India's Tariff on CPO and CPO Price: Why Tariff Matters More than Price on Indonesia's CPO

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Declarations

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Abstract

Palm oil and its derivatives are one of Indonesia's prominent export commodities on the global market. India is one of the main biggest export destinations of Indonesia's CPO, thus every trade policy taken by India regarding CPO is important to Indonesia's trade balance. This study has found that tariff imposed by India on Indonesia's CPO has an elastic relationship compared to the CPO price. Moreover, this study found that changes in tariff are likely to significantly affect Indonesia's CPO export to India, compared to CPO price. Increase in price does not affect Indonesia's CPO export to India since it has inelastic relationship; as such the percentage of change in quantity does not exceed the change of price percentage.

Keywords: export tariff, crude palm oil, export commodity.

1. Introduction

The growing population and wealth have urged the demand for oils and fats worldwide. The consequence was indicated as a significant increase in global consumption of oils and fat (Santika et al. 2019). Palm oil is one of several commodities that has been traded globally and contributed around 34% of vegetable oil production worldwide. Soybean oil is known as palm oil's biggest competitor, which contributed around 29% (United States Department of Agriculture 2017) – followed by Rapeseed oil and Sunflower oil. The benefits of this oil are effectively interchangeable for edible downstream products such as snacks,

sweets, margarine, baked goods, cereals, etc. as well as non-edible products such as detergents, soap, cosmetics, and biofuel (Corley 2009; Wilman 2019).

The increasing global demand for palm oil utilisation in energy, food, cosmetics, and other industrial processes impacts to the escalation of palm oil production demand (Purnomo et al. 2020). The implication of palm oil demand was reflected in the rise of its global production from 14 million tonnes in 1993 to 71 million tonnes in 2018 (Faostat 2020). Over the last two decades, the area palm oil plantations has significantly escalated globally from 6 to 18 million hectares. It has an account of around 0.4% of the permanent cropland worldwide (Santika et al. 2019). Palm oil trees can be cultivated on areas of former humid tropical forests, and it can also grow on burned and drained peatlands. Before 2000, palm oil plantations were mostly developed either on barren land, burnt-over areas, or on existing farmland. However, the conversion from forest to plantation areas becomes a common practice nowadays due to scarcity of non-forest land for agriculture purposes. The conversion practice from forests to plantations can be a potential hazard for biodiversity and the escalation of greenhouse gas emissions (Mukherjee and Sovacool 2014; Potter 2015; Santika et al. 2019).

Therefore, palm oil has a huge contribution to both economic development and environmental degradation. It has become an exceptionally debated topic among researchers. Indonesia and Malaysia are the world's top exporters of palm oil, which provide approximately 56% and 35% of all palm oil exports (United States Department of Agriculture 2017). Meanwhile, India, the European Union (EU) and China are the top three importers of palm oil, with 20%, 15% and 10% of palm oil imports, respectively. The oil palm industry has been proven to be one of the most important industries for both Malaysia and Indonesia.

Palm oil contributes significantly to national development in Indonesia. The growth of palm oil industry has increased rapidly, with the plantation expansion from 1990 to 2005

recorded at more than 12% annually. As of 2010, the total palm oil plantation in Indonesia was around 7.82 million hectares. Most of the oil palm plantations (more than 60%) were located in Sumatera, Kalimantan, and Sulawesi. The major privately-owned palm oil producers in Indonesia are PT. Astra Agro Lestari TBK, PT. Perusahaan Perkebunan London Sumatra Indonesia TBK, PT. Sinar Mas Agro Resources and Technology TBK, and PT. Bakrie Sumatera Plantation TBK (Hashim et al. 2012).

The export value of palm oil exceeded USD 23 billion in 2017, and it was recorded to contribute to 17% of Indonesia's agricultural gross domestic product in 2014 (Tim Riset PASPI 2018). Due to the importance of palm oil commodities, government of Indonesia has established several targets in regards to the production and productivity of palm oil commodities. In the early 2010s, palm oil production has targeted to reach 40 million tons of crude palm oil by 2020. As for productivity, the target is termed as 'Vision 35:26'. With the 'Vision 35:26' means the government encourages palm plantation to generate 35 tons per hectare (ha) of fresh fruit bunches (FFBs) from palm trees with a 26% oil extraction rate. However, the target is unlikely achieveable without expanding the palm plantation area. Thus, the government proposed several incentives to meet the targets such as providing support to the private sector in terms of accessing and expanding their plantations. The palm oil plantations expansion aimed to boost Indonesia's economic growth for over 5% in 2017–2018 (MoA 2013; MoA 2016). The distribution of palm oil plantation and production are shown in Figure 1.

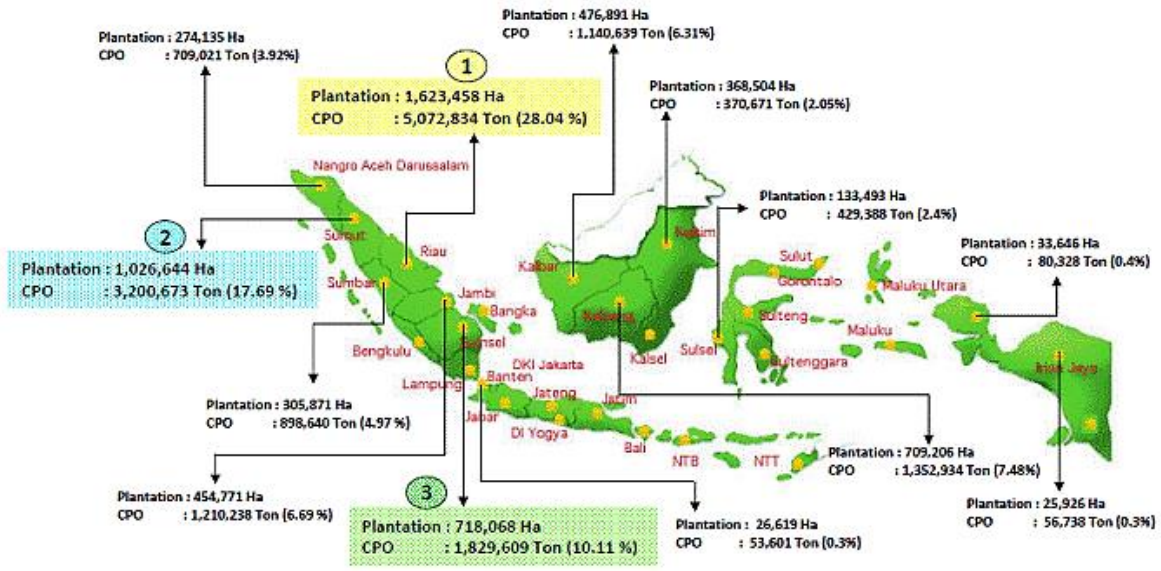

Figure 1. Distribution of Palm Oil Plantation and Production in Indonesia (InfoSawit 2020)

Tariffs are defined as customs duties which collected from the imported goods on a specific basis (fixed charge per unit of import, such as a kilogram/pounds, gallon, tons, or others) or on *ad valorem* basis (fixed percentage of the value from the imported goods) (Suranovic 2010).

Most theoretical analyses of trade policy are carried out in terms of tariffs as duties collected on import activities due to: (i) tariff is a single device applied worldwide to control trade flows, (ii) tariff is the only measurement of trade regulation permitted by General Agreement on Tariffs and Trade (GATT) - in exception of special circumstances, (iii) tariff is determined by the price mechanism which reflects the modern economic theory (Robertson 1972).

During the first decade after 1945, quota restrictions and exchange controls were respected as the main barriers that operated by the countries in Western Europe. Meanwhile, tariffs were not considered as the most important barrier to international trade. Tariff was designed as a punishment for foreign producers and domestic consumers of the taxed commodity. It was created to support domestic producers and the government. The burden of

a tariff will raise the domestic price of the taxed commodity and induce a reduction in the demand of the imported commodity. Thus, the intention of a tariff was to promote domestic output of the protected goods as well as to reduce domestic consumption using higher prices mechanism.

According to Greenaway (1983), tariffs were divided into import tariff and export tariff. Export tariff tends to be collected for revenue purposes, while import tariff tends to be collected for protective purposes – export tariffs commonly applied in less developed countries (LDCs) than developed market economies (DMEs). Tariffs can be seen as a source to gain revenue as well, and this instrument is widely implemented in both LDCs and DMEs (Greenaway, 1983). While the imposed tariff may not affect the trade of the small open economy, the large open economy is a different story. Therefore, the tariff-imposing countries enjoy some control elements of market power. However, unrestricted trade emerges to be consistent with the higher level of economic welfare compared to the restricted trade, unless the countries can apply an optimum tariff to prevent such unfavorable situation. In case of a tariff increase, it can influence consumer behavior due to the change in the final price of the imported good and its substitute (Greenaway 1983). This is consistent with the Partial Equilibrium Effect theory, as shown in Figure 2.

