Analysis of International Trade in Indonesian : Plantation Sub-sector Commodities

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Abstract
This study aims to determine and analyze: the influence and equilibrium of exchange rates, domestic income, foreign income, foreign exchange reserves and inflation on the trade balance of the Indonesian plantation subsector in the long and short term. The data in this study are time series data from 1987 to 2016, and using OLS regression analysis, cointegration test and Vector Error Correction Model (VECM). The results show that (1) the exchange rate, domestic income, foreign income and inflation have a significant effect on the trade balance of the Indonesian plantation subsector. While foreign exchange reserves have no significant effect on the trade balance of the Indonesian plantation subsector. (2) In the short term, the exchange rate and domestic income in lag 1 and foreign income in lag 2, foreign exchange reserves and inflation in lag 1 disrupt the balance of trade in the Indonesian plantation subsector. Meanwhile, in the long run the trade balance of Indonesia's plantation subsector will again reach its equilibrium.

Keywords: trade balance, exchange rate, income, inflation, and foreign exchange reserves

Introduction

International trade plays an important role in the economy of a country. Every country needs another country to fulfill its needs in order to live prosperously. Every country needs cooperation that is carried out to show its economy, the relationship in question can be in the form of trade relations between one country and another (Taghavi, Goudarzi, Masoudi, & Gashti, 2012). International trade in goods and services enables the nation to improve their standard of living by exporting and importing goods and services (Khan, 2011). Export activities are carried out by the state with the aim of increasing the country's economic growth, while imports are carried out to meet a country's demand for commodities that cannot be produced by the country but produced by other countries. International trade has played an important role in the development of both developed and underdeveloped countries because countries are dependent on one another due to uneven distribution of resources (Haider, Afzal, & Riaz, 2011). Trade balance is a difference between a country's imports and its exports. A country has a trade deficit if its imports are more than it exports; the opposite scenario is a trade surplus (Malik, 2015).

The plantation subsector is a mainstay in Indonesia's agricultural sector trade balance because it is always surplus and can cover deficits from other subsectors. The trade balance surplus in the agricultural sector occurred because more than 96% came from the export value of plantation commodities with a relatively smaller percentage of imports, whereas for other subsectors the percentage of the contribution of import value was much higher than its exports.

In general, the trade balance of Indonesia's plantation subsector shows an increasing trend, but in the last 5 years the trade balance value of Indonesia's plantation subsector experienced a significant decline. According to data from the Indonesian Ministry of Agriculture, in 2012 the trade balance of Indonesia's plantation subsector was valued at 31,997.42 million US $ and

continued to decline until 2016 to 21,146.01 million US $. The development of the trade balance can of course be linked to foreign exchange rates and income, as stated by (Froyen, 2002) that developments in the trade balance can be influenced by foreign exchange rates and income.

Aurangzeb (2012) explains that exchange rates are fundamental factors that affect a country's trade. Domestic income also plays a role in trade because real GDP can determine domestic demand for imports. The increase in GDP will increase consumption of foreign goods so that imports increase (Abdullahi & Suleiman, 2008). On the other hand, financing in international trade is highly dependent on a country's foreign exchange reserves, because this is the only medium of exchange on the international market (Sultan, 2011). Therefore, foreign exchange reserves are an important determinant of import demand, especially in developing countries. Meanwhile a price increase that lasts for a long time (inflation) can also affect international trade. Inflation can have an impact on domestic export performance. Inflation will make the price of domestic goods abroad become more expensive so exports will decline. As stated by (Abidin, Bakar, & Sahlan, 2013) that the increase in inflation will reduce exports to other countries.

