Foreign Direct Investment and Economic Growth:
Evidence from Malaysia

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Abstract
The objective of this paper is to examine the relationship of foreign direct investment on real gross domestic product in Malaysia using annually data from 1971 until 2010. VAR model with cointegration technique is applied to examine the effect of foreign direct investment on real gross domestic product in Malaysia. Vector Error Correction model (VECM) is used to analyze the short run effect of the two variables in Malaysia. Granger causality is also employed to see the causal effect of foreign direct investment and real gross domestic product. Our main findings reveal that the increase in foreign direct investment has given a good impact on Malaysian economic growth. Specifically, 1% permanent increase in the level of foreign direct investment causes the level of Malaysian gross domestic product to increase by 49.135%. By using granger causality, it is found that GDP has granger cause to FDI and vice versa.

Keywords: FDI, GDP, VAR model, VECM, granger causality

1. Introduction
Foreign Direct Investment (FDI) is an international strategy in which firms establish a physical presence abroad through acquisition of productive assets. In other words, foreign direct investment is one of the international investments that were made by an investor in foreign countries with interest to gain more return, expanding their products market and enjoy the economies of scale. In the Balance of Payment Manual, the foreign direct investment is cross-border investments that were made by foreign investors who have financial interest in certain companies and wishing to control the company’s operation in certain degree.

Despite the pattern of foreign direct investment has slightly changed time by time, the foreign direct investment still remains as an important tool to generate economic growth (GDP) in most of the countries. In 2002, Organization for Economic Co-operation Development (OECD) reported that the countries with weaker economies consider the foreign direct investment as the only source of growth and economy modernization. Thus, the government especially in developing countries are focussing on foreign capital, (Carkovic & Levine, 2002). According to Hansen and Rand (2006), Foreign Direct Investment had a strong causality impact on economic growth in short term and in 31 developing countries.

Since independence in 1975, Malaysia has fully capitalized natural resources, abundant and cheap labor, and its sizeable domestic market as well as its intangible assets, its preferential trade status under the Generalized System of Preferences (GSP), macroeconomic stability, liberal trade regime and an efficient legal infrastructure to attract foreign direct investment. In that time, the real gross domestic product (GDP) grew by an average of 6.5 percent per year from 1957 to 2005.

The Government of Malaysia’s (GOM) principal policy was to control foreign direct investment as a part of the economic development strategies in order to obtain foreign technology, capital and skills. The import substitution-based economy of the 1960s was replaced by a dynamic and diversified export oriented economy. This was followed by an unprecedented real gross domestic product growth rate, averaging of 8.9 percent per annum from 1988 to 1996, particularly buoyed by foreign direct investment in the manufacturing sector (Okposin & Cheng, 2000).
Figure 1 shows the foreign direct investment inflows in Malaysia from 1970 to 2005. During the period of 1970s, the inflows of foreign direct investment into Malaysia started increasing until 1974. During that period, Malaysia was hit the great recession. After the recession, the foreign direct investment inflows into Malaysia started increasing slowly in late 1970s and early 1980s.

There was a decline during period 1983-1985. In 1983 the foreign direct investment was RM2800 million which was lower than the previous year which was RM3300 million. The major factor for the slow growth was attributed to the world recession and electronic crisis. Since 1987, with the adoption of the Industrial Master Plan, 1986-1995 (IMP), the inflow of the foreign direct investment has increased steadily from RM2900 million in 1983 to RM15500 million in 1993 before a drastic drop in 1994 and 1995. However, the inflows of foreign direct investment managed to improve and it reached a high record of RM 25000 in 1997. In late 1997 and 1998, negative foreign direct investment inflows transpired due to the Asian financial crisis.

After Malaysia has recovered from the Asian financial crisis, Malaysian foreign direct investment inflows were able to grow but in 2001 a drastic drop occurred again during that time. This time, it was resulted by September 11, 2001 incidence that happened to the World Trade Center in the United States. After the incidence, the inflows of the foreign direct investment became volatile in the following year from 2002 until 2005. This study is to examine the effect of foreign direct investment on economic growth and their causality relationship in Malaysia.

