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FOREIGN DIRECT (FDI) INVESTMENTS AS A COMPARISON OF MACROECONOMICS IN ASEAN 5, CHINA AND JAPAN DURING PERIOD 1996-2015

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Abstract. *The purpose of this research is to analyze the Determination of Foreign Direct Investment (FDI) As a Comparison of Macroeconomic Factors in Asean 5, China and Japan. Besides, this research also analyses the influence of macroeconomic factors due to the strength of the influence of macroeconomic factors to the shock.*

This research uses the secondary data during the period of 1996-2015 by using the Panel Data model. The variable, which is used here, is the macroeconomic factor (Broad Money, Economic Development, labor force, exchange rate, industry, transport service) that has an effect on Foreign Direct Investment in Asean 5, China and Japan.

The gap of this research is to connect the macroeconomic factor (Broad Money, Economic Development, labor force, exchange rate, industry, transport service) that has an effect on Foreign Direct Investment. The result of the research shows that the macroeconomic factors have positive effect in ASEAN 5 countries, China and Japan as Home Country, as well as Host Country. Meanwhile, the FDI has a negative impact from one of the macroeconomic factors that is 'exchange rate'. The policy implication of this research is to suggest the monetary authority, government or private, to supervise the direct investment flow that enters the host countries.

Keywords: Determination of Foreign Direct Investment (FDI) As a Comparison of Macroeconomic Factors in Asean 5, China and Japan, Panel Data

JEL Codes: E2, E3

1. Introduction

Efforts to implement policies for economic development, each country needs capital flows as a support for the running of policies. The capital flow needed by each country in the world varies depending on the characteristics of the country, whether it is classified as a developed or developing country. Developed countries in carrying out the wheels of economic policy, the capital flow required are relatively low when compared to developing countries. Large financing in economic development for each country cannot be fully sourced from capital flows, but financing derived from foreign capital is needed to meet deficiencies in financing a country's economic development.

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2. Literature review

2.1. Study Foreign Direct Investment (FDI)

Research studies on Foreign Direct Investment (FDI) that occur in a country have been widely carried out. Research on the influence of Foreign Direct Investment (FDI) in a country has been examined by Rodolphe Desbordes, Shang-Jin Wec (2017), George S. Chen, Yao Yao, Julien Malizard (2017), Arijit Mukherjee, Uday Bhanu Sinha (2016), Qiaomin Li, Robert Scollay, Sholeh Maani (2016), Carmen Boghean and Mihaela State (2015), Agyenim Boateng, Shaista Nisar, Junjie Wu, Xiuping Hua (2015), Juthathip Jongwanich, Archanun Kohpaiboon (2013), M. Fabricio Perez, Josef C. Brada Zdenek Drabek (2012), ShinjiTakagi, Zongying Shi (2011) examines how economic growth, labor force, exchange rate, industry affect foreign direct investment in a country. But for the authors that Broad Money and transport service are things that are also a macro instrument that also affects Foreign Direct Investment in a country and are always interesting to discuss. As observed by Sizhong Sun, Sajid Anwar (2017), "Foreign direct investment and the performance of China's textile industry's indigenous firms" and Shaosheng Jin, Haiyue Guo, Michael S. Delgado, H. Holly Wang (2017) "Benefit or damage? The productivity effects of FDI in the Chinese food industry. "

2.2. The Previous Studies

In neoclassical theory, capital is expressed as "downhill" from rich countries (capital abundant) to poor countries (capital scarce). Where all countries can access the same technology and produce similar goods, while differences in per capita income illustrate the different rates of return on capital, new investments will be made in poor countries. On the other hand, the Heckscher-Ohlin model explicitly predicts that capital flows from countries with low interest rates to countries with high interest rates (Pogoda, 2012). However, Robert E. Lucas, Jr (1990) in an article entitled "Why does not capital flow from rich to poor countries?" Question the validity of the assumptions used in the neoclassical model.

