

UNDERSTANDING THE DETERMINANTS OF FDI IN INDONESIA THROUGH EXTENSIVE DUNNING AND GRAVITY APPROACH

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Abstract

The potential impulse (s) and response (s) of Foreign Direct Investment (FDI) in economy system have been always bring great interest to researchers and practitioners. This paper considers movements of Foreign Direct Investment (FDI) in Indonesia, and therefore, to investigate and understand the determinants of FDI as the primary capital flows among other capitals sources. FDI flow's is very important to help encourage the growth of sustainable investment, creates new job opportunities, deteriorate the balance payments and lower the ability of national competitiveness, and may crowd out domestic capital. This paper has several specific objectives, such as: 1) to study about the determinants of capital inflows of FDI in Indonesia, and 2) to examine the impacts to investments of ASEAN countries towards FDI in Indonesia.

This paper eventually follows maximum likelihood methodology of Dunning and Gravity Model with the panel estimation and OLS (Ordinary Least Square). The analysis also carried out through an extensive review of the relevant literature, microeconomic, and macroeconomic topics related to FDI. In conclusion, this paper assume that economy growth, labor costs, infrastructures, exchange rates, and political stability has significant structural changes in level, respectively, within the time interval from 1992 to 2012.

Keywords: Dunning Model, Economy Growth, FDI, Gravity Model, Investment

JEL Classifications: O47, F43, O16

1. Introduction

During and after 1990s, the dramatic surge in private capital flows to developing countries represented an additional resource for supporting local domestic resources in financing economic growth and development. In many of these countries, domestic resources hardly provide the necessary resources required for financing economic development. In addition, FDI is regarded as an important vehicle and indicator of the country's degree of economic globalization and integration into world economy. Nowadays, FDI, to both the home and host countries, is considered to be very important number of reasons. Firstly, FDI flows provide an important window through which firms can avoid soaring production costs at home and find attractive market abroad. Secondly, since FDI flows are non-debt creating financial commitments, they are preferred instruments of financing external current account deficits particularly in developing countries (Demekas, Horvath, Ribakova, & Wu, 2005). Thirdly, FDI flows affect growth positively by decreasing the costs of research and development through stimulating innovation in the host country (Leinsink & Morrissey, 2001) (E., de Gregorio & Lee, 1998) considered FDI to be an important vehicle for transfer technology, contributing to growth more than domestic investment.

Fourthly, in presence to adequate absorptive capacities, FDI can have positive effects on domestic employment (Lall, 2002) in addition to leading to higher rates of human capital accumulation, hence, a potential for future growth processes and accelerated technological transfer over time. FDI can be an important channel for bringing knowledge and integration

into global production chains which are badly needed for successful exports strategy by developing countries (Yol & Teng, 2009).

Prior the economic transformation in 1998s, after the fundamental economy crisis, Indonesia was starting to look FDI as a source of capital when flows of Official Development Assistance (ODA) and International Monetary Fund (IMF) inclined sharply after crisis. FDI usually represented a long-term commitment to the host country and contributed significantly to gross fixed capital formation especially in Indonesia. FDI had several advantages over the types of capital flows, in particular its greater stability and the fact that it would not create obligations for the host country, as had been observed in the context of the Asian financial crisis of 1997-1998.

Emerging issues in the areas of foreign direct investment are an essential part of the core of regional and global market. Although the last two decades have been marked by a surge of private capital flows to developing countries, developed countries remain the first destination for FDI. In the developing world, some countries succeed in attracting foreign capital while others are more marginalized. This phenomenon was also happened in Indonesia. Even if there is some evidence of its negative effects, FDI is recognized to have beneficial effects on local firms and the economy at large.

