Effects of Nominal Exchange Rates and Domestic Outputs on Imports (Analysis of national food security commodities in ASEAN Countries)

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Abstract

Most ASEAN countries are producing agricultural commodities in the form of; rice, maize, soybeans, sugar cane (sugar products) and cassava. However to meet domestic needs, almost all ASEAN countries import agricultural commodities. The purpose of the research is to analyze; effects of nominal exchange rates and domestic output on imports of agricultural commodities; rice, maize, soybeans, cassava and sugar in ASEAN countries. This study uses panel data of 9 ASEAN countries from 2012 to 2018. The analysis method uses panel analysis of Common Effect Model log (CEM log), Fixed Effect Model log (FEM log) and Random Effect Model log (REM log). The analysis found that the exchange rate had a positive and significant effect on the import of rice, sugar, maize, soybean and cassava in ASEAN countries. Domestic output has a positive and significant effect on imports of maize, soybean and cassava commodities and does not have a significant effect on imports of rice and sugar commodities in ASEAN countries..

Keywords: nominal exchange rate, output domestic, import of agricultural commodity

Introduction

The agricultural sector still plays an important role in the economies of ASEAN countries, especially sources of income from exports, drivers for social development, inclusive growth, guaranteed food availability for residents and sources of employment opportunities (Teng et al, 2016).

Agricultural exploitation in ASEAN countries is supported by the availability of agricultural land. Countries in ASEAN have relatively extensive agricultural land, namely Indonesia with an area of 570 000 km2, Thailand with an area of 221 100 km2, Myanmar with an area of 126 450 km2, Philippines with an area of 124 400 km2, Viet Nam with an area of 108 737 km2, while Countries of Malaysia, Cambodia and Laos PDR have relatively narrow agricultural land that is the area of agricultural land respectively 78 390 km2, 54 550 km2 and 23 390 km2. However, in terms of per capita agricultural land area for the 8 ASEAN countries, narrow land depth can be grouped because all countries have agricultural land area <0.5 ha (World Bank, 2017 in the OECD-FAO Agricultural Outlook 2017-2026).

The agricultural commodities cultivated in the 8 ASEAN countries mentioned above are mainly related to national food security in the form of: rice or rice, corn, soybeans, sugar cane or sugar and cassava. The development of production of each commodity during the 2017-2018 period is as follows; rice or rice production by 2.21%, maize production growth by 1.35%, sugarcane or sugar production grew by 3.39%, and cassava production growth rate by 1.52%. This data shows that the production growth of rice, corn, sugar and cassava commodities is relatively low. For soybean production growth shows a relatively high production growth rate of 25.22%. (World Bank, 2017 in the OECD-FAO Agricultural Outlook 2017-2026). However, some of these commodities are also exported, namely sugar and cassava, with export growth of 6.94% and 2.57%, respectively. The increasing domestic demand for these commodities pushed ASEAN countries to import. The development of the imports of these five food security commodities is presented in Figure 1.

The data in Figure 1 contains imports of agricultural commodities in the form of; rice, maize, sugar, soybean, and cassava in the ASEAN countries for the 2017-2018 period. The lowest number of imports is for rice, sugar and soybean, and the amount of imports of maize and cassava is relatively high. Judging from the growth rate of imports for the five commodities, the highest import growth rate was for cassava commodities

