Effects of Foreign Direct Investment toward Industrial Gross Domestic Product in ASEAN Developing Countries

by Dona Fitria, Pudji Astuty Darwati Susilastuti, Widiyarini

Effects of Foreign Direct Investment toward Industrial Gross Domestic Product in ASEAN Developing Countries

Dona Fitria[1], Pudji Astuty[2], Darwati Susilastuti[3], Widiyarini[4]
{ fitriaqinthar@gmail.com[4], pudji_astuty@borobudur.ac.id[2],
darwatisusi@borobudur.ac.id/darwati_susilastuti@borobudur.ac.id[3], widiya2513@gmail.com[4]}

Student of Doctoral Program in Economics, Borobudur University, Jakarta / Lecturer at Indraprasta University, Jakarta[1],
Lecturer at Borobudur University, Jakarta[2]
Lecturer at Borobudur University, Jakarta[3]
Student of Doctoral Program in Economics, Borobudur University, Jakarta / Lecturer at Indraprasta University, Jakarta[4]

Abstract. Foreign Direct Investment (FDI) is a long-term foreign capital flow and relatively is not vulnerable to economic turmoil. ASEAN countries become world's FDI destination. Numbers amount of FDI will contribute to GDP and economic growth of a country. This research aims at analyzing and studying the effect of FDI to industrial sectoral GDP in ASEAN Developing Countries. This research is a quantitative research. The data used is secondary data from each country for the last 14 years (2006-2019), totally 84 data are collected for each research variables. This study used data panel analysis and eViews help to calculate the data. The result shows that FDI gave positive and significant effect toward industrial GDP in ASEAN Developing Countries.

Keywords: Foreign Direct Investment; Sectoral GDP; Data Panel Analysis

1 Introduction

Foreign Direct Investment is a long-term flow of foreign capital and is relatively not vulnerable to economic turmoil. Foreign direct investment encourages economic development, especially for developing countries that do not have any sufficient funds to meet domestic investment needs. Most of ASEAN member countries are foreign direct investment destinations in the world. The amount of foreign direct investment received fluctuates and tends to increase if there is no world economic crisis. The amount of FDI also affects the GDP[1] of each country both as a whole[2] and by sector [3]. One sector is affected by FDI is the industrial or manufacturing sector [4], [5].

Foreign Direct Investment (FDI) according to the OEDC Benchmark Definition of Foreign Direct Investment [6] is a foreign direct investment activity that can be realized when a resident company's direct investor finds lasting interest through a direct investment company located in another economy. In other words, Foreign direct investment (FDI) defines an international capital flow where companies from one country establish or expand their companies in other countries. The foreign direct investment includes investment into tangible assets in the form of construction of factories, procurement of various kinds of capital goods, purchase of land for production, expenditure of inventory equipment, etc.

There are several forms of FDI based on the direction of investment, the investment instrument used, and sector breakdown [7]. Several theories that explain the existence of FDI in a country[8] are 1). The international operation of Domestic company theory from Hymer in 1960, 2). Product life-cycle theory was proposed by Vernon in 1966, 3). Horizontal and vertical theories were proposed by Caves in 1971, 4). Internalization theory was proposed by Buckley and Casson in 1976, 5). Strategic behavior of firms theory put forward by many experts, one of which is Graham in 1976 and 6). The Eclectic Paradigm theory was proposed by Dunning in 1988.

The entry of FDI into a country can have many effects or impacts both economically and non-economically. From a non-economic perspective, the entry of FDI also affects energy use[9], CO_2 emissions[10], company performance[11], and so on. From the economic side, FDI has a positive and significant impact on GDP and economic growth both overall and sectorally. One sector of concern is the industrial and manufacturing sectors.

The industrial and manufacturing sectors are sectors that make up the national GDP, which include activities including mining, construction, electricity, water, and gas as well as manufacturing which includes the production process of raw materials and auxiliary materials into finished products. In the ISIC classification rev. 4 [12], the industry is included in divisions 05-43 and 10-33, while manufacturing is included in divisions 15-37. GDP of the industrial and manufacturing sectors is the added value resulting from the production process of raw materials, auxiliary materials, and direct labor and overhead.

