ANALYSIS OF FACTORS AFFECTING THE VOLUME OF APPLE IMPORTS IN INDONESIA

Elpawati[1], Puspi Eko Wiranthi[2], Gita Tri Nurrani[3]
[1,2,3]Agribusiness Study Program, UIN Syarif Hidayatullah Jakarta
*Email: elpawati@uinjkt.ac.id

ABSTRACT

Apples are one of the subtropical fruits with the highest volume compared to other imported fruits from 2008 to 2017. The high volume of imported apples is caused by the fact that domestic apple production is not sufficient for consumption. This study aims to see what factors can influence the importance of apples in Indonesia and what factors have the greatest influence. The variables used in this study are local apple production, consumption of Indonesian apples, real GDP per capita of developing countries, real GDP per capita of Indonesia, economic distance, real exchange rates, and Indonesian population. This research uses panel data regression analysis method with PPML Gravity Model estimation approach. This study uses cross section data, namely 9 countries that have apples to Indonesia and time series data, namely Indonesian apple import data for 10 years from 2008 to 2017. The commodity studied was fresh apples with HS code 080810. The variables that have a significant effect on import volume apples in Indonesia, namely real GDP per capita of developing countries, real GDP per capita of Indonesia, economic distance, and population of Indonesia.
Keywords: Apples, Import volume, Gravity model, and PPML.

INTRODUCTION
1.1 Background

Indonesia is a country that has a tropical climate (Wirjohamidjojo and Swarinoto, 2010: 14). Indonesia's soil is very fertile therefore, Indonesia can cultivate fruits. Indonesia has not been able to take advantage of its advantages. Since the enactment of the free market in 2007, until now many imported products have entered and controlled all markets in Indonesia, especially fruits.

Among the many imported fruits circulating in Indonesia, apple is very popular both in fresh and processed products and the nutritional protection of apples is very good (Ashari, 2006: 10). This can be seen from the high imported volume of apples compared to other imported fruits. The largest volume of apple imports occurred in 2011, which was 212,684.7 kg. The growth rate of apple import volume was 9.55%, although the chart decreased the volume of apple imports in Indonesia remained the highest compared to the volume of other fruit imports (*UN Comtrade*, 2017).

However, on the other hand, domestic apple production was still low in the period from 2008 to 2017. The largest apple production occurred in 2016 at 329.780

tons. The average growth rate per year is 253.910 tons (Director General of Horticulture, 2019). There are problems that occur in production centers, the knowledge possessed by farmers is still inadequate and the lack of optimization in garden maintenance so that soil fertility decreases (Alfiyah, 2008).

If apple production is not able to meet domestic needs, apple import activities will continue to be carried out in Indonesia. This certainly has a negative impact on Indonesia because it can cause dependence on the supply of apples from abroad which will cause a deficit in the trade balance. In addition, according to Benny (2013:1414), the inventory of foreign exchange reserves will decrease, due to the increasing imports. Apple products will also lose competition (*UN Comtrade*, 2017).

Based on the problems, the problems in this study can be formulated are:

1. How do the factors of real GDP per capita of exporting countries, real GDP per capita of Indonesia, Indonesian apple production, economic distance, rupiah exchange rate, Indonesian population, and apple consumption in Indonesia affect apple imports in Indonesia for the 2008-2017 period?

2. What factors have the most influence on apple imports in Indonesia?

RESEARCH METHODS

2.1 Data Types and Sources

The data used is quantitative data. Data secondary form cross-*section* 9 largest apple exporting countries from 2008-2017. The data is processed using *Microsoft Excel* and STATA 13. Commodity apple with HS code 080810. Other sources used are various literature, newspapers, and articles downloaded through internet media as well as conducting interviews.

2.2 Data Analysis and Data Processing Methods

The method used is a descriptive method and a quantitative method using a regression analysis of panel data with *a gravity model* approach.

2.2.1 Panel Data Regression Model

The study used *a gravity model* approach from a combination of *cross section* data and *time series* data. *Gravity model.* Then the equation in this study is as follows:

$$VIM_{it} = \beta_0 + \beta_1 LnGDP_i + \beta_2 LnGDP_t + \beta_3 LnDist_{it} + \beta_4 LnPROD_t + \beta_5 XRATE_{it} + \beta_6 LnPOP_t + \beta_7 C_t + \varepsilon_{it} \ (7) \text{ Where:}$$

VIM_{it} = import volume of Indonesian apples from exporting countries i year to t (tons)

$LnGDP_i$ = GDP per capita per year of exporting country i year t(US$)

$LnGDP_t$ = GDP per capita per year Indonesia year t (US$)