which amounted to 22.45% and rice commodities amounted to 20.10%, while the rate of import growth for soybean and maize commodities was respectively 5, 70% and 4.01%. specifically for sugar commodity has a negative import growth rate of -0.24%.
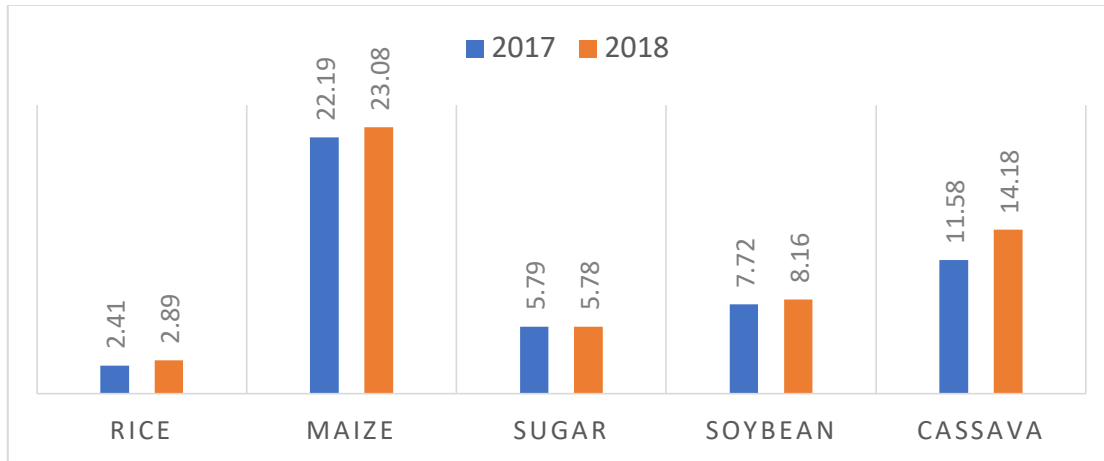

Figure 1. Imports of Agricultural Commodities in ASEAN Countries (Millions ton)
Source: ASEAN Agricultural Commodity Outlook (2017)

Import growth from the commodities of rice, maize, sugar, soybean and cassava above is influenced by the amount of domestic demand (Figure 2)
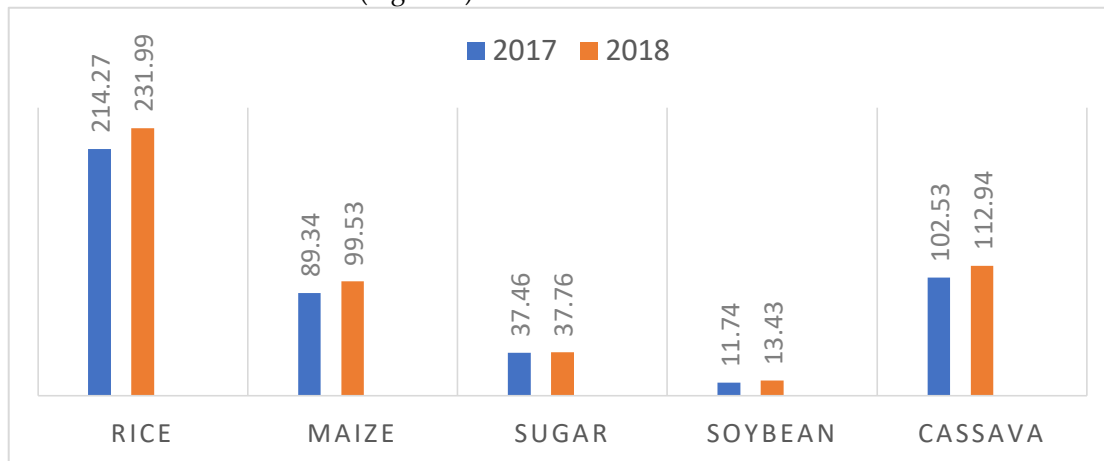

Figure 2. Demand for Agricultural Commodities in ASEAN Countries (Million tons)
Source: ASEAN Agricultural Commodity Outlook (2017)

In Figure 2 the development of agricultural commodity demand is presented; rice, maize, sugar, soybean and cassava in ASEAN countries for the period 2017-2018. From the picture it can be seen that the 3 commodities that have the highest demand are rice, cassava and maize, while the commodities that have a relatively low number of requests are sugar and soybean. In terms of the growth rate of demand for these 5 commodities, the highest growth rate of demand is for soybean commodities at 14.40 %% and maize at 11.40%, and cassava at 10.16%, while the growth rate of demand for rice and sugar is relatively low respectively 8.27% and 0.80%.

The policies of the governments of ASEAN countries in the field of agriculture with regard to food security are different; for the countries of Singapore and Brunei Darussalam is to import. But for the countries of Indonesia and Thailand is to do self production. ASEAN member countries have different policies towards

commodity food security (Teng et al, 2016). For ASEAN countries that produce food security products, the implementation of imports will certainly consider various things in the form of; the availability of products in the country, farmers' income, the price of these products in the country, and other negative effects from the implementation of imports, therefore the governments of several countries implement a policy of import restrictions. Apart from that, the state's decision to import especially for food security commodities also takes into account other variables such as the country's exchange rate and domestic income. However Ammani (2013) found that exchange rate deregulation did not reduce rice imports.

