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Trading Policy Analysis of the Cocoa Industry in Indonesia

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ABSTRACT

Until 2010, the Indonesian cocoa exports had been dominated by cocoa beans, which led the government to stimulate the processing industry by implementing cocoa export tax policy. This study will investigate the impact of the tax tariff policy on the supply and demand of cocoa beans in Indonesia. The imposed ad valorem tariff of Indonesia cocoa beans will be investigated in order to know whether the domestic market is ready or not to absorb the quantity supply of cocoa beans, when the export demand quantity declines. This study aims to determine the impact of cocoa export trading policy on the competitiveness of cocoa beans as well as the integration of cocoa prices. Moreover, this research will further discuss if the export tax policy has no impact on the integration of domestic and international cocoa markets.

Keywords: Cocoa beans, tax imposition, domestic prices, international prices

1. INTRODUCTION

Cocoa is a commodity of high demand around the globe. The processes involved associated with it - its cultivation, processing, and consumption, are relevant discussions concerning the modern economy, society, technology, sustainability, and environment. High demand for cocoa beans is reflected in the international market. Simultaneous with the world's population growth, a consistent increase in the value for cocoa is observed as well (Fluck, 2014).

Indonesia is one of the world's biggest producers of cocoa beans and as of now the third biggest cocoa beans maker in the world, after Ivory Coast and Ghana. Production share of cocoa beans in 2010 of Ivory Coast and Ghana made up 74.9% of the world's add up to cocoa bean production, whereas Indonesia made up 12.2% of the world's add up to cocoa bean generation. Wherein, most of the sent-out items are cocoa beans (Putri, Wahyudi, & Matheos, 2015).

Moreover, in the past five years' cocoa has been one of the main export commodities of Indonesia. Indonesia has given almost 1,951,270 hectares' range of cocoa plants. The cocoa beans are either consumed domestically or exported. In the domestic market, the cocoa beans are processed into intermediate products such as cocoa butter, paste or powder which will be utilized in the food or other industries. In 2010, the domestic consumption of cocoa beans reached 377,498 tons or 44.7 percent of cocoa beans production. In terms of cocoa beans export, Indonesia exported 614 million US$ or 6.7 percent of world total export in 2011. In 2011,

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Indonesia's cocoa beans export decreased significantly by 48.4 percent mainly caused by the implementation of cocoa beans export tax in April 2010.

The objective of the export policy is to ensure the domestic availability of cocoa beans and increase the competitiveness of the domestic cocoa industry. This policy will inevitably create the domestic cocoa industry and increase the cocoa beans item which has higher value included. (Rifin, Nauly, 2013).

To make sure that the local industry has sufficient raw materials at competitive prices and to further increase the value of cocoa, export tax is imposed upon cocoa beans. However, imposing export tax on Indonesian cocoa beans will bring significant changes in terms of prices. Given the principle of the Law of Demand, an increase in prices will result in consumers reducing their demand for the goods and will turn to other alternatives that have relatively lower prices. (Dewanta, 2019)

Additionally, results showed the significant decline in the value of Indonesian cocoa beans in the world market has been observed. The amount of cocoa butter and other processed cocoa exports were not sufficient to offset the decline in the value of exports of cocoa beans. Cocoa farmers are directly impacted by the decline in the exports of cocoa beans. Exporters face the consequences of Indonesia's cocoa export tax because of lower marketing margin since cocoa farmers have a higher bargaining position (Rifin, 2015).

This study estimated the impact of the export policy towards Indonesian cocoa beans. Furthermore, this research will evaluate the competitiveness of the industry of cocoa beans through the improvement of the quality of processed cocoa and eventually increase export volumes, maintain export prices, and further develop the industry's clusters and capital access. The study will contribute knowledge on the cocoa industry and commodity price fluctuations. Moreover, this study adds to the economy by applying econometric time series strategies in analyzing the impacts of an export tax on industrial competitiveness in both the short and long run. These outcomes can be utilized by policy makers to analyze the effect of export tax policies and ought to be considered when export tax on existing crops is considered.

The primary aim of this research is to investigate the effects of export trading policies in the international market of cocoa beans from Indonesia. The main objectives of the research are: (1) To present the industry of cocoa bean production in Indonesia., (2) To evaluate the effect of export trading policies of Indonesia's cocoa bean production, and (3) To construct an econometric model which can be used to evaluate the impact of the tariff tax policy on the cocoa industry in Indonesia.

Through this, the study will help policy makers to identify the effect of exporting crops especially cocoa beans, which is one of the commodities of high demand. Furthermore, this study will provide a deeper understanding on how the imposing of tax will affect the exporting of cocoa beans in the industry.

This research deals with the competitiveness of the harvested cocoa bean supply of Indonesia. It will focus on determining the trade policy impact on production. The factors used for the analysis are limited to annual data production of cocoa beans in tons, export policy

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percentage, as well as the Indonesian cocoa beans and world cocoa prices. The valuable data to support the factors comes from international organizations and Indonesian government data.

2. REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

Because of its location, Indonesia has a competitive advantage compared to other countries making it the third largest exporter of cocoa beans in the world (Akbar, 2015). The comparative advantage theory was applicable in Indonesia to strengthen its competitiveness in the world market. Additionally, this study was anchored with the comparative advantage theory which would evaluate the competitiveness of the exporting policy analysis of cocoa beans in Indonesia. With this, being cautious and estimating in regulating export taxes on trade policy was desirable, otherwise, taxes on export could reduce a sizeable amount of trade and loose the gain welfare if it have not strong market power of the country, whether they are exporter or importer of the taxed commodity (Solleder, 2013).

Furthermore, the principle of comparative advantage was applied by countries to determine what goods and services they should specialize in producing. Comparative advantage was a term associated with 19th Century English economist David Ricardo. Ricardo considered what goods and services countries should produce, and suggested that they should specialize by allocating their scarce resources to produce goods and services for which they have a comparative cost advantage. Furthermore, this theory discusses that the country which would export the goods and services can produce at a low opportunity cost thus would import the goods and services that it will otherwise produce at a high opportunity cost. Moreover, (Piermartini 2004) indicated that export tariff policies on agriculture products would transfer the welfare from the raw material producer to the processing industry. In order to enhance the production sector of raw material, the study suggested that the government should compensate the losses by using appropriate policy.

2.2 Production Status of Cocoa Beans

According to the United Nations Conference on Trade and Development (2008), cocoa beans were seeds of a tree (Theobroma cacao L) that only thrives in the warm and humid equatorial belt (within 10°N and 10°S of the equator). The cocoa tree flowers in two cycles of six months the whole year rounded. Furthermore, the main harvest lasts from October to March and the interim harvest from May to August. Also, harvesting of the cocoa pods normally began after three to five years of growth and maintenance.

At harvesting, the pods are removed from the trees and opened up; the beans are then separated from the pods, cleaned and fermented, the latter process (five to seven days) being essential for flavor to develop. Also, beans are subsequently dried in the sun and, after sorting, were conveyed in sacks to roasting and grinding plants (many of these are in consumer countries, but some were located in producing areas). The first main processing stage was roasting.

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Traditionally, beans were roasted whole (bean roasting), but roasting of the de-shelled or crushed beans (nib roasting) was sometimes preferred.

Overall, it is possible to identify four major product categories based on different stages of processing, namely: 1. Cocoa beans (raw, or minimally processed); 2. Semi-finished cocoa products (cocoa paste/liquor, cocoa butter, cocoa powder); 3. Couverture, or industrial chocolate; 4. Finished chocolate products.

