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Analyzing the Green Field Investment in Malaysia From 1970 to 2009: a Bound Testing Approach

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Abstract: This paper investigates and estimates the factors influencing Foreign Direct Investment (FDI) in Malaysia. Specifically, the objective of this study is to explore empirically the extent to which the local characteristics of Malaysian economy as determinants of FDI inflows to Malaysia. The Autoregressive Distributed Lag (ARDL) model was employed to explore the short run and long run relationships between FDI and its key determinants for Malaysia by using time series data covering the 1970-2009 period. To achieve this objective, the study employs the Johansen co-integration and Error-Correction Model (ECM). The paper focuses on the factors influencing FDI in Malaysian economy. Both the economics theory and prior research work suggests that FDI can be expected to enhance economic growth. Throughout the study, it was found that there was a co-integration relation between FDI and its determinants in Malaysia. The result of this study shows that FDI plays an important role in the capital formation and hence, the development of the economy.

Key words: *Green Field Investment/Foreign Direct Investment, co-integration, bounds testing (ARDL).*

INTRODUCTION

Green field investment is often mentioned in the context of Foreign Direct Investment (hereafter FDI). It occurs when multinational corporations enter into developing countries to build new factories and/or stores (www.investopedia). Foreign direct investment is seen as one of the most important features in the internationalization of economic activities especially in developing countries.

FDI refers to the holding of at least 10 percent of the total equity in a resident company by a non-resident direct investor. Any subsequent transactions in financial assets or liabilities that occur between nonresident direct investors and resident companies that are linked by a foreign direct investment relationship (FDIR) are also classified as FDI (Department of statistics, 2008).

FDI has three components namely; equity capital, reinvested earnings and other types of capital. Equity Capital comprises equity in branches, shares in subsidiaries and associate companies (except non-participating preference shares), Reinvested Earnings (RE) -consisting of direct investors' shares of earnings that are not distributed as dividends by subsidiaries or associates and earnings of branches not remitted to direct investors, and Other Capital - consisting of debt securities, trade credits, loans, deposits and others (Masud et al., 2008).

Many countries regard FDI as an important element of economic development. Developing countries often offer prospective companies tax breaks, subsidies and other types of incentives to set up green field investment. Government see loss of corporate tax revenue as a small price to pay if jobs are created and time knowledge and technology are gained to enhance the country's human capital (www.investopedia).

Despite the relevance of FDI to sustainable economic development, especially to developing countries, there appears to be a lack of consensus on the determinants of FDI. As such, it is important and useful to identify the factors influencing FDI in Malaysia. According to UNCTAD Report (2008), the relative importance of different location-specific determinants depends on at least three aspects of investment namely; the motive for investment (e.g., resources, market or efficiency-seeking), the type of investment (e.g., services or manufacturing), and the size of the investors (small, medium or large).

In this context, the current study investigates and estimates the factors influencing FDI in Malaysia. Specifically, the objective of this study is to explore empirically the extent to which the local characteristics of Malaysian economy are seen as determinants of FDI in Malaysia. The autoregressive distributed lag (ARDL) model was employed to explore the short run and long run relationships between FDI and its key determinants for Malaysia by using annual data covering the 1970 - 2009 period.

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To achieve this objective, the study employs the Johansen co-integration and error-correction representation model. Focus is made on FDI as a key factor in achieving higher and stable growth rates for the Malaysian economy. Both economics theory and prior research work suggest that FDI could enhance economic growth. The rest of the paper is structured as follows. Section 2 discusses the background of the study. Section 3 reviews relevant literature. Section 4 presents data and research methodology. Section 5 analyses the empirical results of the study. Finally, Section 6 includes some conclusions and recommendations for further studies.

Overview of FDI in Malaysia:

Malaysia has attracted a steady inflow of net FDI in the recent decade, averaging 3% of Gross Domestic Product (GDP) per annum with a peak of 4.5% of GDP in 2007. However, relatively lower FDI inflows were recorded in 2001 and 2009, in harmony with the global trend, following the collapse of the technology bubble and the global financial crisis respectively. In absolute volume, Malaysia recorded RM152 billion in net FDI inflows during the 2000-2009 period, which was higher than the RM134 billion received during the 1990-1999 period. However, as shares of GDP, the net inflows of FDI were lower during the 2000-2009 period (3% of GDP) compared to the 1990-1999 period (6.3% of GDP) (Annual Report, 2009).

This moderation was mainly attributed to two reasons. Firstly, the FDI inflows into Malaysia in recent decade were channeled into the higher value-added services sector, namely the financial services and shared services operations. The scales of the investments in these sub-sectors are less and are also less capital-intensive compared to the manufacturing sector; thus utilising lower amounts. More importantly, however, is that the value-added and contribution to growth of this lower amount of FDI is higher as these sub-sectors are more skill-intensive and have higher labour productivity. Secondly, the rising competition for FDI in the region from new emerging market economies such as China, India and Vietnam as well as established investment centers, namely Singapore and Hong Kong SAR. While global net FDI flows into the region more than doubled during the 2000-2009 period (USD1.4 trillion; 1990-1999: USD0.6 trillion) Malaysia's share of the regional FDI flows has declined as a major part of these flows went to PR China (Masud et al., 2009).