The Heckscher-Ohlin model deals with differences in the role of resources in trade. This model shows that comperative advantage is influenced by the interaction between resources in the form of relatively abundant production factors and production technology in the form of the intensity of the use of production factors. A country will produce commodities using abundant factors and then export, and the country will import commodities produced using rare production factors (Krugman, et al 2018).

Based on the H-O model, a country will import products where the country experiences a scarcity of production factors. Thus countries that have the availability of agricultural land and labor that will produce a lot of agricultural products, and vice versa countries that have the availability of capital will produce industrial products, resulting in exports and imports. But now in international trade there is openness in goods.

According to Blanchard (2017) openness in goods markets is the ability of consumers and firms to choose between domestic goods and foreign goods. In an open economy, consumers are faced with two decisions to buy domestic products or to buy foreign products. This opinion shows that in the domestic economy there are two groups of commodities, namely commodities produced by domestic and imported commodities.

The volume of imports of a country depends positively on national income where an increase in domestic income (domestic output) will increase imports (Pugel, 2012; Blanchard, 2017; Appleyard and Field, 2017). Muslim (2014) found in his research that in the long run Indonesia's GDP has an influence on soybean imports in Indonesia. The policy of a country to limit imports through a policy of tariff or non-barrier barriers is; 1). Increase domestic production of the product. 2) Increase employment of labor and other resources in this domestic production. There is no single country that can truly choose free from restrictions, but there are still tariffs, import taxes, and import quotas even with low restrictions (Pugel, 2012). Modern governments use 3 forms of policy to control trade in the form of tariffs, quotas, and export subsidies. Quota is a legal limit of a number of goods that can be imported (Baumol and Blinder, 2016). Import quotas will always increase domestic prices of imported commodities (Krugman, et al 2018). The results of the Ammani study (2013) found that an increase in domestic rice production did not create confidence in the deegulation of the exchange rate so that it did not reduce rice imports in the country.

Imports of a country will be influenced by the country's currency rates. Blanchard (2017) Nominal Exchange Rate between 2 currencies of 2 countries as the price of the domestic currency in terms of foreign currency. As the price of the foreign currency in terms of the domestic currency. appreciation in the real exchange rate will increase imports. Krugman and Obstfeld, (2003: 327) argued that if a country's currency depreciates the domestic population will obtain imported goods from abroad more expensive and if the currency of a country is appreciated domestic consumers will pay cheaper prices for imported products Depreciation of the currency has an effect on trade balance, if currency depreciation means that an increase in the price of imported commodities and a decrease in the quantity of imports. Thus if a country's currency exchange rate depreciates it will cause a decrease in the number of imports. Several research results have found a negative effect of this exchange rate on rice and soybean imports (Muslim, 2014; Mosavi, et al. 2014).

Methods

The data in this study is a panel that is a combination of cross section data with time series (Gujarati, 2010). This research data covers 9 ASEAN countries from 2012 to 2018. Countries that are the objects of research: Brunei, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. In

this study the country of Cambodia was excluded because of the unavailability of data. The variables in this study consisted of: 1). Nominal Exchange Rate (NER), 2). Domestic output (Y) is measured in million US dollars 3). Import (M) is measured in million tons. Analysis was carried out on agricultural commodities in ASEAN Countries, namely: 1) rice, 2) maize, 3) soybean, 4) sugar, and 5). Cassava.

