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Determinants of Foreign Direct Investment Inflows to Malaysia

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Abstract

This paper aims to investigate the important factors that influence foreign direct investment (FDI) inflows to Malaysia. A multiple linear regression analyses by using Ordinary Least Squares (OLS) method are used in order to find the best fit model to explain variations in FDI inflows. Six (6) independent variables identified for this study are export, import, inflation, population, current account balance and quasi money. This study involves annual data from year 1981 until 2011. The finding of this study indicates that only import can be used to explain the variation in FDI inflows. Import is significant towards the study at 10% level of significance. Import is an important indicator because it reflects the amount of Foreign Direct Investment made from other countries into Malaysia. Malaysian government should focus more on the import activities in order to enhance the amount of FDI inflows and thus, it will also increase the government revenues. Other combinations of independent variables fail to satisfy all of the statistical tools examined in this study thus appear to be insignificant in explaining FDI inflows to Malaysia.

Keywords*: FDI inflows, Malaysia, Ordinary least squares, Linear regression analyses*

1. INTRODUCTION

Foreign Direct Investment (FDI) can be translated as an investment made by an investor or a group of investors based in one country, into a company or entity based in another country. According to Rehman, Orangzab and Raza (2011), FDI plays an important role in economic development of both developed and developing countries. Because of the FDI, technology and skilled management have been transferred to the host country. New job opportunities are created which help to reduce poverty, and also improve the financial condition in recipient country. These offer the reason why many countries make changes in their economic policies in order to attract FDI inflows into their economy. In regards to this, FDI affect various aspects of a country's economy namely production, prices, employment, economic growth, balance of payment and the market structure (Pradhan and Saha, 2011).

According to World Investment Report 2012, Malaysian FDI inflows continued to decrease as year goes by as compared to countries such as Thailand and Indonesia, whose FDI figures did not contract even after the global financial crisis (UNCTAD, 2010). Currently, Malaysian FDI inflows are smaller than outflows amount of investment. These situations prove that local investors have enough resources to invest locally but they tend to invest abroad. According to the report by National Economic Advisory Council (2009), Malaysia's place within the Global Competitiveness Index dropped to 24th in 2010 from 21st previously, indicates that the country is losing its attractiveness as an investment destination. These phenomena are really critical to our country as our net national income will be affected when FDI inflows decrease. Therefore, there is a need to investigate what determine the FDI inflows into Malaysia. By identifying the determinants of FDI inflows, the study will propose necessary steps to be taken in order to enhance the FDI inflows. For that reason, this paper intends is to investigate the important factors that influence FDI inflows to Malaysia.

2. LITERATURE REVIEW

Rehman *et al.* (2011) investigate the determinants of FDI and its impact on gross domestic product's growth in Pakistan. They uncovered a positive and significant impact of FDI on the gross domestic product of Pakistan. On the other hand, Singhania and Gupta (2011) who had examined the determinants of FDI in India revealed that GDP, inflation rate and scientific research are significant, while openness, money growth and real interest rate are found to be insignificant in promoting FDI in India. Their study proposed that changes on FDI policy in India have a significant impact on their FDI inflows. In addition, inflation must be controlled and the government should open their economy further to enhance the FDI inflows. However, relationship of a country's money growth and the FDI inflows are still unclear and always been debated. Although they have made several attempts, but they still failed to prove the relationship between those two. Moreover, Aziz and Makkawi (2012) studied about the relationship between FDI inflows and country population proved a positive significant relationship between the two variables. Two most populous countries of the world are China and India who are believed to hold financial powers in the future. Their study suggests that due to the large spending and purchasing power hold by the citizen, a country's population has important implications for economic growth.