Various empirical studies that are almost related to the problems examined from this study are (Amoro & Shen, 2012) which concluded that rubber exports were significantly influenced by domestic rubber production, producer prices, exchange rates, domestic consumption and interest rates. While cocoa exports are significantly affected by cocoa output, domestic consumption and rainfall. Research conducted by (Alkhteeb & Sultan, 2015) concluded that agricultural exports in India were significantly affected by demand for agricultural goods, real exchange rates, production and per capita income. Real exchange rates and per capita income have a negative effect on exports, while production and demand for agricultural goods have a positive effect on agricultural exports in India. (Samanhudi, 2009) states that the prices of agricultural products, namely oil palm, rubber and cocoa, US GDP, and exchange rates have a significant effect on exports of agricultural products, while the population has no significant effect on exports of agricultural products to the United States.

Ari & Cergibozan (2017) research in Turkey using the VECM method found that the devaluation of the exchange rate and the increase in domestic income would increase the trade balance in the long run, while the increase in foreign income would worsen the trade balance. In the short term domestic and foreign income has a negative effect, while the exchange rate has no effect on trade. Meanwhile, (Kennedy, 2013) and (Rahmawati, 2014) found that there was a positive and significant relationship between the exchange rate and the trade balance. The same thing was expressed by (Muhammad, 2010), (Akbostanci, 2002) and (Yazici & Islam, 2012) which concluded that in the short term the exchange rate has a positive and significant influence on the trade balance. (Khatoon & Rahman, 2009) in their study concluded that in the long run the exchange rate and foreign income had a positive and significant effect on the trade balance but domestic income had a negative effect. Whereas, in the short term all variables have a positive effect.

Ray (2012) analyzed the trade balance determinants in India and found that in the long run the exchange rates, FDI, domestic consumption and foreign income had a positive and significant effect on the trade balance. Meanwhile in the short term FDI and foreign income have a positive and significant effect. While domestic consumption and exchange rates have a negative effect on trade. (Shawa, Moses Joseph & Shen, 2013) conclude that the factors that influence the trade balance are FDI, development of human capital, household consumption expenditure, government expenditure, inflation, availability of natural resources, foreign income and trade liberalization. Furthermore (Ali, 2017) in his research concluded that in the long run the exchange rate, real per capita GDP, financial costs, credit to the private sector

and investment have a significant effect on the trade balance, while in the short term all variables have no influence on the trade balance.

Mete & Bozgeyik (2017) in their research in Turkey found that FDI, foreign income and the real exchange rate had a positive and significant effect, while domestic consumption and real interest rates had no effect on the trade balance. Whereas (Sharif, M. N., & Sheikh Ali, 2016) in their research found that FDI and the real exchange rate had a positive and significant effect, while inflation had no effect on the trade balance in Somalia. On the other hand, (Ademe, 2016) using the VECM method concludes that in the short term inflation previously affected the trade balance negatively and significantly.

Yuen-ling & Geoi-mei (2002) conclude that in the long run there is a positive and significant relationship between exchange rates and domestic income with the trade balance but negatively related to foreign income. Conversely, in the short term domestic income has a negative effect and foreign income has a positive effect. (Baek, Koo, & Mulik, 2009) in his study also found that in the long run US domestic income was positively related to the trade balance with Mexico, France, Italy and the Netherlands, but negatively related to the trade balance with Canada, Australia and Indonesia. (Arize & Osang, 2007) concluded that an increase in foreign exchange reserves could lead to an increase in imports. (Hibbert, Thaver, & Hutchinson, 2012) concluded that in international trade between Jamaica and US foreign exchange reserves did not affect imports.

Methods

The data used in this study from the period 1987-2016 which is secondary data obtained from related institutions or agencies such as the Central Statistics Agency, the Ministry of Agriculture and the Worldbank website.