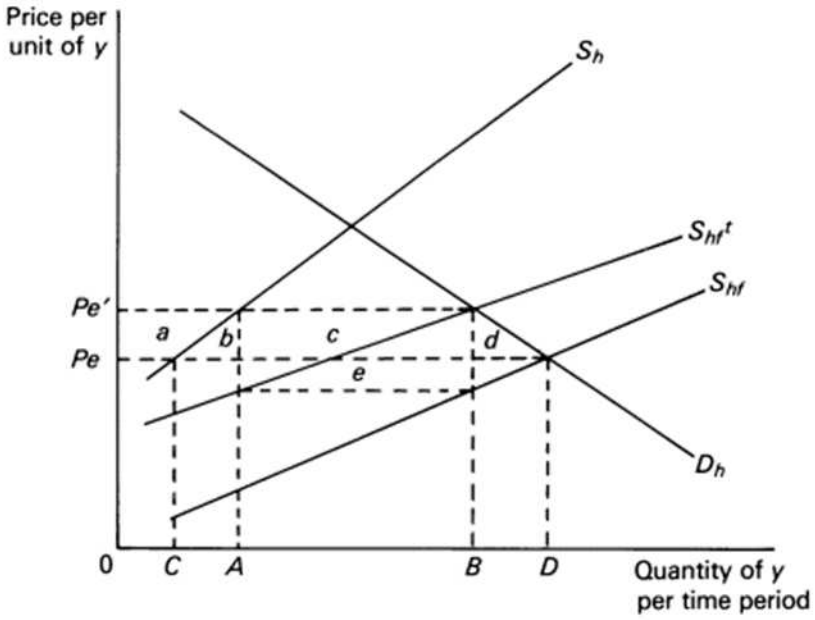

Figure 2. Partial Equilibrium Effect of a Tariff in a Country (Greenaway 1983)

Notes:

y : a substitute for imported commodity

D_h: country's demand for commodity y

S_h : country's supply of commodity y

S_{hf} : total market supply (domestic supply + imports)

S_{hf}^t: supply of a tariff-distorted market

Pe : the domestic market price of y without tariff burden

Pe' : the domestic market price of y with a nominal tariff rate of t on all imported y

Figure 2 outlined a partial equilibrium effect in the case of a large country. S_{hf} stands below S_h considering the pre-trade factor endowment, foreign producers produced commodity y at lower unit costs compared to domestic producers. OB is the market-clearing quantity of y, OA is supplied by domestic producers, and AB was imported, while OD is the expansion of demand when the tariff is removed. In the new equilibrium, domestic producers provide OC rather than OA, which means that they supplied a smaller and lesser fragment of

the market . When tariff liberalization is introduced, the import penetration rises from AB/OB to CD/OD. These changes encourage rise to a number of effects, namely (Greenaway 1983): Static effects (production, consumption, revenue, balance-of-payment, terms-of-trade) and Dynamic effects (economies of scale and efficiency).

Static effects include:

a. Production effect takes place when fewer units are supplied by inefficient domestic producers; thus, there is no misallocation loss of the resource-related aspect with the tariff (the triangular area b).
b. Consumption effect happens when the existing costumers purchase commodity *y* at a lower price, therefore generating a net gain in customer surplus (the triangular area d).
c. Revenue effect develops when there is tariff liberalisation as indicated in vanished e + c in Figure 2 . However, if the revenue from a tariff disappears and government expenditure has to be supported, the country will allow revenue from alternative sources such as increases in expenditure taxes, income tax, etc.
d. The balance-of-payments effect has been considered as an implicit barter model that has no meaning and tends to be ignored. However, unilateral trade liberalisation may generate a tendency towards payments deficit when trade flows are balanced by opposite monetary flows. This deficit has to be corrected by allowing some regulations (e.g. devaluation or deflation).
e. The terms-of-trade effect occurs when there is unilateral tariff liberalisation to generate an unfavorable change in the international terms of trade and followed by a fall in real income. It is represented by area of c in Figure 2, and such losses may have to be compensated by positive gains from production and consumption effects.

Dynamic effects include:

a. Economy of scale is considered to be consistently increased with opportunities due to trade liberalisation and larger production that aim to reduce the unit cost of *y*. However, it is often argued that when such reductions are introduced towards the consumers, there would be parallel gains from production and consumption effects as price drops below Pe.

b. The efficiency is obtained as a result of an expanded market and increase competition, which in turn leads to a rise in efficiency. Further, it causes falls in unit costs of *y* and/or better quality products.

Several researchers had studied the impact of tariff changes on various commodities. Wilman (2019) found that deforestation tariff levied unilaterally by an importer induces leakage on market redirection to non-tariffed markets. It was also reported that an output subsidy can be an option to lower potential leakage from tariffed to non-tariffed markets. However, it may not work effectively in case of reducing unsustainable production when the transaction costs become a barrier for unsustainable producers to switch into sustainable producers. When the transaction costs can be subtracted sufficiently, the output subsidy will be more effective. Thus, it will encourage exports to enter the tariffed market with lower transaction costs. Combining a tariff scheme with some programs that aim to lower the transaction costs (for example, an output subsidy), can be a more effective approach in preventing market redirection leakage.

Badri and Khorana (2014) showed that tariff escalation on cotton and coffee had developed mixed effects on export shares, depending on the initial economic structure. Tariff escalation may not reduce export shares due to its dependence on various other factors, including the structure and composition of international trade flows, as well as tariff discrepancies across sectors and countries. However, it can be concluded that within a global level, the dismissal of tariff escalation generates a higher average on export shares globally.

Elsheikh et al. (2015), revealed that amendments of import tariff on wheat commodity create vast interlinkages among all sectors of the economy in Sudan. Lifting wheat's import tariff generates a negative impact on the economy. Further, the reduction of the wheat tariff has consequences on its imports, accompanied by a decrease in imports on other agricultural commodities and industrial and services sectors. An increase in wheat imports is found to decrease the domestic price and reduce the resources required in its production. The overall effect of a rise in wheat's import tariff is a reduction in wheat imports thus encourages the production for self-sufficiency of wheat in Sudan, along with a negative impact on GDP.

Kim (2014) explored the effects of import-price shocks on labor, output, and total factor productivity (TFP) for a small open economy during the Korean crisis on 1997–1998. The simulated results showed that a significant increase in import price generated significant shrinkage in labor and output. A sizable drop in TFP was noticeable as well. This issue could be due to an anticipation measure from an increase in import price by utilising a substitution of imported goods with domestic intermediate goods. Moreover, this import substitution turned to result in negative effects on measured output (labor and productivity).

Javorcik and Narciso (2008) used product-level data on export activities from Germany to ten Eastern European countries. It was to prove that the trade gap, which defined as a positive discrepancy between the exports values reported by Germany and the imports values from Germany reported by an Eastern European importer, is positively correlated with the tariff level in 8 out of 10 countries.

Based on the above studies, specific research on CPO tariff changes toward the price and export activities is still limited. Hence, this research aims to explore whether tariff imposed by India on Indonesia's CPO has a relationship with Indonesia's CPO price and export activities.

This study analysed whether the tariff has more significant impact on Indonesia's CPO export volume compared to the CPO price itself. Time series data were utilised to measure the price and tariff elasticity to the Indonesia's CPO export volume. A modified microeconomic approach (elasticity model) were used to analyse the significance of India's tariff change is to the volume of exports. The related data used in this study was a monthly data, started from 2015 until January 2020. The tariff data gathered from WTO was yearly data. Hence, the tariff data were interpolated into a monthly data. Since tariff is relatively static and has a proportional number (percentage, not changed frequently and generally imposed on commodity groups), the interpolation is not followed by any data loss.

Figure 3 discusses about the elasticity and the impact of tariff and price changes on the export volume.

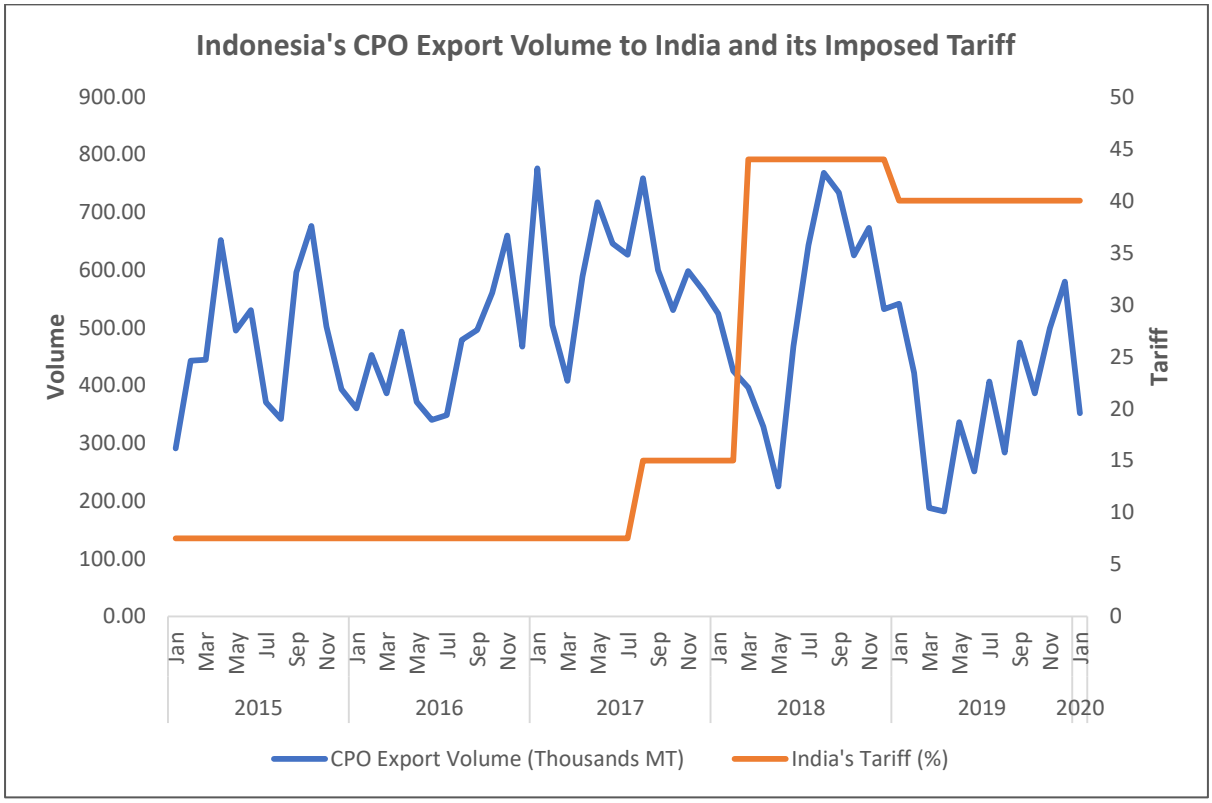

Figure 3. Export volume and tariff (BPS and WTO)

After the export volume and the tariff data were included within the same graph, it was shown that the tariff (orange line) does change frequently, as such the result is in stair-like shape on the graph. The unchanged value within similar time range will result in 0 elasticity value. To address this issue, the timeline was then grouped into yearly timeframe in order to catch any significant change in the variable. This method also converted the monthly export volume into yearly value which the sum function was used.