Alfaro (2008) in his research concluded that the increase in international capital flows as a result of financial openness was in line with the improvement of institutional quality. Second, capital market imperfections due to asymmetric information and sovereign risk The empirical studies of Herrmann and Kleinert (2014) on countries that are members of the European Monetary Union (EMU) show that market imperfections will hamper the efficiency of capital allocation. As a result, capital flows to poor countries and in perspective.

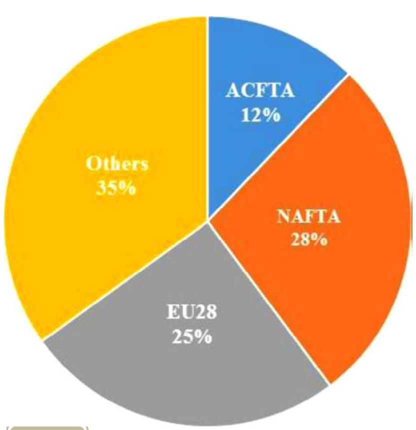

Fig. 1. GDP of the three largest trade blocks in the world economy in 2010

Data Source: UNCTAD.

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FTA (Free Trade Agreement) ASEAN-China forms the third largest economic group in the world, after the European Union and NAFTA (North America Free Trade Agreement). It has 1.85 billion people and covers an area of 14 million square kilometers. In 2010, the total Chinese GDP and ASEAN-68 were US $ 7.79 trillion, contributing 99% of the combined Chinese GDP and 10 ASEAN members, and 12% of the world economy. Between 2000 and 2010, annual GDP growth rates were 10.8% for China and 5.5% for ASEAN-6. This rapid growth coincides with the increasing importance of members of the ACFTA (Asean-China Free Trade Area) in the world economy. (Qiaomin Li, Robert Scollay, Sholeh Maani, 2016).

Foreign investment entering the country consists of foreign direct investment (FDI) and portfolio investment. Both types of investment both have a positive impact on the process of a country's economic development, but in its development FDI provides more significant benefits when compared to portfolio investment. Foreign Direct Investment (FDI) consists of inward and outward. Inward FDI is an investment originating from other countries to countries in the ASEAN region, which are mostly classified as developing countries. Economic development that is running in developing countries must experience a lag when compared to developed countries.