$LnDIST_{it}$ = Indonesia's economic distance from the exporting country i year to t (Km)

$LnPROD_t$ = production of apple domestic in the t year (US$/ton)

LnXRATE$_{it}$=Indonesia's exchange rate against the exporting country i year t (Rp/US$)

LnPOP$_t$ = Indonesian population year t year (Million)

LnC$_t$ = Indonesian apple consumption t year (Kg)

α$_0$ = Intersep

β$_1$ − β$_8$ = coefficient of independent variables

ε$_{it}$ = Error

I = China, USA, New Zealand, South Africa, France, Australia, Chile, Rep. Korea, and Japan

t = 2008-2017

2.2.2 PPML (*Poisson Pseudo Maximum Likelihood*)

According to Silva and Tenreyro the PPML estimator is more efficient. If V [y$_i$|x] is constant, based on the equation:

$$\sum_{i=1}^{n}[yi - \exp(xi\,\beta)xi = 0 \quad (8)$$

The PPML *command or command* in S TATA.13 forms an equation like the following:

Xtpqml and lnx1 lnx2 lnx3. . . lnx10, fe id(country) (9) Where:

Xi : country variables

Pqml : *posisson quasi maximum likelihood*

lnx1-lnx10 : *independent* variables fe

: *fixed effect*

id(country) : *dummies*

By writing a command or *command* as follows:

xtpqml vim lnprodt lnct lngdpi lngdpt lndistit lnexrateit lnpopt, fe i(idcountry) (10)

Where :

Xtpqml :*poisson quasi maximum likelihood* vim

: volume impose

lnprodt : local apple production per year lnct

: consumption of apples per year lngdpi :

gross domestic product exporter per year lngdpt :

gross domestic product importer per year lndistit :

economic distance

lnexrate : rupiah exchange rate against the US dollar per year lnpopt :

Indonesian population per year

fe : *fixed effect* I

(idnegara) : *dummie*

RESULTS AND DISCUSSION 3.1 Estimasi PPML (*Poisson Pseudo Maximum Likelihood*)

Table 7. Calculation Results of Gravity Model Panel Data with PPML Estimation

Volume Impose	Coefficient	Error Standards	With	Probability > Z	95% Interval Coefficient	
LnPRODt	-0.0725673	0.8089949	-0.09	0.929	-1.658168	1.513033
LnCt	0.6765224	6.552866	0.10	0.918	-12.16686	13.5199
LnGDPCi	-0.9732602	0.214676	-4.53	0.000	-1.394017	-0.5525031
LnGDPCt	1.576316	0.1359796	11.59	0.000	1.309801	1.842831
LnDISTit	-0.2911438	0.1324317	-2.20	0.026	-0.5507051	-0.0315825
LnEXRATEit	-0.0891744	0.6243678	-0.14	0.886	-1.312913	1.134564
LnPOPt	-4.475072	1.615472	-2.77	0.006	-7.641339	-1.308804
Forest chi2 (7)	116792.12					
Prob > chi2	0.0000					
Log Likelihood	-101087.82					

Source: Secondary Data, 2019 (processed)

Based on calculations using the PPML estimator, it shows that out of seven independent variables, there are four variables that have a significant effect. Indonesia is Indonesia's real GDP per capita, real

GDP per capita exporter, economic distance, and Indonesia's population. The independent variables in this study were converted into log numbers (logs) except for dependent variables.

3.2 Factors Affecting Apple Imports in Indonesia

The influence of these factors on the volume of apple imports in Indonesia, namely as follows:

3.2.1 *Gross Domestic Product* (GDP) Real Per Capita Exporting Countries

The real GDP variable per capita of the exporting country has a coefficient value of β_1 of -0.9732602 and a *P-Value* of 0.000 (α. = 0.05). Assuming other variables are constant, a decrease of 1% of real GDP per capita of exporting countries will increase the volume of apple imports in Indonesia by 0.9732602%. This proves that the results of the study are in accordance with hypothesis H_7. The results of this study are in line with research conducted by Wayne (2015)

3.2.2 *Real Gross Domestic Product* (GDP) Per Capita Indonesia

Indonesia's real GDP per capita has a coefficient value of β_2 of 1.576316 and *a P-Value* (α) of 0.000 (α = 0.05). A positive value, meaning that the increase in Indonesia's GDP per capita can increase the volume of apple imports in Indonesia. Assuming other variables are constant, an increase of 1% of Indonesia's real GDP

per capita will increase the volume of apple imports in Indonesia by 1.576316%. The results of this study are in accordance with the research hypothesis H_6.

