source of biofuels or biodiesel. Most palm oil is produced in Southeast Asia. World palm oil production is dominated by Indonesia and Malaysia. These two countries produce a total of around 80–85% of the world's total palm oil production. Indonesia is the largest producer and exporter of crude palm oil.

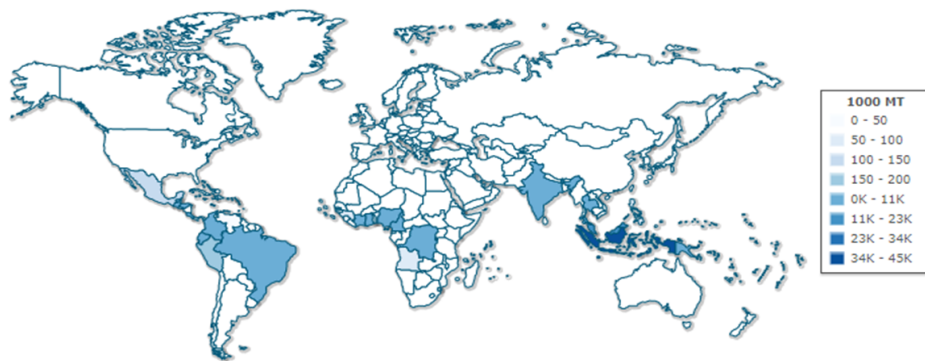


Figure 1: Map of the 10 Highest Producers of Crude Palm Oil in 1000 Metric Ton
Source: IndexMundi (2019)

In the long term, the world demand for palm oil shows an increasing trend in line with the growing population of the world and hence increases the consumption of products with palm oil raw materials such as food products and cosmetics. Meanwhile, governments in various countries are supporting the use of biofuels. But the palm resolution issued by the European Parliament is a concern for producing countries and exporters of palm oil commodities. In the report entitled "Report on Palm Oil and Deforestation on Rainforests" states that the issue of oil palm is a problem relating to issues of corruption, child labor, human rights violations, the elimination of the rights of indigenous peoples and others. In the report, the European Union (EU) plans to limit trade and imports of palm oil commodities into its territory.

Indonesia and Malaysia as a producer and major exporter of palm oil in the world vegetable oil trade must consider this situation. The world trade in vegetable oils is dominated by four types of oil, namely palm oil (50%), soybean oil, rapeseed oil, and sunflower oil. In line with the increasing growth of the world population and the development of downstream programs (especially fuel), the need for vegetable oil has also increased every year. In 2050, the projection of consumption per capita of world vegetable oil reaches 25 kg so that the availability

Table 1: Crude Palm Oil Production by Country

Rank	Country	Production (1000 Metric Ton)
1	Indonesia	43,000
2	Malaysia	20,700
3	Thailand	3,000
4	Colombia	1,680
5	Nigeria	1,015
6	Guatemala	852
7	Ecuador	630
8	Papua New Guinea	630
9	Honduras	580
10	Brazil	540

of a total of 230 million tons of vegetable oil is needed or needs an additional 60 million tons of production in 2015 (*Swa.co.id*, 2015; Persaud & Maurice, 2006).

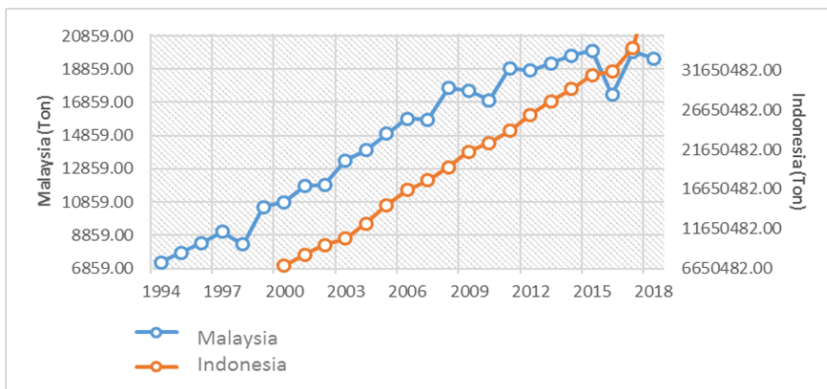


Figure 2: Crude Palm Oil Production

Source: CEIC (2019)