Regression equation model for rice commodity

$logMR_{it} = \alpha + \alpha 1 log\ NER_{it} + \alpha 2 log Y_{it} + log\ u$ ....(1)

MR = Import rice

NER = Nominal Exchange Rate of ASEAN countries

Y = Domestic Output of ASEAN countries

Regression equation model for maize commodity;

$logMM_{it} = \alpha 3 + \alpha 4 log\ NER_{it} + \alpha 5 log Y_{it} + log u$ ....(2)

MM = Import of Maize

Regression equation model for sugar commodity

$log\ MSug_{it} = \alpha 6 + \alpha 7 log\ NER_{it} + \alpha 8 log Y_{it} + log u$ ....(3)

MSu = Importing of Sugar

Regression equation model for soybean commodity

$logMSoy_{it} = \alpha 9 + \alpha 10 log\ NER_{it} + \alpha 11 log Y_{it} + log u$ ....(4)

MSoy = Import of Soybean

Regression equation model for Cassava commodity

$logMCas_{it} = \alpha 12 + \alpha 13 log\ NER_{it} + \alpha 14 log Y_{it} + log u$ ....(5)

MCas = Import of Cassava

Data were analyzed using panel regression with common effects, fixed effects and random effects methods, while to determine which method is more appropriate with this study, the Lagrange Multiplier Test, Chow Test and Hausman Test were used.

Results and Discussion

Results

Data presented below illustrates the population and GDP per capita in ASEAN countries, because the population of each country and GDP per capita are expected to affect the demand for agricultural products in ASEAN countries.

Table 1. Number of Population and GDP Per Capita of ASEAN Countries

No	Country	Population (millions)	GDP Per capita
1	Cambodia	15.6	1.159
2	Indonesia	257.6	3 346
3	Lao PDR	6.8	1 818
4	Malaysia	30.3	9 768
5	Myanmar	53.9	1.161
6	Philippines	100.7	2 904
7	Thailand	68.08	5 815
8	Viet Nam	91.7	2 111

Source: World Bank (2017) World Development Indicators, (in OECD-FAO Agricultural Outlook 2017-2026)

From Table 1 it can be seen that the three countries that have the largest population are Indonesia, the Philippines and Viet Nam. Large population will require a large demand for agricultural commodities, especially the availability of food such as; rice, maize, soybean, sugar and cassava. Apart from that the GDP per capita of the population of each country will affect the demand for agricultural commodities originating from imports. From the data it can be seen that countries with high GDP per capita are Malaysia and Thailand, while countries with GDP per capita are in the middle group, namely Indonesia, the Philippines and Viet Nam. ASEAN group of countries with low GDP per capita are Myanmar and Cambodia.

1. Effects of NER and Domestic Output on Rice Import

Based on the results of the panel data regression analysis the probability value (F-statistic) is less than 0.05, it can be concluded that the model can simultaneously be accepted. The value of R^2 is 0,983. This shows that the contribution of nominal exchange rate (NER) and domestic output (Y) variables to rice imports in ASEAN countries is 98.3%, while the remaining 1.7% is influenced by other variables not included in the model .

The model chosen in the rice commodity regression is the Random Effect Model Log (REM log).

$$\text{LogMR} = 9.46 + 1.13 \text{ LogNER} - 9.37 \text{ LogY} \quad \dots\dots\dots(6)$$

The analysis shows that an increase in NER of 1 percent, rice imports increased by 1.13 percent assuming other variables are considered constant in ASEAN countries. Y increase of 1 percent, then rice imports decreased by 9.37 percent assuming other variables are considered constant (cateris paribus) in ASEAN countries. Partial test (t test) shows that NER has a positive and significant effect on rice imports, while Q has a negative effect on ASEAN rice imports but is not significant.

2. Effect of NER and Domestic Output on Maize Import

Based on the results of the panel data regression analysis of imported corn models, the probability value (F-statistic) is obtained less than 0.05. which means that, the model can simultaneously be accepted. R^2 value of 0.62. This shows that the contribution of the Nominal Exchange Rate (NER) and domestic output (Y) variables to corn imports is 62%, while the remaining 38% is influenced by other variables not included in the model.

The model chosen for the corn commodity regression is the Common Effect Model Log (CEM log).

$$\text{logMM} = -26.29 + 0.23 \text{ logNER} + 1.45 \text{logY} \quad \dots\dots\dots(7)$$

The analysis shows that an increase in NER of 1 percent, so corn imports increased by 0.23 percent assuming other variables are considered constant in ASEAN countries. Y increase of 1 percent, then maize imports increased by 1.45 percent assuming other variables are considered constant in ASEAN countries. Partial test (t test) shows that NER and Y have positive and significant effect on maize imports in ASEAN countries.