2. Literature Review

The significant relationship between foreign direct investments and gross domestic product has been proven in many countries. AbdusSamad (2008) studied a relationship between foreign direct investment and economic growth, involved nineteen developing countries of South-East Asia and Latin America. For his result, Latin America had a long run relationship between gross domestic product and foreign direct investment. Five countries in Latin America which had this relationship such as Argentina, Brazil, Chile, Guatemala, and El-Salvador and one country that was Sri Lanka in the East and South East Asia also indicated the same direction of relationship. Besides that, there was double-sided relationship between gross domestic product and foreign direct investment in East and South East Asia that are Singapore, Indonesia, India, Thailand, and Pakistan. Lastly, there was also a short run relationship in Latin America that was Bolivia, Columbia, Ecuador, Honduras, and Mexico gross domestic product and foreign direct investment were not cointegrated.

Besides that, Borensztein, Gregoria, and Lee (1998) also carried out their study on 69 developing countries to prove the relationship between the foreign direct investment and the economic growth. For their analysis, they used seemingly unrelated regression technique (SUR). Obviously, the same result has been found that foreign direct investments had a positive effect on the countries’ economy growth. However it depended on its country’s human capital. The foreign direct investment had a high productivity effect on a country’s economic growth when a country had a minimum threshold stock of human capital. It was obvious that foreign direct investment could lead to economic growth with the support of productive human capital.
Economic growth can be improved through many factors. One of the factors is through the higher export. Export is said to have a positive relationship with foreign direct investment. The higher foreign direct investment can be improved, the higher export can be achieved and thus economic growth. Dilek and Aytac (2009) stated that foreign direct investment gave an impact on export such as transfer of technology, promotes domestic investment, improved human capital, improved existing knowledge, and served as an instrument of economic growth in Turkey. Besides that, economic growth can be improved not only by foreign direct investments, the other factors should be considered to have a positive effect on economic growth. Lheem and Guo (2004) stated that economic growth was also influenced by educational attainment and development momentum. So, they summarized that there are other indicators that can affect the economic growth besides the foreign direct investment.

However there is a study that stated there is no relationship between foreign direct investment and economic growth. Katherina, John and Athanasios (2004) carried out their study on 17 countries in US and Western European, and applied Bayesian regression analysis. The empirical results showed that foreign direct investment does not have any significant effect on the economic growth in transition countries. It proved that it is not necessary to escalate foreign direct investment to stimulate economic growth in every country. It is additionally supported by G. Jayachandran and A.Seilan (2010).

3. Data and Methodology

This study applies an empirical analysis and only focus on two variables such as foreign direct investment and real gross domestic product. The data from 1971 to 2010 were collected to see the effect of foreign direct investment and real gross domestic product and vice versa. The following equation 1 is the estimating equation that will be used in this study.

\[ GDP_t = \beta_0 + \beta_1FDI_t + \epsilon_t \]  

Where GDP\(_t\) is real gross domestic product in period \(t\), FDI\(_t\) is foreign direct investment in period \(t\). To get the best result, the equation must for all variables because to see the percentage of change in dependent variables when the independent variable change around 1 percent.

\[ \ln GDP_t = \beta_0 + \beta_1\ln FDI_t + \epsilon_t \]  

Unit Root Test, Cointegration Test and also Vector Error Correction Model (VECM), Granger Causality are applied to find out the effect of foreign direct investment on real gross domestic product and vice versa. Unit root test was applied to see the stationary of the series at the level and first difference test by using Augmented Dickey Fuller (ADF) and also Akaike Information Criteria (AIC). If this stationary test has a significant, it means that the variable series is stationary and does not has a unit root test, so the null hypothesis will be rejected but alternative hypothesis will be accepted (Trung & Vinh, 2011). But if the stationary test is not significant, it means that the variable series is non-stationary and has a unit root test (so, null hypothesis will be accepted). The hypothesis in this test is:

\[ H_0: \delta = 0 \text{ (unit root test / not stationary)} \]
\[ H_1: \delta \neq 0 \text{ (no unit root test / stationary)} \]

If value of t-statistic is greater than ADF critical value, the null hypothesis does not reject (unit root test exits) but if the t-statistic is less than ADF critical value, the unit root test does not exists (so, the null hypothesis will be rejected). Firstly, the unit root test be tested at level (unit root test at level with constant and unit root test at level with constant and trend) and after that, the unit root test be tested at first difference (unit root test at first difference with constant and unit root test at first difference with constant and trend). The following equation 3, 4 and 5 are the equation at level without constant and trend, at level with constant only and with constant and trend.

