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The Effect of Foreign Direct Investment and Innovation on High Technology Product Imports in Asean 6

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ABSTRACT

Current technological development changes the people's lifestyle becoming progressively modern. Technological development encourages the rapid digitalization that occurs in all countries. The incapability of a country to meet domestic demand for digital products that are closely related to high technology content drives the import of high technology products. On the other hand, the development of Foreign Direct Investment (FDI) is essential in order to support the development of domestic technology of a country due to its spillover effects. ASEAN 6 is a highly attractive for foreign investors as it has strategic location, large market share and abundant resources. This study examines the influence of FDI and innovation on imported high technology products in ASEAN 6. This research employed the panel data analysis from six ASEAN countries during the period of 2007 to 2016. The results of this study indicated that FDI and innovation have a positive effect on imports of high products technology in ASEAN 6.

Keywords : ASEAN 6, FDI, High Technology, Innovation

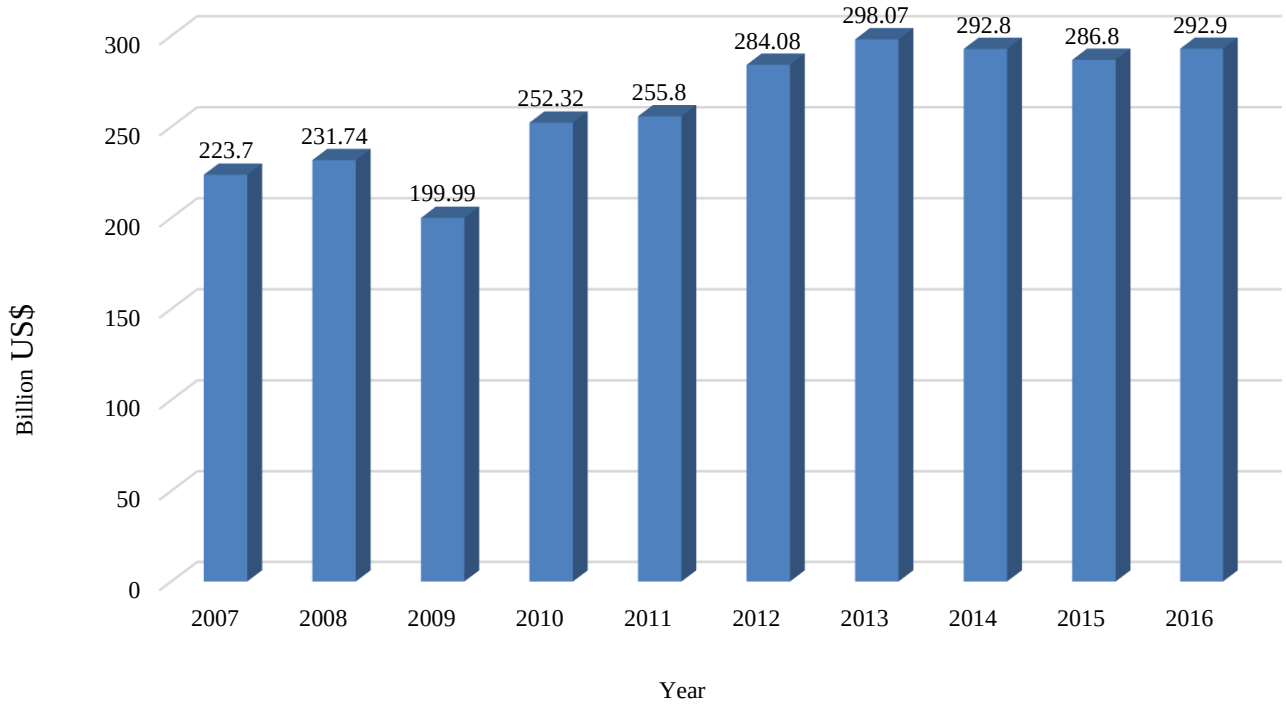
I. INTRODUCTION

Technological development has made economic activities faster, easier and more efficient. A lower cost of business transaction, looser government's regulations in global business, and enhanced infrastructure in communication between countries has also supported the business practice called globalization. This globalization will be more complex in future time as the public demand for high-specification application grows. The growing needs high-specified device in various aspect human life has indirectly changed the people way of living to be all-digital. Digitalization is a media transfer process from conventional to digital. This digitalization requires equipment with high technology content.