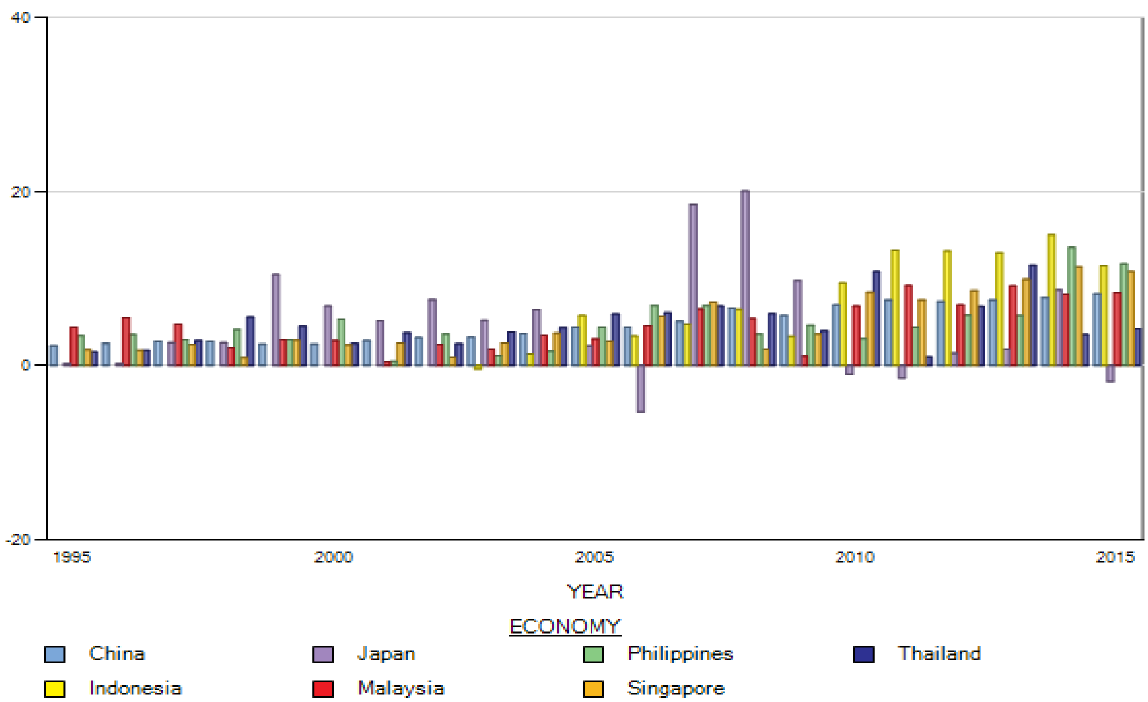

Fig. 2. Flow of foreign direct investment (FDI): inward and outward in ASEAN, China and Japan 1995-2015.

Data Source: UNCTAD.

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Along with the rapid economic growth in ASEAN, China and Japan, there was a growth in FDI inflows. Foreign direct investment in ASEAN, China and Japan from 1995 to 2015 began to decline in 2000 to 2005, FDI grew slowly, with FDI shares in ASEAN, China and Japan between 2005 and 2007, and after 2007, China's growth rates began to increase, so that FDI ASEAN, China and Japan grow side by side.

The related growth pattern narrows that Real Sector (Gross Domestic Product, Industry, Labor), Monetary and financial sectors (Broad money) and External Sector (Exchange rate, transport service) have an influence on Foreign Direct Investment. Panel data analysis (pooling data) that is obtained by connecting data that is time series cross section.

3. Methodology

Panel data is a combination of time series data and cross-section data, where the same cross section is measured at different times. Data panel analysis is used to observe the relationship between one dependent variable and one or more independent variables. The use of panel data is able to provide many advantages both statistically and in economic theory, among others (Gujarati; 2003):

Data panels are able to take into account the heterogeneity of individuals explicitly by allowing individual-specific variables so that data panels can be used to test and build more complex behavioral models.

If the specific effect is significantly correlated with other explanatory variables, then the use of panel data will substantially reduce the problem of omitted variables.

Panel data based on repeated cross section observations so that the panel data method is suitable for the study of dynamic adjustment.

The high number of observations has implications for more informative data, more varied, collinearity between diminishing variables, and an increase in degrees of freedom so that a more efficient estimation can be obtained. These advantages have implications for not testing classical assumptions in the panel data model, according to what is in some literature used in this study (Maddala, 1998; Pindyck and Rubinfield, 1991; and Gujarati, 2003. The linear regression model uses cross section and time series data.

Model with cross section data

$$Yi = \alpha + \beta\ Xi + \varepsilon i\ ;\ i = 1,2,....,N \qquad (1)$$

N: amount of data cross section

Model with time series data

$$Yt = \alpha + \beta\ Xt + \varepsilon t\ ;\ t = 1,2,....,T \qquad (2)$$

N: amount of data time series

Considering the panel data is a combination of cross section data and time series data, the model is written with:

$$Yit = \alpha + \beta\ Xit + \varepsilon it\ ;\ i = 1,2,....,N;\ t = 1,2,\ldots.., T \qquad (3)$$

Where:

N = number of observations

T = amount of time

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N x T = number of panel data

With Y_it being the value of the response variable in the i-observation unit and t-time, x_it is the value of the predictor variable in the i-observation unit and t-time,, α is the intercept parameter or the intersection between the upright Y xis and the linear function line the x_it β value is the slope coefficient or slope coefficient or slope coefficient, and ε_it is a mistake or error or error component in the i-observation unit and t-time.