The analysis used in this study is Error Correction Model (ECM). ECM is a technique for correcting short-term imbalances towards the long-term balance introduced by Sargan and popularized by Engle and Granger. By definition, error correction mechanism is a means of reconciling the short run behavior (or value) of an economic variable with its long run behavior (or value). To use the ECM model there must be a cointegration relationship between variables. Data processing begins with unit root testing. The test used in this study is the Augmented Dickey-Fuller test (ADF). After the unit root test then proceed with the optimal lag length test. After that the ECM model is formed by using residuals from the long-term equations or cointegrated equations. Residuals from long-term equations are used as error correction terms that affect short-term equations. The ECM model in this study can be written as follows:

$$\Delta LogTB = \beta_0 + \beta_1 \Delta logER + \beta_2 \Delta logYd + \beta_3 \Delta logYf + \beta_4 \Delta logFER + \beta_5 \Delta INF + U_{t-1} \quad \ldots\ldots \quad (1)$$

Where TB is the trade balance of Indonesia's plantation subsector, ER is the exchange rate, Yd is domestic income, Yf is foreign income, FER is foreign exchange reserves and INF is inflation.

Results and Discussion

Unit Root Test

Before testing the whole model, the data stationarity test is first done. Stationary data testing used for all variables in the model is based on Augmented Dickey Fuller test (ADF test). The results of the stationary test calculations presented in Table 1 show that not all variables included in the model are significant at the level of 5%.

However, the stationary level was achieved in the ADF test on the 1st difference for all variables, namely the plantation subsector trade balance, the exchange rate, domestic income, foreign income, foreign exchange reserves and inflation. Because, stationary data on the first difference model can be continued with VECM analysis.

Table 1 Unit Root Test Results

Variabel	Augmented Dicky Fuller (ADF)	
	Level	*First difference*
LTB	0,5329	-4,6954*
LEXR	-2,2394	-6,1749*
LYD	-0,4527	-3,8050*
LYF	1,5388	-4,2889*
LFER	-6,111	-5,7771*
INF	-4,4140	-6,4363*

Source: Secondary data (Processed), 2018
*) significant at alpha 95%

Determination of Optimal Lag Length

One of the problems that occur in stationary testing is optimal lag. It is necessary to specify optimal lag length, as too few lags means that regression residuals does not behave like white noise processes and too many lags reduces the power of the test to reject the null hypothesis of unit root. Lag Length Criteria test results as shown in Table 2 below:

Table 2 Lag Length Criteria Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-55.73729	NA	3.31e-06	4.409807	4.695279	4.497078
1	149.8240	308.3419	1.94e-11	-7.701714	-5.703407	-7.090812
2	220.3668	75.58155*	2.45e-12*	-10.16906*	-6.457914*	-9.034522*

Source: Secondary data (Processed), 2018

The number of lags is determined by the criteria for information recommended by Final Prediction Error (FPE), Aike Information Criterion (AIC), Schwarz Criterion (SC) and Hannan-Quinn (HQ). The results in the test of lag length are determined by the number of most stars recommended from each lag test criteria. Referring to the table above, the optimal lag is 2. This means that the optimal influence of an independent variable on the dependent variable occurs in the second year.

Long Term Analysis

Based on the estimation results with Ordinary Least Square (OLS) in Equation 2 shows that the exchange rate (ER), domestic income (Yd), foreign income (Yf) and inflation (INF) have a significant effect, while foreign exchange reserves (FER) have no significant effect on trade balance of the Indonesian plantation subsector that is at a 5 percent significance level.

$$LogTB_t = 13.189 - 1.659logER_t - 1.534logYd_t + 2.469logYf_t + 0.363logFER_t + 0.018INF_t \quad .....(2)$$
$$(0.054) \quad (0.000)^{**} \quad (0.049)^{**} \quad (0.000)^{**} \quad (0.270) \quad (0.010)^{**}$$

The estimation result in Equation 3 shows that the exchange rate has a negative and significant effect on the trade balance of the Indonesian plantation subsector, which means that if the real exchange rate depreciate by 1 percent, the trade balance decreace by 1.66 percent. This means that when the depreciation rate will decrease the trade balance. Any exchange rate depreciation is expected to improve the trade balance, but for trade in the plantation subsector in Indonesia negatively affects the balance of the trade balance. This finding is consistent with the results of (Yazici & Islam, 2012), (Ali, 2017), (Sertoglu & Dogan, 2016) and (Chebbi & Olarreaga, 2011) which concluded that there was a negative and

significant relationship between the exchange rate and the trade balance. But this is contrary to the findings of (Mete & Bozgeyik, 2017) and (Korap, L., Irhan, B., & Alacahan, 2011).