In the 2012–2014 world trade in palm oil (Crude Palm Oil/CPO) grew by 3.26%, above the average growth of vegetable oil (2.75%) (OECD/FAO, 2015), but soybean oil declined due to drought in Argentina and Brazil (Mielke, 2015). Apart from the increase in population and economic growth, the increase in demand for palm oil on the world market is also caused by an increase in world biodiesel production (biofuel) that uses palm oil as a raw material (mix in fossil oil) (Purba et al., 2018). World biodiesel production is increasing every year in line with the mandatory biodiesel policy carried out by all exporters and importers of vegetable oils (Rosillo-Calle et al., 2009).

Palm oil is a vegetable oil which has the lowest production costs for producing biodiesel compared to nonvegetable oil (Gashaw & Teshita, 2014; Wisena et al., 2014; Sipayung & Purba, 2015) so that palm oil has an important role as one of the

largest sources of vegetable oil in the world. All types of vegetable oil can be used as raw material for biodiesel, but palm oil has greater competitiveness because of higher productivity, lower prices, and lower carbon emissions (Mukherjee et al., 2014).

The increasingly important position of palm oil in world trade has been negatively responded to by the European Union. The European Union controls palm oil imports by imposing a high import tariff policy, anti-dumping duties, and the refusal of palm oil products on food products to the plan to ban import biodiesel made from palm oil from Indonesia in 2021 and postponed to 2030. The European Union as the main importer of palm oil and as a rapeseed oil producer faces a trade-off dilemma between food, fuel, and feed, resulting in a tug of interest between the food sector and the transportation sector (Purba et al., 2018). Likewise, the United States faces the problem of the increasingly limited supply of soybeans for energy raw materials. This condition is an opportunity for Indonesia and Malaysia to fill the biodiesel market globally.

The European Union plans to stop the import of palm oil into its territory, which inevitably will affect two palm oil-exporting countries in the world namely Indonesia and Malaysia. For Indonesia, palm oil is the biggest contributor to foreign exchange reaching IDR239 trillion in 2017 (*Direktorat Jenderal Perkebunan [Ditjenbun]*, 2018). The foreign exchange comes from exports of palm oil and its downstream products (cooking oil, biodiesel, and other industrial products). Until April 2018 the export value of Indonesian palm oil reached 5.87 billion US dollars. Based on GAPKI data, in 2018 Indonesia's palm exports to the European Union were 4.7 million tons, 60% of which was used for biofuels. This amount reaches 14% of Indonesia's total palm oil exports. Palm oil is the 10 main non-oil and gas export commodities included in the processing industry commodities. Three of the ten export destinations for Indonesian palm oil are countries from the European Union, namely Spain, Italy, and Netherlands.

The policy of the ban will take effect starting in 2030 and reductions begin in 2024. Malaysia as the second-largest producers and exporters of palm oil in the world will also experience the impact of the European Union's trade policy to stop palm oil imports. This policy will have an impact on macroeconomic variables in each exporting country, especially for the two highest-exporting palm oil countries.

The difference between this research and other studies lies in the difference in research approaches. Generally, non-tariff policy analysis is measured only by a regression approach. However, in this study using the computable general equilibrium approach in its modeling wherein very few studies that measure the impact of non-tariff policies use the computable general equilibrium approach. This research aims to analyze the impact of the ban on palm oil imports by the European Union on the economies of Indonesia and Malaysia. The rest of this paper is divided into the following sections. Part 2 discusses the literature review. Part 3 discusses the research methodology. Part 4 is followed by results and analysis. Finally, section 5 concludes.

2. Literature Review

This analysis used the assumption of perfectly competitive markets and the Computable General Equilibrium (CGE) incorporating the import substitution mechanism written in Constant Elasticity of Substitution (CES) functional forms. According to Nugraheni and Widodo (2018), The CGE formulation is based on the socio-economic structure using multisectoral disaggregation Social Accounting Matrix (SAM), and multisegment. These elements are at the core of a multimarket model, where economic agent decision is price and market responses in reconciling demand and supply.