The existence of variables that are not all included in the model equation allows an intercept that is not constant. Or in other words, this intercept might change for each individual and time. This thought is the basis for the formation of the model.

The assumptions on this FEM are clearly almost in accordance with the actual reality. It must be noted that in equation (3) an index i is added at the intersection point. The index is used to state that this case is a time invariant case. Unlike the case if the added index is it, the case will be called the time variant. The following is the FEM with time invariant cases, namely:

$$Y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \qquad (4)$$

It should be noted that the amount of D in the equation can be explained by the following statement, "if a qualitative variable has n categories, only n -1 doll variables need to be introduced in the regression model, while one variable that is not introduced, the average will be intercept or the cut-off point in the model". The addition of a doll variable into FEM aims to facilitate the use of the model.

This is because dummy variables can represent our ignorance about the actual model. But it must be remembered that the use of FEM will have consequences for the reduction of degrees of freedom (degree of freedom) which will ultimately reduce the efficiency of the parameters. This problem is what drives the development of the next approach, namely the random effect approach. Panel data regression model that uses this approach is known as Random Effect Model (REM).

The basic idea of REM is to describe the intercept in equation (3), namely:

Y_it=α_i+βx_it+ε_it

Dalam hal ini tidak lagi tetap (fixed). Sebagai gantinya α_i diasumsikan sebagai variabel random dengan nilai rata-rata (mean value). Berikut ini adalah penjabaran intersep untuk masing-masing unit:

In this case α_i is no longer fixed. Instead α_i is assumed to be a random variable with a mean value. The following is a description of intercepts for each unit:

$$\alpha_i = \alpha + \mu_i \text{ , i = 1, 2, 3, …, N}$$

Where u_i is a component of random error with zero mean and variance σ_ε^2 Substituting equation (4) into equation (3), the following equation will be obtained:

$$\begin{aligned} Y_{it} &= \alpha + \beta x_{it} + \mu_i + \varepsilon_{it} \\ &= \alpha + \beta x_{it} + w_{it} \qquad (5) \end{aligned}$$

Where

$$w_{it} = \mu_i + \varepsilon_{it} \qquad (6)$$

The error w_it component consists of two components, namely u_i which is the error component of each unit cross section and ε_it which is a combination of error time series components and cross section.

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Because it consists of two (more) error components, REM is also known as the Error Components Model (ECM).

The following are some assumptions related to ECM, namely:

$\mu_i \sim N(0, \sigma_u^2)$
$\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$
$E(\mu_i \varepsilon_{it}) = 0 \quad E(\mu_i \mu_j) = 0 \qquad (i \neq j)$
$E(\mu_{it}\mu_{is}) = E(\mu_{it}\mu_{jt}) = E(\mu_{it}\mu_{js}) = 0 \qquad (i \neq j\,; t \neq s)$

This means that the error component is not correlated with each other and there is no autocorrelation between the cross section unit and the time series unit. Noteworthy, there are important differences between FEM and REM. In FEM, each cross section unit has a fixed intercept value of all N observations, while in REM the intercept value μ_i states the average value of all intercepts cross section and error component μ_i states the interception of the intercept unit cross section of the average value. This error component cannot be observed directly, so it is known as the unobservable or latent variable.

The parameter estimation for this model no longer uses the OLS method because this method cannot produce an efficient estimator under the REM assumption. The right method for estimating REM is Generalized Least Square (GLS).