Cocoa (Theobroma cacao L) was one of the export commodities from the agricultural sub-sector which was a national superior commodity in Indonesia (Adelina, Hasyim, & Wibowo, 2020). Wherein the role is significant for the national economy and provides the third largest foreign exchange contribution after palm oil and rubber. Cocoa was one of the plantation commodities which were suitable for Indonesia's climate and soil type, so that Indonesia could produce cocoa. In addition, cocoa was also a provider of employment because it was able to absorb a large number of workers. The Indonesian culture that did not consume large quantities of cocoa and the cocoa bean processing industry had made cocoa more exported than sold in the domestic market (Puspita, Hidayat et al, 2015).

Cocoa has been cultivated in Indonesia over 1.5 million hectares, generating over $1.2 billion in exports annually (Asmin, 2016). Thus, the cocoa bean was one of the most important agricultural export products of Indonesia. Wherein, cocoa production provides the main source of income for over 1,400,000 smallholder farmers and their families in Indonesia and they contribute 93% of national production. The majority (71%) of Indonesian cocoa production is concentrated on Sulawesi island. The remaining cocoa production areas were situated on North Sumatra, West Java and Papua, with some small-scale production areas in Bali, Flores, and other islands.

As one of the largest cocoa bean producers in the world, the cocoa based industry was one of the priorities in the agro-industry sector in Indonesia (Daryanto & Machfud, 2015). Furthermore, the industry has gained government incentives for its development. Indonesia had been a major agricultural exporter since the 19th century, when world demand for various tropical commodities soared (Neilson, 2007). According to ICCO data (2012), in 2009, the Indonesian cocoa beans production was the 3rd largest in the world (15% share) after the Ivory Coast (34% share) and Ghana (17% share), with 550,000 tons. The data indicate that Indonesia is the main producer of cocoa beans in Asia. Results showed that the export value of the Indonesian processed cocoa products is even below than other ASEAN countries that precisely utilizes most of the cocoa beans raw materials from Indonesia for the production of processed cocoa (Hastiadi & Yudyanto, 2017).

Studies showed that the decline in exports was due to the introduction of export duties for cocoa beans by the government (Hastiadi & Yudyanto, 2017). The implementation of this export duty aims to stop the export of cocoa beans or at least experience a reduction. With this export duty, the selling price on the market had been more expensive than before but still of the same quality (Andelisa, 2011). This would result in affecting the competitiveness of Indonesian cocoa beans. Industry circles would also be motivated to stopped selling cocoa beans, but would focus on increasing the added value of the product so as not to lose (Chang & Andreoni, 2020; Cherif

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& Hasanov, 2019; Kupfer, Ferraz, & Marques, 2013; Lauridsen, 2018; Wade, 2012). Whereas, slowly the export value of processed cocoa products such as cocoa paste, cocoa butter, and cocoa powder has begun to increase compared to before the export duty policy (Salvatore, 2013).

Hypothesis 1: The volume of production for Cocoa Beans does not determine the price fluctuations of Indonesian domestic price.

2.3 Indonesian and World Cocoa Beans Prices

The cocoa beans annual price increases because of the increased grinding capacity and it was stated that a 5% tax was imposed on exported cocoa beans and it is 2% above the optimal rate. It was said that in the year 2019, it was about USD 1,598.40 per ton and in 2010 it was about USD 2,080 per ton and it increased by about 30%. The result of this, the export of cocoa beans in Indonesia decreased by 51.42% in the year 2011 and their production was also reduced by 15.67%. (Akbar, 2015). The low productivity and low quality of cocoa beans was affecting the price of the Indonesian cocoa in the international market and it was discounted by 10-15% of the market price. On the other hand, when the cocoa export tax was high, the price of subsidized fertilizers amounted to 35% on average (Syarief, 2015).

The cocoa prices in Indonesia were increasing because of the large demand of cocoa which is not offset by the increased production of cocoa. The increase of price would had an impact on the supply of cocoa because when the price was high the farmers would increase their production. In addition, the increase of cocoa price started in the year 2007-2016 and the average growth rate was 11.12% per year. (Anindita, 2020). The export tax, according to those industry representatives in Indonesia, seemed to have an adverse effect on farmer pricing and severely interrupted supply in the following years. Since cocoa bean output in Indonesia had been stable and may perhaps be decreasing in recent years, it is hard to distinguish the tax as the main or even a contributing cause since there are so many other factors involved (Nielson, 2013). Due to poor quality and the absence of fermentation, Indonesian cocoa beans were frequently sold at a discount on the international market. However agricultural prices will fluctuate based on international markets, the gap between agricultural and ICCO pricing should remain reasonably consistent over time. (Nielson,2013)

During the years 1987 to 2016, the prices of domestic cocoa in Indonesia fluctuated and, most often, increased. Domestic cocoa prices, on the other hand, frequently did not follow the volume of cocoa beans exported. When the price of domestic cocoa dropped, the volume of cocoa beans exported should increase (Wardhany & Adzim, 2018). When domestic cocoa prices fall, however, Indonesian cocoa exports fall as well. It is because cocoa export volume was impacted by the quality, flavor, and fermentation process of cocoa beans, rather than just the price of domestic cocoa (Wardhany & Adzim, 2018).

The world price of cocoa and trading limitations in Indonesia, as well as the currency rate against the dollar, had a substantial impact on the price of Indonesian cocoa exports. This was due to Indonesia's role as a commodity in the global cocoa trade. **(**Setiaji, Hanani, Koestiono & Setiawan, 2015). The research outcomes indicate that increased cocoa acreage by 5% would boost Indonesian cocoa production by 9.98%, cocoa exports by 8.51%, and cocoa export price by 2.27 percent. The rationale for this was because cocoa is Indonesia's primary export. On the

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demand side, higher cocoa prices would have a negative impact on domestic cocoa demand. **(**Setiaji, Hanani, Koestiono & Setiawan, 2015)

Farmers' capability to acquire and meet their input requirements had been influenced by input prices. If this input was not fulfilled in a reasonable timeframe, the fertility rate would drop, and the plant's production would have decreased. As a result, the reduction of fertilizer subsidies should have been reconsidered **(**Setiaji, Hanani, Koestiono & Setiawan, 2015). World cocoa bean prices dropped in 2010, while Indonesian prices began to increase, due to tariffs implemented that brought prices closer to international levels. However, palm oil as an alternative plantation, had followed the same pattern as cocoa bean prices, with palm oil prices surpassing Indonesia cocoa bean prices in 1998 at USD 671 per ton, despite the fact that palm oil prices did not surpass cocoa bean prices ever since. (Akbar, 2015). Cocoa prices in Indonesia have risen as a result of the high demand for cocoa in the country, which had not been fulfilled by increased production. Because when buyer demand increases, producers can increase the product's selling price. Increases in cocoa prices had an effect on cocoa supply in Indonesia, wherein farmers would respond by increasing cocoa production when cocoa prices were high. (Madura, 2007). Cocoa prices in Indonesia were affected by global cocoa prices. High profits from cocoa sales stimulate producers to have more fertilizers, resulting in higher outputs.

The effect of Indonesia's cocoa bean trade policy was that the country's cocoa imports had dropped as a result of its non-tariff policy. As the quantity of cocoa beans in the domestic market grows, the price of cocoa beans decreases. Imported cocoa bean demand had increased as a result of higher cocoa bean consumption. As a result of Malaysia's and the United States' non-tariff policies, Indonesia's cocoa bean production had decreased, and the country's cocoa area had shrunk due to reduced local cocoa bean prices. Indonesia's cocoa bean yield is also declining, resulting in lower overall cocoa production (Sinuraya, Sinaga, Oktavianic, & Hutabaratd, 2017).