Pradhan and Saha (2011) examine the determinants of FDI in selected South Asian Association for Regional Cooperation (SAARC) countries by using the panel VAR model. They found that FDI are determined by economic growth, exchange rate, inflation, labor population, trade balance, current account balance and long term debt outstanding. Accordingly, economic growth and exchange rate are bidirectional with the dependent variable (FDI), while others are unidirectional. Furthermore, Vijayakumar, Sridharan and Rao (2010) investigate about the determinants of FDI in Brazil, Russia Federation, India and China; formally known as BRIC countries. Their results show that inflation and industrial productions are important determinants in attracting FDI inflows. Trade openness is found to have no impact on the FDI inflows. On the other hand, Ranjan and Agrawal (2011) explore the determinants of FDI inflow in the BRIC countries by using a panel data analysis. The results of their study show the market size, trade openness, labor cost, infrastructure facilities and macroeconomic stability are the considerable determinants of FDI inflows in the BRIC countries. According to them, geographical position, special trade openness facilities and cheap labor cost are the reasons that make Brazil become one of the major destinations for FDIs.

Kok and Ersoy (2009) analyses the FDI determinants in developing countries. Their results show that the important determinants of FDI are the communication variable, total debt service/GDP and inflation. When a country has higher degree of openness, they tend to attract more foreign firms and investors to invest into their country. To be added, a country needs to encourage the import of investment goods so that it can boost the FDI inflows in their country. Openness indicator is said to be important in the study. Lastly the study proved that GDP per capita growth has a positive significant relationship with the FDI inflows. Shahmoradi, *et al.,* (2010) researched on determinants of FDI inflows in high income countries which include six selected variables namely outflow, gross domestic product (GDP), balance of payment (BOP), export, import and labor. Their study proposed that both BOP and Outflow are significant to their study in all years. BOP is said to be negatively related with FDI. Outflow is said to be a major indicator that influence FDI. Export was significant only in year 2000. Moreover, they found that GDP is not significant and cannot be used to explain the dependent variable (FDI inflows). Alon (2010) analyze the impact of the Chinese institutional environment on its globalization patterns, and also to investigate the determinants of FDI in China. According to him, GDP, GDP per capita, exported products (agriculture, metals and fuel) and aggregate trade (divided by GDP) are all properly accurate

and significant to the study. However, host exports to China and host imports from China failed to prove any significant relationship in his study.

3. DATA AND METHODOLOGY

This section will explain about the data involves in this study and methodology used to analyze the data.

3.1 Data

The data are collected from DataStream. Time frame of this study is from year 1981 to 2011 (31 years) and the selected country is Malaysia. All the data are in term of percentage of GDP (%).