3.1. Test the Data Panel Model Selection

Chow Test or also called F Statistic test is a test that is done to choose what model to use Common Effect or Individual Effect, based on the previous explanation stating that sometimes the assumption that each unit cross section has the same behavior tends to be unrealistic and unwarranted. Given that there is a possibility that each cross section unit has a different behavior. Therefore, this test is carried out with the following hypothesis

H_o: Model Common Effect (Restricted)

H_1: Model Individual Effect (Unrestricted)

In testing the hypothesis, the F Statistics equation is used as Chow has formulated below:

$$F\,(\alpha, k-1, n-k) = \frac{(R_{UR}^2 - R_R^2)\ /\ k-1}{(1 - R_R^2)\ /\ n-k}$$

Where : R_{UR}^2 = unrestricted
R_R^2 = restricted
k = total number of regression coefficients (including constants)
n = number of samples

Hausman Test

After obtaining two significant models through two approaches, then which model should be chosen is the most suitable for the data they have. The most basic thing is to look at the correlation between the components of specific error cross section u_i with regresor or x predictor variable. If it is assumed and x is uncorrelated, then REM is appropriate. It is different if u_i and x correlate, then FEM is the most appropriate.

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Judge (Gujarati, 2003: 650) suggested several key considerations in choosing FEM and REM, namely:

If the amount of time series (T) data is large and the number of cross section (N) units is small, the estimated parameter value between FEM and REM is not significantly different. As a result, the choice is based on ease of calculation, namely FEM.

When large N and T are small, the estimated parameter values differ significantly. It should be noted that the cross section unit in the sample. If it is believed that the sample unit is not random, then FEM is the right choice, but if the sample unit is random then REM is more appropriate.

If the u_i error component correlates with one or more regressions, the REM estimator is a bias estimator and the FEM estimator is an unbiased estimator.

If the assumption of large N and small T and REM is fulfilled, the REM estimator is more efficient than the FEM estimator.

Formal testing to determine whether or not there are differences in estimated values between the two models was developed by Hausman. This test is then known as Hausman's Specification Test, which is based on the idea that the regression model uses the OLS estimator on the second assumption of the fixed effect approach and the regression model using an efficient GLS estimator, while the regression model using the OLS estimator without the doll variable on the assumption " all coefficients are constant between time and panel members "inefficient. However, because in this final project the first assumption of the fixed effect approach is not discussed, the OLS method with this assumption is ignored. Based on this, the null hypothesis (H0) is that the estimated values are not different so that the test can be done based on the difference in estimates. An important element for the Hausman test is the covariance matrix of different vectors,[(β) ̅-β ̅_GLS], that is:

$$Var[\bar{\beta} - \bar{\beta}_{GLS}] = Var[\bar{\beta}] + Var[\bar{\beta}_{GLS}] - 2\,Cov[\bar{\beta}, \bar{\beta}_{GLS}] \quad (7)$$

The main result of the Hausman test is that the covariance difference from an efficient estimator with an inefficient estimator is zero. This can be written as follows:

$$Cov[\bar{\beta} - \bar{\beta}_{GLS}], \bar{\beta}_{GLS} = Cov[\bar{\beta}, \bar{\beta}_{GLS}] - Var[\bar{\beta}_{GLS}] = 0 \quad (8)$$

In other words

$$Cov[\bar{\beta}, \bar{\beta}_{GLS}] = Var[\bar{\beta}_{GLS}] \quad (9)$$

Substituting equations (8) and (9) into equation (7), the following covariance matrix will be obtained:

$$\begin{aligned} Var[\bar{\beta} - \bar{\beta}_{GLS}] &= Var[\bar{\beta}] + Var[\bar{\beta}_{GLS}] - 2\,Cov[\bar{\beta}, \bar{\beta}_{GLS}] \\ &= Var[\bar{\beta}] + Var[\bar{\beta}_{GLS}] - 2\,Var[\bar{\beta}_{GLS}] \\ &= Var[\bar{\beta}] - Var[\bar{\beta}_{GLS}] \\ &= Var[\hat{q}] \end{aligned} \quad (10)$$

From equation (10), it can be defined that [q̂]=[(β) ̅-β ̅_GLS]. Furthermore the Hausman test will follow the distribution of Chi squares with the criteria of Wald, as follows:

$$m = \hat{q}\,Var(\hat{q})^{-1}\hat{q} \quad (11)$$

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Hausman test statistic follows Chi square distribution with k degree of freedom (number of predictor variables). If the test statistic value is greater than the critical value, the right model is a fixed effect model (FEM), whereas if the test statistic value is smaller than the critical value, the right model is a random effect (REM) model.