As Indonesia's cocoa exports dropped, the world's cocoa exports fell as well. Reduced cocoa exports result in a higher cocoa price around the world. The world's demand for cocoa beans has decreased as the price of cocoa beans rises (Sinuraya, Sinaga, Oktavianic, & Hutabaratd, 2017). A non-tariff barrier is a restriction on the transportation of products into a country caused by factors other than the imposition of tariffs. Other policies used by the government were export subsidies, import quotas, the utilization of local product, and other technical limitations. A technical constraint was one of the non-tariff barriers that a government uses to secure its local interests (Sinuraya, Sinaga, Oktavianic, & Hutabaratd, 2017).

2.4 Imposition of Export Tax to Indonesian Cocoa Beans

The export tax policy on cocoa beans was issued by the Government of Indonesia to increase the supply of cocoa beans raw materials for domestic use by reducing the export volume of the raw materials. The increased supply of cocoa beans raw materials was expected to stimulate the increase of Indonesian processed cocoa production so that it may also improve the competitiveness of processed cocoa products in the global market (Putri et al., 2013 & Suryana et al. (2013).

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Therefore, the success of the application of the export tax policy on cocoa beans in the long-term was not only observed from the effect of the policy on the export of processed cocoa products from Indonesia but other certain factors as well. A country applied the policy for export tax on products for various purposes. According to Liefert and Wescott (2016), the main reasons of the government to impose export tax tariffs or other export restrictions are for: (1) Increased revenues, (2) Increased profits from export products by using the market power to increase selling prices, (3) Increased competitiveness and also the added value of domestic industries by providing cheaper raw materials so that production costs are lower than competitor countries, and (4) Improving domestic food security by increasing the product volume at lower prices.

The imposition of export tax on raw materials led to decreased price of raw materials in the domestic market. In addition, export tax also increased the price of raw materials in the international market, depending on the market share. Bouët and Laborde (2012) group the market share of a country into small countries and large countries and further perform a partial equilibrium analysis to identify the impact generated from the imposition of export tax. Small countries referred to countries with a small market share, while large countries are countries with large market shares. In this analysis, it is assumed that domestic prices are equal to international prices and domestic demands are lower than domestic supply. The difference between domestic supply and domestic demand is the exported quantity.

In small countries, the imposition of export tax made domestic producers prefer selling their products to the domestic market to exporting because the product is not taxable if sold domestically (Effendi, 2016). The imposition of export tax led to decreased domestic prices. Wherein, domestic consumers benefited from the export tax policy by the increased consumption at lower prices attributable to decreased export quantities (Wijaya, 2020). Increased domestic consumption with lower prices created a consumer surplus. Moreover, the government also benefited from the application of export tax, namely from the revenue of the export tax. Nonetheless, this policy precisely creates disincentives to domestic producers that are marked by a decreased surplus of producers.

Ad valorem tariff was a good trade policy for many developing countries for as long as these countries develop manufacturing sectors effectively as well, and if it doesn't damage the export and the production (Du, Harrison & Jefferson, 2014). However, export tax might harm domestic production if it highly depends on the world market. Indonesia, as a developing country that supported the manufacturing industry in the cocoa sector, imposes Ad valorem tariff to the cocoa beans export since 2010 (Akbar, 2015). Therefore, it is worthy of further study in order to reveal whether the policy worked and served its purpose or not. In this case, analyzing the growth of the export and production was helpful to forecast the effect of the policy.

According to Rifin and Nauly (2013), cocoa beans had two important impacts on the economy of Indonesia. First, cocoa beans are an important commodity that provide export earnings and generate employment opportunities for millions of farm families. Second, cocoa beans are the primary source of ingredients for the chocolates industry. Due to this reason, the government initiated a policy that was attractive and which protects the domestic market to ensure that an adequate supply of cocoa beans at ideal prices is put in place for the value added industry of cocoa beans. Furthermore, the Indonesia government created ad valorem tariff rates

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policy which imposed an export tax on cocoa beans in 2010 (decree No. 67/2010) amounting to zero percent when the price was below USD 2000 a ton, 5% when the price was between USD 2000-2750 a ton, 10% when price was between USD 2750-3500 a ton, and 15% when the price was above USD 3500 a ton.

Hypothesis 2: Export trading policy has no impact towards the World Cocoa Beans price.

Some studies have shown that Indonesian cocoa exports were dominated by cocoa beans which were more competitive than processed products (Hasibuan, Nurmalina, & Wahyudi, 2012; Lubis & Nuryanti, 2011; Rifin, 2013). The policy was expected to deliver advantages to the national economy such as increasing in value-added and export competitiveness, opening employment opportunities, improving cocoa farmers' welfare, and eventually enhancing the contribution of this commodity to the economic growth (Arifin, 2013; Drajat, 2011; Lubis & Nuryanti, 2011; Sa'id, 2009; Syam et al., 2006).

The impact of these policies have been widely studied, both before and after implementation (Arsyad, Sinaga, & Yusuf, 2011; Hasibuan, Nurmalina, & Wahyudi, 2012; Permani, 2011, 2013; Rifin, 2015; Syadullah, 2012; Tresliyana, Fariyanti, & Rifin, 2015). For example, the cocoa export tax might encourage the growth of the domestic cocoa processing industry, as well as the use of domestic cocoa beans as its raw materials. Hence, it has resulted in a high demand for local cocoa beans, eventually affecting a significant decline in the export (Hasibuan, Nurmalina, & Wahyudi, 2012; Syadullah, 2012). Furthermore, there was a possibility that Indonesia will become a net importer of cocoa beans in the future (Permani, 2013). At on-farm levels, Arsyad et al. (2011) cautions that the policy could decrease the production of cocoa beans. However, it will increase competition between exporters and domestic processing industries that will eventually generate a positive impact on the farm gate price (Rifin, 2015).

The implementation of export tax has decreased the competitiveness of Indonesia's cocoa beans and cocoa product export compared with the other two producers, Ivory Coast and Ghana. On the other hand, Indonesia gained a positive market composition effect which shows that Indonesia has expanded on the growing market (Hasubuan & Sayekti, 2018). In the future, Indonesia must increase its cocoa product export rather than cocoa beans by expanding in the fast growing market.

The imposition of export tax on raw cocoa beans aims to increase the value of cocoa exports and to ensure that the local industry does not lack raw materials at competitive prices (Giordani, Rocha & Ruta, 2018). However, the policy of imposing the Indonesian cocoa bean export tax had an impact on prices (Bantacut, Fakhrurrazi, & Raharja, 2018; Wibowo, 2014; Diana, 2016; Marimin, 2017; Abdullah, 2012; Howara, 2013). Several studies on the impact of the export tax on cocoa have been carried out. Rifin and Nauly (2013) stated that the adoption of Indonesian cocoa export tariffs had caused a shift in the composition of cocoa export products from cocoa beans to processed cocoa, but there was a decline in market share and also imply declining competitiveness.

Akbar (2015) proves that the imposition of export taxes has affected the demand for Indonesian cocoa beans. Permani (2013), which uses data from 1970-2011, said that the imposition of export taxes was above the optimal level. These conditions raised concerns about

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the possibility of Indonesia becoming an importer of cocoa in the future. Meanwhile, in 2012, the Indonesian Cocoa Industry Association estimated that the local processing industry had absorbed 80 percent of the production of cocoa beans, and there was an increase in production by 35 percent. Pardomuan and Taylor (2012), stated that the National Cocoa Movement (Gerakan Kakao Nasional) had not shown successful results. Many cocoa farmers have responded to export taxes by turning production into corn, rubber and palm oil Permani (2013). Market constraints and technical assistance to farmers can provide better opportunities for farmers compared to blunt trade policies, which are likely to prevent producers from exporting cocoa products (Permani, 2011).