3. Effect of NER and Domestic Output on Sugar Import

Based on the results of the panel sugar model regression analysis of imported sugar, a probability value (F-statistic) of less than 0.05 means that the model can simultaneously be accepted. R^2 value of 0.986. This shows that the contribution of the Nominal Exchange Rate (NER) and domestic output (Y) variables to sugar imports amounted to 98.6%, while the remaining 1.4% was influenced by other variables not included in the model.

The model chosen for sugar commodity regression is the Fixed Effect Model Log (FEM log).

$$\text{logMSug} = -17.48 + 2.49 \text{ logNER} + 0.67 \text{logY} \quad \dots\dots\dots(8)$$

The analysis shows that an increase in NER of 1 percent, sugar imports increased by 2.49 percent assuming other variables are considered constant in ASEAN countries. Y increase of 1 percent, then corn imports increased by 0.67 percent assuming other variables are considered constant in ASEAN countries. Partial test (t test) shows that NER and Y have positive and significant effect on sugar imports, but Y has no significant effect on sugar imports in ASEAN countries.

4. Effect of NER and Domestic Output on Soybean Imports

Based on the results of the panel soybean model data regression analysis, the probability value (F-statistic) is less than 0.05, meaning that the model can simultaneously be accepted. The R2 value is 0.664. This shows that the contribution of the Nominal Exchange Rate (NER) and domestic output (Y) variables to Soybean imports is 66.4%, while the remaining 33.6% is influenced by other variables not included in the model.

The model chosen in the soybean commodity regression is the Common Effect Model Log (CEM log).

logMSoy = -33.85 + 0.23logNER + 1.71 logY..(9)

The analysis shows that an increase in NER of 1 percent, so soybean imports increased by 0.23 percent assuming other variables are considered constant in ASEAN countries. Y increase of 1 percent, then soybean imports increased by 1.71 percent assuming other variables are considered constant in ASEAN countries. Partial tests (t test) indicate that NER and Y have a positive and significant effect on soybean imports of ASEAN countries.

5. Effect of NER and Domestic Output on Cassava Imports

Based on the results of the panel data regression analysis of cassava import models, the probability value (F-statistic) obtained is less than 0.05. means that the model can simultaneously be accepted. R2 value of 0.663. This shows that the contribution of the Nominal Exchange Rate (NER) and domestic output (Y) variables to cassava imports is 66.3%, while the remaining 33.7% is influenced by other variables not included in the model.

The model chosen for cassava commodity regression is the Common Effect Model Log (CEM log).

logMCas = -40.37 + 0.58logNER + 1.84 logY..(10)

The analysis shows that an increase in NER of 1 percent, cassava imports increased by 0.58 percent assuming other variables are considered constant in ASEAN countries. Increased domestic output (Y) by 1 percent, cassava imports increased by 1.84 percent, assuming other variables are considered constant in ASEAN countries. Partial test (t test) showed that NER and Y had a positive and significant effect on cassava imports in ASEAN countries.

Discussion

Analysis using Eviews 9 and panel data regression analysis methods, namely the Common Effect Model log (CEM log), Fixed Effect Model log (FEM log) and Random Effect Model log (REM log). Panel data regression model for rice import using REM log, panel data regression model for import of maize, soybean, cassava using CEM log, and panel data regression model for import of maize using FEM log.

The NER variable has a positive and significant effect on rice imports. The results of this study indicate that the higher the NER the increasing imports of rice commodities in ASEAN countries. The results of this study are not relevant to the theory put forward by Krugman and Obstfeld, (2003: 327), because the higher the NER means that the currencies of ASEAN countries depreciate, the price of imported commodities will be more expensive. The above conditions are thought to be caused by several things namely; the increasing domestic demand while the domestic production is not sufficient to meet the needs, thus encouraging the government to increase imports in the short term. Nevertheless the above findings are relevant to the findings of Rungkat (2014) and are not relevant to the results of Sari's research (2014). Variable Y has a negative effect on ASEAN rice imports but is not significant. The findings of this study indicate that rice imports are not dependent on national income in ASEAN countries, this is because rice commodity is a staple food for the population so domestic availability must meet domestic demand. The results of this study are also not relevant to the theory which states that increasing Y also increases imports (Pugel, 2012; Blanchard, 2017; Appleyard and Field, 2017). however this finding is relevant to the research conducted (Ammani, 2013: Muslim, 2014; Mosavi et al, 2014; Armaini and Gunawan, 2016).