Testing the hypothesis for the Hausman test can be written mathematically, as follows:

• Hypothesis Formulation

H_o: The estimated parameter value between FEM and REM is not significantly different

H_1: The estimated parameter values between FEM and REM differ significantly

• Magnitude Required

$$[\hat{q}] = [\bar{\beta} - \bar{\beta}_{GLS}]$$
$$Var[\hat{q}] = Var[\bar{\beta} - \bar{\beta}_{GLS}]$$
$$= Var[\bar{\beta}] + Var[\bar{\beta}_{GLS}] - 2\,Cov[\bar{\beta}, \bar{\beta}_{GLS}]$$
$$= Var[\bar{\beta}] + Var[\bar{\beta}_{GLS}] - 2\,Var[\bar{\beta}_{GLS}]$$
$$= Var[\bar{\beta}] - Var[\bar{\beta}_{GLS}]$$

Statistics Test

$$m = \hat{q} Var(\hat{q})^{-1} \hat{q}$$

• Testing Criteria

With a significance level α, rejected H_o if $m < x^2_{1-\alpha;k}$

Interpretation that is rejected or received H_o, If it turns out H_o is rejected, it means that the estimated values of the two models differ significantly. Furthermore, the determination of the best model to be chosen is based on Judge criteria (Gujarati, 2003: 650)

3.2. Model

Research Model in estimating the determination of Foreign Direct Investment (FDI) as the Influence of Macro Economic Factors in ASEAN 5 (Indonesia, Malaysia, Singapore, Thailand, Philippines), China and Japan models adopted by Catherine and Rashid (2011)

FDI = f(Macroeconomic Factor, Country Specific Factor) (12)

In accordance with the requirements in this study, the selected independent variables are (a) Broad Money, (b) Economic Growth, (c) Labor force, (d) exchange rate, (e) Industry, (f) transport service; the above model can be simplified to:

FDI=f [(Broad Money)_it,(GDP)_it,(Labor force)_it,(exchange rate)_it,(Industri)_it,(transport service)_it] (13)

In this study to facilitate data analysis used several indicators representing the research variables used, namely FDI inflow as an indicator of FDI, broad money was given the symbol of BRM, economic growth was given the symbol of Economic Growth, labor force was given the symbol LBF, the exchange rate is given the EXR symbol, the industry is given the INST symbol, Transport services are given the TRANS symbol. So that this research model can be formulated as follows:

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FDI = f [BRM, GDP, LBF, EXR, INST, TRANS] (14)

4. Results and Discussions

The regression model results are presented in table 1. We compared three (3) models consisting of OLS models, fixed effect models and random effects models. Based on the Hausman test, the effect model remains efficient, so the model can be used for the main analysis of this study (see attachment).

Table 1 Research Results

Panel data estimation results with PLS ASEAN 5 FDI Determinants China and Japan Period 1996 - 2015:

Variable Dependent : FDI

VARIABLES	(1) OLS Model	(2) Fixed Effect Model	(3) Random Effect Model
Broad Money	-0.02	0.04	0.02
	(-1.3472)	-1.85	-1.00
Labor	0.10	0.22	0.15
	-1.07	-1.29	-1.12
Exchange Rate	-6.25	1.37	0.15
	(-2.685635)	-0.55	-0.06
Infrastructure	0.14	0.10	0.10
	-1.94	-1.99	-1.95
Transport Service	0.44	0.07	0.11
	-10.41	-1.60	-2.47
C	-7.11	-17.27	-10.36
	(-1.081234)	(-1.329595)	(-1.01447)
Filipina		0.69	-0.52
Singapura		11.63	10.51
Thailand		-0.94	-0.86
China		-3.69	-2.29
Jepang		-8.21	-5.61
R-squared	0.47	0.80	0.08
F-statistic	23.58	45.64	0.05