Without constant and trend
\[ \Delta Y_t = \delta Y_{t-1} + U_t \]  

With constant only
\[ \Delta Y_t = \alpha + \delta Y_{t-1} + U_t \]  

With constant and trend
\[ \Delta Y_t = \alpha + \beta T + \delta Y_{t-1} + U_t \]  

The cointegration test also used in this study because to examine the long run relationship between two variables (foreign direct investment and real gross domestic product). The Vector Error Correction Model (VECM) is used
in this study to examine whether in the long run, economy is converging towards equilibrium or not. In this cointegration test, two approached will be used, the model that developed by Engle and Granger (1987) and another model by Johansen (1988) and Johansen and Juselius (1990). The hypothesis for this study is:

\[ H_0: \delta = 0 \text{ (not stationary for } \mu_t \text{ or not cointegration if } t_{\delta} > \tau) \]

\[ H_1: \delta < 0 \text{ (stationary for } \mu_t \text{ or have cointegration if } t_{\delta} < \tau) \]

Where \( \mu_t \) is an error term and \( \tau \) is a critical t-statistic in this model. The Engle-Granger procedure used to examine the stationary for variable at level of the residual term. But, the Engle-Granger does not settle the problem if have many variable are cointegrated whereas we assumed that only one vector has cointegrated. So, Johansen test will be used in this study because to solve that problem with used the Vector Autoregression (VAR) system for many variables that we used. VECM also applied in this studied because to see the relationship between variables in the short run (ShehuUsman, 2009). The following equation 6 is the VAR equation:

\[ \Delta Y_t = \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \prod Y_{t-1} + \epsilon_t \]  

Where \( Y_t \) is 2 X 1 vector (Foreign Direct Investment and Gross Domestic Product) respectively while \( \Delta \) is a difference operator. \( \epsilon_t \) is 2 X 1 vector for residuals. The VECM model can explain the short run relationship and long run adjustment to change in \( Y_t \) through the estimated parameters \( \Gamma_i \) and \( \prod \). The vector can be factored into separate matrices \( \alpha \) and \( \beta \) such as \( \prod = \alpha \beta \) and \( \beta \) is vector of cointegrating parameter and \( \alpha \) shows the vector of error correction coefficient. It is to measure the speed of convergence to the long run steady state. The Johansen-Juselius approach as two likelihood ratio tests such as the trace test and maximum eigenvalue test.

3.1 Trace Test

\[ \lambda \text{trace}(r) = -T \sum_{r=1}^{n} \ln(1 - \lambda) \]  

Where, \( T \) is the total number of observation, \( n \) is the number of variables and \( \lambda \) is the smallest value eigenvalue. \( \lambda \text{trace}(r) \) has the chi-square distribution with \( n-r \) degrees of freedom. Large value of \( \lambda \text{trace}(r) \) will give the evidence against the hypothesis of \( r \) or fewer cointegration vectors.

3.2 Maximal Eigenvalue Test

\[ \lambda_{max} = -T \ln[1 - \lambda_{r+1}] \]  

In this maximal Eigenvalue test, the null hypothesis of \( r=0 \) cointegration vectors is tested against the alternative of \( r=r+1 \) cointegration vectors.