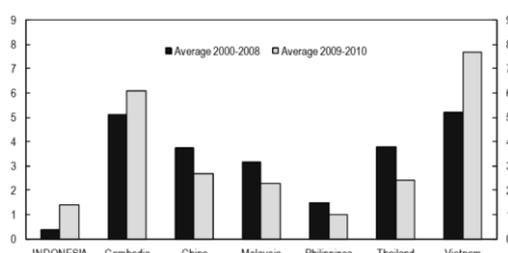


Figure 1. FDI Net Inflows in Selected Asian Economies; Percent of GDP (Source:(World Bank Database, n.d.)

As we can see on the figure above (Figure 1), foreign direct investment (FDI) inflows have been increasing, albeit from a comparatively low level. They grew by 18.5 % in 2011. According to the latest A.T. Kearney FDI confidence index, Indonesia moved from the 20th to the 9th most attractive FDI destination from 2008 to 2012 (Kearney, 2012). In the fact, while further corporate tax cuts might attract more FDI, a number of other factors may play important roles (Lipsev & F.Sjöholm, 2011). Indeed, FDI is usually believed to be beneficial to growth and development, as it's a source of technology transfer, allows risk diversification, and can deepen financial markets (Kose, Prasad, Rogoff, & Wei, 2009).

2. LITERATURE REVIEW

Determinants of FDI

As a long term endowment and relatively invulnerable to the economic fluctuation, FDI inflows are expected to drive sustainable development in Indonesia. Recently, foreigner investors tend to alternate their investment through FDI inflows instead another form of endowment influenced by the condition of the recipient country of FDI (the pull factors) as well as the conditions and strategies of foreign investors (push factors) (Kurniati, Prasmuko, & Yanfitri, 2007)

Kurniati et al. (2007) considered pull factors of FDI investment, include market conditions, availability of resources, competitiveness, policies related to trade and industry as well as the liberalization of FDI policies (in the form of investment incentives). What is more, highlighted how FDI decisions can be traced back to industry characteristics such as labour costs or production cost differentials, the exploitation of economies of scale and scope, the availability of a qualified labour force and the opportunities for upgrading

production techniques and product quality. While the pull factors include, among others, investment strategy and production strategy of the investor, indeed the perception of risk to the recipient country.

Meanwhile, FDI can also be distinguished by the motivation behind foreign inventors, namely:

- 1) Resource seeking: Investment done to find the factors of production more efficiently in other countries compared to the use of factors of production in the country is more expensive.
- 2) Market seeking: Investments made with the purpose of seeking new markets or maintain the market long. This strategy can also be done as a strategy pertahanan⁷. Investment in the background to find the market is realized in the form of mergers.
- 3) Efficiency seeking: Investments in which the company seeks to increase efficiency by taking advantage of the economic scale and scope. Type of FDI is widely used in developing countries.

3. RESEARCH METHOD

Dunning Model

The conceptual framework to answer the question related about determinants of FDI by using Dunning's eclectic paradigm, and the so-called OLI model and Gravity Model. Eclectic paradigm of J.H. Dunning, known as the OLI model, has been the most influential framework for empirical investigation of FDI determinants for decades. The paradigm offers a holistic framework to take in consideration all of the important factors. There are, in contemporary literature, some extensions of the OLI model in an attempt to fully develop conceptual framework. As mentioned above, FDI possess certain competitive (ownership) advantage, and they are able to internalize transaction costs (internalization), the key remaining determinant in decision-making process to invest abroad are location advantages of the host country and the government economic policy objectives.