The large demand for high technology products encourages a country to import due to its unavailability or inability to procure these products domestically. Imports are not a negative, according to the theory of Heckscher Ohlin, importing country is a country which requires production factors that are scarce or relatively more expensive than producing it themselves.

Grossman and Helpman (1994) stated that imports can help actualize the unavailable innovations in the

domestic economy, and local researchers can also gain insights from these innovations. Accessibility of foreign innovations would enable trade improve the technology diffusion and economic growth. Falvey, Foster, and Greenaway (2009) in his research has proven that importing countries with current innovation activities imitates the learning by import process.



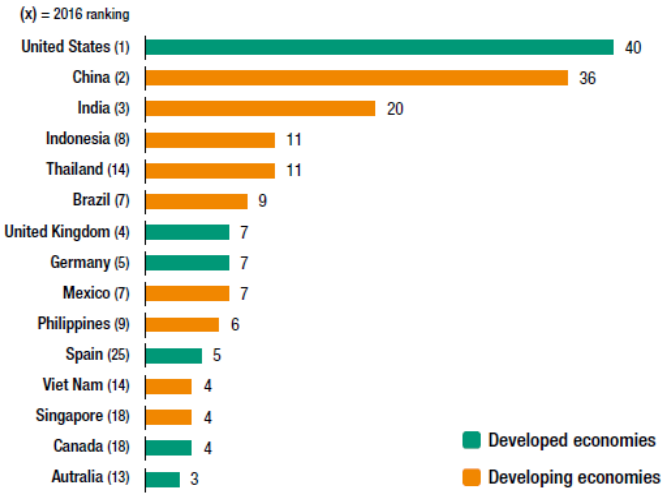
Source : World Integrated Trade Solution, 2019

Figure 1. The development of imported ASEAN 6 high technology products 2007-2016 (Billion US $)

Innovation can lay out several benefits as follows: (1) Improving the quality of human life through new discoveries which help the process of fulfilling the needs of human life, (2) Enabling a company to increase sales and profits, (3) Improve the ability to convey creativity into the creation of something new, (4) the diversity of products in the market (Rogers, 2003).

Based on the ASEAN Investment Report (2018), ASEAN is one of the fastest growing areas for internet use and has the third largest number of internet users after China and India. The number of internet users of ASEAN in 2016 was approximately 250 million, which was a 13 percent increase from 2015. This indicates the need for digital products that are closely related to high technology content in ASEAN is very high.

Based on Figure 1, imports of ASEAN 6 high technology products over the past 10 years have an increasing trends where there was an increase in imports of 31 percent from 2007 to 2016. The decline in import in 2009 was 14 percent due to the global crisis that occurred during the time. After the global crisis, in 2010 there was a surge in imports of high technology products by 26 percent from the previous year.



Source : World Investment Report, 2017

Figure 2. MNEs' top prospective host economies for 2017-2019 (Per cent of executives responding)

Foreign direct investment (FDI) is considered as an important element for industrial development and economic growth of a country. Moreover, FDI has a spillover effect in the form of foreign technology transfers, managerial capabilities, and international competitiveness for domestic companies. Foreign investment and international trade have long been a major source of international technology transfers (Keller, 2009).

In terms of investment level, the ASEAN region has become an attractive area as an investment destination. According to the World Investment Report 2018 report published by UNCTAD, two ASEAN countries, namely Singapore and Indonesia, are included in the top 20 host economies for FDI. Represented on Figure 2, a survey conducted by Multinational Enterprise (MNE) executives of UNCTAD showed that the five ASEAN countries namely Indonesia, Singapore, Philippines, Vietnam and Thailand are included in the MNEs' top prospective host economic for 2017 until 2019 (World Investment Report, 2017) . The report also stated that ASEAN countries are classified as priority countries for host countries of FDI.

The rapid increase in FDI in fact not only brings positive benefits but can also have negative implications. New investment will open jobs, which will help reduce unemployment and stimulating national income growth. On the other hand, the expansion of FDI into the country is believed to increase imports. As research conducted by Pacheco-Lopez (2005) showed that liberalization of foreign investment in Mexico in the late 1980s provided easy access to the establishment of Multinational Corporation (MNC) in the country. The more MNCs established, besides having an impact on export promotion, it also creates increase in imports of goods from abroad, because the import of these goods is necessary for MNC production activities and most of these imports are capital goods containing high technology content . However research conducted by Kokko et al. (1995) regarding the characteristics of FDI during two different trade regimes in Uruguay, showed that MNC affiliates are able to provide positive spillover productivity which indicates that FDI can reduce imports in Uruguay.