Computable General Equilibrium modeling is a dynamic field for each study (Burfisher, 2008). The model is a comprehensive one, describing all the interacting parts. The Global Trade Analysis Project (GTAP) is the most recent source of correlation information that is very helpful about the CGE database model that applies in the world. Hertel (1997) states The GTAP model has a fully documented database, publicly available and globally. GTAP provides information on the equilibrium of relationships between each country and each sector.

Empirical research by Gunning and Keyzer (1995) that CGE argues that the focus is on tariff and tax reform, price increases and imperfect competition markets, reduced market neutrality, and restrictions on imports and exports in world trade through the policies of each country. Purba et al. (2018) state that in world trade, the import ban policy is a non-tariff barrier policy. Non-tariff barriers are carried out by a country to protect products and domestic consumers. Within the WTO, non-tariff barriers are accepted by importers and exporters. Non-tariff barriers can be restrictions on export or import quantities. Restrictions on exports and imports can be done using various methods such as export and import bans, export taxes, export quotas, or export permits.

The import restriction policy is applied by both developing countries and developed countries to realize economic and non-economic goals. The economic goals of implementing import restriction policies include increasing state revenues, encouraging the development of downstream industries, and stabilizing the prices of export commodities in the domestic market. In this study, non-tariff barriers (NTM) analyzed were related to the import ban policy will be carried out by Europe on Indonesian and Malaysia palm oil in 2030 and the reduction will begin in 2024.

3. Research Methodology

3.1. Method

This study uses the CGE model assuming constant returns to scale and perfectly competitive markets. This study uses the GTAP (Global Trade Analysis Project). GTAP with the latest database of five production factors, 57 industries, and 140 regions makes it possible to analyze the impact of restrictions and restrictions

by the European Union on palm oil imports in various industrial sectors and macroeconomic variables in each region

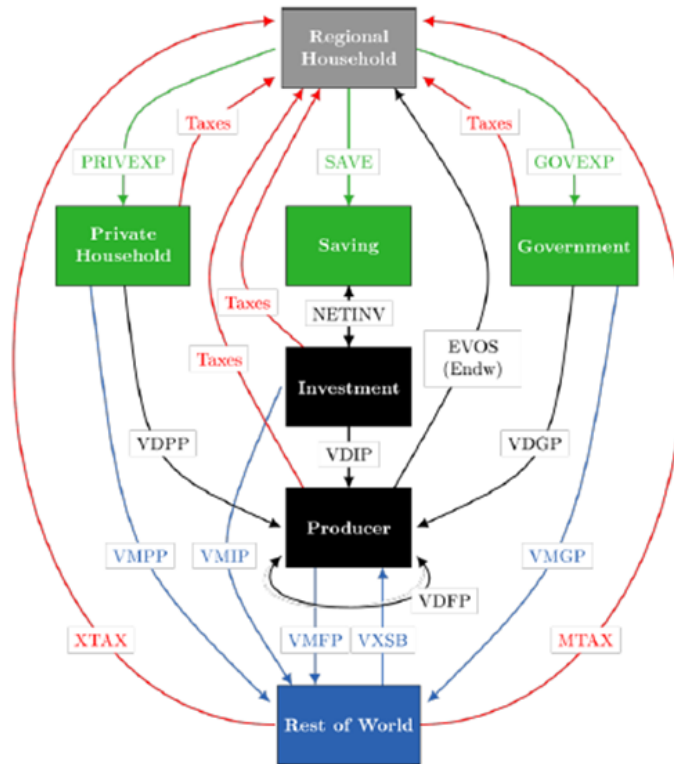


Figure 3: Circular Flows in A Regional Economy
Source: Hertel (2017)

3.2. Data

This research uses GTAP (Global Trade Analysis Project) Database from Center for Global Trade Analysis, Purdue University. The main data source in this research utilized a database derived from the GTAP, with the base year 2011. This database consists of five production factors, 57 industries, and 140 regions around the world. Aggregations in the GTAP database will be aggregated into 5 regions, and the industrial sector will be aggregated into 12 sectors.