In contrast, the price and the export volume data change more frequently therefore resulting in a more detailed timeframe. Monthly timeframe was used on price to export volume elasticity, where no specific treatment was needed in this case. The detailed graph of monthly CPO exports from 2015 to January 2020 and the CPO price is shown in Figure 4.

Figure 4. Export volume and CPO Price (BPS, Bloomberg)

2. Materials and Methods

This study examines the iimpact of tariff changes held by India's trade authority on Indonesia's CPO. To understand the magnitude of the tariff's impact to the number of CPO exports, elasticity analysis approach was utilised to determine changes in CPO exports following changes in the tariff. To deepen the analysis, this study also examined the CPO price elasticity relative to Indonesia's CPO export. To avoid biases, exports of CPO were measured through its volume. However, the value measurements (of elasticity) were included when the price change is insignificant. This study examined how the change in tariff might affect CPO exported by Indonesia to India and compare the dominant factor of the change in Indonesia's CPO; partner's tariff or CPO price itself.

2.1 Indonesia to India's CPO Export Data

The data used in this study are: (i) quantity of Indonesia's CPO export to India, (ii) the value of Indonesia's CPO export to India, (iii) world's CPO price, (iv) India's Tariff on Indonesia's CPO. The data stated on point (i) to (iii) are in monthly timeframe, ranging from January 2015 to January 2020. The data of India's tariff on CPO is stated in monthly timeframe (derived from yearly timeframe), since the tariff change did not occur frequently. Hence, the elasticity analysis carried out in this study is a point within the timeline. All changes on variables used in this study are stated on %MtM (month to month) change. In this study, CPO is defined as vegetable oil commodities with HS code of 1511.

2.2 Elasticity of India's Tariff on Indonesia's CPO Exports (*dQ/dT*)

To examine the elasticity of India's tariff changes on CPO exports, this study used elasticity analysis derived from demand elasticity on microeconomic analysis. The elasticity model is stated as follows:

$$\varepsilon_T = \frac{\Delta Q}{\Delta T} \times \frac{T_1}{Q_1}$$

Elasticity of tariff measures the impact to CPO exports quantity when the tariff is changed by 1. The elasticity itself is measured by changes occurred on quantity to the tariff relative to tariff-to-quantity ratio.

$$\varepsilon_T = \frac{(Q_t^{CPO} - Q_{t-1}^{CPO})}{(T_t^{CPO} - T_{t-1}^{CPO})} \times \frac{T_t^{CPO}}{Q_t^{CPO}}$$

The change in quantity was measured by volume of CPO exported on *t* period substracted by CPO exported on *t-1* period. The change of tariff (in percentage) was measured as the gap between CPO tariff on *t* and *t-1* period. In other words, the elasticity of tariff on CPO exports can be stated as follows:

$$\varepsilon_T = \frac{\%\Delta Q_{CPO}}{\%\Delta T_{CPO}}$$

To simplify the calculations, the elasticity of tariff to the CPO was measured by the ratio of percentage changes on CPO's quantity to the percentage changes on India's tariff on CPO.

2.3 Elasticity of CPO Price on Indonesia's CPO Exports (*dQ/dP*)

To undertake in-depth analysis, the elasticity of CPO price changes on its export volumes was examined in order to understand whether price factor has a dominant effect on Indonesia's CPO export raise. The elasticity model is stated as follows.

$$\varepsilon_T = \frac{\Delta Q}{\Delta P} \times \frac{P_1}{Q_1}$$

Elasticity of price is utilised to measure how CPO exports quantity (from Indonesia to India) is affected when the CPO price is changed by 1. The elasticity itself is measured by change on quantity with regards to its price, relative to price-to-quantity ratio.

$$\varepsilon_T = \frac{(Q_t^{CPO} - Q_{t-1}^{CPO})}{(P_t^{CPO} - P_{t-1}^{CPO})} \times \frac{P_t^{CPO}}{Q_t^{CPO}}$$

The change of quantity is measured by volume of CPO exported on *t* period minus CPO exported on *t-1* period. The change of price (in USD/MT) is measured by the gap between CPO price on *t* and *t-1* period. In other words, the elasticity of tariff on CPO exports can be stated as follows.

$$\varepsilon_T = \frac{\%\Delta Q_{CPO}}{\%\Delta P_{CPO}}$$

In this study, elasticity of price to the Indonesia's export CPO to India is measured by the ratio of percentage changes on CPO's export quantity to the percentage changes on CPO's world price.

3. Result and Discussion

Following data processing, the results of elasticity calculations is shown on the Table 1.

Table 1. Calculation Results (BPS, WTO and Bloomberg)

I	II	III	IV	V	VI	VII	VIII	IX
Year	**Volume (Thousands MT)**	**Tariff (%)[1]**	**Average CPO Price (USD/MT)[2]**	**Volume Change (%)**	**Average Tariff Change (%)[3]**	**Average Price Change (%)[4]**		
2015	5,401	7.5	679.52	7.69	-1.99	-1.43	-5.37	-3.87
2016	7,210	7.5	768.88	3.51	2.83	2.63	1.33	1.24
2017	6,073	15	692.08	5.08	6.61	-1.43	-3.56	0.77
2018	5,177	44	572.00	4.24	8.40	-1.92	-2.21	0.51
2019	2,782	40	689.93	8.88	1.71	3.27	2.71	5.20
Average	5,329	22.8	680.5	1.26	0.82	1.04	**-0.43**	**2.16**

Notes:

[1]Oficial tariff announced on WTO.

[2]Yearly average world price of CPO commodity in year *t*.

[3]Calculated as the yearly average of average tariff imposed per metric tons on CPO (HS 1511)

[4]Yearly average world price change of CPO.

[5]Elasticity of CPO Price on Indonesia's CPO Export Volume to India (column VII / column V)

[6]Elasticity of India's CPO Tariff on Indonesia's CPO Export Volume to India (column VI / column V)

Based on calculation methods explained on previou section, positive and negative values on elasticity only indicate negative or positive changes on CPO price or tariff. Refer to notes in Appendix 1 for detailed calculations.

Table 1 shows the elasticity of CPO prices with an average export volume of -0.43, while the elasticity between tariffs and CPO exports is 2.16. According to the results above, tariff of CPO imports from Indonesia being imposed by Indian trade authority is relatively elastic to the Indonesia's CPO export, since it has higher elasticity (| | > 1) compared to the price (| | < 1) regardless the positive or negative signs. The positive signs indicates that positive changes on determinant will be followed by positive change on the export volume (and vice versa).

Negative value of average elasticity between the price and export volume indicates that the price and quantity of India's demand on Indonesia's CPO has negative relationship (in compliance with supply-demand law, wherein demand price has reversed impact on demand quantity). The price elasticity, as stated above on the table, is also inelastic (| | < 1) meaning that the raise in price by 1 USD/MT will followed by the decrease on quantities by less than 1

thousand MT. On the other words, the price change of palm oil price will not reduce Indonesia's export quantity of CPO to India significantly.

Countries that have a comparative advantage in natural resources in their regions are specialised in economic activities in the production of export goods, while regions that cannot meet domestic demand for goods need to import (Murshed 2019). India cannot meet the needs of vegetable oil, therefore the country imports CPO from Indonesia which has comparative advantages. Import and export activities affect the trade relations between the two parties, where the relationship will affect the volume, prices and policies of each country.

The production of goods for export has to attend several things, one of which is the quality of the goods. Quality playes a role in trade as a determinant of import decisions from other countries. Import decisions are also limited by price effects. Price elasticity of import demand comes from product differentiation. The strength of country-level market products is derived from the elasticity of import demand, and the elasticity of export supply (Lake and Linask 2016). Low elasticity occurs due to trade equations, therefore elasticity will be higher if the quality of production is more maintained (Shilva and Hidalgo 2020).

Export volumes are also affected by marginal production costs. Lower marginal production costs lead to lower exports. Higher export prices and quantities may occur, especially when exporters face a negative slope of the demand curve or marginal income (Dinopoulos, Kalyvitis, and Katsimi 2020). For developing countries, the most important factor that plays a role in determining imports is the price associated with the affordability of the country's economy (Shilva and Hidalgo 2020). Price elasticity plays a role in evaluating policy, used as a tool for understanding the impact of changes in tariffs for circulation and as a policy study.