After doing the cointegration test, the granger-causality test is also applied in this study. This is to determine causality relationship between those variables. The causality test is to see a reaction between variables such as, if variable FDI has granger cause to GDP and GDP also has granger cause to FDI, it means that the value after FDI can help us to expect the value for the next period of GDP and also the value after Y can help us to expect the value for the next period of FDI. The following equation 9 and 10 are the formula for granger causality regression test for two-way variable (FDI and GDP).

\[ GDP_t = \sum_{i=1}^{p} \sigma_i GDP_{t-i} + \sum_{i=1}^{q} \beta_j FDI_{t-j} + \mu_{1t} \]  

\[ FDI_t = \sum_{i=1}^{p} \gamma_i GDP_{t-i} + \sum_{i=1}^{q} \delta_j FDI_{t-j} + \mu_{2t} \]

4. Empirical Result

The empirical results of the study will be discussed and interpreted in four. The data will started from 1971 to 2010 were used in this study for both variables. Real GDP is the dependent variable and foreign direct investment (FDI) is identified as the independent variable this in study. First of all, unit root test based on Augmented Dickey-Fuller (ADF) test will be conducted to measure the stationary property of the time series data. Then, Johansen and Juselius cointegration test will be presented to examine the existence of a long run relationship among foreign direct investment (FDI) and real GDP per capita (GDP). Lastly, granger causality test will be performed to identify the direction of causality between these variables. It is used to analyze the causality direction between FDI and real Gross Domestic Product (GDP).

Table 1 shows the results of unit root test of Augmented Dickey-Fuller. Unit root test is crucial to examine the stationarity properties of the time series data. The results indicate that the real gross domestic product and foreign direct investment of Malaysia are non stationary in levels and stationary in first differences at 1 percent. Thus, we can proceed to the long run cointegration analysis.
Table 1. Augmented Dickey Fuller Unit Root Test Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intercept Level</th>
<th>Intercept First Difference</th>
<th>Intercept + Trend Level</th>
<th>Intercept + Trend First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>-2.0520**(0.2644)</td>
<td>-7.6618***</td>
<td>-2.2396(0.4525)</td>
<td>-7.4870***</td>
</tr>
<tr>
<td>GDP</td>
<td>-3.1608(1.0000)</td>
<td>-4.8424***</td>
<td>-0.8801(0.9848)</td>
<td>-6.3668***</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.

The main focus in this paper is to assess how FDI in the long run react to real GDP is existing or not. So, to test the long run equilibrium relationship between FDI and real GDP, cointegration test was used in this studied and the result is shown in table 2. The result above shows that the both maximum-Eigen statistic and trace statistic are presence in the Malaysian economy. Its means that, the long-run equilibrium relationship between the gross domestic product and the foreign direct investment exists. At null hypothesis, the trace statistic value is 21.2246, higher than the critical value (trace) 15.4947 at five percent significant level. This trace statistic result present that this equation have a long run relationship between two variables at five percent significant level. For Max-Eigen statistic, the result also showed the relationship between the variables in long run at one percent significant level. Max-Eigen statistic 24,1257 is higher than critical value (Eigen) 14.2626 at one percent significant level. Johansen procedure also applied in this studied because to see the long run coefficients of model.

Table 2. Cointegration Test

<table>
<thead>
<tr>
<th>Rank</th>
<th>Max-Eigen Statistic</th>
<th>Critical value (Eigen) at 5%</th>
<th>Trace Statistic</th>
<th>Critical value (Trace) at 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>r*=0</td>
<td>21.1257***</td>
<td>14.2646***</td>
<td>21.2246**</td>
<td>15.4947**</td>
</tr>
<tr>
<td>r ≤ 1</td>
<td>0.0989</td>
<td>3.8415</td>
<td>0.0989</td>
<td>3.8415</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.

Table 3 shows the result of cointegrating vectors, GDP is dependent variable, we can derive cointegrating equation between real GDP and FDI for Malaysia as below:

\[
\text{GDP} = 49.135 \times \text{FDI}
\]

The cointegrating equation implies that a 1% permanent increase in the level of foreign direct investment causes the level of Malaysian gross domestic product to increases by 49.135%. The result shows that the higher foreign direct investment in Malaysia can contribute to gross domestic product.

Table 3. Cointegrating vectors

<table>
<thead>
<tr>
<th>One Cointegrating Equation</th>
<th>Log likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-535.0625</td>
</tr>
<tr>
<td>FDI</td>
<td>49.1341(13.2129)</td>
</tr>
</tbody>
</table>

Vector Error Correction Model is for short run relationship between FDI and real GDP. Table 4 shows that the parameter of the error correction terms for the real gross domestic product for Malaysia is negative and significant. For the model when gross domestic product is dependent variable the result shows that the real gross domestic product has an automatic adjustment mechanism and that responds to correction deviations from equilibrium in a balancing manner. The error correction coefficient, -0.012 means that gross domestic product will converge towards its long run equilibrium after the change in the foreign direct investment. Based on the short run analysis for Malaysia, foreign direct investment gives a positive effect on economic gross domestic product. For example a 1% increase in foreign direct investment prompts an increase in real gross domestic product by 1.5%.