In the Indonesian cocoa bean export data, the composition of the trade value of cocoa exported to the world has changed. After 2010, the export value of Indonesian cocoa beans to the World market experienced a dramatic decline, and exports of cocoa butter and other processed cocoa have not been able to replace the decline in the value of exports of cocoa beans (Asheri & Rivin, 2015; Maharani et al., 2013; Septiaji et al., 2017; Abankwah et al., 2010). The decrease in cocoa bean exports has direct implications for domestic producers, namely cocoa farmers (Dewanta, 2019). Rifin (2015) has a different opinion. Exporters bear the burden of Indonesia's cocoa export tax by lowering the marketing margin because cocoa farmers have a higher bargaining position. The farmers have the independence to sell cocoa beans to institutions that offer better prices (Rifin, 2015). Meanwhile, Yudyanto and Hastiadi (2017) stated that the imposition of export taxes on Indonesian processed cocoa significantly affected the increase in the export volume of Indonesian processed cocoa in the long term.

Hypothesis 3: The export tax percentage has no impact in the Annual Data Production of Cocoa Beans in Indonesia.

Based on data obtained from ITS (2019), the export and import value of Indonesian cocoa from 2009 to 2018 in general continues to fluctuate. There are fluctuations in the value of cocoa exports which can be caused by many factors, including the occurrence of a global crisis which can result in a decline in national income from the export side and disrupt Indonesia's export performance. The increase in Indonesian cocoa exports from year to year shows that the potential for the cocoa market was still high in the international market (Dewanta, 2019). This can be used by the Indonesian state to increase Indonesian cocoa exports so it is necessary to know the determinants that drive Indonesian cocoa exports in the international market.

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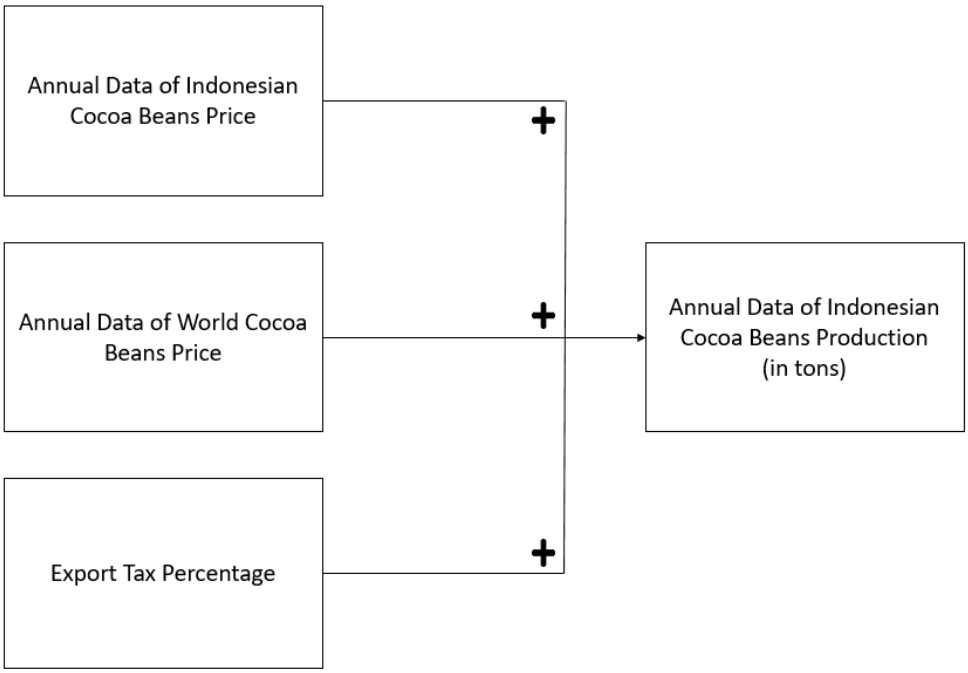
2.5 Simulacrum



3. RESEARCH METHOD

3.1 Study Design

This research aims to study the impact of export trading policies in the international market of cocoa beans from Indonesia, and also the annual data of Indonesian and the world cocoa price at wholesale price. The researchers focused on a quantitative approach to attain the objectives given that it is structured to process and analyze numerical data in quantifying the variables.

Furthermore, the researchers will be gathering data using the time-series method to evaluate the impact of export trading policies in the international market of cocoa beans from Indonesia, as well as the export tax percentage mandated by the government. Time-series analysis contains statistical methods for analyzing data from a large number of repeated observations on a single unit or entity at regular intervals (Salkind, 2010). Such a method is deemed appropriate for the data set given that it is an annual data. Time series analysis can come up with an understanding of succeeding observations, as well as the imposition of tax through the years.

3.2 Data Collection Procedure

This research will be gathering data from 1991 to 2020, adapted from different previous researches related to the impact of the exporting policy of Cocoa Beans in Indonesia. The researchers will gather online data resources from scholarly literature which includes academic journals and articles from experts in websites. The data that this study will be gathering for

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Trading Analysis of Cocoa beans will be sourced from World Bank and Economic related academic journals.

3.3 Data Analysis/Mode of Analysis

The multiple regression analysis will be used to evaluate the data to obtain and determine the association between the regressors and the dependent variable. With this, it will determine the linkages between the dependent and independent variables in the short-run, and in the long-run (Khadka, 2019). These results can be used to address the objectives of the study particularly regarding the imposition on export taxes towards the cocoa beans industry. Also, policy makers can use these to analyze the impact of export tax policies. Regression analysis is used to evaluate the relationship between variables, and provide predictive data based on that relationship (Uyanik & Güler, 2013). The following is the formula for a multiple regression model:

$$Y = \beta 0 + \beta 1AIP + \beta 2AWP + \beta 3Tax + e$$

A multiple regression analysis will be utilized in order to identify the relationship between the Annual data of Indonesian Cocoa Beans Production, Annual Data of Indonesian Cocoa price, Annual data of World Cocoa price, and Export Tax percentage. Where *Y* is the dependent variable, B1, B2 and B3 as regression coefficient, and *e* for standard error. For this study, the independent variables are Annual Indonesian Cocoa Bean Price (*ICB Price Percentage)* and Annual World Cocoa Price (*WCB Price Percentage*), and the Export Tax Percentage (Tax). Meanwhile, the dependent variable is the Annual data of Indonesian Cocoa Bean Production (ICBP Percentage).

$$ICBP = \beta 0 + \beta 1\ ICB + \beta 2\ WCB + \beta 3\ tax + e$$

Where Y = Annual Production of Cocoa Beans (tons)
B0 = Intercept / constant
β1, β2, β3 = Regression Coefficient
AIP = Annual Indonesian Cocoa Bean Price
AWP = Annual World Cocoa Price
Tax = Export Tax Percentage
e = Term of Error

Test for Heteroskedastic Disturbances

If the variance of the regression residuals of the model is time varying, the parameters and their standard errors are said to be biased and inefficient. This condition is known as heteroskedasticity and if uncorrected could lead to wrong conclusions and decisions on the part of the investigator. To detect the presence of heteroskedastic disturbances in the residuals, the White Heteroskedasticity Test will be used.