In terms of the sectoral distribution, inflows of FDI into Malaysia are relatively broad-based. FDI inflows continue to be underpinned by the large and long-standing presence of MNCs in the manufacturing sector and investments in the oil and gas sector. The 2000-2009 period saw the rising importance of FDI into the services sector, with the share of FDI in this sector more than doubled to 37% of the total FDI flows (1990-1999: 15%). FDI in the services sector is well diversified. A significant development is the sizable increase in FDI in the financial sector, including Islamic finance. It is estimated that net FDI inflows into this sector amounted to RM41.6 billion over the recent 10-year period following the liberalization that has been undertaken in this sector (Annual Report, 2009)

Malaysia has persistently striven to maintain the competitiveness of FDI determinants, and many policy instruments have been set up. Policy reforms, included the introduction of the Investment Incentives Act 1968, the establishment of free trade zones in the early 1970s, and the provision of export incentives alongside the acceleration of open policy in the 1980s and more liberal incentives under the Promotion of Investment Act (PIA), 1986. Apart from these policy factors, it is generally believed that sound macroeconomic management, sustained economic growth, and the presence of a well functioning financial system have made Malaysia an attractive prospect for FDI (Ministry of Finance, 2001).

Literature Review:

Foreign direct investment plays an important role in developing countries, growth and transformation towards globalization, particularly in economic and financial broadening. Over the past two decades, FDI has been one of the main contributors to East, South and Southeast Asia developing economies including Malaysia. Developing Asian countries continue to be increasingly attractive relative to other regions, with six Asian countries among the top 15 – as against five in last year's survey-despite the economic crisis (UNCTAD, 2009).

A voluminous number of empirical studies have been conducted on the role of FDI in developing countries. However, focus will be made on two main contributions; the impact of FDI on economic growth and the determinants of FDI flows in host countries. Thus, the literature review is devoted to highlighting the impact of FDI on economic growth based on the results of empirical studies; either there is bidirectional, unidirectional or no causality between endogenous and exogenous variables.

Liu et al. (2002) tested the existence of a long run relationship among economic growth, FDI and trade in China by using quarterly data for exports, imports, FDI and growth of the 1981 to 1997 period. It was found that there existed a bi-directional causal relationship among FDI, economic growth and exports. Hsiao

& Shen (2003) revealed a feedback association between FDI and GDP in their time series analysis of the data from China. Using data on 80 countries for the 1971–1995 period, Choe (2003) detected two-way causation between FDI and growth. However, the effects were more apparent from growth to FDI. Meanwhile, Chowdhury and Mavrotas (2005) examined the causal relationship between FDI and economic growth for three developing countries, namely Chile, Malaysia and Thailand. It was found that GDP affected FDI in the case of Chile and not *vice versa*, while for both Malaysia and Thailand, there was a strong evidence of a bi-directional causality between the two variables (refer to Appendix 1).

On the other hand, Chakraborty and Basu (2002) utilized the technique of co-integration and error-correction model to examine the link between FDI and economic growth in India. The results suggested that the GDP in India was not Granger caused by FDI, and the causality runs more from GDP to FDI. Wang (2002) explored the kinds of FDI inflows that most likely contributed significantly to economic growth. Using data from 12 Asian economies over the 1987-1997 period, she found that only FDI in the manufacturing sector had a significant and positive impact on economic growth. She attributed this positive contribution to FDIs' spillover effects. Choong & Lam (2010) found a unidirectional causality from real GDP of both Malaysia and China, degree of openness and literacy rate to FDI inflow.

According to Duasa (2007), there was no strong evidence of causal relationship between FDI and economic growth. This indicates that, in the case of Malaysia, FDI does not cause economic growth, and vice versa. However, FDI seems to contribute to stability of growth as growth contributes to stability of FDI.

Few studies have examined the factors influencing the FDI flows in developing economies. Lucas (1993) used a model of derived demand for foreign capital by using a multiple product monopolist for seven Asian countries. FDI inflows are estimated to be less elastic with respect to the costs of capital (including taxes) than to wages, and to be more elastic with respect to aggregate demand in export markets than domestic demand. The output deterrent effect of higher wages was estimated to outweigh any substitution toward greater capital intensity. The estimates also suggest that FDI rises with greater costs within the investors' home countries; no similar effect occurs with respect to costs in rival host countries; concerns for political stability have overlain economic determinants.

Ang (2008) applied unrestricted error-correction model and 2SLS approach. The results showed that GDP had a significant positive impact on FDI inflows and growth rate of GDP exerted a small positive impact on inward FDI. The results revealed that increases in the level of financial development, infrastructure development and trade openness promote FDI, and higher statutory corporate tax rate. It was also found that appreciation of the real exchange rate appeared to discourage FDI inflows and higher macroeconomic uncertainty induced more FDI inflows.

According to Shahrudin et al. (2008), the bound testing for a restricted model revealed that there was a significant positive relationship between FDI, money supply (M2) and growth rate. The positive significant sign of money supply and growth rate in both short-run and long-run, demonstrates that the money supply and GDP growth rate are important in explaining FDI in Malaysia. Thus, the existence of a long-run relationship between FDI and M2 suggests that advancement in financial market instrument is an important factor attracting foreign investor to country.