The rise and fall in CPO prices are influenced by the quality and average world prices. The average global CPO price always fluctuates, depending on the amount of CPO

353 production from each country. Crude oil exports are the main factor affecting oil prices in
354 other countries (Bakirtas 2020). If the amount of CPO rises without an increase in demand,
355 there will be a surplus of world CPO and CPO prices will likely decline. Higher product
356 quality can increase demand (Dinopoulos et al. 2020) and should be accompanied by an
357 increase in the country's needs. Exports are affected by short-term fluctuations in relative
358 prices internationally (Raissi 2017). The level of imports in India is not affected by price
359 changes. India considers the quality of CPO to make import decisions, on the condition that
360 price changes are still in the country's ability to pay.

361 The tariff relationship to the export volume is elastic (in average), meaning that the
362 percentage of change in volume exported to India will be higher than percentage of change in
363 tariff imposed by India's trade authority. This finding is supported by the data visualisation
364 between the tariff and export volume. The change in volume tends to be significantly
365 changed with a lag of 2-3 months.

366 Trade restrictions can be carried out by setting import or export tariffs, it can also
367 limit quotas. Tariff is an import duty charged on imported goods. Specific situations where
368 tariffs do not apply to all countries are due to alternative trade agreements (Chae et al. 2019).
369 Tariffs are pro-cycle driven by the behaviour of developing countries' tariff setting; tariffs are
370 acyclical in developed countries. Pro-cycle follows the economic cycle (Lake and Linask
371 2016). Import and export tariffs are imposed through tax increase, as such the regulation is
372 carried out by customs and has a more complex nature. Trade restrictions can dissolve buyer-
373 supplier relations (Chae et al. 2019). Determination of the imposed tariff will affect several
374 aspects of trade. It explicitly affects prices, however for NTB case, general have an impact on
375 import volumes (Soon 2020). Import tariffs are an obstacle for trading (Elsheikh et al. 2015).

376 Likewise, the reduction or dismissal of a tariff has effects on production (results in a
377 decline from the tariff-levying country) and on consumption (the lower prices commodity is

more likely to be consumed) (Robertson 1972). At the tactical level, tariffs are likely to boost firms' sourcing costs and overall supply governance costs (including all costs related to supplier identification, development, switching, and management). Meanwhile, at the strategic level, tariffs could sway the firms' supply bases on its structure and complexity (Chae et al. 2019).

However, a tariff change has its own costs. For example, when a country mitigates oil supply disruption by implementing import tariffs, tariffs will raise the domestic oil price and generate negative effect on social welfare or consumer surplus. It can be concluded that the supposed optimal level of import tariff implemented by a country should balance the trade-off. The trade-off is between the benefits of preventing economic losses due to oil supply disruption and the loss of decreasing social welfare as the effect of higher domestic oil prices (Zhang 2018).

The import tariff works similar to the emissions tax encountered by exporters. Exporters with lower transaction costs are likely to reduce their tariffs by sustainable production, while exporters with high transaction costs are likely to settle a full tariff. The tariff must include the trade-off into account since its advantage at closing the competitiveness channel may lose to its costs in creating the channel of market redirection. In the case of palm oil, the trade-off between channels relies on: (i) the price sensitivity on supply by unsustainable and unsustainable producers, and (ii) the price sensitivity on demand for palm oil by the non-tariffed importer (Böhringer et al. 2018).

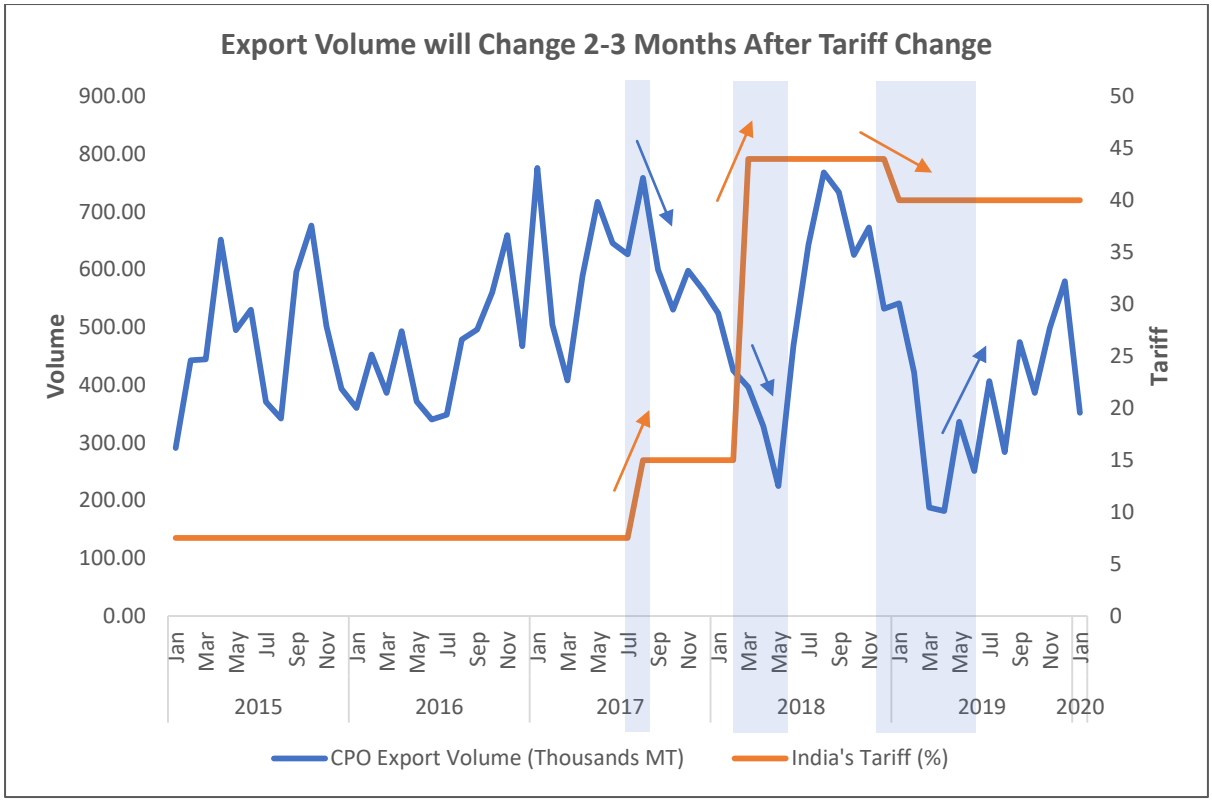

Figure 5. Lag of Export Volume Change Caused by Tariff Change (BPS, WHO)

In Figure 5, from 2015 to early 2020, India has experienced a change (increase/decrease) in import tariffs for 3 times. Tariff changes occurred in 2017 in July-August and 2018 in February-March as well as the changes in December 2018-June 2019. Every country does not necessarily be able to change import tariffs easily because there are regulations on governing import tariffs due to globalisation that supports international trade. Tariff changes are marked by the severity, uncertainty of the interval period and geographical coverage (Chae et al. 2019). The severity is related to what percentage change (increase / decrease) is applied. The uncertainty of the tariff interval period is related to the tariff start and end timing, the duration the tariff will be applied, and whether the tariff can be changed through subsequent negotiations or permanent. The geographical coverage of a country will affect the amount of tariffs from that country whether the import tarrif between one country and another is the same or different. If tariff raise is only applied to one or several countries,

then it is possible that importers will identify alternative exporters to possibly switch to other exporters. Changes in tariffs will have an impact on increasing or decreasing imported goods, affecting the prices of domestic goods, GDP revenues, changes in the trade balance, investment and changes in private consumption (Elsheikh et al. 2015). Tariff changes do not hold any correlation to industry characteristics such as stocks, concentration, employment, wages, productivity and others (Bown and Tovar 2011).

The change in import tariffs imposed by India has several purposes. The main objective is to protect the domestic production sector. Limiting imported goods can help to staibilise the price of domestic goods because the amount of imported goods does not experience excess hence public consumption will shift to domestic goods. In additionit becomes one of the sources of state revenue derived from the tax sector, together with the import tariff,. Changes in import tariffs will affect the amount of income earned by the country. An increase in import tariffs will provide an increase in sources of state income and vice versa. A decrease in import tariffs provide a decrease in sources of state revenue from the tax sector.