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Johansen Cointegration Test

In applying the Johansen Cointegration Test which consists of five options, although options 1 and 5 are avoided because of their explosive values which are not consistent with economic realities, such options were utilized according to the Dickey-Pantula principle by beginning with the most restrictive (Option 2) down to the least restrictive (Option 4). If the computed *trace statistics* and *maximum-eigenvalue statistics* exceed their critical values, then there is cointegration among the variables. The hypothesized relationships cannot be deemed spurious and therefore genuine equilibrium relationships existed.

Specification Error Test

The Ramsey regression equation specification error test (RESET) will be used to test whether non-linear combinations of independent variables help in explaining the dependent variable. This will also help determine if there is no misspecification error in the data used in the study. A Specification error test is associated with the specification of the model regarding the inclusion of an irrelevant variable, the exclusion of relevant variables, or the functional form of the model. A Specification error creates biased or inconsistent regression estimators, and the inconsistency can still be there even when the sample observation increases.

4. RESULTS AND DISCUSSION

This study examined the impact of the tax imposition to Indonesian cocoa beans towards its domestic and international prices. Furthermore, the authors also determined the significance of the production of cocoa beans varying to the Indonesian and international prices. Also, this research study used the annual production of Indonesian cocoa beans as the dependent variable to determine if there are factors affecting its export prices, and tax percentage, which are the independent variables. Meanwhile, the independent variable for tax imposition is measured by 0 and 1, as quantifiers respectively. The data were gathered from The World bank organization, and the period covers from 1991 up until 2020.

4.1 Regression Equation Findings

Indonesian Cocoa Beans Production (ICBP) **= β0+ β1 ICB + β2 WCB+ β3 (d(tax)) +e**

Variables	OLS Coefficient	OLS Probability	Significance
C	7.075230	0.0218	-
ICB Price Percentage	-0.328618	0.0081	Significant
WCB Price Percentage	0.112143	0.3716	Insignificant
Tax Pecentage	6.162943	0.6904	Insignificant

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Table 4.1 Regression Analysis Results

Based on the regression output in Table 4.1, constant is at 7.075 while the independent variable specifically the ICB Price Percentage with a p-value of 0.0081 exhibits a significant, negative relationship to Indonesian Cocoa Beans Production (ICBP Percentage) at a 0.01 level of significance which signifies an indirect relationship. This suggests that a 1 unit increase in the cocoa beans production leads to a 0.328618 decrease in Indonesian Price Percentage (ICB Price Percentage). Furthermore, the World Cocoa Beans Price Percentage (WCB) Price Percentage and the Tax Percentage has negative relationship with a p-value of 0.3716 and 0.6904 respectively with a 0.01 level of significance. Resulting to still accepting the null hypothesis wherein the world prices and tax imposition does not impact the production of Indonesian cocoa beans.

From the estimation results on the model, it is known that the cocoa beans production has a negative and significant effect on the Indonesian cocoa beans price and has an indirect relationship. It explains that any increase in cocoa production, it will have an inverse decrease of the Indonesian cocoa bean price. The results are in line with the study of Puspita (2015) which shows that the production has a negative effect on the export volume of cocoa beans. The value of production coefficient of -0.328618 shows that the production inversely affects the export volume of cocoa beans in Indonesia. That is, if there is a production increase of 1 unit, it will cause a decrease in export volume of cocoa beans of -0.328618 with the assumption that other variables are constant.

Production is a variable that directly and significantly influence the export of cocoa beans. As cocoa production in Indonesia increases, it will be followed by increased export volume of cocoa beans. This is due to the abundance of cocoa available so that it is not only sold domestically but also exported abroad and vice versa. Cocoa production in Indonesia itself in the period 1987-2016 tended to increase. This is also followed by the increasing trend of cocoa export volume. However, over the past five years, cocoa production has tended to decline so that the export volume of cocoa beans in the last five years also decreased. Increasing cocoa production will increase exports rather than cocoa. However, increased production should also be offset by improvements in quality. Because the quality of cocoa greatly influences the interest of other countries to import cocoa from Indonesia.

The estimation result from multiple linear regression shows that domestic cocoa price is negatively and insignificant to the export volume of cocoa beans in Indonesia. The results are in line with the results of Komalasari's (2009) study which states that domestic cocoa prices are negatively and insignificantly related to the export volume of cocoa beans. The negative effect of the domestic cocoa price on the export volume of cocoa beans in Indonesia is due to the fact that when domestic cocoa prices increase, domestic producers will tend to market their cocoa products to the domestic market rather than to overseas markets as they expect greater profits by increasing domestic prices cocoa exports will decline.

On the contrary, when domestic cocoa prices decline, domestic producers will switch to selling their goods abroad rather than to the domestic market as they expect greater profits so that the export volume of cocoa beans will increase The development of domestic cocoa price in Indonesia during the period of 1987-2016 fluctuated and more often increased. However, the

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development of domestic cocoa prices is often not in line with the export volume of cocoa beans. When the price of domestic cocoa decreases, cocoa beans export volume should increase. However, on the contrary, when there is a decline in domestic cocoa prices, cocoa exports in Indonesia also decreased. This is because the export volume of cocoa is not so affected by the price of domestic cocoa but also influenced by the quality and taste and fermentation process of cocoa beans. Based on the model estimation in this research, international cocoa price has negative and significant effect to production volume of cocoa beans in Indonesia. The coefficient value of the international cocoa price variable shows the number 0.112143. The value explains that when international cocoa price increases by 1 unit, the world price cocoa beans will increase by 11.1 %. Vice versa, if international cocoa price decreased by 1 unit, the export volume of cocoa beans will increase by 0.112143 assuming other variable remain.

International cocoa prices have a great influence on the export volume of cocoa beans in Indonesia because the cocoa trade in the international market uses the cocoa price standard in the international market. The results of this study in accordance with the theory of demand, where when the price of an item increases, then the amount of goods demanded will go down. In the period 1987-2016, international cocoa prices have grown and tend to increase. This is certainly very influential on the volume of Indonesian exports, especially within the last five years. In the past five years, international cocoa prices have continued to increase. This affects the export volume of cocoa beans in Indonesia which actually decreased. The decline was triggered by the rise in international cocoa prices that caused importing countries of cocoa beans from Indonesia to reduce the volume of imports so that the direct impact on the export volume of cocoa beans in Indonesia.

As stated by Martin and Anderson (2011), export restriction policy, such as export tax, has an impact on price surge and prevents farmers to obtain higher world price (An, Qiu, & Zheng, 2016). For example, the government will raise export tax to reduce the domestic price as a response to increasing international price. On the other hand, these findings reveal that the implementation of cocoa bean export tax policy since April 2010 has not made an impact on the integration of domestic market and the world market. The formation of domestic prices of cocoa beans is reliant upon international prices as reference. This integration occurs because there is a significant disclosure of information price of cocoa.