The results of this study are in accordance with the theory of gravity Zarzoso and Lehmann (2003), Dewi (2018) Doumbe and Belinga (2015), Nature, et al (2009), (Wang, 2016). According to Linneman (2008), real GDP per capita can describe the average welfare of individuals in a country. The decline and increase that occurs in Indonesia's real GDP per capita have an influence on the volume of apple imports in Indonesia. The highest increase in import volume occurred in 2011, namely 13.86% with an increase in real GDP per capita of 11.11%.

3.2.3 Local Apple Production

Local apple production has a coefficient value of β_3 of -0.0725673and a *PValue* of 0.929(α = 0.05). Shows a negative value, meaning that local apple production has a negative influence on the volume of apple imports in Indonesia. A significant value of 0.929 indicates that local apple production has an insignificant effect on the volume of apple imports because the *P-Value* value is greater than 0.05 (α >0.05), due to the production of local apples being less than the import volume so although it tends to increase. Assuming other variables are constant, a 1% decrease in Indonesia's apple production will increase the volume of apple imports in Indonesia by 0.0725673%. The results of this study are inconsistent with the research hypothesis H_1. Although production increases, if the product reserves are insufficient, the government will import as stated by Christiano (2013) in his research.

However, this research is not in line with research conducted by Pamungkas (2013), and Putri (2015) Revania (2014) explained that high and low production is influenced by productivity and harvest area. The relationship between local apple production and the volume of apple imports has the opposite effect.

3.2.4 Economic Distance

The economic distance has a coefficient value of β_4 of -0.2911438 and a *PValue* of 0.026 (α = 0.05). Showing a negative value means that economic distance has a negative influence on the volume of apple imports in Indonesia. Increasing Indonesia's economic distance from export countries will reduce the volume of apple imports in Indonesia. A significant value of 0.026 indicates that the economic distance has a significant effect on the volume of apple imports in Indonesia because the *P-Value* is smaller than 0.05 (α < 0.05). Assuming other variables are constant, a 1% decrease in economic distance will raise the volume of imports by 0.2911438 %. The results of this study are following the research hypothesis H_4.

This research is in line with the theorist's gravity of Tinbergen (1962), Wang (2016), Ndayetwayeko, et al (2014), and Doumbe and Belinga (2015). However, this research is contrary to the research of Manik (2012) and Muhrim (2014) which stated that economic distance is significantly positive. The farther the economic

distance between apple export countries, the lower the volume of apple imports in Indonesia.

3.2.5 Rupiah Exchange Rate Against US Dollar

The rupiah exchange rate against the US dollar has a coefficient value of β_5 of -0.0891744 and a *P-Value* of 0.886 (α = 0.05). Negative Nilai means that the rupiah exchange rate against the US dollar has a negative influence on the volume of apple imports in Indonesia. A significant value of 0.886 indicates that the economic exchange rate has an insignificant effect on the volume of apple imports in Indonesia because the *P-Value* value is greater than 0.05 (α >0.05). The decline of 1% of the rupiah exchange rate against the US dollar will increase the volume of apple imports in Indonesia by 0.891744%. The results of the study are following the research hypothesis H_5.

The results of this study are in accordance with the research conducted by Manik (2012), and Revania (2014). However, this research is not in line with the research conducted by Muhrim (2014) and Sari (2016). According to some economists such as Raul Prebisch, Hans Singer, and Gunnar Myrdal the commodity trade exchange rate of developing countries tends to experience a slump caused by an increase in productivity in developed countries (Salvatore, 1997:431).

3.2.6 Population of Indonesia

The population of Indonesia has a coefficient value of β_6 of -4.475072 and a *P-Value* of 0.006 (α = 0.05). A negative value means that the Indonesian population has a negative influence on the volume of imports in Indonesia. The increase in Indonesia's population can reduce the volume of apple imports. A significant value of 0.006 indicates that the Indonesian population has a significant effect on the volume of apple imports in Indonesia because the *P-Value* is smaller than 0.05 (α < 0.05). Assuming that other variables are constant, an increase of 1% of the Indonesian population will decrease by 4.475072% of the volume of apple imports in Indonesia. The results of the study do not correspond to the research hypothesis H_1.

This research is in line with research conducted by Manik (2016) Singgih and Sudirman (2015), and Yuniarti (2007). However, this research is not in line with the research conducted by Al-Badri (2015). The contribution of the Indonesian population to the volume of imports does not always have an effect. This was proven in 2012 even though the population increased by 248,452,413 people or 9.93% from the previous year apple imports decreased from the previous year of 183,859.44 tons of apples or 11.98% from the previous year.