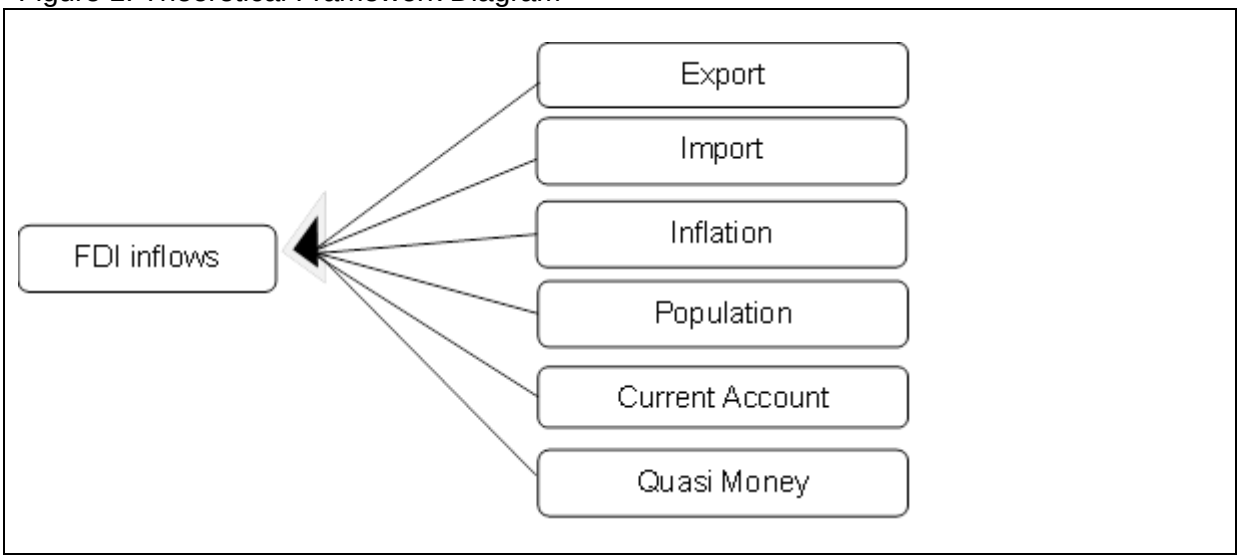
3.2 Variables for the study

a) Dependent Variable
   FDI inflows are the dependent variable for this study. It is explained by six (6) selected independent variables.
b) Independent Variables
   Export (X1), Import (X2), Inflation (X3), Population (X4), Current Account Balance (X5), and Quasi Money (X6) are all the independent variables that are tested in order to examine their relationship with the dependent variable.

3.3 Research framework

The research framework undertakes this study is provided by the following diagram. It shows that FDI inflows are influenced by the selected variables as shown below.

Figure 1: Theoretical Framework Diagram



3.4 Data analysis and treatment

In order to achieve the objective of this study, the multiple regression analysis is conducted based on 10% level of significance. A basic model function for this paper is demonstrated below:

$$Y = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \varepsilon \quad (1)$$

Where;

Y	=	FDI Inflows
α	=	Intercept
β	=	Coefficient (beta value)
χ_1	=	Export
χ_2	=	Import
χ_3	=	Inflation
χ_4	=	Population
χ_5	=	Current Account Balance
χ_6	=	Quasi Money
ε	=	Error term

3.4.1 Hypothesis statement

The hypothesis statement for this study is stated below. As null hypothesis, we hypothesized that there is no significant relationship between the selected variables and the FDI inflows.

H_0: There is no significant relationship between the selected variables and the FDI inflows.
H_1: There is a significant relationship between the selected variables and the FDI inflows.

3.4.2 Test on stationarity

Augmented Dickey-Fuller (ADF) test is used in order to test the entire variables whether they are stationary or non-stationary. Below are the hypotheses of this test:

H_0 = Data is non-stationary.
H_1 = Data is stationary.

To proceed with the data analysis and regression, the data must be stationary by rejecting the null hypothesis. In order to reject the null hypothesis, the probability (prob.) value (P-value) of each variable must be lower than the level of significance. Researcher will unable to conduct a relevant study if they the data are non-stationary.

3.4.3 Correlation matrix

Correlation matrix is one of the statistical tools used to investigate any relationship for the variables under this study. Below are the hypotheses of this test:

H_0: $\rho = 0$ (There is no correlation between the variables).
H_1: $\rho \neq 0$ (There is a positive/negative correlation between the variables).

The rule of thumb to reject the null hypothesis is the P-value must be smaller than the level of significance (10%).

3.4.4 Multiple linear regressions

This study is using a multiple linear regression analysis. The basic model function used in this study is:

$$Y = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \varepsilon \quad (2)$$

By using multiple linear regressions, the best fit model is identified to explain the dependent variable (FDI inflows). It can be observed by looking at several indicators such as:

a. P-value of the independent variables must be significant (at least one independent variable) at the level of significance.
b. Prob. F-test must be significant at the level of significance.

c. R – Squared and adjusted R – Squared must be at the level that able to explain the relationship between dependent variable and independent variables.