The differences grounds in the results of the study was the distinction in the objectives of foreign investors in investing their capital to the country. Some previous economists who have analyzed the reasons and objectives of foreign investors to invest their money in a country but have yet to find an agreement. Chakrabarti (2001), Demirham and Masca (2008) and Faeth (2008) stated that the differences in the results of these studies were due to differences in theoretical perspectives, empirical approaches, sample selection and the combination of determinant variables used.

Referring to previous FDI theories, the results of the study of Pacheco Lopez (2005) is in line with the FDI theory proposed by Kojima (1973) which stated that FDI is needed so that market factors are more competitive and efficient at the international level, where MNCs invest their capital in the domestic market are more cost reduction oriented, that way,

the need for supporting goods for foreign companies will still be imported from the related country. while the results of the study by Kokko et al. (1995) is more directed at the FDI theory that Vernon presented through the product life cycle which said that the level of imitation of a country from importing at a certain point will push the country's innovation level which in turn can reduce imports from the previous period because the country would be able to produce it themselves by that time.

II. METHODS AND MATERIAL

The type of data used in this study was secondary data in the form of panel data from 6 ASEAN countries (Indonesia, Malaysia, Singapore, Philippines, Thailand and Vietnam) during 2007 to 2016. The data of this study was obtained from several sources online. Data on imports of high technology products were obtained from the SITC-Rev.3-based World Integrated Trade Solution (WITS), internet individuals data (INU), patent applications, Foreign Direct Investment (FDI), and inflation obtained from World Development Indicators (WDI) . To discover factors affecting high technology products imports and how the influence of innovation and FDI on imported high technology products in ASEAN, the analytical method used was quantitative panel data with the utilization of STATA application.

Technique analysis in model estimation of this study was panel data regression. Panel data is a combination of time series and cross section data (Gujarati, 2004). The panel data regression method has its eminence particularly due to its robustness to several types of violations of the Gaus Markov assumption, namely heteroscedasticity and normality (Wooldridge, 2003). There are three methods that can be used for panel data estimation. These three methods are pooled least square (PLS), fixed effect model (FEM), and random effect model (REM).

The model in this study is a modification of the previous research model, namely by Ismail (2013) who modified the dependent variable into high technology products imports, the variable which reflects innovation in this study was patent application based on research conducted by Schneider (2005) and Kabaklarli et al. (2017) and also used internet user variables to describe the public demand for high technology products of a country. This research considered the model carried out by Al-Mukit et al. (2013) in analyzing imports, that is by adding inflation and exchange rates variables. Thus, the econometric model used in this study can be formulated as follows:

$$LIHT_{it} = \alpha 0 + \beta 1 INU_{it} + \beta 2 FDI_{it} + \beta 3 LIN_{it} + \beta 4 INF_{it} + \beta 5 LEXR_{it} + \varepsilon_{it}$$

Keterangan :

$LIHT_{it}$ = Natural logarithms for the import value of high technology products from the country I on year t

INU_{it} = Percentage of internet users to the population of i country in year t

FDI_{it} = Percentage of FDI to GDP of country i in year t

LIN_{it} = Natural logarithm of innovation country i in year t

INF_{it} = Inflation in percent country i in year t

$LEXR_{it}$ = The natural logarithm of the nominal exchange rate of country i in year t

ε_{it} = Error term

III. RESULTS AND DISCUSSION

The data panel method has two tests for the best model selection, they are the chow test and the hausman test. Both of these tests were performed to choose one of the three approaches to the panel data method, i.e random effect model, fixed effect model or pooled least square. Based on Table 1, the Chow Test resulted a probability value that is less than the 2.5 percent real level, which is 0.0084 so that the null hypothesis is rejected which means the fixed effect model approach is selected. Second test, the hausman test, was used to estimate the model for the Random Effect Model (REM) approach. The Hausman Test

results showed a probability of 0.0395, which is greater than the 2.5 percent level, meaning it does not reject the null hypothesis or the REM approach. Therefore, the best model to estimate the effect of FDI and innovation on high technology products imports in ASEAN 6 is the Random Effect Model (REM).