India has experienced an energy deficit due power plants that were used required fuel in the form of coal (Raissi 2017). Energy deficit due to coal depletion compelled the Indian government to look for other type of fuels that are still available (alternative energy). To maintain energy security in India, one alternative other than coal is to use CPO. India has its own palm oil industry, however its production is still unable to meet the needs of the country. Therefore, along with its own production, India also imports from Indonesia and Malaysia hence the country's CPO needs are met. Energy security in India can be achieved by increasing oil reserves and through import tariff instruments (Zhang et al. 2018). In order not to depend too much on imported goods, India began to increase CPO production for the domestic industry. Maximising production is carried out at the same time as providing

protection and support to local industries. Energy supply is obtained through imports with regard to prices that are still at a reasonable level.

in 2018 the Government of India increased the import tariffs, especially to Indonesia. The imposed tariff rises was relatively high, with an increase of 30% (Figure 5). Increase in import tariffs to Indonesia resulted in changes in the volume of Indonesia's CPO exports to India. Indonesia's exports then declined sharply due to rising tariffs. Exports do not only depend on external demand but also on the level of price competitiveness (Raissi and Tulin 2017). The decline in Indonesia's CPO exports to India was also influenced by differences in tariff prices imposed on Malaysia. Malaysia and Indonesia are located in one region, however the geographical scope of India's imposed import tariffs is different between the two countries (Chae et al. 2019). Malaysia and Indonesia are the biggest CPO importer countries in the world, even in India. The higher import tariffs given to Indonesia impacts to higher prices for CPO originating from Indonesia. The price of CPO originating from Indonesia cannot compete with the price of CPO originating from Malaysia due to higher price, causing a decrease in CPO demand. The setting of high tariffs has a potential to reduce the supply of imports, impacting the price of domestic products that have higher prices and therefore reduces social welfare (Zhang et al. 2018). An increase in import tariffs will affect the selling price of the goods in the country that imports the goods, hence a significant difference in prices with other products is anticipated and may cause the number of imported goods to decrease as people switch to consuming cheaper domestic goods. Increased import tariffs, which aimed at reducing imported goods, is for India to encourage CPO production in India to become self-sufficient (Elsheikh et al. 2015). The increase will impact in the reduction of the quantity of imported goods hance the amount of available goods fails meet the country's needs for these goods. To cover the shortage of the required amount of goods, the country encourages self-sufficiency, hence the needs of the goods can be met. The increase in tariffs

is indeed to protect India, however this policy can affect global supply chains, and will affect import costs and production costs (Chae et al. 2019). However, based on our data analysis, the tariff policy imposed by India on Indonesia is elastic in volume, yet inelastic in price. Increase in import tariffs gives its own concern to importers (India), in which India is concerned of the availability of domestic commodities that are improportional to the needs, hence the country becomes lacking in CPO energy.

India's increased tariffs to Indonesia is actually aimed to reduce the volume of imports. However, based on the results of the analysis, the increase in tariffs does not affect the volume of CPO imports from Indonesia. The reason for the import volume in India is not affected by the increase in tariffs is because India is still dependent on CPO from Indonesia. India is experiencing energy shortages in the ability of coal and natural gas to constrain industry recovery (Raissi and Tulin 2017). The imposition of high import tariffs or policy restrictions on quota restrictions can cause energy insecurity to occur (Zhang 2014).

Changes in import tariffs can also be influenced by liberalisation of shifting cultivation (TL). Liberalisation is an agreement made by bilateral or multi-regional countries for tariff reduction (Baldawin 2009). This policy is carried out to support free trade. The purpose of this policy is to utilise authority in cutting tariffs as such trade traffic becomes smoother. According to (Saggi et al. 2018), TL aims to eliminate trade restrictions between treaty member countries. TL policy also has an impact on the formation of human resources (Li et al. 2019), both in terms of cognitive, non-cognitive and social aspects. Trade liberalisation sets a maximum tariff to be applied to all members. TL provides special benefits for its members, however this policy can reduce non-member incentives (Saggi et al. 2018). Low rates are only available to members and not available to non-members. TL policies only improve environmental welfare if the related costs can be internalised (Murshed 2019). Low tariff reductions are implemented to preferential products to maintain preference

489 margins (Ketterer et al. 2015) and to preserve or prolong partner countries. The impact of
490 trade liberalisation on other countries is fundamental microeconomic changes (poverty,
491 productivity growth, labor demand, and product changes) (Bown and Tovar 2011).

492 One of the agreements included in trade liberalisation is the General Agreement on
493 Tariffs and Trade (GATT), in which import policy must not provide protection to domestic
494 producers without regard to other countries. For this reason, the country cannot determine
495 tariffs or amend tariffs at its own will. The application of TL in terms of removing import and
496 export tariffs is suitable for the application of trade, especially in the biofuel energy trade.
497 The establishment of this TL is similar to increasing open trade. Tariff reduction due to TL
498 can increase the use of renewable energy, one of which is CPO. Energy that contributes little
499 to produce pollution, hence considered to be more environmentally friendly (Mahidin 2020).
500 The use of fossil energy is a threat to the world due to the destruction of nature, hence its
501 availability is now running low and unable to meet future needs. Alternative energy that can
502 be used to replace the use of fossil energy is in the form of processed CPO which is
503 renewable and environmentally friendly energy. The existence of TL supports the openness
504 of trade, which will facilitate the transfer of renewable energy in developing countries
505 (Murshed 2019). This is one of the strategies to increase renewable energy consumption in
506 developing countries. To optimise the flow of renewable energy, barriers of export and
507 import must be removed using the TL policy system. In the short term, the benefits of TL
508 policies cannot be felt, hence these policies must be carried out in the long term to feel the
509 benefits. According to Omri and Nguyen (2014), a 1% increase in trade openness can
510 increase renewable energy consumption by 7.5%, which translates to a decrease in CO2
511 emissions by 0.2%, where this gas is one of the contributors to GHG that causes an increase
512 in the earth's surface temperature (Uusitalo 2014). TL decisions can be used to promote the
513 trading of renewable energy sources which will later have an impact on increase in

consumptionand market share, as well as the efficiency of their use (Murshed 2019). India needs to align TL policies in the country's development strategy by considering more renewable energy for national energy and playing an important role for Sustainable Development Goals (SDGs). An increase in Indonesia's CPO exports means an increase in the openness of international trade between Indonesia and India. Increased trade in renewable energy does not mean limiting the greenhouse effect (Murshed 2019), because it needs public understanding of the use of fossil fuels.

The elasticity between trade openness and renewable energy is less elastic (Murshed 2019). The effectiveness of TL policies in regards to the transition to renewable energy is also determined by the presence of unrenewable energy. Bioenergy availability and more affordable prices than fossil fuels can increase elasticity. Humans have been dependent on fossil resources for a long time as primary resources, hence time is required to replace them with renewable resources. There is a need for encouragement from countries that have used renewable energyin order for developing countries to gain a greater interest in using renewable energy rather than using fossil energy.

India began to recognise trade liberalism from 1991/1992, before that India used to set limits on imported goods using large tariffs. India joined the WTO in 1997, therefore import tariffs was adjusted to WTO tariffs (Bown and Tovar 2011). In 2009, the Regional Comprehensive Economic Partnership (RCEP) was binding for the implementation of the same tariff by India for CPO from Indonesia and Malaysia (Andri 2019). Import tariffs imposed on Indonesia were reduced. Figure 5 shows tariff reduction provides an opportunity for Indonesia to increase CPO exports again. Tariff reduction can increase imported goods, which result in a reduction in the price of domestic goods because more goods are available on the domestic market (Elsheikh et al. 2015). The reduction in import tariffs will affect the selling price of the goods in the country that imports the goods Imported goods will have a

lower price compared to the prices of domestic goods hence public consumption will be more inclined to imported goods and will increase the number of imported goods. In addition to reducing the import tariffs of India as an opportunity to increase exports for Indonesia, there are also employment opportunities in the plantation sector or CPO industry in Indonesia (Cheong 2016). Tariff reduction will increase the imports demand from developing countries and increase exports for supplying countries. This increase in demand will result in an increase in the amount of goods that have to be produced and can correlated with the needs of the number of workers to provide jobs in the plantation or industrial sector. Tariff reduction creates better free trade opportunities, however sacrifices the welfare of domestic farmers due to low prices (Elsheikh et al. 2015; Defever et al. 2020). Tariff reduction will increase demand for goods hence free trade is better, but on the other hand, the price of goods will be lower and will have an impact on the income of farmers and workers that ultimately decrease their welfare. TL policies in the form of reducing import tariffs can encourage exchanges to promote the diffusion of renewable natural resources (Murshed 2019). Reducing import tariffs will facilitate trade between countries, as such the possibility of imported goods entering India will increase. Easier trade between countries will help countries that have used renewable energy to encourage countries that still use fossil energy to switch to using more profitable renewable energy. The reduced import tariffs were apparently replaced by new policies. India has begun to use anti-dumping and safeguards policies to limit imports (Bown and Tovar 2011).

The reduction in import tariffs by India does not only affect the export-import trade, but affect the human resources in Indonesia. Similar to China, where China got a cut in import tariffs from other WTO members after joining as WTO member. This tariff reduction has an impact on the increase in Chinese exports. Oil palm cultivation and CPO industry are labor-intensive industries, therefore an increase in exports will require more labor. Increasing

needs of workers will provide more jobs for the community. The effect is the high dropout rate of young people who want to work (Li et al. 2019). This is because labor-intensive industries only require workers with low levels of education and skills. The impact is caused by the low cognitive abilities, considering low levels of education will result in low income. Workers are also affected by non-cognitive effects, such as decreased satisfaction and mental weakness (prone to stress). Overall, human resources have low competitiveness and quality.

The reduction in tariffs assigned to Indonesia should not be perceived from the benefits of expansion, but also needs to reviewed in terms of negative impacts to Indonesia. As mentioned by (Li et al. 2019), there must be concern about how Indonesian human resources will be affected. For this reason, a strategy is formed by making policies in an effort to minimise impacts and improve Indonesia's human resources. The government can train young workers who have low skills or provide education to workers, as such there is an increase in the level of cognitive and skills and Indonesian human resources become more competitive globally.

According to Hayakawa et al. (2020) changes in a country's import tariffs do not only affect the amount of imported goods in the country but also affect the level of exports. This happens when shipping rates adjust to import tariffs and charged to both parties. Changes in import tariffs are faced with an increase in freight tariff adjustments (Hayakawa et al. 2020). Increased tariffs lead to rising domestic oil prices, which have a negative impact on consumer surpluses and social welfare (Zhang et al. 2018).