2 Methods

The research method used in this study is a quantitative research method. Judging from the level of explanation, this research is a causal associative study that examines and tests hypotheses related to the effect of FDI on the GDP of the industrial sector. The object of this research is 6 ASEAN developing countries, namely Indonesia, Malaysia, Vietnam, Thailand, Cambodia, and the Philippines. The span of the period studied is 14 years, from 2006 to 2019. So the amount of data used in this study is 84 data, both FDI and GDP in the industrial sector. Data is obtained through secondary sources or data published by the ASEAN Secretariat, the World Bank, UNTAD, and the World Economic Forum. The data analysis technique used in this research is panel data regression analysis. The panel data regression analysis technique used in this study is the Ordinary Least Square (OLS) technique. For the data analysis process, researchers used eViews software.

3 Result and Discussion

The model in this study is the model used to see the effect of foreign direct investment on the GDP of the industrial sector in developing ASEAN countries. To obtain the desired results, the researcher took several steps. First, do a stationary model test as shown in table 1 which shows the results that all variables are stationary at the level, so the model can be continued using panel data regression then to choose the best model this research uses the common effects model (results can be seen in table 2), fixed effect model (table 3) and random effect model (table 4). After the results are obtained then it is done by comparing the results of the common effect model and fixed effect model using redundant or chow test. The result of this comparison is shown in Table 5. According to the result, it can be seen that the probability value of cross-section F < 0.05, therefore it can be concluded that Ho is rejected and Ha is accepted, which means that the best model based on the redundant test is the fixed effect model. The fixed effect model is better used in estimating panel data when compared to the common effect model. Data processing is continued by conducting the Hausman test which results can be seen in Table 6. Table 6 is the result of the Hausman test which was carried out to select the best estimated Fixed Effect model with random effects for model II.

Table 1. Stationer Test

Variable	Level	
	PP Fisher	Keterangan
Industry Sectoral GDP	0.0001	Stationer
Foreign Direct Investment	0.0001	Stationer

Sources: output eViews (2021)

Tabel 2. Common Effect Model

Dependent Variable: IND
Method: Panel Least Squares
Date: 08/19/21 Time: 04:26
Sample: 2006 2019
Periods included: 14
Cross-sections included: 6
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-54.82177	11.96813	-4.580645	0.0000
lnFDI	4.015249	0.531645	7.552505	0.0000

R-squared	0.410243	Mean dependent var	35.47964
Adjusted R-squared	0.403051	S.D. dependent var	6.262098
S.E. of regression	4.838252	Akaike info criterion	6.014506
Sum squared resid	1919.512	Schwarz criterion	6.072382
Log likelihood	-250.6092	Hannan-Quinn criter.	6.037772
F-statistic	57.04034	Durbin-Watson stat	0.500583
Prob(F-statistic)	0.000000		

Sources: Output eViews (2021)

Table 3. Fixed Effect Model

Dependent Variable: IND
Method: Panel Least Squares
Date: 08/19/21 Time: 04:27
Sample: 2006 2019
Periods included: 14
Cross-sections included: 6
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.368369	10.55411	0.887651	0.3775
lnFDI	1.161037	0.469050	2.475294	0.0155

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.775369	Mean dependent var	35.47964
Adjusted R-squared	0.757865	S.D. dependent var	6.262098
S.E. of regression	3.081403	Akaike info criterion	5.168302
Sum squared resid	731.1184	Schwarz criterion	5.370870
Log likelihood	-210.0687	Hannan-Quinn criter.	5.249733
F-statistic	44.29738	Durbin-Watson stat	0.696869
Prob(F-statistic)	0.000000		

Sources: Output eViews (2021)

Table 4. Random Effect Model

Dependent Variable: IND
Method: Panel EGLS (Cross-section random effects)
Date: 08/19/21 Time: 04:28
Sample: 2006 2019
Periods included: 14
Cross-sections included: 6
Total panel (balanced) observations: 84
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.196266	10.23170	-0.019182	0.9847
lnFDI	1.586328	0.452005	3.509535	0.0007

Effects Specification

	S.D.	Rho
Cross-section random	2.726376	0.4391
Idiosyncratic random	3.081403	0.5609