3.3. Aggregation

The aggregation of commodities in this research is in accordance with the characteristics and types, referring to Hertel (1997) which consists of Crude Palm Oil, Mining and Extraction, Agricultural Products, Animal and Meat Products, Textiles and Clothing, Heavy Manufacturing, Light Manufacturing, Processed Food, Transportation and Communication, Utilities and Construction. While region aggregation is based on research objectives, which are classified into 5 regions in accordance with the research objectives. The regional and sectoral aggregations in this study are as follows:

Table 2: The Aggregation of Regions

No	Region Code	Comprising Economies	Region Description
1	IDN	Indonesia	Indonesia
2	MYS	Malaysia	Malaysia
3	SEAsia	Southeast Asia	Southeast Asia
4	EU'28	European Union	EU Countries
5	ROW	Rest of the World	All other countries that are not included in the 4 groups

Source: Author specification based on GTAP Database

Table 3: The Aggregation of Sector

No	Sector Code	Sector Description
1	CPO	Crude Palm Oil
2	GrainsCrops	Grains and Crops
3	MeatLstk	Livestock and Meat Products
4	Extraction	Mining and Extraction
5	Procfood	Processed Food
6	TextWapp	Textiles and Clothing
7	PPP	Paper products, publishing
8	LightMnfc	Light Manufacturing
9	HeavyManfc	Heavy Manufacturing
10	Util'Cons	Utilities and Construction
11	TransComm	Transport and Communication
12	OthServices	Other Services

Source: Author specification based on GTAP Database

3.4. Simulation Scenario

The shocks used in this study are in the form of a quota ban on imports of palm oil commodities by the EU and the imposition of double import tariffs on palm oil commodities.

In the first scenario, shocks in the form of a quota ban on imports of palm oil commodities mean that there are no commodities of palm oil imported to the EU by Indonesia and Malaysia (100% of no palm oil exported to the EU by Indonesia and Malaysia).

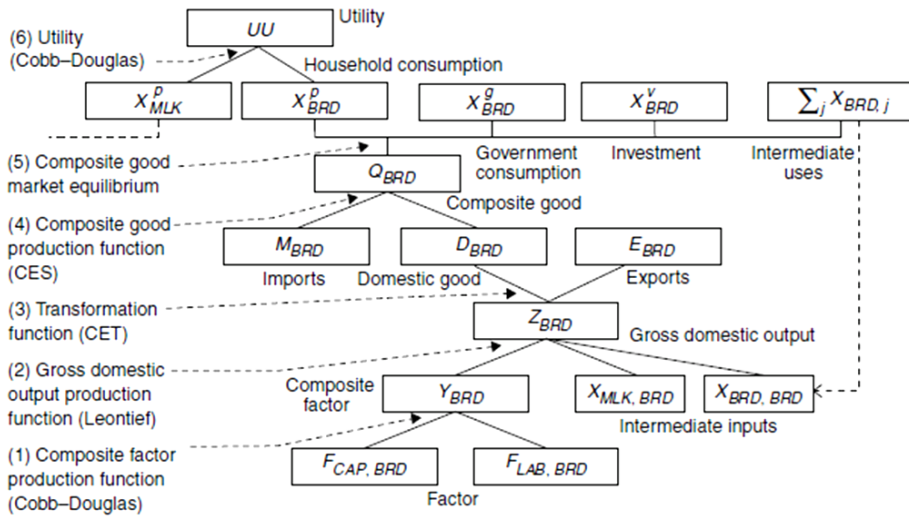


Figure 4: Overview of the Standard CGE Model
 Note: Assumed Functional forms are indicated in parentheses

In the second scenario, this research also uses tariff policy simulations using the Global Trade Analysis Project (GTAP) model CGE (Computable General Equilibrium) (Hertel, 1997). The calculated model is likely to generate ex-ante policy rates through mathematical simulations.