TABLE I
BEST FITTED MODEL SELECTION TEST

Best Model Test	Probability	Hypothesis Result
Chow Test	0.0084	Reject H0, FEM
Hausman Test	0.0395	Does not reject H0, REM

After the best model selection, the model had to go through classical assumptions tests. This test is done in order for the model to meet the BLUE criteria, or Best Linear Unbiassed Estimator. The panel data method with the Random Effect Model (REM) approach does not require classical assumption tests such as normality, autocorrelation, and heteroscedasticity (Paradise, 2011). But the multicollinearity test was still carried out in this study.

According to (Juanda, 2009) multicollinearity can occur due to two things. First, a high R2 value but only a few significant variables. Second, the value of Variance Inflation Factors (VIF) shows greater than 10. The best model results showed R2 of 0.85 and all independent variables in this study significant at the 2.5 percent level. There is no VIF value for each independent variable in this study that is greater than 10 so it can be concluded that there is no violation of the multicollinearity assumption in the research model estimation. VIF values for each variable can be seen in Table 2.

TABLE II
MULTICOLLINEARITY TEST RESULTS

Variable	VIF	1/VIF
LIN	7097	0.12542
INU	5.97	0.167498
LEXR	4.45	0.224727
INFL	3.09	0.323273
FDI	2.77	0.36052
Mean VIF	4.85	

Source: Results of data processing using STATA 14

Based on a series of assumption test results, the REM model is the best fitted model for this study. The estimation with the REM model based on Table 3 generated R2 of 0.85, which means 85 percent of the variance of high technology products imports (LIHT) can be explained by variables INU, LFDI, LINO, INFL and LEXR, and the remaining 15 percent is explained by other variables outside the model . The probability of F-statistics found in Table 3 showed the value of 0 or less than the significance level of this research which is 2.5 percent, meaning the independent variables used in the research model all together are able to explain the dependent variable.

TABLE III
RESULTS OF STATIC PANEL REGRESSION ESTIMATION

Variable	Coef.	Probability
INU	0.0070039*	0.011
FDI	0.0221108**	0.008
LIN	0.5699373**	0.000
INFL	-0.0087096	0.520
LEXR	-0.0613939**	0.000
Cons	-0.2553109	0.700
R-squared		0.8498
Prob (F-statistic)		0.0000

Notes: ** Significant at the significance level of 1%
* Significant at the significance level of 2.5%
Source: Results of data processing using STATA 14

Based on the World Investment Report (2017) on the background of this study, showed that five ASEAN countries are included as the MNEs' top prospective host economies for 2017 until 2019. This shows that the role of foreign investment, specifically FDI in

ASEAN is very substantial. Investment is very closely related to the process of technological development, especially foreign investment in the form of FDI. FDI is believed to have spillover effects in domestic and multinational companies so that they are considered capable of producing innovations that cannot be created by domestic technology. In other words, FDI is very closely related to the creation of innovation. Along with the increase in FDI, of course innovation will also continue to grow. Technological developments of various innovations in turn, make domestic technology independent at an established stage. Innovation also has to be supported by capable technology, so that countries that have not been able to emulate developing technology must meet this supporting equipment by importing from innovating countries.

Based on Table 3, innovation and import of high technology products have a positive value. meaning, the improve of innovation in ASEAN 6 is still supported by high technology products imported from other countries. The results of this study are in line with the research conducted by Scherer and Huh (1992) which showed that multinational companies with high R & D intensity are not submissive and relatively aggressive towards domestic import regulations so that the trade balance of high technology products increases. LIN coefficient value which is a proxy of innovation in this study is 0.57 which showed that every 1 percent increase in innovation will increase imports of high technology products by an average of 0.57 percent.