3.4.5 Test on assumption

a. Testing for normality
The purpose of this test is to identify whether the residuals of the final estimate regression are being normally distributed or vice versa. Below are the hypotheses that will be used:
H_0 = Error term is normally distributed.
H_1 = Error term is not normally distributed.
As for the null hypothesis, the study hypotheses that error term are normally distributed. Therefore, when probability value is larger than the level of significance, this study fails to reject the null hypothesis. Thus the error term is normally distributed and vice versa**.**

b. Testing for serial correlation
Serial correlation is important in the study as this test is specially associated with the time series data. Testing for serial correlation aims to examine whether the error term in one period is correlated with the error term in the future period in some systematic ways. Below are the hypotheses of this test:
H_0 = Error term is serially independent.
H_1 = Error term is not serially independent.
As for the null hypothesis, the study hypotheses that error term are serially independent.

c. Testing for heteroscedasticity
This test is aims to examine whether there is any disturbance of error term among the variances. Hypotheses below will be used in order to test the existence of heteroscedasticity:
H_0 = Error term is Homoscedastic (Homo).
H_1 = Error term is Heteroscedastic (Hetero).
As for the null hypothesis, the study hypotheses that error term are homoscedastic.

d. Ramsey reset test
In order to test on the functional form, Ramsey Reset Test is used. Below are the hypothesis statements for this test:
H_0 = No misspecification.
H_1 = Error in specification.
When P-value of either one of T-stat, F-stat, or likelihood is larger than the level of significance, this study fails to reject the null hypothesis. Thus, there is no misspecification**,** vice versa.

e. Testing for multicollinearity
Multicollinearity test must be conducted to ensure that there is no perfect collinearity relationship among those independent variables. A rule of thumb indicates that:
When centered Variance Inflation Factors (VIF) value is larger than 10, serious multicollinearity problem. When centered VIF value is lesser than 10, no serious collinearity problem is detected.

4. EMPIRICAL RESULTS

4.1 Unit root test

From the above below, it shows that at 1% level of significance, all variables are stationary at 1st difference.

Table 1: Results of augmented dickey-fuller test

Variables	P-Value (Level)	P-Value (1^{st} Difference)
FDI (Y)	0.1487	0.0000
EXPORT (X_1)	0.5107	0.0078
IMPORT (X_2)	0.6141	0.0027
INFLATION (X_3)	0.5192	0.0032
POPULATION (X_4)	0.5888	0.0003
CURRENT ACC BAL (X_5)	0.4477	0.0002
QUASI MONEY (X_6)	0.1304	0.0001

4.2 Correlation matrix

The correlation matrix which shows the correlation between the dependent variable and independent variables are presented below:

Table 2: Summary of the correlation matrix

Variables	Correlation	P-Value	Conclusion
FDI vs. EXPORT	0.0913	0.6315	No correlation between the variables
FDI vs. IMPORT	0.4036	0.0270	Positive correlation between the variables
FDI vs. INFLATION	-0.3647	0.0476	Negative correlation between the variables
FDI vs. POPULATION	-0.3037	0.1028	No correlation between the variables
FDI vs. CURRENT ACC BAL	-0.3579	0.0522	Negative correlation between the variables
FDI vs. QUASI MONEY	-0.2140	0.2561	No correlation between the variables

4.3 Multiple linear regressions

Regression analysis is important in order to find the best fit model to explain the dependent variable (FDI inflows). Five (5) models are reported below in order to find the independent variable that is significant towards FDI inflows.

Model 1: DY C DX_1 DX_2 DX_3 DX_4 DX_5 DX_6
Model 2: DY C DX_5 DX_6
Model 3: DY C DX_2 DX_3 DX_4
Model 4: DY C DX_2 DX_4
Model 5: DY C DX_2

Test on assumptions are conducted before making any conclusion. Table below reported the results on the tests:

Table 3: Summary tests on assumptions

	Model 1	Model 2	Model 3	Model 4	Model 5
Normality:					
Jarque Bera	0.5543	0.4789	0.3265	0.3305	0.5673
Prob.	0.7579	0.7871	0.8494	0.8477	0.7531
Conclusion: Error term is	Normally distributed	Normally distributed	Normally distributed	Normally distributed	Normally distributed
Serial Correlation:					
Prob.Chi-squared	0.2619	0.3472	0.3452	0.3587	0.3900
Conclusion: Error term is	Serially independent	Serially independent	Serially independent	Serially independent	Serially independent
Hetero:					
Prob.Chi-Squared	0.2678	0.2402	0.2517	0.1311	0.1659
Conclusion: Error term is	Homo	Homo	Homo	Homo	Homo
Ramsey Reset Test : F-Stat	0.0688	0.8285	0.0691	0.0661	0.4799
Conclusion	Error in Specification	No error	Error in specification	Error in Specification	No error