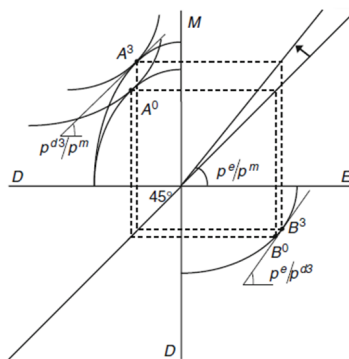


Figure 5: One-sector Mode - Impact of Terms of Trade Shock
 Source: Devarajan et al. (1990)

The second scenario is in the form of imposing very high tariffs on palm oil commodities up to 100%. These simulations are suitable for this study because

currently there are no ex-post data generated from the policy.

4. Result and Discussion

4.1. Macroeconomics Effect

The enactment of restrictions and barriers to entry of Indonesian and Malaysian palm oil commodities carried out by the European Union exerted a sizable impact on the size of macroeconomic variables in the regional areas studied.

Table 4: Change in Macroeconomics

Region	Simulation I			Simulation II		
	Trade Balance	Real GDP	EV	Trade Balance	Real GDP	EV
	(USD Million)	(%)	(USD Million)	(USD Million)	(%)	(USD Million)
Indonesia	-4,144.98	-7.66	-30,083.10	-3.88	-0.08	-104.62
Malaysia	-4,797.11	-4.16	-45,071.26	-28.51	-0.05	-90.90
Southeast Asia	962.17	1.78	1,328.21	-3.24	0.00	10.23
EU-28	-22,606.34	-0.05	39,388.00	-13.69	0.00	-24.27
Rest of the World	30,320.52	-0.29	32,495.97	51.74	0.00	93.84

Source: Authors' results from GTAP simulations

Based on the Table 4, the GTAP model predicts changes in macroeconomic variables as a result of banning imports of CPO commodities from Indonesia and Malaysia (Simulation I) and imposing import tariffs that are twice as high for Indonesian and Malaysian palm oil commodities. The first simulation showed that Indonesia's trade balance experienced a negative impact as a result of the ban on exports of palm oil commodities to the European Union, based on the results of the Table 4, Indonesia's trade balance decreased by USD4,144.98 million. In addition to Indonesia, the negative impact also occurred in Malaysia on simulation I. Malaysia experienced a decline in the trade balance of USD4,797.11 million, this was greater than the decline experienced by Indonesia. This happened because Indonesia's main CPO trading partners other than the European Union were India and China, so that if the simulation I happened then the quota for exports of palm oil to the European Union would be transferred to other trading partners namely India and China. In contrast to Malaysia, where the main trading partners of palm oil commodities are the European Union, the policy to ban palm oil from entering the EU region will have a greater impact on Malaysia.

However, the Southeast Asian region had a positive impact on simulation I. The Southeast Asian region experienced an increase in the trade balance as much as USD962.17 million, which means that in general exports in Southeast Asian countries are greater than imports carried out when the ban on imports of palm oil commodities is imposed. Indonesia and Malaysia by the European Union.

Meanwhile, for the European Union, trade policy prohibition on importing palm oil commodities into its territory caused its trade balance to experience a

deficit of USD22,606.34 million. Imports of palm oil carried out by the European Union are used as raw material for making biofuels and are subsequently re-exported to other countries. However, when the raw material for biofuel is stopped to enter the EU region, it will hamper biofuel production, which will also have an impact on the EU trade balance. The Rest of the World has been positively impacted by the implementation of simulation I. In general, the Rest of the World has increased by USD30,320.52 million. Another change in macroeconomic variables in the simulation I is Real GDP. For Indonesia, the implementation of simulation I will have a real GDP decline of 7.66%, followed by Malaysia, which also experienced a decline in real GDP of 4.16%. In the Southeast Asia region, in general, there was a real GDP increase of 1.78%, but it was different from the European Union which experienced a real GDP reduction of 0.05% when the policy of importing Indonesian and Malaysian palm oil was imposed. The simulation results I also show that the Rest of the World has a real GDP decline of 0.29% as a result of the implementation of the policy in simulation I.