The basic model of OLI model started with configuration in a subsequent moment of time. Let OLI_{t_0} be the OLI configuration in time t_0 , OLI_{t_1} the OLI configuration in the time t_1 , S_{t-n} the past (i.e. pre t_0) strategies of firms still being worked out, and $\Delta S_{t_0 \rightarrow t_1}$ any change in the strategic response. Then, *ceteris paribus*:

$$OLI_{t_1} = f(OLI_{t_0} S_{t-n} \Delta S_{t_0 \rightarrow t_1}) \quad (1)$$

If we extend the analysis to a second time period t_2 , then:

$$OLI_{t_2} = f(OLI_{t_1} S_{t-n} \Delta S_{t_1 \rightarrow t_2})$$

This analysis further suggests that S_{t-n} and $S_{t_0 \rightarrow t_2}$ determine the path of the movement from OLI_{t_0} to OLI_{t_2} . If we take all endogenous variables other than strategy to be *EN*, and all exogenous variables to be *EX*, and assume that changes in *EN* and *EX* do not affect the firms' strategies, then we can rewrite equation (1) as:

$$OLI_{t_1} = f(OLI_{t_0} S_{t-n} \Delta S_{t_0 \rightarrow t_1} \Delta EN_{t_0 \rightarrow t_1} \Delta EX_{t_0 \rightarrow t_1}) \quad (2)$$

Equation 2 can be similarly reconstructed and it is east to incorporate any change in strategy which embraces the response to ΔEN and ΔEX if it occurs before t_1 is reached by adding * to $\Delta S_{t_0 \rightarrow t_1}$ in the equation. Based on initial equation above, the dunning model that used to see the determinants of FDI Indonesia is:

$$FDI_t = \beta_0 + \beta_1 \times GDP_t + \beta_2 \times Wage_t + \beta_3 \times TC_t + \beta_4 \times Polrisk_t + \beta_5 \times REER_t + \beta_6 \times Excvolt_t + \beta_{10} \times FDI_t \quad (3)$$

where GDP_t = real gross domestic product at time t , $Waget$ = average wage for workers in the manufacturing sector at time t , TC_t = transport and communication expenditures compared with GDP nominal, $Polrisk_t$ = political risk during the time t , $REER_t$ = real effective exchange rate, $Excvolt_t$ = differences in exchange rate with average, and FDI_t = foreign direct investment (inflow).

The product of this equation estimates by using OLS (Ordinary Least Square) method. In case to determine model by using OLS method, where the model has a correlation with a constant error rate, the model used is fixed effects model, while if the constants are not correlated with the error rate, the model used is random effects model. Random effects model can be written as follows:

Gravity Model

Ever since the gravity model's first application by Tinbergen and Pöynönen in early 1960s, most gravity regressions fit data remarkably well, but a theoretical basis of the model was lacking. The trade model identification is particularly important when a gravity model is applied to a single country rather than to pairs of countries. As the model serves to reveal the trade pattern of bilateral trade flows, it will be more relevant to a country than to groups of industries in country pairs, as in (Evenett & Keller, 2002).

The empirical gravity equation takes the form:

$$\ln T_{ij} = \alpha + \beta_1 \ln [Y_i \cdot Y_j] + \beta_2 \ln [(Y/P)_i \cdot (Y/P)_j] - \beta_3 \ln Dist_{ij} + \varepsilon_{ij} \quad (5)$$

where T_{ij} = bilateral trade volume (exports + imports) between countries i and j , $Y_i \cdot Y_j$ = product of country i 's and country j 's GDPs, $(Y/P)_i \cdot (Y/P)_j$ = product of country i 's and country j 's per capita GDPs, and D_{ij} = distance between countries i and j .

This equation above is a development formula that has been done by Deardoff (1995) and applied in FDI formula (Boss & Van de Laar, 2004).

$$\begin{aligned} FDI_{ij} &= A_{ij} \times \left(\frac{GDP_i \times GDP_j}{Dist_{ij}} \right) \\ FDI_{ij} &= A \times (Y_i \cdot Y_j) \times \left(\frac{GDP_i}{Y_i} \times \frac{GDP_j}{Y_j} \right) \times \left(\frac{1}{Dist_{ij}} \right) \\ FDI_{ij} &= A \times (Y_i \cdot GDPC_i) \times (Y_j \cdot GDPC_j) \times \left(\frac{1}{Dist_{ij}} \right) \quad (6) \\ \ln FDI_{ij} &= \beta_0 + \beta_1 \ln GDPC_j + \beta_2 \ln Y_j - \beta_3 \ln Dist_{ij} + \varepsilon_{ij} \end{aligned}$$