On the other hand, FDI can also encourage an increase in goods imports from abroad, especially capital goods needed by foreign and domestic parties to run their businesses. Capital goods and supporting materials for the needs of FDI companies are very closely related to high technology products. ASEAN 6 is a very in demand area t by foreign investors to invest, besides because its population is 8.4% of the world population which is a potential market, natural resources in ASEAN 6 are also very abundant. According to Table 3, the relationship between FDI and imports of high technology products is positive, which means that an increase in FDI can increase the import number of high technology products in ASEAN 6. The FDI coefficient value in this study is 0.02 which shows that every 1 percent increase in FDI will increase imports of high technology products by an average of 0.02 percent. The results of this study are in line with the research conducted by Pacheco Lopez (2005), Liu et al. (2001), Tabassum et al. (2012), Hossain (2018), yousaf et al. (2008), Hailu (2010) and Faeth (2006) who obtained research results that FDI had a positive impact on import values.

Currently, the world population in 2018 has reached 7.4 billion. Nearly half of that or around 3.4 billion people have used the internet in their lives (World Bank, 2018). ASEAN 6 internet users in 2018 has hit 246 million people or 7.2 percent of the total world internet users (We Are Social, 2018). The number of internet users can be used as a reference that demand for telecommunications equipment which closely related to high technology content is very high in ASEAN 6. The number of internet users which are used as a proxy for high technology product demand in this study have a positive relationship to the import of high technology products. Based on Table 3, the INU coefficient value which is a proxy for high technology product demand is 0.007 showing that every increase of 1 percent in INU will increase imports of high technology products by 0.007 percent. This indicates that the electronic products used by the community in ASEAN 6 are supported through imports from outside the country.

Based on research conducted by Al-Mukit et al. (2018) one of the indicators affecting imports was the inflation rate in the country. In his research he found that if inflation in a country was high, the number of imports will also increase. Based on Table 3 the inflation rate does not have a significant effect at the significance level of research, which is 2.5 percent on

imported high technology products in ASEAN 6. There is no significant effect on the level of inflation on imports of high technology products in ASEAN 6, one of the reasons is because the proportion of high technology products imported by ASEAN 6 countries were dominated by electronics and computers. Wong (2008) in his research found that electronic products fell into the classification of products that are inelastic because price changes that occurred do not significantly affect the demand for these goods. The elasticity of a product can be influenced by several factors, one of which is the level of need and substitution for the product. Currently electronic products, especially telecommunications products, have become one of the vital products and cannot be replaced or substituted by other goods hence changes in price levels (inflation) do not affect imports of high technology products.

International trade involving countries with different currencies will certainly determine how much goods will be purchased. Then it can be said that the exchange rate is one of the variables that is very essential to consider when discussing international trade. Krugman et al. (2006) say that the depreciation of the domestic currency will stimulate exports because prices abroad would be relatively more expensive than domestic prices. Whereas when there is an appreciation, it will encourage imports because the value of foreign goods will be relatively cheaper than the price of domestic goods. In this study the negative value of the exchange rate coefficient shows the appreciating domestic exchange rate while the positive value of the exchange rate coefficient shows the domestic exchange rate depreciation.

Based on Table 3, the exchange rate and import of high technology products in ASEAN 6 have a negative correlation, where domestic exchange rate appreciation will increase imports of high technology products in ASEAN 6. The results of this study were aligned with research conducted by Anderson and Wittwer (2013) which showed that the value of wine imports in China is influenced by the exchange rate of its trading partners, when there is an appreciation of the domestic currency, the import of wine in China increased. The LEXR coefficient which is a proxy of the exchange rate in this study is -0.06, showing that each appreciation of 1 percent will increase imports of high technology products by an average of 0.06 percent.

IV. CONCLUSION

Based on the results of panel data regression, the study found that foreign investment in the form of FDI and innovation had a significant positive effect on imported high technology products in ASEAN 6, where each percent increase in FDI would promote the import value of high technology products by 0.02 percent, and also every 1 percent increase in innovation will promote the import value of high technology products by an average of 0.56 percent. In addition to FDI and innovation, other variables such as internet users and exchange rates also have a significant effect on imports of high technology products in ASEAN 6. Based on the results of this study, in terms of encouraging foreign investment and also the development of innovations that take place in the domestic, the government needs to be more selective in receiving investments, especially foreign investment. The importance of regulating policies related to foreign investment is very crucial in order to save the position of the domestic economy from the negative long-term effects resulting from these foreign investments. The government also needs to oversee the course of domestic innovation so that in the long run it can provide better returns on every aspects for the domestic economy. Not only supervising the course of innovation which taking place, but also providing active support for the innovator in order to be able to optimally develop the technology discovered and continues to be developed in the long term.

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