Table 4. Vector Error Correlation Model (VECM)

<table>
<thead>
<tr>
<th>Vector Error Correction Model</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cointegrating Equation of GDP(EC(-1))</td>
<td>-0.0120**</td>
<td>0.0056**</td>
<td>-2.1411**</td>
</tr>
<tr>
<td>ΔGDP(-1)</td>
<td>-0.1760</td>
<td>0.4014</td>
<td>0.4387</td>
</tr>
<tr>
<td>ΔFDI(-1)</td>
<td>1.4993*</td>
<td>0.7989*</td>
<td>1.8766*</td>
</tr>
<tr>
<td>C</td>
<td>-7942.759</td>
<td>4568.363</td>
<td>-1.7386</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.
Granger causality test is to determine the pair of time series data has a correlation or not (causal between 2 variables). The correlation for granger causality test only can apply for 2 variables. If the F-statistic for is smaller than the F-critical, its mean that no granger cause between both variables. The time series data have been checked before running the causality test by applying the unit root and the cointegration test. Table 5 present pairwise Granger Causality of gross domestic product and foreign direct investment. The result shows that gross domestic product granger cause to foreign direct investment and foreign direct investment also granger cause to gross domestic product. It means that the two variables are mutually correlated.

Table 5. Granger Causality

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP does not Granger Cause FDI</td>
<td>32</td>
<td>3.2429</td>
<td>0.0237**</td>
</tr>
<tr>
<td>FDI does not Granger Cause GDP</td>
<td></td>
<td>3.8110</td>
<td>0.0124**</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.

5. Conclusion and Policy Implication

This paper is to find out the relationship between foreign direct investment and gross domestic product. The empirical analysis was used to obtain the result. At first we carried out a unit root test and it was non stationary in level and stationary in first difference. VAR with cointegration model was applied and we found out that the foreign direct investment give a positive impact on economic growth in Malaysia. It suggests that a 1% permanent increase in the level of foreign direct investment causes the level of Malaysian gross domestic product to increases by 49.135%. Thus, foreign direct investment is an important factor to boost Malaysian economy from 1971 to 2010. The short run analysis of VECM suggests that the real gross domestic product in Malaysia has an automatic adjustment mechanism and it converges towards long run equilibrium. The analysis also suggests that the foreign direct investment has a desirable impact on the real gross domestic product. Finally, granger causality model was used to see the causal effect of gross domestic product and foreign direct investment. The result suggests that foreign direct investment granger cause to gross domestic product and gross domestic product also granger cause to foreign direct investment.

Therefore, the foreign direct investment (FDI) is considered as an important determinant to boost the economic growth in Malaysia. Large natural resource endowment and substantial domestic market of Malaysia are becoming an attraction for foreign investors especially in petroleum, plantation, and so on. However, capital inflows only flow to Malaysia if government policies have indulged foreign investors favourably. That mean more foreign investors will come to Malaysia especially have special terms which are provided by government. Therefore, foreign direct investments should be considered as a priority by the government to increase the economic growth in Malaysia. Government incentives should play an important role to attract more foreign direct investments into Malaysia (Mun et al., 2008).

The unfavourable policies may be considered as a reason of slow progress in flow of foreign direct investment to Malaysia. High tariff rates are one of the examples of government policies that deter FDI inflows to Malaysia. It is also a way of the government to gain tax revenue in order to reduce government financial burden. However, this measure will reduce the capital inflows into Malaysia and less foreign investors will invest because of high cost of production and less favourable rate of return in investment. Therefore, the government should lower tariff rates as well as formulate the policies that provide favourable investment incentive. Foreign direct investment will increase and hence increase the productivity due to well training of the labour force, cheaper cost of production and business-friendly environment.

References