Other aspects seen are the Equivalent Variation (EV) used by the GTAP model as a measure of the profit or loss of a country's welfare. The EV variable in Indonesia has decreased by USD30,083.1 million, this indicates that the implementation of the policy on the simulation I has negatively impacted welfare in Indonesia, this is reflected in the considerable welfare loss. The lost welfare is possible in Indonesia because palm oil in Indonesia is the largest contributor to foreign exchange reaching USD17 billion and if palm oil exports are disrupted it will have a major impact on the welfare of the country. For Malaysia, lost welfare reached USD45,071.26 million. This welfare loss is greater than Indonesia, so it can be concluded if the prohibition on palm oil import is implemented, Malaysia suffers a considerable loss of welfare. For countries in Southeast Asia, from the simulation results I, it can be observed that welfare increased by USD1,328.21 million, the findings support and are in line with the findings of real GDP which also declined. Meanwhile, the European Union has seen an increase in welfare reaching USD39,388.00 million. Unlike Indonesia and Malaysia, the European Union's ban on palm oil imports has a positive impact on the welfare (EV) variable. From the results of the GTAP simulation I, it was found that the welfare of the European Union increased. The last region is the Rest of the World (ROW), which has increased welfare by USD32,495.97 million. That means that the imposition of import restrictions on Indonesian and Malaysian palm oil commodities by the European Union has made a positive contribution to the welfare of the whole world.

In simulation II, with the form of a policy of imposing import tariffs on Indonesian and Malaysian palm oil commodities by the European Union twice as high, it was found that Indonesia's trade balance had decreased by USD3.88 million while Malaysia had more decreases of USD45,071.26 million. The implementation of the policy on simulation II will have a greater impact on Malaysia because the trading partners of Malaysia's palm oil commodities are the European Union. Southeast Asia was also negatively affected by the implementation

of trade policies in simulation II, from the above results (Table 4) it is known that Southeast Asia experienced a decline in the trade balance of USD3.24 million. Meanwhile, for the European Union, the implementation of the import tariff policy on palm oil commodities will reduce the trade balance by as much as USD13.69 million.

However, different from the previous region, the Rest of the World (ROW) experienced an increase in the trade balance as a result of the implementation of simulation II. In the real GDP side of simulation II, Indonesia has a real GDP decline of 0.08%, indicating that Indonesia's real GDP has a negative impact if its palm oil commodities are subject to double import tariffs by the European Union. The unique finding in this study is that forwarding policy in simulation II has no impact on real GDP in the Southeast Asia region, the European Union, and the Rest of the World.

In terms of welfare loss, the simulation results II show that the policy of implementing an increase in import tariffs on palm oil commodities by the European Union has caused Indonesia to have the highest welfare loss (USD104.62 million), followed by Malaysia (USD90.90 million) and the European Union (USD24.27 million). But precisely Southeast Asia experienced a welfare gain of USD10.23 million and the Rest of the World amounting to USD93.84 million.

4.2. Sectoral Effect

The implementation of trade policies in simulations I and II besides having an impact on macroeconomic variables but also having an impact on the industrial production output sector originating from palm oil commodities. The GTAP results provide information that the implementation of the EU import ban on palm oil commodities (simulation I) will have an impact on other sectors in each region. The impact of these policies can be seen in the Table 5.

Table 5: Results of Simulation I on Industrial Output from Commodities CPO

Sectors	Region (%)					
	Indonesia	Malaysia	Southeast Asia	The European Union	Rest of the World	
CPO	4.93	3.89	0.013	-5.02		0.03
GrainsCrops	0.46	1.55	0.060	-0.59		0.02
MeatLstk	-1.50	-3.76	0.070	0.14		0.02
Extraction	2.21	3.83	-0.010	-1.17		-0.05
Procfood	-0.74	-6.81	0.090	0.08		0.04
TextWapp	9.34	2.19	0.070	0.54		0.03
PPP	0.25	-6.02	0.090	-0.04		0.02
LightMnfc	2.53	-0.87	-0.050	-0.07		-0.06
HeavyManfc	3.38	8.90	-0.030	-0.31		-0.05
Util'Cons	-1.10	-3.39	-0.100	0.43		0.13
TransComm	-0.28	0.49	0.160	0.01		0.03
OthServices	-3.21	-7.75	0.110	0.05		0.03