4.2 Diagnostic Results

Diagnostic Tests	*Results*	*Interpretation*
ADF Unit Root Test	All p-values < 0.05	No presence of unit root
VIF Multicollinearity Test	All values < 5	No presence of multicollinearity
Serial Correlation Test	P-value is > 0.05	No presence of serial correlation
Normality of Residual	P-value is > 0.05	Residuals are normally distributed
Specification of Error	P-value is > 0.05	No presence of misspecification

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Heteroskedasticity - Breusch-Pagan-Godfrey Test	P-value is > 0.05	No presence of heteroskedasticity
Heteroskedasticity - White Test	P-value is > 0.05	No presence of heteroskedasticity
Cointegration	P-values are < 0.05	Four cointegrating equation

4.2 Regression Diagnostic Results

Table 4.2 shows the Augmented Dickey-Fuller test used by the authors for determining stationarity. The variables consumption and income in their second difference have probabilities less than 0.01, indicating that they are both stationary. This suggests that we can reject the null hypothesis that all series have a unit root, finding that the statistical properties of the time series do not vary over time. The values for Uncentered Variance Inflation factors for variables Income and D1 are less than 5, and this suggests that no multicollinearity is present in the model. The serial correlation LM test shows the presence of autocorrelation in the residuals. As depicted in Table 4.2, the probability value is at 0.97, which is greater than 0.05, and the p-value of the F-statistic is at 52%, meaning that there is no autocorrelation existing in the residuals. Additionally, with a probability of 0.105 that is greater than the predetermined significance level of 0.05, we accept the null hypothesis for the normality of residual diagnostic, which proves that the residuals are normally distributed in this model. The p-value for F-stat is 98%, and the p-value for the FITTED2 or squared of the added fitted values is 0.4970. As a result, it fails to reject the Ramsey RESET test null hypothesis of correct specification at the 5% significance level. This shows that the functional form is correct and that our model is free of missing variables. The Breusch-Pagan-Godfrey is one of the tests used in checking for the strong presence of heteroskedasticity in the model. The probability value is at 0.975 or 98%, and this suggests that the null hypothesis is accepted. Another test used to check the presence of Heteroskedasticity is the White test. Based on Table 4.1, the probability value is 0.298 or 30%, and this means that we accept the null hypothesis that the residuals are homoskedastic. Lastly, with p-values less than or equal to 0.05, the results of the Johansen Cointegration test suggest that there are four cointegrating equations or a deterministic trend is present at any number of equations.

4.3 Relationship between Cocoa Beans Production and Domestic Prices

According to Nisurahmah, Nuryartono, and Novianti (2017), the financial stability of a cocoa plantation relies on early returns on the original investment and higher yields to reduce unit costs. Cocoa prices are highly unstable. Farmers were instructed to move to other crops due to the uncertainty of the cacao price. Cocoa productivity declines may have an impact on the cocoa processing industry's raw material supply. Price variability is a major source of concern for producers, traders, and consumers. Farm producers are price takers, with little control over the prices they are paid for their goods. Furthermore, the price is frequently variable, i.e., it varies over time. Variability can result in losses or profits, resulting in a high level of uncertainty. Uncertainty is a crucial notion since it has been proven to limit output, investment, and consumption, as well as trade.

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Furthermore, cocoa bean prices fluctuate a lot, which has an influence on producer revenue. Farmers, as price takers, are more exposed to risk than local or international price levels. The farmer's price has the largest coefficient of fluctuation compared to domestic and international prices. Farmers face uncertainty, thus there is little reason for them to continue producing cocoa. Cocoa bean prices fluctuate a lot, which has an influence on producer revenue. Farmers, as price takers, are more exposed to risk than local or international price levels. The farmer's price has the largest coefficient of fluctuation compared to domestic and international prices. Farmers face uncertainty, thus there is little reason for them to continue producing cocoa.

4.4 Relationship between Cocoa Beans Production and World Prices

Based from the study of Rifin (2013), the cocoa beans in Indonesia have comparative advantages when producing cocoa beans in some world market such as, Ivory Coast, Ghana and Nigeria. Indonesia has complementary cocoa beans in Ghana in the international market that's why the cooperation between the said countries is recommended. It means that the increase in cocoa beans world demand will greatly benefit Indonesia. When it comes to cocoa beans production, Indonesia exported 614 million US dollars of world total export in 2011. The Ivory Coast has 3 billion US dollars, followed by Ghana with 2.07 billion US dollars and Nigeria with 959 million in 2011. The Indonesia's cocoa beans export grew by 14.7 percent in the period of 2000-2011.While in 2011, the cocoa beans export decreases by 48.9 percent because of the implemented tax.

4.5 Relationship between Cocoa Beans Production and Tax Imposition

Results from the same study suggests that the implementation of a cocoa export tax policy has resulted in a 46 percent reduction in cocoa bean exports. The imposition of the export tax, on the other hand, moved the percentage of cocoa product exports from cocoa beans to processed cocoa products. To ensure availability of cocoa beans for the domestic cocoa processing sector, the government has enforced an export tax policy. The cocoa business needs to expand, yet there is a scarcity of cocoa beans.

Because a small country's exports are too small to have an impact on global markets, a change in its exports does not result in a change in global pricing. When a big nation changes its net supply (the volume of its exports) on global markets, however, it can have an impact on world prices. The export tax will lower the domestic price of cocoa beans, which will be used to the downstream cocoa sector by lowering the cost of raw materials. The impact of export taxes on farmers, however, is still unknown.

5. Conclusion and Recommendation

Data analyses outcomes imply that the imposition of the export tax on the Indonesian cocoa beans significantly affect the increased value of the Indonesian processed cocoa exports in the long-term. The imposition of the export tax on the Indonesian cocoa beans in the long-term

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will affect the increased value of the Indonesian processed cocoa exports. As the policy on the imposition of the tariff will significantly affect in the long-term, it is best to continue the implementation of the policy.

The policy on the imposition of the export tax on Indonesian cocoa beans does not significantly affect the decreased processed cocoa export. Variables of domestic cocoa bean prices in the long-term do not have significant effects on the export volume of the Indonesian processed cocoa. This is assumed because the trend of the domestic cocoa prices is affected by the trends of international cocoa bean prices. As stated by Bappepti (2014), domestic prices of cocoa beans are strongly affected by international prices. Accordingly, when international cocoa bean prices decrease, it will lead to a decreased price of the domestic cocoa beans, and thereby impacting a decreased price of processed cocoa, internationally and in Indonesia.

Furthermore, to be able to increase export revenue of cocoa beans with inelastic elasticities, increasing export quantity is preferred and is seen to be more effective than to impose a price decrease or offer discounts. Price elasticities will be determined for both compensated and uncompensated situations. Uncompensated price elasticity comprises both the price and income effects of a change in price, whereas compensated price elasticity simply shows the price effect of a change in price and is compensated for the change in the income.

5.1 Policy Implications

The policy of the imposition of export tax on cocoa beans leads to a decreased cocoa beans export of Indonesia. The declined export of the Indonesian cocoa beans will cause an abundance of domestic cocoa bean raw materials that encourages investments in the national cocoa processing industries. The increasing number of the Indonesian cocoa processing industries leads to increased production of processed cocoa, that may affect the increase of the Indonesian processed cocoa export value. On the word of Piermartini (2004), domestic processing industries will benefit from the imposition of export tax on the input of the decreased raw material prices, so that it may increase competitiveness and expansion of the international market share.

Competitiveness Analysis - Before and after the industrialization strategy in 2010, the shifting in competitiveness of Indonesian cocoa exports (cocoa bean, cocoa paste, cocoa butter, cocoa powder, and chocolate) was assessed using Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) criteria. These factors are frequently used to assess a country's product competitiveness in the global market. The use of cocoa export tax policy as the major instrument for the government to promote the cocoa sector was able to support the growth of intermediate cocoa goods such as cocoa paste, cocoa butter, and cocoa powder, according to the RCA and RSCA requirements. Indonesian byproducts have also become more comprehensive among ASEAN countries as a result of the policy.