To determine the optimum import tariffs, the country must balance the trade off between the benefits obtained and the potential economic losses (Zhang et al. 2018). The balance between benefits and opportunity losses is intended to minimise undesired effects and optimise the success of the system or policy. Tariff determination motivates companies to review their supply bases (Chae et al. 2019). Changes in tariffs imposed by a country on

another country will change the strategy of the exporter. The strategy is in the form of speed of adaptation, which is determined by how quickly or slowly exporters make changes after the imposition of tariff increases. The speed of this adaptation is important for exporters to ensure economic activity continues to happen. This effort is a response given by exporters facing a dynamic environment (Chae et al. 2019). Rapid response given by exporters will produce changes in the complexity of goods, while the slow response of exporters can weaken trade relations between the two parties.

Import tariff policies can also be used to assist recovery for post-disaster countries, as carried out by the European Union (EU) to Pakistan (Cheong 2016). The flood disaster paralysed the economy in Pakistan. After the disaster, the Pakistani government restored the economy through trade. To support economic recovery in Pakistan, the EU cut import tariffs from Pakistan. The low EU import tariffs for Pakistan was to support exports increase and to help Pakistan re-develop the country's economy. Trade concessions and policies for economic recovery are considered successful in restoring the economy in Pakistan. Lowering import tariffs is the same as reducing economic uncertainty. After the disaster, a lot of aid flowed to restore the economy. Since post-disaster official assistance has weaknesses, the policy of reducing import tariffs in other countries can help improve the economy. Tariff reductions imposed in order to improve the economy of other countries after a disaster can be used to refinance infrastructure, provide disaster relief, and minimise political instability caused by disasters

Market changes, such as the tariff imposition, encourage firms to adjust their approaches to managing suppliers, therefore affecting the overall complexity of their supply bases. The adaptation phenomenon were widely discussed in the early systems theory literature (Von Bertalanffy 1968). Thus, tariff is an important factor that has the ability to influence the decisions of supply management. Due to the uncertainty of changes in tariffs,

exporters may experience difficulties in planning their supply base for the long term, given that the majority of tariffs are potentially subject to renegotiation (Chae et al. 2019). The US car manufacturer, Ford, for example, ignored its plans to build a new factory in Mexico and decided to build its Focus compact car in an existing US facility after the US President called for a 35% tariff for cars manufactured abroad (Welch and Merrill 2017).

CPO import volume can also be influenced by substitute goods. The complementary effect and substitution in consumption, as well as the price of substitute goods can affect oil palm (Santeramo and Searle 2019). Palm oil fuel is used for many needs, including for food and transportation. The use of palm oil fuel can be replaced with soybean oil. If the price of soybean oil is lower and has more supplies as well as better quality, it is likely for the consumers to shift to palm oil.

Trade (export-import) is an indicator of economic growth. Economic growth can experience a surplus or deficit, which is usually associated with export and import values. The value of exports and imports can change depending on changes in tariffs of a country. Imposing an increase and decrease in tariffs will have both positive and negative impacts on both parties. As previously discussed, the impact of increased tariffs on exporting countries is a decrease in export volumes and economic growth. For the importing country, it can suppress imported goods in the country, hence stabilise the price of domestic goods and protect domestic producers. The country can maximise production by self-sufficiency, however the country will lack products to meet its needs if this strategy fails. When tariffs are reduced, exporters will have an impact on increasing volume. Many jobs will be created, but it will reduce the quality of human resources in the exporting country. In the importing country, fulfillment of needs will occur, with the possibility of turning off domestic production. The government must carefully consider which policies will be implemented to deal with the occurring changes.

In this study, researchers only carried out an analysis of the effects of increasing tariffs in the short term. There is a difference in the effect of import tariffs from the long term and in the short term in terms of the development of the trade balance. The short term has no significant effect on the development of the trade balance which is a positive sign, hence it is likely to have an impact on the long term development (Murshed, 2019)

Conclusion

According to the results above, tariff of CPO imports from Indonesia imposed by Indian trade authority is relatively elastic to the Indonesia's CPO export since it has higher elasticity ($|\varepsilon_T| > 1$) compared to the price ($|\varepsilon_P| < 1$) regardless of the positive or negative signs. Price elasticity, as stated above, is inelastic ($|\varepsilon_P| < 1$), meaning that the raise in price by 1 USD/MT will be followed by the decrease on quantities by less than 1 thousand MT. India's tariff on CPO relationship to the Indonesia's CPO export volume is elastic in average, meaning that the percentage of change in volume exported to India will be higher compared to percentage of change in tariff imposed by India's trade authority. Tariff elasticity shows elastic elasticity ($|\varepsilon_T| > 1$), meaning that the change in imposed tariff by 1% increase per MT will be followed by the decrease on quantities by more than 1 thousand MT, with a lag of 2-3 months. Negative value of average elasticity between the price and export volume indicates that the price and quantity of India's demand on Indonesia's CPO has a negative relationship, which complies with supply-demand law, where demand price has a reversed impact on demand quantity.

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Appendices and Notes

Appendix 1: Data Used in this Research

i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii
Year	**Month**	**Total CPO Export Volume (Thousands MT)**	**Total CPO Export Value (Millions USD)**	**Price + Tariff Avg (USD/MT)**	**Price w/o tariff (USD/MT)**	**Tarif (%)**	**Tariff/MT (USD/MT)**	**Q Changes (%)**	**P change (%)**	**Tariff Change (% per MT)**	**dQ/dP**	**dQ/dT**
2015	Jan	291.25	183.74	630.86	586.85	7.5	44.01	-	-	-	-	-
	Feb	442.93	273.68	617.87	574.76	7.5	43.11	52.08	0.47	-2.06	110.2	-25.3

	Mar	444.91	273.71	615.21	572.29	7.5	42.92	0.45	-3.34	-0.43	-0.1	-1.0
	Apr	651.85	390.96	599.76	557.92	7.5	41.84	46.51	-2.31	-2.51	-20.2	-18.5
	May	495.38	294.88	595.26	553.73	7.5	41.53	-24.00	2.14	-0.75	-11.2	32.0
	Jun	530.57	318.74	600.74	558.83	7.5	41.91	7.10	1.23	0.92	5.8	7.7
	Jul	371.16	220.98	595.39	553.85	7.5	41.54	-30.04	-3.67	-0.89	8.2	33.7
	Aug	341.97	187.58	548.54	510.27	7.5	38.27	-7.86	-11.56	-7.87	0.7	1.0
	Sep	595.75	284.76	477.98	444.63	7.5	33.35	74.21	-0.31	-12.86	-237.4	-5.8
	Oct	676.31	339.04	501.31	466.33	7.5	34.97	13.52	6.20	4.88	2.2	2.8
	Nov	502.19	252.27	502.34	467.30	7.5	35.05	-25.75	-4.47	0.21	5.8	-124.7
	Dec	393.47	196.71	499.92	465.04	7.5	34.88	-21.65	-0.14	-0.48	158.6	44.9
2016	Jan	360.16	186.50	517.82	481.69	7.5	36.13	-8.47	0.70	3.58	-12.1	-2.4
	Feb	452.93	243.07	536.66	499.22	7.5	37.44	25.76	11.04	3.64	2.3	7.1
	Mar	386.69	225.43	582.98	542.30	7.5	40.67	-14.63	5.42	8.63	-2.7	-1.7
	Apr	493.72	314.94	637.89	593.39	7.5	44.50	27.68	8.25	9.42	3.4	2.9
	May	371.54	244.85	659.03	613.05	7.5	45.98	-24.75	-2.78	3.31	8.9	-7.5
	Jun	340.32	221.69	651.42	605.97	7.5	45.45	-8.40	-4.68	-1.15	1.8	7.3
	Jul	348.96	217.79	624.12	580.58	7.5	43.54	2.54	-5.57	-4.19	-0.5	-0.6
	Aug	478.78	300.95	628.58	584.72	7.5	43.85	37.20	13.69	0.71	2.7	52.1
	Sep	496.25	340.45	686.04	638.17	7.5	47.86	3.65	3.48	9.14	1.0	0.4
	Oct	560.45	380.50	678.92	631.55	7.5	47.37	12.94	-6.03	-1.04	-2.1	-12.5
	Nov	659.96	440.55	667.55	620.97	7.5	46.57	17.76	2.29	-1.67	7.7	-10.6
	Dec	467.24	323.22	691.76	643.50	7.5	48.26	-29.20	5.80	3.63	-5.0	-8.1
2017	Jan	776.07	562.34	724.60	674.04	7.5	50.55	66.10	1.68	4.75	39.4	13.9
	Feb	504.35	376.03	745.58	693.57	7.5	52.02	-35.01	-1.99	2.90	17.6	-12.1
	Mar	407.84	289.21	709.14	659.67	7.5	49.47	-19.14	-3.70	-4.89	5.2	3.9
	Apr	588.83	398.08	676.05	628.88	7.5	47.17	44.38	-3.42	-4.67	-13.0	-9.5
	May	717.68	473.65	659.97	613.92	7.5	46.04	21.88	1.42	-2.38	15.4	-9.2
	Jun	645.93	422.29	653.77	608.16	7.5	45.61	-10.00	-3.62	-0.94	2.8	10.6
	Jul	626.29	397.05	633.98	589.75	7.5	44.23	-3.04	-1.99	-3.03	1.5	1.0
	Aug	759.29	474.80	625.32	543.76	15	81.56	21.24	-0.35	84.40	-60.5	0.3
	Sep	600.04	390.30	650.46	565.62	15	84.84	-20.97	5.20	4.02	-4.0	-5.2
	Oct	530.85	350.08	659.48	573.46	15	86.02	-11.53	-1.12	1.39	10.3	-8.3
	Nov	598.11	397.27	664.21	577.57	15	86.64	12.67	-2.40	0.72	-5.3	17.7
	Dec	564.62	364.07	644.81	560.71	15	84.11	-5.60	-6.82	-2.92	0.8	1.9
2018	Jan	524.75	328.78	626.55	544.83	15	81.72	-7.06	3.57	-2.83	-2.0	2.5
	Feb	424.98	270.19	635.78	552.85	15	82.93	-19.01	0.85	1.47	-22.3	-12.9
	Mar	396.25	254.42	642.07	445.88	44	196.19	-6.76	-0.46	136.58	14.8	0.0
	Apr	328.88	211.47	643.02	446.54	44	196.48	-17.00	-0.71	0.15	24.0	-114.6
	May	224.96	139.55	620.35	430.80	44	189.55	-31.60	-2.00	-3.53	15.8	9.0