The product of GDP serves as a proxy for two countries' economic size, in terms of both production capacity and market size. There is a negative relationship with the distance between countries to another country. This distance related about transaction costs may arise due to foreign investment. The distance variable is a trade resistance factor that represents trade barriers such as transport costs, delivery time, cultural unfamiliarity, and market access barriers. Most of the previous literature interpreted the coefficient of distance variable β_3 as the elasticity of trade with respect to an absolute geographical distance. Recently, however, it is generally accepted that a relative distance, rather than the absolute distance, matters more for bilateral trade flows in the gravity estimation (Sohn & Yoon, 2005).

Data Source

The objective of this study is to identify significant factors or determinants of FDI in Indonesia. The study employs annual data on foreign direct investment (FDI) flows, gross

domestic product (GDP), wage; defined as average of all wages in manufacturing sector, real effective exchange rate (REER), transport and communication defined as the number of expenditures in transportation and communication and compared with GDP nominal, political risk, and exchange rate volatility over period 1992 – 2012. For FDI data, we use collected data from World Bank's World Development Indicators Database. The data are obtained from various publications databases. Sample size was determined by the data availability which, in turn, dictated the number of variables to include in the study.

4. RESULT AND DISCUSSION

Unit Root Test Results

As a first step in finding out, estimation will use Ordinary Least Square (OLS) method which used time series data. In the beginning, the variables must meet the basic assumptions, which include homoscedasticity of error rate, none both of multi-collinearity and autocorrelation. Before process the time series data, we are doing some stationary testing by using Augmented Dickey Fuller test (ADF). In the first phase, we are testing variables at the level, first difference and second difference to know about integration degree.

Table 1. Simulation Results of Stationary Test Data

No	Variable Name	ADF Test Statistics (Level)		ADF Test Statistics (L(1))	
		t-statistic	Probability	t statistic	Probability
1	GDP Real	-1.862409	0.0810	-2.932366	0.0103
2	Real Wage	-1.969493	0.0665	-3.311553	0.0047
3	Transportation Communication	-3.007855	0.0083	-3.687695	0.0022
4	Political Stability	-4.157672	0.0007	-5.638864	0.0000
5	REER	-2.037798	0.0585	-3.914713	0.0014
6	Exchange Volatility	-1.758404	0.0978	-3.735517	0.0020

Based on the results of testing the unit root test, we found that all of the variables used in the test are stationary at the first difference level. Most of the explanatory variables are found quite highly probability and effective for explaining determinants of FDI in Indonesia. It also shows that variable selection is appropriate for a single-country case.

Dunning Model Test Results

The single-country OLS regression results for the Dunning equations are reported in table 2. The overall performance of the model seems to be surprisingly good, with high R^2 (R-squared) value of around 0.796 for the equation. Most of explanatory variables have a high significant number, meaning that also have significant influence to FDI in Indonesia.

Based on the table 2, we can take a look at the coefficient of economy growth. Percentage of economy growth in Indonesia has significantly affect to level of investment when GDP increase by 1 %, it also increase investment by 5.72 %. The log of products GDP's is highly significant and consistent with rate stability after crisis, which is in the range of 6 %. Growth (GDP)'s coefficient is quite large compared with other variables, and give some advice to encourage investment into Indonesia, preferably with promoting and increasing economy growth itself.

In contrast, real wage have a negative impact for FDI into Indonesia. Increased labor cost that reflecting of increase the cost of production, will make cost for production is relatively more expensive. Increased labor cost by 1 % during period time from 1992 to 2012 will decrease investment around 11 %.