In addition, domestic income has a negative and significant effect on the trade balance of Indonesia's plantation subsector, which means that when domestic income increases by 1 percent it can reduce the trade balance of the plantation subsector by 1.52 percent. As expected, the coefficient shows a negative impact on the trade balance. This means that increasing domestic income will cause demand for higher goods and services including foreign goods. Therefore, there will be a negative impact on the trade balance through increased imports from abroad. This is consistent with the research of (Sertoglu & Dogan, 2016), (Rahmawati, 2014), (Duasa, 2007) and (Korap, L., Irhan, B., & Alacahan, 2011) which concluded that there was a negative and significant relationship between domestic income and the trade balance.

Foreign income affects the trade balance of Indonesia's plantation subsector in a positive and significant, which means an increase in foreign income of 1 percent can increase the trade balance by 2.47 percent. An increase in foreign income can increase consumption of foreign people towards domestic products so that exports increase and the trade balance becomes a surplus. The results of this study are in line with the research of (Muhammad, 2010), Khan and Hossein (2010), (Alhanom, 2016), (Korap, L., Irhan, B., & Alacahan, 2011) and (Mete & Bozgeyik, 2017) which concluded that there is a positive and significant relationship between foreign income and the trade balance.

Foreign exchange reserves have no significant influence on the trade balance of the plantation subsector, meaning that foreign exchange reserves do not affect the changes in the trade turnover of the plantation subsector trade balance. (Hibbert et al., 2012) concluded that in international trade between Jamaica and US foreign exchange reserves did not affect imports. On the other hand, inflation positively and significantly affects the trade balance of Indonesia's plantation subsector, an increase in inflation of 1 percent can increase the trade balance by 0.02 percent. This means that when inflation increases, the trade balance of the plantation subsector also increases. The same thing was also found by (Muzammil & Ahad, 2015) where inflation had a positive and significant influence on the trade balance.

The long-term balance of the trade balance of Indonesia's plantation subsector can be seen in equation 3.

$$\Delta RES_t = -\underset{(0.005)^*}{0.570}\ RES_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

The estimation results show that the lag error term test significantly affects the change in error in the trade balance of the Indonesian plantation subsector at alpha 5 percent. This means that the exchange rate, domestic income, foreign income, foreign exchange reserves and inflation affect the trade balance of the Indonesian plantation subsector and can achieve a balance of trade balance in the long term.

Short-term analysis

Based on the estimation results in equation 4 shows that the error correction term has a significant effect on the trade balance of the Indonesian plantation subsector at alpha 5 percent. This means that there is an imbalance in the short-term relationship between exchange rates, domestic income, foreign income, foreign exchange reserves and inflation on the trade balance of Indonesia's plantation subsector.

$$D(LTB) = -1{,}11 + 0{,}60\ D(LER(-1)) + 3{,}51\ D(LER(-2)) - 2{,}41\ D(LYD(-1)) + 14{,}87\ D(LYD(-2)) + 5{,}45\ D(LYF(-1)) - 0{,}07\ D(LYF(-2)) + 0{,}04\ D(LFER(-1)) - 0{,}03\ D(LFER(-2)) -$$

0,03 D(INF(-1)) – 0,03 D(INF(-2)) - 0,82*ect* ………………………………… (4)

The exchange rate in lag 1 did not have a significant effect on the trade balance of the Indonesian plantation subsector which caused an imbalance in the trade balance of the plantation subsector. Then the exchange rate in lag 2 has a significant effect on the trade balance of the Indonesian plantation subsector. This means that the exchange rate in the second lag is stabilized even the depreciation of the rupiah exchange rate against the dollar can improve the trade balance of the Indonesian plantation subsector. The results of this study are consistent with the research of (Khatoon & Rahman, 2009), (Yuen-ling & Geoi-mei, 2002), (Akbostanci, 2002) and (Yazici & Islam, 2012) which concluded that in the short term the exchange rate has a positive and significant influence on the trade balance.