Variance inflation factor (VIF)

Variables		Model 1	Model 2	Model 3	Model 4	Model 5
	Centered VIF	32.37				
DX_1	Conclusion	Serious Multicollinearity problem				
	Centered VIF	35.27		1.4446	1.0028	
DX_2	Conclusion	Serious Multicollinearity problem		No serious collinearity problem	No serious collinearity problem	
	Centered VIF	3.68		3.2931		
DX_3	Conclusion	No serious collinearity problem		No serious collinearity problem		
	Centered VIF	4.5161		2.7612	1.0028	
DX_4	Conclusion	No serious collinearity problem		No serious collinearity problem	No serious collinearity problem	
	Centered VIF	25.09	1.0188			
DX_5	Conclusion	Serious Multicollinearity problem	No serious collinearity problem			
	Centered VIF	1.1871	1.0188			
DX_6	Conclusion	No serious collinearity problem	No serious collinearity problem			

Table below reports the results of the regression analysis:

Table 4: Summary of regression analyses

Independent Variables		Model 1	Model 2	Model 3	Model 4	Model 5
	Coefficient	-0.1636	0.0693	-0.1746	-0.1891	-0.1130
C	T-Stat	-0.3806	0.2420	-0.4504	-0.6927	-0.4063
	P-Value	(0.7070)	(0.8106)	(0.6561)	(0.4944)	(0.6876)
	Coefficient	0.0679				
DX_1	T-Stat	0.2395				
	P-Value	(0.8128)				
	Coefficient	0.0342		0.1156	0.1138	0.1182
DX_2	T-Stat	0.1088		1.9246	2.3175	2.3340
	P-Value	(0.9143)		(0.0653)	(0.0283)	(0.0270)
	Coefficient	1.3452		28.2406		
DX_3	T-Stat	0.0023		0.0536		
	P-Value	(0.9982)		(0.9577)		
	Coefficient	-0.1742		-0.1900	-0.1822	
DX_4	T-Stat	-0.7043		-1.0414	-1.6886	
	P-Value	(0.4883)		(0.3073)	(0.1028)	
	Coefficient	-0.0736	-0.1063			
DX_5	T-Stat	-0.2561	-1.8772			
	P-Value	(0.8001)	(0.0713)			
	Coefficient	-0.0060	-0.0168			
DX_6	T-Stat	-0.3040	-0.9445			
	P-Value	(0.7638)	(0.3533)			
R – Squared		0.2475	0.1560	0.2429	0.2428	0.1629
Adjusted R – Squared		0.0512	0.0934	0.1556	0.1867	0.1330
F – Stat		1.2606	2.4946	2.7807	4.3295	5.4473
Prob. (F – Stat)		0.3136	0.1014	0.0610	0.0234	0.0270
Akaike Info Criterion		3.9561	3.8041	3.7621	3.6955	3.7293

4.3.1 Model 1

Model 1 involves all the independent variables namely DX_1, DX_2, DX_3, DX_4, DX_5 and DX_6. Below is the equation of this model:

$$DY = \underset{(0.7070)}{-0.1636} + \underset{(0.8128)}{0.0679DX_1} + \underset{(0.9143)}{0.0342DX_2} + \underset{(0.9982)}{1.3452DX_3} - \underset{(0.4883)}{0.1742DX_4} - \underset{(0.8001)}{0.0736DX_5} - \underset{(0.7638)}{0.0060DX_6} \quad (3)$$

***** Figures in the parentheses are the P-value of the variables.

Model 1 is rejected because all of its independent variables are not significance at 10% level of significance. In order to find a significant model, another model is adopted.