	Jun	468.08	286.49	612.07	425.05	44	187.02	108.07	-4.46	-1.34	-24.2	-80.9
	Jul	643.25	368.39	572.70	397.71	44	174.99	37.42	-6.15	-6.43	-6.1	-5.8
	Aug	768.43	421.29	548.25	380.73	44	167.52	19.46	-0.23	-4.27	-86.3	-4.6
	Sep	733.90	395.16	538.44	373.92	44	164.52	-4.49	-1.56	-1.79	2.9	2.5
	Oct	625.57	319.68	511.02	354.87	44	156.14	-14.76	-2.45	-5.09	6.0	2.9
	Nov	672.94	324.46	482.16	334.83	44	147.33	7.57	-8.68	-5.65	-0.9	-1.3
	Dec	532.11	239.92	450.89	313.12	44	137.77	-20.93	-0.76	-6.49	27.7	3.2
2019	Jan	541.53	242.97	448.67	320.48	40	128.19	1.77	9.26	-6.95	0.2	-0.3
	Feb	422.11	204.02	483.34	345.24	40	138.10	-22.05	3.15	7.73	-7.0	-2.9
	Mar	187.72	91.99	490.02	350.01	40	140.01	-55.53	-4.97	1.38	11.2	-40.2
	Apr	181.92	88.62	487.13	347.95	40	139.18	-3.09	2.69	-0.59	-1.1	5.2
	May	336.62	159.75	474.58	338.98	40	135.59	85.04	-4.29	-2.58	-19.8	-33.0
	Jun	251.41	115.12	457.90	327.07	40	130.83	-25.31	-1.95	-3.51	12.9	7.2
	Jul	407.20	183.71	451.15	322.25	40	128.90	61.96	-1.50	-1.47	-41.2	-42.0
	Aug	283.58	129.69	457.32	326.66	40	130.66	-30.36	7.77	1.37	-3.9	-22.2
	Sep	474.80	234.86	494.65	353.32	40	141.33	67.43	-0.99	8.16	-67.9	8.3
	Oct	386.60	189.17	489.32	349.52	40	139.81	-18.58	1.90	-1.08	-9.8	17.3
	Nov	498.90	261.84	524.82	374.87	40	149.95	29.05	15.56	7.26	1.9	4.0
	Dec	580.08	337.30	581.47	415.34	40	166.13	16.27	12.66	10.79	1.3	1.5
2020	Jan	351.99	250.99	713.07	509.33	40	203.73	-39.32	8.32	22.63	-4.7	-1.7

Calculation Notes

- Column v: Since volume and values included here are various CPO commodities (with prefix of HS 1511), we count average price by dividing total export value (column iv) with export volume (column iii) and times it with 1000 (thousand MT and millions USD to USD/MT conversion).
- Column vi: To earn average prices per metric tons without tariff, we calculated this variable through the price (column V) times with 100/(100+ *tariff percentage on column vii*).
- Column viii = column v – column vi
- Column xi: changes on average tariff per MT (column viii)

Figures

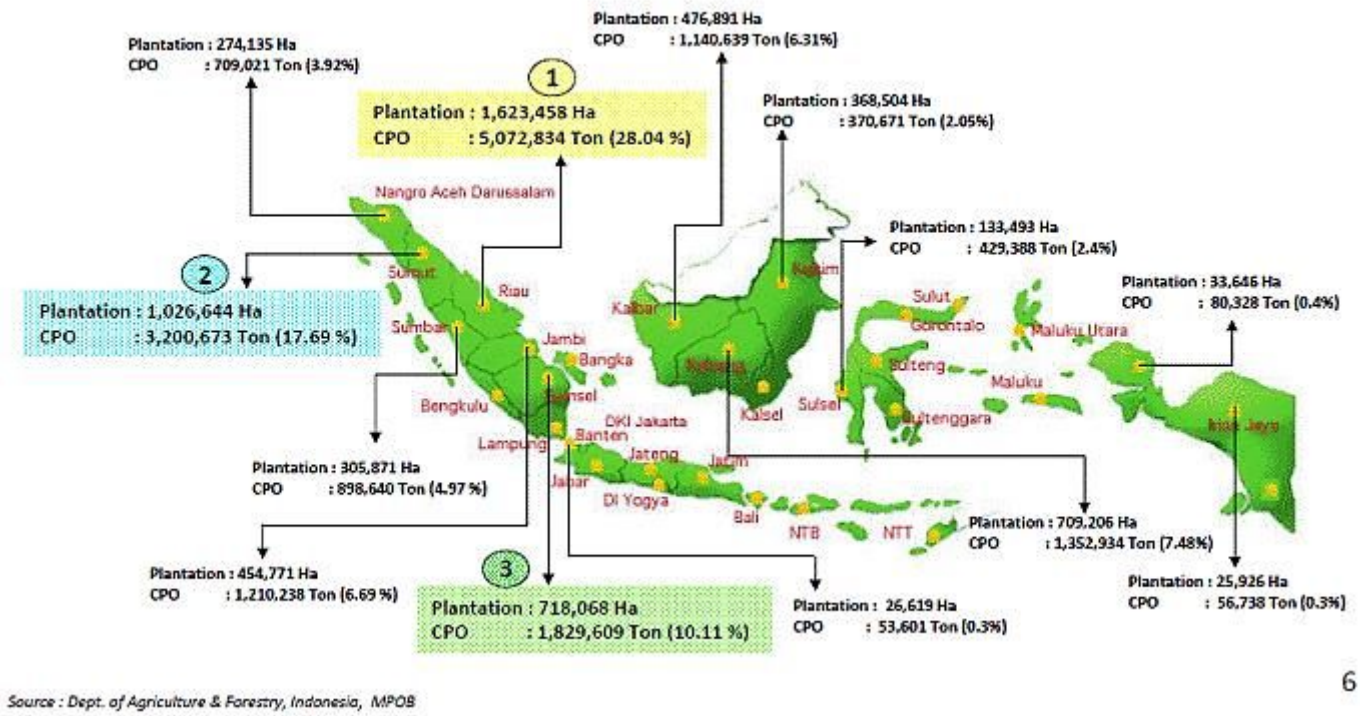

Figure 1

Distribution of Palm Oil Plantation and Production in Indonesia (InfoSawit 2020)