3.2.7 Apple Consumption in Indonesia

Apple consumption in Indonesia has a coefficient value of β_7 of 0.6765224 and a *P-Value* of 0.918 (α = 0.05). A positive value meaning that apple consumption has a positive influence on the volume of apple imports in Indonesia. An increase in the amount of domestic apple consumption can increase the volume

of apple imports and vice versa. A significant value of 0.918 indicates that apple consumption has an insignificant influence on the volume of apple imports in Indonesia because the *P-Value* value is greater than 0.05 ($\alpha > 0.05$). Assuming other variables are constant, a 1% increase in local apple consumption will increase by 0.6765224% of the volume of apple imports in Indonesia. Based on these results, the study does not match the H 3 hypothesis.

This research is in line with research conducted by Sari (2016), Wang (2016), Pamungkas (2013), and Sari (2014). This is in accordance with the theory of Keynes, who stated that the level of consumption depends on *disposable income* (disposable income), the higher the level of income the greater the consumption in the country. The increase in domestic apple consumption has made apple imports increase.

3.3 **Factors That Have the Greatest Influence on Apple Imports in Indonesia**

There are four variables that have a significant effect, namely the real GDP per capita variable of the exporter country with a coefficient value of -0.9732602%, the real GDP per capita variable of Indonesia has a coefficient value of 1.576316%, the economic distance variable has a coefficient value of -0.2911438% and the Indonesian population variable has a coefficient value of -4.475072 %. Indonesia's population variables have the greatest influence on the volume of apple imports in Indonesia.

CONCLUSIONS AND RECOMMENDATION

4.1 Conclusion

Based on the results and discussion of the study, it can be concluded that:
The variables of real GDP per capita of exporting countries, economic distance, and population of Indonesia show the influence of significant negatively on the volume of apple imports in Indonesia. Indonesia's population variable has the greatest influence on the volume of imports in Indonesia with coefficient of -4.475072. Meaning every increase of 1 % will reduce the volume of imports by 4.475072 %.

4.2 Recommendations

Based on the results of the analysis in this study, there are several suggestions that can be given, namely:
Further research may add other variables that can influence. Expands the scope of the year and country to be studied. The increase around land, facilities, and infrastructure for apple plantations inIndonesia is increasing. So that domestic apple production continues to increase, so that the need for apples can be met and reduce the volume of imports and can export apples to other countries.

BIBLIOGRAPHY

Wirjohamidjojo, Soerjadi and Swarinoto, Yunus.2010. *Climate of Indonesia (From a Dynamic–Synoptical Aspect)*. Jakarta: Meteorological Climatology and Geophysics Agency

Ao, Xiang. 2004. *Introduction to Calculating Model Data* [Jurnal]. China:

Ashari, Semeru. 2006. *Increasing the Superiority of Indonesian Tropical Culture*. Yogyakarta: C.V Andi Offset

Ashari, Semeru. 2004. *Reproductive Biology of Commercial Fruit Crops*. Malang: Bayumedia Publishing. [p-49]

Citrus and Horticultural Research Center. 2017. *The development of apples in Indonesia*. Accessed via Http:// balitjestro.litbang.go.id on July 4, 2018 at 22:55 WIB

CEPPI. 2019. *GeoDist*. Retrieved March 14, 2019 from the link below,http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6

Chakravarty, Smwarajit Lahiri dan Chakrabarty, Ranajit. 2013. *A Gravity Model Approach to Indo-ASEAN Trade-Fluctuations and Swings* [Jurnal]. India: Elsevier Ltd

Christiano, Edward. 2013. *Factors Affecting Rice Imports in Indonesia* [Jurnal]. Malang: LP3M STIE Asia Malang

Dewi, Eka Rachmawati. 2018. *Analysis of Non-Tariff Barriers And Other Factors Affecting the Volume of Indonesian Tuna Exports To The European Union Market* [Thesis]. Jakarta: UIN Syarif Hidayatullah Jakarta

Directorate of Horticulture Djendral. 2019. *Apple Consumption per Capita*. Jakarta: Datin Horticulture

Doumbe, Eric Doumbe dan Belinga Thierry. 2015. *A Gravity Model Analysis for Trade between Cameroon and Twenty-Eight European Union Countries* [Jurnal]. China: Scientific Research Publishing

Dwi, et al. 2017. *Local Apple Accessories Only*. Retrieved from https://radarmalang.id/apel-impor-hanya-aksesoris/html on December 27, 2018

Elshehawy, Mohamed. A, dkk. *The Factors Affecting Egypt's Exports: Evidence from the Gravity Model Ananlysis* [Jurnal]. 2014. Egypt: Scienctific Research.

Fally, Thibault. 2015. *Structural Gravity and Fixed Effects* [Jurnal]. USA: *Elsevier B.V. All rights*