Contributions Strong standard error in parentheses
*** p <0,01, ** p <0,05, * p <0,1

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5. Conclusions

From the research above, some conclusions can be drawn as follows:

1. Increasing capital inflows into a country can result in excessive appreciation of the (real) currency, especially if capital flows are in the form of investment portfolios.
2. The impact of FDI on economic growth has focused on the existence and level of technology and productivity spillovers related to the transfer of technology by multinational companies, which reflects the understanding of modern growth theory that increasing productivity is supported by technological advances to maintain economic growth in the long run, against the possibility convergence of per capita income.
3. The impact analysis of FDI is concentrated on wages and the quality of work, and so on income inequality. The quality of work can be seen from the point of view of the worker, focusing on the company's relative overseas wage rates on wage levels in domestic companies, and from a national perspective, focusing on how jobs created by FDI affect overall productivity in the economy.
4. Short-term effects of nominal exchange rates on changes in domestic currency depreciation reduce the productivity of domestic cut and export firms. The effect of depreciation on industry productivity is uncertain in pure theoretical analysis. But empirical tests using company data from the Japanese manufacturing industry (general machinery, electrical machinery, and transportation equipment) show that currency hosts tend to increase industrial productivity. This result has several important policy implications. First, a policy that allows host currencies to fall in the value of the Foreign Exchange market can increase the average productivity in some manufacturing industries depending on the situation. Second, such policies can be protective for export companies, but not always beneficial for domestic and FDI.
5. FDI can improve the performance of the export market of domestic companies. If the increase in export market income is large enough, the overall impact on society will be positive. FDI can improve the performance of the export market of domestic companies at the expense of their market performance. If the increase in export market income is large enough, the overall impact on society will be positive. Overall, it seems that FDI in the industry has a positive effect on the total income of domestic companies. While other companies in the textile industry seem to benefit from FDI, to identify industries where FDI has a positive impact on revenues from companies. Increasing total company income can be attributed to increased employment.
6. Vertical FDI growth is associated with the development of production networks, which in turn are related to the liberalization of trade in intermediate goods. The hypothesis that the effect of ACFTA's vertical fragmentation (ASEAN-China Free Trade Agreement) will occur substantially, results in a positive impact on vertical FDI. The finding of horizontal FDI implies that market expansion effects may also contribute to explaining bilateral FDI in China and ASEAN. Horizontal FDI will increase due to the effects of market expansion, namely, the effect of reducing trade barriers in expanding the market size available to producers in FTA (Free Trade Agreement), and the effect of this market enlargement in attracting MNCs (Multinational Corporation) seeking markets

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7. Appendix

Results of the Chow Panel Fixed Effects Method (FEM) Test Data Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	53.797505	(6,127)	0.0000
Cross-section Chi-square	177.041574	6	0.0000

Results of the Hausman Test Data panel Random Effects Method (REM) panel

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	21.132061	5	0.0008

T-statistical test results (α = 5%) Model Fixed Effect (FEM) GLS

Variable Independent	t-Statistic	t-tabel df (α/2,n-k) df (0,025%,133)	Prob.	Kesimpulan
BRM	1.30148	±1.97796	0.1953	Signifikan
GDP	5.17642	±1.97796	0.0000	Signifikan
LBF	1.24605	±1.97796	0.2149	Signifikan
EXR	-4.98953	±1.97796	0.0000	Signifikan
INST	4.21032	±1.97796	0.0000	Signifikan
TRANS	3.24749	±1.97796	0.0015	Signifikan