The government is implementing progressive cocoa export taxes starting in 2010, namely 5% -15% to support domestic expulsion. This policy resulted in a decline in export of cocoa beans in 2012 (30.16%) and in 2011 (38.36) from the previous year. This decline was influenced by the absorption of cocoa in the domestic industry. This government policy must remain in order to develop the existing processed cocoa industry. In addition, the application of the Indonesian National Standard (SNI) on cocoa bean commodities is expected to improve the

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quality of existing raw materials. The imposition of the export tax on the Indonesian cocoa beans in the long-term will affect the increased value of the Indonesian processed cocoa exports.

In the case of Indonesia, however, export tax caused a lower price transmission after application of the policy, which is indicated by a lower coefficient of co- integrating estimation. This might be due to tariff scheme for cocoa export which follows the fluctuation in international price. Permani (2013) estimated that export tariff implemented by the government was higher than the optimal rate, causing the competitiveness of cocoa beans to decrease significantly. Government policies in developing downstream cocoa industry by implementing export tax instrument since 2010 have been able to improve the performance of cocoa processing industry significantly. With regards to the structure and competitiveness of exports, the policy was able to drastically suppress cocoa bean exports and increase the export of processed cocoa products. In addition, export competitiveness of cocoa beans and processed cocoa.

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APPENDIX

Appendix A - Secondary Data Collected

Year	ICBP Percentage	ICB Price Percentage	WCB Price Percentage	Tax
1991	22.9	12	-5.7	0
1992	18.4	-8.1	-8	0
1993	24.6	-9.4	1.6	0
1994	-6.3	3	25	0
1995	15.2	34.2	2.6	0
1996	26	1.3	1.6	0
1997	-6	0.4	11.2	0
1998	38.5	-29.2	3.6	0
1999	-19.5	79.9	-32.3	0
2000	14.6	-11.8	-20.2	0
2001	27.5	-16.9	18	0
2002	15.3	17.9	66.4	0
2003	12.3	13.8	-1.5	0
2004	-0.5	-2.1	-11.5	0
2005	8.3	-14.6	-0.8	0
2006	2.7	4.4	3.5	0
2007	-3.8	18.8	22.6	0
2008	8.6	26.3	32	0
2009	0.7	9.7	12.1	0
2010	4.3	30.1	8.5	1
2011	-15.7	32.2	-4.9	1
2012	31.5	-44	-19.7	1
2013	-23	-18.4	-33.8	1
2014	1	10.3	46	1
2015	-18.5	-7.9	23.4	1
2016	10.7	6.4	-25.3	1
2017	-10.1	46.1	-3	1
2018	29.9	-14.9	34.9	1
2019	2.2	-7.1	-4.7	1
2020	-4.1	-15.5	11.3	1

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Appendix B – Eviews Numerical Results

(Regression Equation and Normality Results)

REGRESSION

Dependent Variable: ICBP PERCENTAGE
Method: Least Squares
Date: 11/26/21 Time: 08:42
Sample (adjusted): 1992 2020
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.075230	2.891481	2.446922	0.0218
ICB PRICE PERCENTAGE	-0.328618	0.114154	-2.878721	0.0081
WCB PRICE PERCENTAGE	0.112143	0.123251	0.909878	0.3716
DTAX	6.162943	15.29250	0.403004	0.6904

R-squared	0.266423	Mean dependent var	6.372414
Adjusted R-squared	0.178394	S.D. dependent var	16.24926
S.E. of regression	14.72874	Akaike info criterion	8.344920
Sum squared resid	5423.393	Schwarz criterion	8.533513
Log likelihood	-117.0013	Hannan-Quinn criter.	8.403985
F-statistic	3.026526	Durbin-Watson stat	2.172782
Prob(F-statistic)	0.048255		

MULTICOLLINEARITY (VIF)

Variance Inflation Factors
Date: 11/26/21 Time: 08:44
Sample: 1991 2020
Included observations: 29

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.360664	1.117655	NA
ICB PRICE PERC...	0.013031	1.078103	1.040409
WCB PRICE PER...	0.015191	1.061522	1.000784
DTAX	233.8606	1.078018	1.040845

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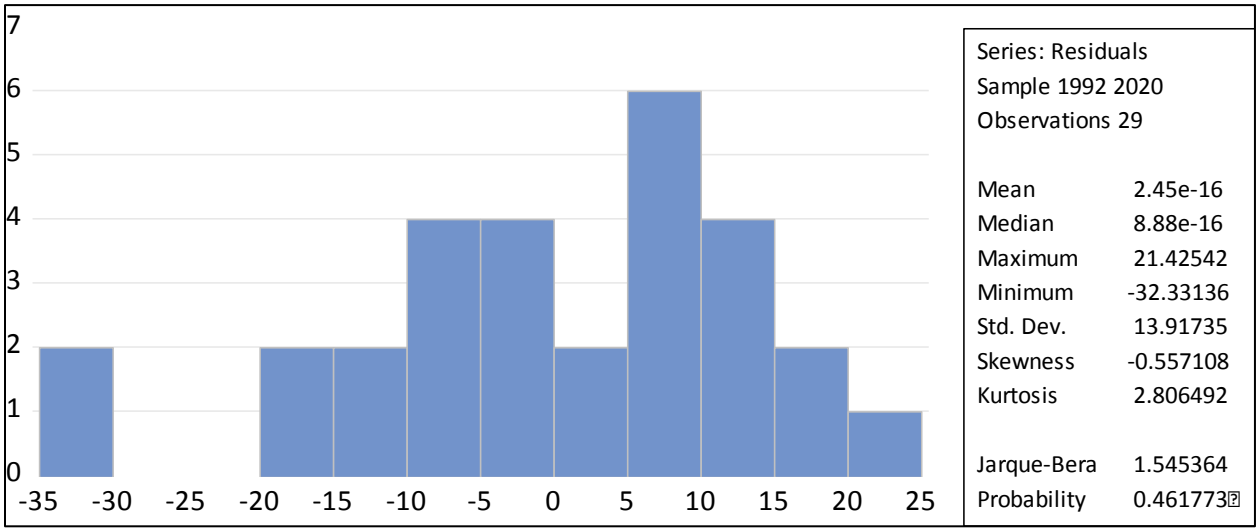
NORMALITY



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AUTOCORRELATION (SERIAL LM)

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.418501	Prob. F(1,24)	0.5238
Obs*R-squared	0.497022	Prob. Chi-Square(1)	0.4808

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 11/26/21 Time: 08:46
Sample: 1992 2020
Included observations: 29
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.108324	2.930495	0.036964	0.9708
ICB PRICE PERCENTAGE	0.015264	0.117891	0.129478	0.8981
WCB PRICE PERCENTAGE	-0.010395	0.125741	-0.082669	0.9348
DTAX	-1.111796	15.56866	-0.071412	0.9437
RESID(-1)	-0.139149	0.215096	-0.646916	0.5238

R-squared	0.017139	Mean dependent var	2.45E-16
Adjusted R-squared	-0.146672	S.D. dependent var	13.91735
S.E. of regression	14.90308	Akaike info criterion	8.396599
Sum squared resid	5330.443	Schwarz criterion	8.632339
Log likelihood	-116.7507	Hannan-Quinn criter.	8.470430
F-statistic	0.104625	Durbin-Watson stat	1.868563
Prob(F-statistic)	0.979791		

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HETEROSCADISTICITY (BP AND WHITE TEST)

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.292367	Prob. F(3,25)	0.2988
Obs*R-squared	3.893602	Prob. Chi-Square(3)	0.2732
Scaled explained SS	2.613615	Prob. Chi-Square(3)	0.4551