Infrastructure and political risk have a significant impact on FDI into Indonesia. Development of infrastructure that became better, especially for roads and communication, will make production activities increasing faster and efficient. The increasing in

infrastructure growth by 1 % will lead to investment into Indonesia around 0.17 % while political stability also has an important role in attracting investment to Indonesia. Increased political stability by 1 % will encourage investment in Indonesia amounted 0.309 %. This is consistent with the previously proposed Dunning’s theory that investors saw existence of risks in the country.

Table 2. Results of Dunning Test using OLS, White Test

Dependent Variable: LOG_FDI				
Method: Least Squares				
Date: 06/10/13 Time: 04:25				
Sample: 1992 2012				
Included observations: 16				
Excluded observations: 5				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-29.38065	26.28224	-1.117890	0.2926
LOG_GDP	5.722618	1.412699	4.050839	0.0029
LOG_WAGE	-11.88178	13.60320	-0.873455	0.4051
LOG_TC	0.174595	0.192429	0.907321	0.3879
LOG_POLRISK	0.309611	0.377307	0.820583	0.4331
LOG_REER	-0.186153	3.340787	-0.055721	0.9568
LOG_EXCVOL	5.136656	0.991748	5.179397	0.0006
R-squared	0.796367	Mean dependent var	9.639687	
Adjusted R-squared	0.660611	S.D. dependent var	0.517852	
S.E. of regression	0.301685	Akaike info criterion	0.740771	
Sum squared resid	0.819126	Schwarz criterion	1.078779	
Log likelihood	1.073831	F-statistic	5.866188	
Durbin-Watson stat	1.339051	Prob(F-statistic)	0.009646	

Based on the results, exchange rate volatility does not give a significant effect to investment in Indonesia. It can be figured out as FDI is an investment for long term, therefore the volatility just effect in the short term (less than a year) and does not give affect for investor’s decision to invest in Indonesia. Although the exchange rate volatility does not give a significant effect, REER has a negative relation with FDI. Increased (appreciation) effective exchange rate by 1 % will decrease investment point until 0.186 %. This showing that the appreciation which happened in Indonesia will lead for investment (cost of product and service) to become more expensive (Hattari & Rajan, 2008).

Thus, the effective model that can be taken from Dunning Model is:

$$\text{LOG_FDI} = -29.38064758 + 5.72261814*\text{LOG_GDP} - 11.88178447*\text{LOG_WAGE} + 0.1745948663*\text{LOG_TC} + 0.3096113774*\text{LOG_POLRISK} - 0.1861530319*\text{LOG_REER} + 5.136655848*\text{LOG_EXCVOL}$$

Gravity Model Test Results

As we discussed above, we make some adjustment to Gravity Model that will be used for estimate the factors of investment in ASEAN and Indonesia and try to find relationship among them. ASEAN countries are represented by five countries (except Singapore) defined as Indonesia, Malaysia, Thailand, Vietnam, and the Philippines (Kurniati et al., 2007). The adjustment Gravity Model that will be used is:

$$FDI_{ij,t} = \beta_0 + \sum \beta_{a1} \times FDI_{j,t} + \sum \beta_{a2} \times GDP_{j,t} + \sum \beta_b \times IR_{j,t} + \sum \beta_c \times WageDiff_{j,t} + \sum \beta_d \times Oil_{j,t} + \varepsilon_{ij} \quad (7)$$

where, $FDI_{ij,t}$ = amount of FDI inflows in ASEAN member countries at time t , $GDP_{j,t}$ = Gross Domestic Product in ASEAN member countries at the time t , $IR_{j,t}$ = interest rate for each ASEAN member countries during the time t , $WageDiff_{j,t}$ = difference level of wages in manufacturing sector between ASEAN member countries and Indonesia, and $Oil_{j,t}$ = total value of oil imports during time t . We used Panel Data Test, because the data that used in model is combination of time series data (year) and cross section (countries).