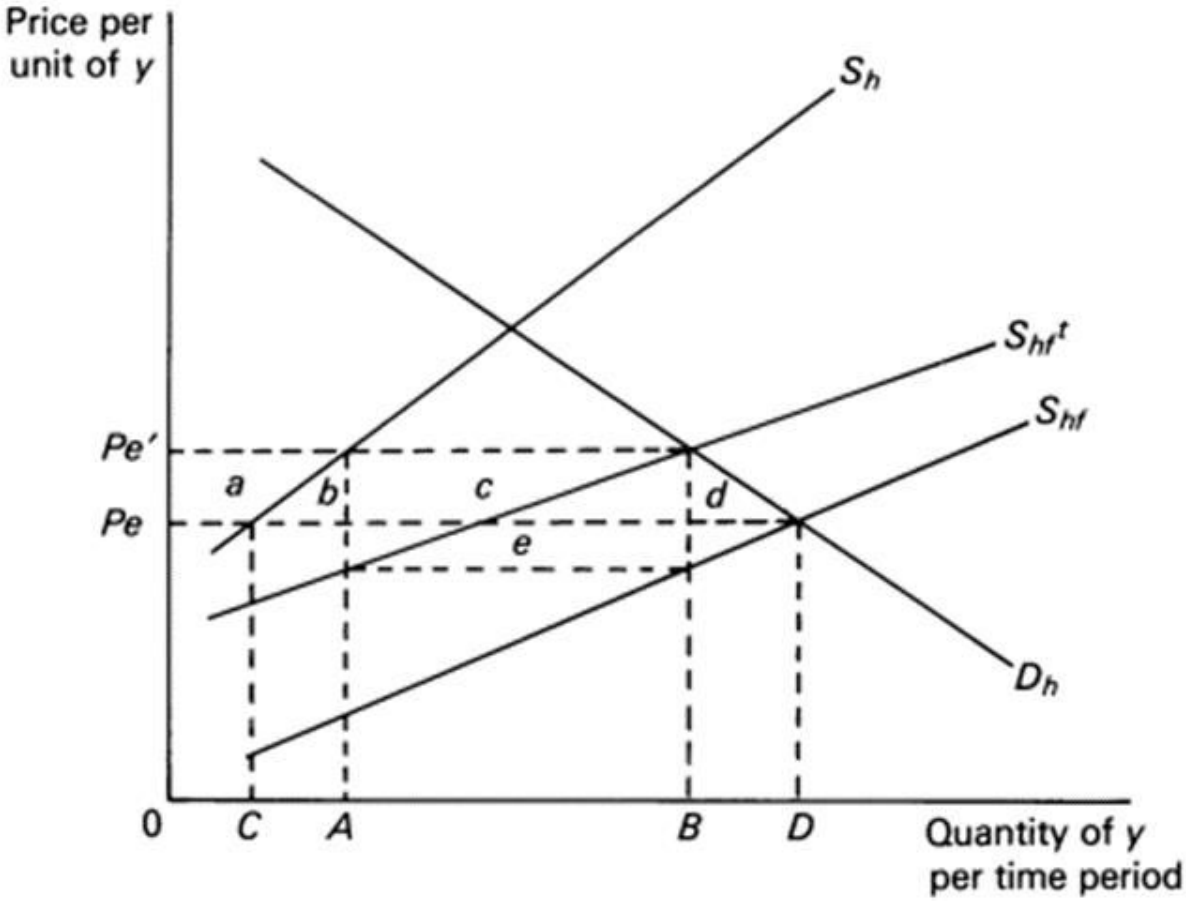

Figure 2

Partial Equilibrium Effect of a Tariff in a Country (Greenaway 1983) Notes: y : a substitute for imported commodity Dh: country's demand for commodity y Sh : country's supply of commodity y Shf : total market supply (domestic supply + imports) Shf t: supply of a tariff-distorted market Pe : the domestic market price of y without tariff burden Pe' : the domestic market price of y with a nominal tariff rate of t on all imported y

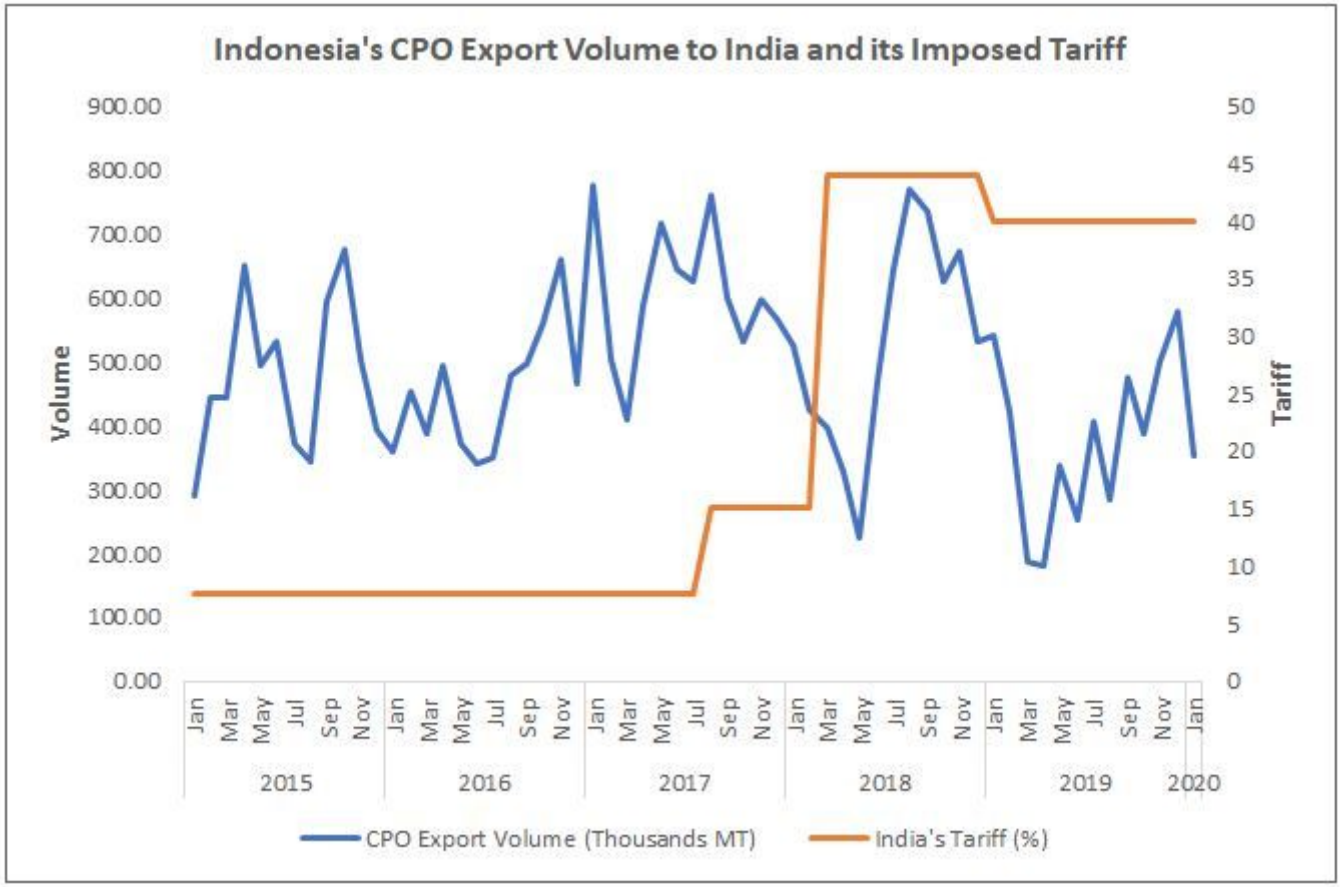

Figure 3

Export volume and tariff (BPS and WTO)

Figure 4

Export volume and CPO Price (BPS, Bloomberg)

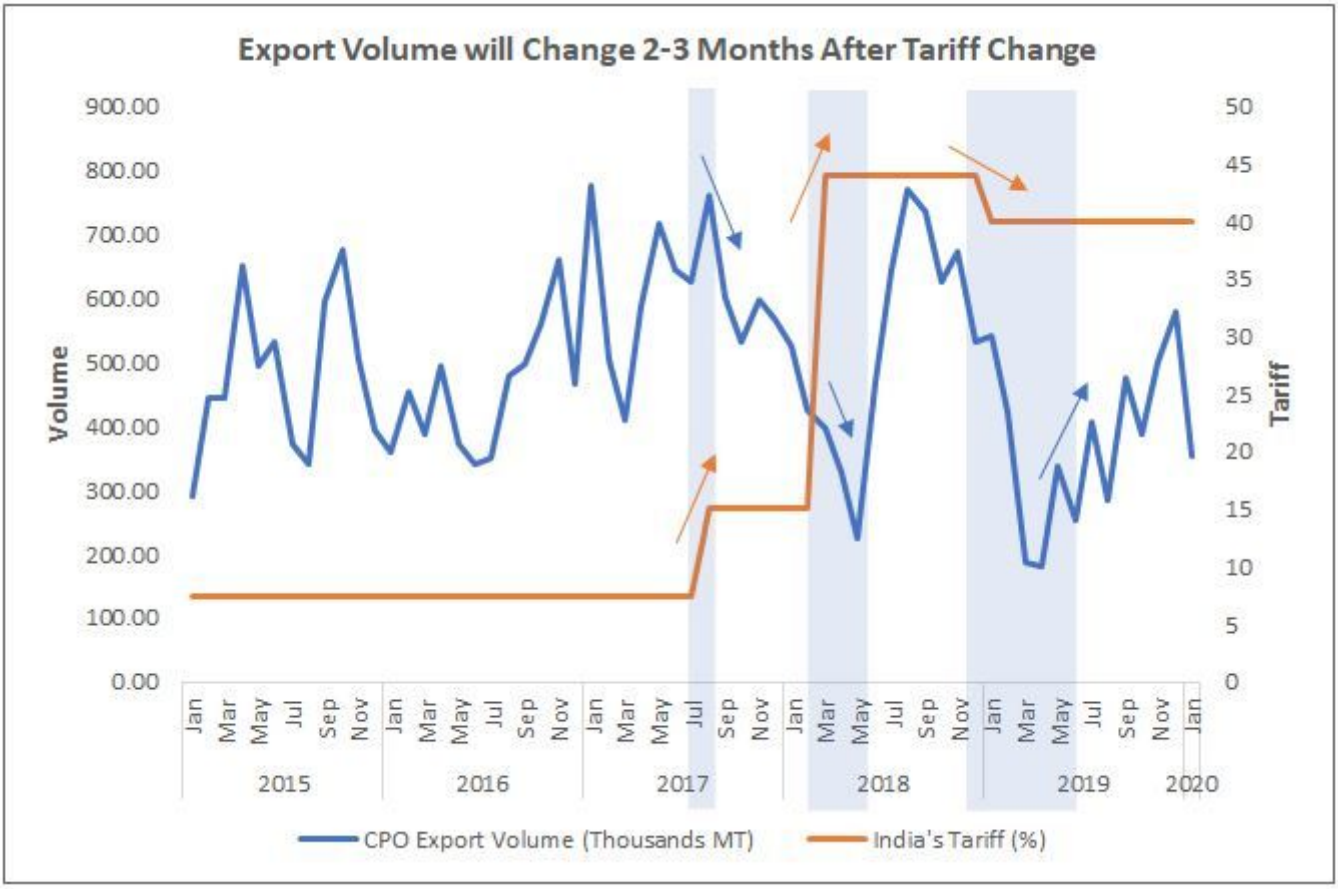

Figure 5

Lag of Export Volume Change Caused by Tariff Change (BPS, WHO)