Base on Table 3, domestic income in lag 1 had no significant effect on the trade balance of the Indonesian plantation subsector, which means that the imbalance in the trade balance of the plantation subsector was also influenced by domestic income. However, on lag 2 domestic income has a significant effect on the trade balance of the plantation subsector, where an increase in domestic income can improve the trade balance of the plantation subsector. This finding is in line with the research of (Khatoon & Rahman, 2009) and (Eke & Obafemi, 2015) which concluded that in the short term domestic income had a significant effect on the trade balance.

Foreign income in lag 1 have a significant effect on the trade balance of Indonesia's plantation subsector. This means that an increase in foreign income can increase consumption of foreign people towards domestic products thereby increasing the trade balance. This is according to the findings of (Ray, 2012), (Khatoon & Rahman, 2009) and (Yuen-ling & Geoi-mei, 2002) that in the short term foreign income can improve the trade balance. While on foreign income lag 2 does not affect the trade balance of the plantation subsector. On the occurrence of short-term trade balance imbalances.

Table 3. Vector Error Correction Model Test Result

Short Run		
Variabel	Coeficient	t-statistics
CointEq1	-0,8148	-2,7597
D(LER(-1))	0,6037	0,5156
D(LER(-2))	3,5068	2,4782**
D(LYD(-1))	-2,4074	-0,4759
D(LYD(-2))	14,8702	2,2786**
D(LYF(-1))	5,4497	2,3881**
D(LYF(-2))	-0,0709	-0,0249
D(LFER(-1))	0,0372	0,0956
D(LFER(-2))	-0,2588	-0,7478
D(INF(-1))	-0,0278	-1,4464
D(INF(-2))	-0,0260	-2,3445**
C	-1,01966	-2,1400
R-squared	0,7552	
Adj. R-squared	0,5105	
**, significant at α=5%		

Source: Secondary data (Processed), 2018

Meanwhile foreign exchange reserves both in lag 1 and lag 2 have no significant effect on the trade balance of Indonesia's plantation subsector. This means that foreign exchange reserves affect the trade balance imbalance in the short term. (Hibbert et al., 2012) concluded

that in international trade between Jamaica and US foreign exchange reserves did not affect imports. On the other hand, inflation at lag 1 also did not have a significant effect on the trade balance of Indonesia's plantation subsector which caused an imbalance in the trade balance. However, this condition stabilized again in lag 2 where inflation had a significant effect on the trade balance. (Hakim, A & Kusuma, 2012) and (Ademe, 2016) also found that in the short term inflation affects the trade balance negatively and significantly. Inflation affects the trade balance through increased imports. Domestic inflation in the previous year could reduce foreign demand to import from domestic and this will have an impact on exports.

Impulse and Response Analysis

The function of the response to shocks serves to see the response of the dynamics of each variable if there is a certain shock of one standard error. This response shows the influence of a dependent variable shock on the independent variable. The response to shock analysis in this study aims to determine the role of innovation variables from each variable such as exchange rate, domestic income, foreign income, foreign exchange reserves and inflation on the trade balance of the plantation subsector. The results of processing impulse response can be seen in Figure 1.

The response given by the trade balance of the plantation subsector due to the shock of the exchange rate showed a negative response. The decline occurred in period 1 to period 3, entering period 4 there was an increase and this increase continues until period 10 although it is still in a negative trend. While the response to the trade balance of the plantation subsector due to the shock of GDP also shows a negative trend. This can be seen from the IRF line which is below the horizontal line.