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/26/21 Time: 08:48
Sample: 1992 2020
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	212.4609	49.45021	4.296460	0.0002
ICB PRICE PERCENTAGE	-3.376358	1.952266	-1.729456	0.0961
WCB PRICE PERCENTAGE	-1.143696	2.107838	-0.542592	0.5922
DTAX	-101.1111	261.5328	-0.386609	0.7023

R-squared	0.134262	Mean dependent var	187.0136
Adjusted R-squared	0.030374	S.D. dependent var	255.8062
S.E. of regression	251.8914	Akaike info criterion	14.02331
Sum squared resid	1586231.	Schwarz criterion	14.21191
Log likelihood	-199.3381	Hannan-Quinn criter.	14.08238
F-statistic	1.292367	Durbin-Watson stat	2.186872
Prob(F-statistic)	0.298841		

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Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	0.658107	Prob. F(6,22)	0.6837
Obs*R-squared	4.412969	Prob. Chi-Square(6)	0.6210
Scaled explained SS	2.962244	Prob. Chi-Square(6)	0.8136

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/26/21 Time: 08:48
Sample: 1992 2020
Included observations: 29
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	203.3679	66.35679	3.064764	0.0057
ICB_PRICE_PERCENTAGE^2	-0.018306	0.072478	-0.252579	0.8029
ICB_PRICE_PERCENTAGE*WCB_PR...	-0.048591	0.122610	-0.396302	0.6957
ICB_PRICE_PERCENTAGE*DTAX	-1.625448	9.568821	-0.169869	0.8667
ICB_PRICE_PERCENTAGE	-3.673701	2.776485	-1.323148	0.1994
WCB_PRICE_PERCENTAGE^2	0.052397	0.080068	0.654407	0.5196
WCB_PRICE_PERCENTAGE	-2.191934	3.248471	-0.674759	0.5069

R-squared	0.152171	Mean dependent var	187.0136
Adjusted R-squared	-0.079055	S.D. dependent var	255.8062
S.E. of regression	265.7252	Akaike info criterion	14.20931
Sum squared resid	1553418.	Schwarz criterion	14.53934
Log likelihood	-199.0350	Hannan-Quinn criter.	14.31267
F-statistic	0.658107	Durbin-Watson stat	2.223642
Prob(F-statistic)	0.683698		

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MISSPECIFICATION ERROR (RAMSEY)

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: ICBP PERCENTAGE C ICB PRICE PERCENTAGE WCB PRICE PERCENTAGE DTAX

	Value	df	Probability
t-statistic	0.871372	24	0.3922
F-statistic	0.759289	(1, 24)	0.3922
Likelihood ratio	0.903260	1	0.3419

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	166.3184	1	166.3184
Restricted SSR	5423.393	25	216.9357
Unrestricted SSR	5257.075	24	219.0448

LR test summary:

	Value
Restricted LogL	-117.0013
Unrestricted LogL	-116.5497

Unrestricted Test Equation:
Dependent Variable: ICBP PERCENTAGE
Method: Least Squares
Date: 11/26/21 Time: 08:50
Sample: 1992 2020
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.595313	4.067138	1.129864	0.2697
ICB PRICE PERCENTAGE	-0.321753	0.114978	-2.798388	0.0100
WCB PRICE PERCENTAGE	0.134964	0.126587	1.066175	0.2970
DTAX	7.856391	15.48906	0.507222	0.6166
FITTED^2	0.020868	0.023949	0.871372	0.3922

R-squared	0.288919	Mean dependent var	6.372414
Adjusted R-squared	0.170406	S.D. dependent var	16.24926
S.E. of regression	14.80016	Akaike info criterion	8.382739
Sum squared resid	5257.075	Schwarz criterion	8.618479
Log likelihood	-116.5497	Hannan-Quinn criter.	8.456570
F-statistic	2.437861	Durbin-Watson stat	2.139676
Prob(F-statistic)	0.074653		

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TEST FOR COINTEGRATION

Sample (adjusted): 1994 2020
Included observations: 27 after adjustments
Trend assumption: Linear deterministic trend
Series: ICBP PERCENTAGE ICB PRICE PERCENTAGE WCB PRICE P...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.777975	91.72865	47.85613	0.0000
At most 1 *	0.657223	51.09455	29.79707	0.0001
At most 2 *	0.405588	22.18632	15.49471	0.0042
At most 3 *	0.260316	8.141380	3.841465	0.0043

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.777975	40.63410	27.58434	0.0006
At most 1 *	0.657223	28.90823	21.13162	0.0033
At most 2	0.405588	14.04494	14.26460	0.0541
At most 3 *	0.260316	8.141380	3.841465	0.0043

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

ICBP PER...	ICB PRICE...	WCB PRIC...	DTAX
0.038945	-0.056843	-0.012702	2.081412
0.006940	0.019461	-0.059297	-0.264114
0.008261	-0.007688	0.001506	8.075442
-0.114836	-0.035792	0.002534	-0.320577

Unrestricted Adjustment Coefficients (alpha):

D(ICBP PE...	-11.01692	3.579084	1.049810	4.724213
D(ICB_PRI...	21.35056	-9.742526	-5.672841	6.619373
D(WCB PR...	8.081940	21.65675	-5.108415	2.177219
D(DTAX)	-0.023588	-0.037706	-0.144033	-0.006422

1 Cointegrating Equation(s): Log likelihood -348.6333

Normalized cointegrating coefficients (standard error in parentheses)

ICBP PER...	ICB PRICE...	WCB PRIC...	DTAX
1.000000	-1.459573	-0.326146	53.44466
	(0.20497)	(0.17939)	(24.5861)

Adjustment coefficients (standard error in parentheses)

D(ICBP PE...	-0.429056
	(0.10148)
D(ICB PRI...	0.831501
	(0.19420)
D(WCB PR...	0.314753
	(0.24259)
D(DTAX)	-0.000919
	(0.00197)

2 Cointegrating Equation(s): Log likelihood -334.1792

Normalized cointegrating coefficients (standard error in parentheses)

ICBP PER...	ICB PRICE...	WCB PRIC...	DTAX
1.000000	0.000000	-3.139426	22.12148
		(0.47854)	(61.6338)
0.000000	1.000000	-1.927468	-21.46051
		(0.32058)	(41.2891)

Adjustment coefficients (standard error in parentheses)

D(ICBP PE...	-0.404217	0.695890
	(0.09834)	(0.14936)
D(ICB PRI...	0.763889	-1.403233
	(0.17843)	(0.27101)
D(WCB PR...	0.465049	-0.037949
	(0.16053)	(0.24381)
D(DTAX)	-0.001180	0.000607
	(0.00197)	(0.00300)

3 Cointegrating Equation(s): Log likelihood -327.1568

Normalized cointegrating coefficients (standard error in parentheses)

ICBP PER...	ICB PRICE...	WCB PRIC...	DTAX
1.000000	0.000000	0.000000	1943.964
			(505.875)
0.000000	1.000000	0.000000	1158.466
			(311.850)
0.000000	0.000000	1.000000	612.1638
			(162.006)

Adjustment coefficients (standard error in parentheses)

D(ICBP PE...	-0.395544	0.687819	-0.070714
	(0.10003)	(0.14993)	(0.15015)
D(ICB PRI...	0.717024	-1.359621	0.297972
	(0.17528)	(0.26273)	(0.26311)
D(WCB PR...	0.422847	0.001323	-1.394535
	(0.15768)	(0.23634)	(0.23669)
D(DTAX)	-0.002370	0.001714	0.002319
	(0.00156)	(0.00234)	(0.00235)