4.3.2 Model 2

The combinations of independent variables used in Model 2 are DX_5 and DX_6. Equation below shows the equation of Model 2:

$$DY = \underset{(0.8106)}{0.0693} - \underset{(0.0713)}{0.1063DX_5} - \underset{(0.3533)}{0.0168DX_6} \quad (4)$$

Model 2 is rejected because the prob. f-test of the model is not significance at 10% level of significance.

4.3.3 Model 3

Thus, another combination of independent variables is assumed for Model 3 which includes DX_2, DX_3 and DX_4.

$$DY = -0.1746 + 0.1156DX_2 + 28.2406DX_3 - 0.1900DX_4 \quad (5)$$
$$(0.6561) \quad (0.0653) \quad (0.9577) \quad (0.3073)$$

Although prob. f-test of Model 3 is significant at 10% level of significance, but the model is rejected because it holds error in specification.

4.3.4 Model 4

Thus, another model is form which is Model 4. Model 4 contained independent variables of DX_2 and DX_4. The equation of this model is shown as follows:

$$DY = -0.1891 + 0.1138DX_2 - 0.1822DX_4 \quad (6)$$
$$(0.4944) \quad (0.0283) \quad (0.1028)$$

Likewise, Model 4 is rejected as it holds error in specification.

4.3.5 Model 5

$$DY = -0.1130 + 0.1182DX_2 \quad (7)$$
$$(0.6876) \quad (0.0270)$$

Finally, Model 5 is adopted by dropping DX_4 as the variable is insignificant at the previous model. This fifth model is the best fit model in this study where only one independent variable (DX_2) is significant to explain the dependent variable. This model can be classified as a simple regression model. The independent variable (DX_2) is significant at 10% level of significance as the P-value is 0.0270. It suggests that increases one unit of import tends to promote increases of FDI inflows by 0.1182.

Even though the R – Squared value of this model is only 0.1629, but the prob. f-test for this model is 0.0270, which is able to proved that this model is significant at 10% level of significance. In addition, this model does not have any serious problems on the test on assumptions.

As a result, import is found to be positively significant towards FDI inflows in Malaysia. It is consistent with the suggestions and recommendations made by Kok and Ersoy (2009), who propose that a country needs to encourage import of investment goods in order to boost the FDI inflows. However, it is contradict with research by Shahmoradi, *et al.* and Alon (2010). In particular, Alon (2010) found that host exports to China and host imports from China failed to prove any significant relationship in the study.

The rest of the independent variables are found to be insignificant to explain FDI inflows in Malaysia. This results is not consistent with the studies conducted by Singhania and Gupta (2011), Aziz and Makkawi (2012) as well as Pradhan and Saha (2011) who suggest the significant relationship between inflation, population and current account balances with FDI inflows. Nevertheless, the results of this study that propose the relationship between money growth and the FDI inflows are unclear are supported by the studies conducted by Singhania and Gupta (2011).

5. CONCLUSION

The findings of this study indicate that only import is significant to explain the variation in FDI inflows. Import is significant in explaining FDI inflows at 10% level of significance. Besides,

researcher decides to drop other independent variables in the final model as their combinations in the previous models fail to satisfy the statistical tests.

5.1 Implications

The results of this study appear to suggest a positive significant relationship between import and FDI inflows. It has drawn some important insights for policy implication. Import is an essential indicator because it reflects the amount of FDI made from other countries into Malaysia. Malaysian government should focus more on the import activities in order to enhance the amount of FDI inflows and thus, it will also increase the government revenues. This implies the important of the concept of interdependence of one country with another country in term of products and services. In addition, trade openness is essential to facilitate FDI inflows. Therefore, lifting of certain trade barriers may encourage openness which will ultimately enhance economic development and support positive FDI inflows.

5.2 Recommendations

It is recommended that future research is conducted using more advance methodologies in order to improve the results of the study. In addition, researchers are recommended to consider other significant variables which are able to explain FDI inflows. Last but not least, future research may be conducted using different unit of analysis in order to have different point of views and results.

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