Weighted Statistics

R-squared	0.117485	Mean dependent var	10.25929
Adjusted R-squared	0.106722	S.D. dependent var	3.463129
S.E. of regression	3.273120	Sum squared resid	878.4917
F-statistic	10.91622	Durbin-Watson stat	0.579212
Prob(F-statistic)	0.001415		

Unweighted Statistics

R-squared	0.260122	Mean dependent var	35.47964
Sum squared resid	2408.121	Durbin-Watson stat	0.211299

Sources: Output eViews (2021)

Table 5. Redaundant or Chow Test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	25.031878	(5,77)	0.0000
Cross-section Chi-square	81.081086	5	0.0000

Sources: Output eViews (2021)

Table 6. Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.521076	1	0.0007

Sources: Output eViews (2021)

From the results of the Hausman test above it can be seen that the probability value of random cross section <0.05, (0.0007 <0.05), so Ho is rejected and Ha is accepted, which means that the best model based on the Hausman test is the fixed effect model. The fixed effect model is better used in estimating panel data when compared to the random effect model.

Because based on the redundant test and the Hausman test, it can be concluded that the fixed effect model is the best in estimating model II, so there is no need to proceed to the Langanre test which is used to test the best model between common effects and random effects. Based on the stages above, the best model for model II is the fixed effect model shown in table 4.14. From the output results in table 4.14, the interpretation of panel data regression with the fixed-effect model and using the recursive method ($\hat{Y}1 = Y1 +$ Residual model 1) is described. This model is to estimate the impact of foreign direct investment on the GDP of the Industrial Sector in developing ASEAN countries, namely:

$$Z = \beta o + \beta \, Ln\_\hat{Y} + \varepsilon_t \quad \textbf{(1)}$$

Z	=	Industrial Sector GDP
βo	=	Model Constant
$\hat{Y}$	=	Foreign Direct Investment (FDI)
β	=	Regression coefficient of independent variable
ε_t	=	Epsilon (Other factors outside the model)

The calculation results in Table 3 can be explained as follow:

Industrial Sector GDP = 9.368369 + 1.161037 $Ln\hat{Y}$

From the form of the regression equation above, it can be interpreted as follows:

1) Constant value = 9.368369 means that statistically if all ceteris paribus variables have a constant value, then the GDP value of the Industrial Sector is 9.368369 units.
2) The value of the Regression Coefficient = 1.161037, meaning that the elasticity value of foreign direct investment to GDP in the industrial sector is E = 1.161037. The value of E > 1 indicates that the increase in foreign direct investment is elastic to the GDP of the Industrial Sector.

Results of Model II Hypothesis Testing

Based on Table 3, the t-value of foreign direct investment statistics is 2.475294 with a probability value (p-value) of 0.0155. The t-statistic value of the foreign direct investment is 2.475294 and positive indicates that foreign direct investment has a positive effect on the GDP of the Industrial Sector. The probability value (p-value) of 0.0155 is less than the significance value of 0.05. It can be concluded that H0 is rejected, and Ha is accepted, which means that foreign direct investment has a positive and significant impact on the GDP of the industrial sector in developing ASEAN countries. A positive understanding means that every increase in foreign direct investment will be followed by an increase in the GDP of the industrial sectors. The magnitude of the influence of foreign direct investment on the GDP of the Industrial Sector is indicated by the Adjuted R-Squared value of 0. 757865, which means that foreign direct investment affects the GDP of the Industrial Sector by 75,7865%, and the remaining 24.21% are influenced by other factors outside the model under study.

4 Conclusion

Foreign direct investment has a positive effect on the GDP of the industrial sector in developing ASEAN countries. Foreign direct investment has an effect of 75.78% in the GDP of the industrial and manufacturing sectors in developing ASEAN countries. The industrial and manufacturing sectors of developing ASEAN countries still rely on foreign direct investment as a source of funds in the industrial and manufacturing sectors.

References

[1] S. Mitra, "Effect of Foreign Direct Investment on GDP, Export and Domestic Investment: Bangladesh Perspective," *J. Innov. Dev. Strateg.*, vol. 9, no. 2, 2015.