The NER variable has a positive and significant effect on maize imports in ASEAN countries, this finding shows that the more depreciated currencies in ASEAN countries will also increase the amount of maize

imports. This condition occurs in the short term due to increasing domestic demand for maize which cannot be met by the amount of domestic production, so that maize imports continue to be conducted even though the exchange rate in ASEAN countries has depreciated. This finding is not relevant to the theory (Krugman and Obstfeld, 2003: 327), nor is it relevant to the results of Sudirman's research (2015), but this finding is supported by the findings of Reavania (2014) who find that in the long run the exchange rate has a positive and significant effect on imports maize in Indonesia.

The domestic output variable (Y) has a positive and significant effect on maize imports in ASEAN countries. This meeting indicates that the more domestic output (Y), the more imported corn in ASEAN countries.This finding is supported by theory (Blanchard, 2017; Appleyard and Field, 2017), and is also relevant to the findings (Revania, 2014: Singgih and Sudirman, 2015).

Similar to maize commodity, for sugar commodity it was found that the NER variable had a positive and significant effect on sugar imports, but the domestic output variable (Y) did not have a significant effect on sugar imports in ASEAN countries. The positive and significant effect of the NER variable on sugar imports means that the higher the exchange rate of ASEAN countries, the higher the amount of sugar imports. This is partly due to sugar, including food that is much needed by the population, therefore its availability in the country in sufficient quantities is very important. If domestic sugar production is insufficient, the government implements an import policy that is generally based on import quotas. In this connection, even though the nominal exchange rate is depreciating, the government continues to import. The same condition also caused Domestic Output not to have a significant influence on sugar imports in ASEAN Countries.

The NER variable has a positive and significant effect on soybean imports in ASEAN countries. This finding indicates that the higher (depreciation) of the nominal exchange rate the Soybean imports will increase in ASEAN countries. This finding is irrelevant to the theory that if a country's currency depreciates then the price of foreign commodities becomes expensive for the domestic population (Krugman and Obstfeld, 2003: 327). Furthermore this finding is also not in line with Zhang et al (2010) and Muslim (2014) that soybean importers are sensitive to exchange rate risk, and the exchange rate has a negative effect on soybean imports. Domestic Output Variable (Y) has a positive and significant effect on soybean imports in ASEAN countries. This finding is consistent with the theory put forward by (Blanchard, 2017; Appleyard and Field, 2017).

The NER variable has a positive and significant effect on cassava imports in ASEAN countries. This finding shows that the higher the NER the increasing number of cassava imports in ASEAN countries, cteris paribus assumption. The results of this study are not relevant to the theory that if a country's currency depreciates, the price of imported commodities becomes expensive for domestic residents, so the amount of imports decreases (Krugman and Obstfeld, 2003: 327). these findings include Domestic Output Variable (Y) positive and significant effect on cassava imports in ASEAN countries. In line with the theory that the volume of imports of a country depends positively on national income where an increase in domestic output will increase imports (Pugel, 2012: Blanchart, 2017: Appleyard and Field, 2017).

Conclusions

Nominal Exchange Rate (NER) and Domestic Output (Y) have different effects on the import of rice, maize, sugar, Soybean, and Cassava. Specifically for the Nominal Exchange Rate (NER) variable, it has a positive influence on imports of agricultural commodities; rice, maize, sugar, Soybean and Cassava. This means that the higher the NER the higher the import of the 5 agricultural commodities in the short term. The results of this study indicate that the depreciation of the currency exchange rates in ASEAN countries did not cause imports of agricultural food security commodities to decline, even increasing. This condition occurs because domestic demand exceeds the domestic production of this agricultural commodity. Domestic Output Variable (Y) has different effects on the import of rice, maize, sugar, soybean, and cassava. The domestic output variable (Y) has no significant effect on the import of rice and sugar commodities in ASEAN countries but has a positive and significant effect on the import of maize, soybean and cassava in ASEAN countries.

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