Source: Authors' results from GTAP simulations

In Indonesia, the implementation of simulation I, the most affected sector is

the palm oil industry sector itself where the output volume of this sector has increased by 4.93%. It can be interpreted that Indonesia manages palm oil crude itself. Similarly, Malaysia has experienced an increase in industrial output in the palm oil sector. Whereas for the European Union, the implementation of simulation I had a negative impact in the form of a decrease in CPO industrial output by 5.02%. For the Rest of the World, simulation I exhibits the most significant impact on the extraction sector.

Table 6: Results of Simulation II on Industrial Output from Commodities CPO

Sectors	Region (%)					
	Indonesia	Malaysia	Southeast Asia	The European Union	Rest of the World	
CPO	-1.96	-0.77	-0.11		1.63	0.03
GrainsCrops	-0.05	-0.23	-0.01		0.06	0.00
MeatLstk	0.03	0.23	0.00		-0.01	0.00
Extraction	0.05	0.01	0.00		-1.01	-0.90
Procfood	0.06	0.13	0.00		-0.01	0.00
TextWapp	0.20	0.15	0.00		-0.01	0.00
PPP	0.17	0.03	-0.01		0.00	0.00
LightMnfc	0.09	0.03	0.00		-0.01	0.00
HeavyManfc	0.17	0.08	0.00		-0.01	0.00
Util'Cons	-0.01	0.01	0.00		0.00	0.00
TransComm	0.01	0.01	0.00		0.00	0.00
OthServices	0.00	-0.01	0.00		0.00	0.00

Source: Authors' results from GTAP simulations

In the Table 6, it can be concluded that the implementation of simulation II in the form of imposing import tariff doubled makes the palm oil sector decreased by 1.96%, this is a significant decrease compared to other sectors. Meanwhile, the Malaysian CPO sector also experienced a significant decline compared to other sectors, a decrease in the industrial output of the palm oil sector by 0.77%. Similarly, countries in Southeast Asia experienced a decline in industrial output by 0.11%. But the European Union and the Rest of the World experienced increases in the CPO sector of 1.63% and 0.03% respectively. But the Rest of the World (ROW) region experienced a decline in the extraction sector by 0.9%.

5. Conclusion

The European Union's plan to implement a prohibition and barriers policy on imports of palm oil products originating from Indonesia and Malaysia will exert sizable impact in various regions. The findings of this study using CGE (Computable General Equilibrium) show that EU trade policies reflected through simulations I and II have an impact on several countries/regions especially for Indonesia, Malaysia, Southeast Asia, and the European Union.

In general, the trade policies planned by the European Union not only adversely affect exporting countries such as Indonesia and Malaysia but also for

the European Union itself. This is seen from the findings of some macroeconomic variables in the European Union such as the trade balance, real GDP, and equivalent variation (EV) both in simulation I and II.

This research creates several implications for improving academics and practitioners. For academics, this research contributes to the expansion of knowledge about the application of the CGE model to the trade policies that will be carried out by the European Union. For practitioners, this is a matter of consideration to see the impact before and after the implementation of the trade policy plan for prohibiting palm oil products. A number of macroeconomic and sector indicators in this study produced surprising findings from the simulations carried out. The governments of Indonesia and Malaysia can focus on the use of palm oil as raw material for domestic industries. This can be done to empower the produced palm oil and maintain its economic value.

There are limitations in this study, namely the use of a database referring to the world balance coefficient database in 2011. The latest balance coefficient is needed to obtain more precise results. This study using GTAP from Purdue University with the latest 2011 database. GTAP provides a computable general equilibrium model between sectors and countries as of 2011. So that is treated with updates in database parameters using the latest CGE parameters.

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