Over the sample period from 1992 to 2012, the FDI for both of all ASEAN member countries has significantly increased. However, before interpreting, the results, it is worth nothing an important limitation associated with the approach and some adjustment taken in the analysis. That is, while each of the regression coefficients is indicative of the impact of a change in the explanatory variable on the FDI, it would not be valid for a particular variables and country in the sample, unless that country closely resembles the average country with regard to the economy structure summarized by the values of the explanatory variables. Nevertheless, despite this shortcoming, the empirical results are good informative.

Table 3. Results of Gravity Test using Panel Data, GLS (Cross Section Weights)

Dependent Variable: LOG_FDI?				
Method: GLS (Cross Section Weights)				
Date: 06/29/13 Time: 05:43				
Sample: 1992 2012				
Included observations: 21				
Total panel (balanced) observations 105				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.274130	0.215954	38.31433	0.0000
LOG_GDP?	0.184456	0.033649	5.481799	0.0000
LOG_IR?	-0.037750	0.118570	-0.318373	0.7509
LOG_WAGE?	-0.091738	0.154788	-0.592666	0.5547
LOG_OIL?	0.495577	0.116547	4.252157	0.0000
Weighted Statistics				
R-squared	0.991232	Mean dependent var	19.12607	
Adjusted R-squared	0.990881	S.D. dependent var	8.276265	
S.E. of regression	0.790336	Sum squared resid	62.46318	
Log likelihood	-46.20370	F-statistic	2826.137	
Durbin-Watson stat	1.315962	Prob(F-statistic)	0.000000	
Unweighted Statistics				
R-squared	0.187411	Mean dependent var	9.305210	
Adjusted R-squared	0.154907	S.D. dependent var	1.122490	
S.E. of regression	1.031893	Sum squared resid	106.4803	
Durbin-Watson stat	0.946778			

We use weighted statistic estimation, for increasing and generalizing cross section data during the test. However, we found that adjusted R_2 of around 0.99 (using weighted statistics) and 0.18 (without weighted statistics), which is little bit hard to achieve the good conclusion. But, we try to focus on generalizing and put weighted statistics as the estimation. All the coefficients have not on the right signs. The wage difference and interest rate are negatively correlated in the model. On the other hand, GDP variable and oil imports variable openness appear to give strong positive correlation with the FDI to Indonesia. The variable, oil imports, defined as the total value of oil imports in the country during the period time. The measure of openness (Knight, Loayza, & Villanueva, 1993) affect growth through investment and efficiency. The efficiency term accounts for technological improvements.

The result of the data panel test show that 1 % increase in GDP (growth) leads to a rise in the FDI by around 0.18 %. 1 % point increase in oil imports increases 0.49 % investment over a 20-year period. The combined effect of 1 % increase in interest rate will decrease 0.8 % of FDI and last, 1 % increase in wage in manufacturing sectors will decrease 0.09 % of FDI in Indonesia. Similar result were also obtained under the random effects model, albeit more significant.

In the final step, we have analyzed a model and result of impact of investment into ASEAN member countries will lead the positive result to Indonesia. The impact is slightly weaker under the fixed effects model. The fact that it is negatively correlated with FDI should reconfirm the importance of interest rate and differential wage among ASEAN member countries.

4. CONCLUSION

The objective of this paper was to determine some of the necessary determinants of Foreign Direct Investment in Indonesia. The results provide useful insights into these factors. There has been a long debate among policy makers and economists at the national and international levels about whether FDI enhances growth in the host countries. Further, we analyzed both economy growth, transportation and communication, political stability, and exchange rate volatility have significant impact for FDI to Indonesia. We conducted also an empirical analysis in the framework of a panel for Five ASEAN member countries by employing data from 1992 to 2012. The results give us useful information about relationship among ASEAN member countries to speed-up the FDI acceleration. The results suggest FDI will be supported by an increase in economy growth and oil imports to improve capital, increase domestic investment, and encourage efficiency in investment.

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