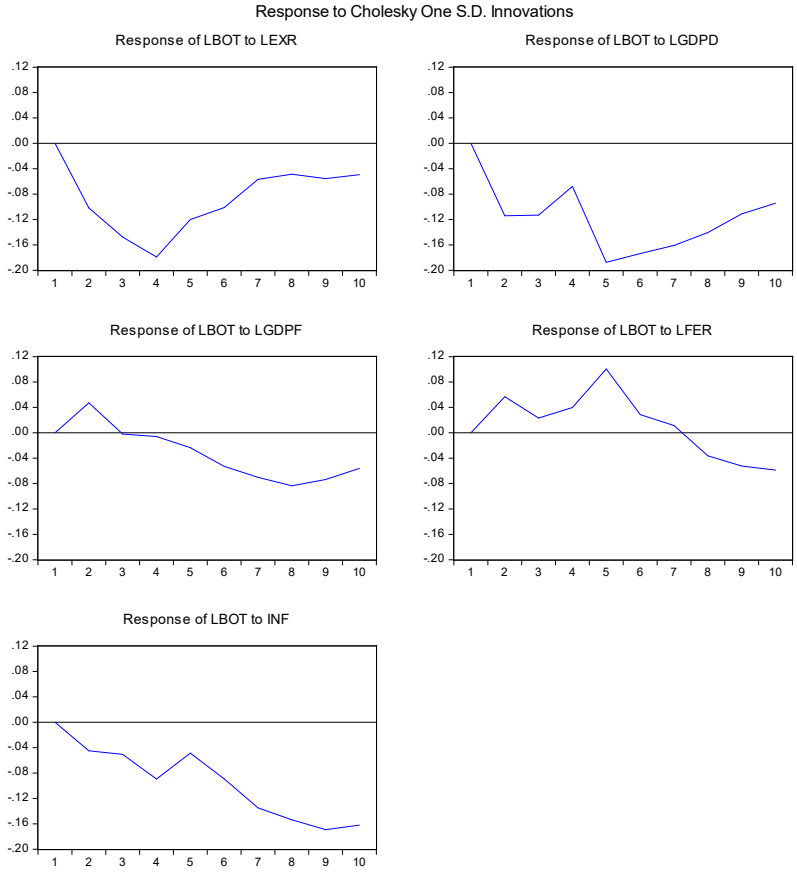

Figure 1 Impuls response function

Then, the trade balance of the plantation subsector began to respond to the shock of foreign income with a positive trend, but entering the second period moved downward. In the period 3 to 10 the trade balance shows a negative response. While the response of the trade balance of the plantation subsector to the shock of foreign exchange reserves showed a positive trend up to period 6, entering the 7th period the trade balance response showed a negative trend up to period 10. Meanwhile, the response of the plantation subsector trade balance due to inflation shock showed a negative trend, seen from the IRF line below the horizontal line.

Conclusion

Based on the results of research on exchange rates, domestic income, foreign income, and inflation have a significant effect on the trade balance of the Indonesian plantation subsector. While foreign exchange reserves have no significant effect on the trade balance of the Indonesian plantation subsector.

The results of the study with cointegration tests also found that the variables of exchange rate, domestic income, foreign income, foreign exchange reserves and inflation have a long-term balance relationship. But in the short term there is an imbalance in the trade balance of the Indonesian plantation subsector. This imbalance occurs because there is a disturbance in the exchange rate and domestic income in lag 1, foreign income in lag 2, inflation in lag 1 and foreign exchange reserves in the short term. This needs to be a serious concern for policymakers and the Indonesian government to deal with the trade balance of the plantation subsector so that the trade balance can be achieved. Increased investment in the plantation subsector needs to be done so that production increases and output quality can compete at the global level so that foreign exchange reserves can also increase. On the other hand, the role of the government is also needed in making policies to stabilize the exchange rate problem and inflation which can cause long-term problems in the trade balance of Indonesia's plantation subsector.

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