[2] J. A. Edwards, C. B. Naanwaab, and A. A. Romero, "Effect of FDI on real per capita GDP Growth. A Rolling Window Panel Analysis of 60 countries, 1982-2011," *Appl. Econom. Int. Dev.*, vol. 17, no. 1, pp. 19–36, 2017.

[3] M. A. Khan and S. A. Khan, "Foreign direct investment and economic growth in Pakistan: A sectoral analysis," 2011.

[4] D. Jain, K. Nair, and V. Jain, "Factors affecting GDP (manufacturing, services, industry): An Indian perspective," *Annu. Res. J. SCMS Pune*, vol. 3, pp. 38–56, 2015.

[5] C. U. Idoko and U. U. Taiga, "Effect of Foreign Direct Investment (FDI) On Manufacturing Output In Nigeria (1981–2016).," *Adv. Soc. Sci. Res. J.*, vol. 5, no. 5, 2018.

[6] H. Qi, "The Definition of Investment and its Development: for the Reference of the Future BIT between China and Canada," *RJT ns*, vol. 45, p. 541, 2011.

[7] M. Duce and B. de España, "Definitions of Foreign Direct Investment (FDI): a methodological note," *Banco de Espana*, vol. 6, no. 2, pp. 43–49, 2003.

[8] J. Jones and C. Wren, *Foreign direct investment and the regional economy*. Routledge, 2016.

[9] S. A. Sarkodie and V. Strezov, "Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries," *Sci. Total Environ.*, vol. 646, pp. 862–871, 2019.

[10] S. K. Rai, A. M. Bembey, and D. Sarfare, "Empirical verification of causality between CO2 emissions, energy consumption, foreign direct investment, gross domestic product, and openness of the economy: Evidence from India," *Int. J. Sustain. Econ.*, vol. 11, no. 3, pp. 237–257, 2019.

[11] S. Girma, Y. Gong, H. Görg, and S. Lancheros, "Estimating direct and indirect effects of foreign direct investment on firm productivity in the presence of interactions between firms," *J. Int. Econ.*, vol. 95, no. 1, pp. 157–169, 2015.

[12] ISIC, "International Standard Industrial Classificatin of All Economic Activity Rev. 4," New York, Rev. 4, 2008.

Effects of Foreign Direct Investment toward Industrial Gross Domestic Product in ASEAN Developing Countries

ORIGINALITY REPORT

16%	13%	7%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.um.edu.mt Internet Source	1%
2	Submitted to Brunel University Student Paper	1%
3	ejournal.upbatam.ac.id Internet Source	1%
4	cendekiawan.unmuhbabel.ac.id Internet Source	1%
5	Submitted to University of Wollongong Student Paper	1%
6	media.neliti.com Internet Source	1%
7	Submitted to President University Student Paper	1%
8	www.scilit.net Internet Source	1%
9	hdl.handle.net Internet Source	1%

10	Elumalai Vengadesan, Ramalingam Senthil. "A review on recent development of thermal performance enhancement methods of flat plate solar water heater", Solar Energy, 2020 Publication	1 %
11	Submitted to Universitas Pancasila Student Paper	1 %
12	Submitted to Universitas Diponegoro Student Paper	1 %
13	www.bircu-journal.com Internet Source	<1 %
14	eprints.unm.ac.id Internet Source	<1 %
15	library.birzeit.edu Internet Source	<1 %
16	Xiaoshu Cao, Xiaoyan Huang. "City-level determinants of private car ownership in China", Asian Geographer, 2013 Publication	<1 %
17	Yu-Shan Chen, Ke-Chiun Chang. "Using the entropy-based patent measure to explore the influences of related and unrelated technological diversification upon technological competences and firm performance", Scientometrics, 2011 Publication	<1 %

18	bircu-journal.com Internet Source	<1%
19	blog.ipleaders.in Internet Source	<1%
20	cesmaa.org Internet Source	<1%
21	docplayer.net Internet Source	<1%
22	papers.ssrn.com Internet Source	<1%
23	sjdgge.ppj.unp.ac.id Internet Source	<1%
24	themimu.info Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		