Krishna et al. (2009) examined barriers under four categories namely; macroeconomic policy factors, political factors, institutional factors and socioeconomic factors against per capita FDI inflows and volatility in FDI inflows using fixed effects pooled regression analysis. Using cross-sectional time-series data for 17 South East Asian economies for the 1996-2005 period, the researchers found that all the possible set of barriers identified have significant negative effect on per capita FDI and positive impact on volatility in FDI inflows. They suggested that there is an urgent need to find the solutions to break these barriers that are acting as stumbling blocks against attracting FDI of their actual potential.

Yol and Teng (2009) conducted a similar study to investigate the short run and long run factors that influence FDI flows into Malaysia using annual data over 1975-2006 period by using co-integration and error-correction model. The results of the long-run FDI equation indicate that FDI flows in Malaysia are positively influenced by real exchange rate, GDP growth and infrastructure while negatively by exports.

Reviewing the literature, some previous studies found mixed evidence of the impact of FDI on economic growth and FDI and its key determinants relationship. Generally there seems to be a significant relationship between FDI and economic growth. Hence, the determinants may affect differently across countries. Although the directions or magnitudes differ across countries and times, the empirical studies generally agree that FDI has a significant impact on economic growth. Therefore, the motivation of this study is specifically to identify the most important variables that affect the FDI in Malaysia, in which, it is useful to the policymakers as a well informed entity.

Research Methodology:

Data:

This study uses annual data to examine both short run and long run relationships between FDI, exchange rate, money supply, company tax, gross fixed capital formation, electricity generation and economic growth for Malaysia. Yearly data on FDI, growth fixed capital formation (GFCF) and electricity generation (EG) for 1970-2009 period were collected from the Department of Statistics. The growth rate was measured in constant price (2000 as a base year) and was taken from Bank Negara Malaysia (BNM). Exchange rate (ER), money supply (M2) and company tax (CTAX) data were also taken from Bank Negara Malaysia. Meanwhile, human capital data. FDI (LFDI), money supply (LM2), Growth fixed capital formation (LGFCF), company tax (LCTAX) and electricity generation (LEG) are transformed into log form in order to standardize the different units of measurement. In this paper, time series data for Malaysia will be utilized in order to assess the factors influence FDI in Malaysia and to determine to what extent FDI played an important role in economic growth.

Research Instrument:

To empirically examine the short run and long run relationships among the variables of interest, the model was estimated by using the bounds testing (or autoregressive distributed lag, ARDL) co-integration procedure, developed by Pesaran & Shin (1995) and further extended by Pesaran, Shin and Smith (2001). Basically, the ARDL method of co-integration analysis is unbiased and efficient. This is because it performs well in small samples size which is also the case in this study (40 observations). It is also applicable irrespective of whether the underlying variables are integrated of *I*(1) or *I*(0). We can also estimate the long run and short run components of the model simultaneously. Finally, the ARDL method can distinguish dependent and explanatory variables. The data analysis will be conducted by using Microfit 5 software.

Model Specification:

We explore the long run and short run relationship between FDI and the determinants variables, by considering the following model:

$$\ln FDI_t = \beta_0 + \beta_1 GR_t + \beta_2 ER_t + \beta_3 \ln M2_t + \beta_4 \ln GFCF + \beta_5 \ln CTAX + \beta_6 \ln EG + \varepsilon \quad (1)$$

Where β_0 is the intercept point, β_i is the coefficient of independent variables and ε is the error term. FDI denotes Foreign Direct Investment for the Malaysia; GR denotes real GDP growth rate to measure the size of the market. We expect a positive influence of this variable. ER denotes as an exchange rate (RM/ US$). We expect that the sign of the variables can be positive or negative influences to FDI. This is because the exchange rate volatility discourages FDI. On the other hand, the depreciation of a host country's currency tends to reduce the multinational company cost. Therefore, it will promote FDI inflows. Meanwhile, M2 denotes money supply, as a proxy for financial development. We expect a positive influence of this variable because the advancement in financial market mechanism is an important factor attracting foreign investor to the country. GFCF denotes gross fixed capital formation and is used as a proxy for domestic investment. We expect a positive influence of this variable. CTAX denotes company tax; we expect a negative influence of this variable. This is because the tax break encourages FDI. Finally, EG denotes electricity generation and is used as a proxy of energy supply or basic necessity for the country. We expect a positive influence of this variable where it is important factor to attract the FDI in Malaysia.

The error correction model representation of the ARDL model for equation 1 can be written as follows:

$$\begin{aligned}\Delta \ln FDI_t = {} & \beta_0 + \sum_{j=1}^{k} \beta_{11} \Delta \ln FDI_{t-j} + \sum_{j=0}^{k} \beta_{12} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{13} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{14} \Delta \ln M2_{t-j} + \\ & \sum_{j=0}^{k} \beta_{15} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{16} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{17} \Delta \ln EG + n_{11} \ln FDI_{t-1} + n_{12} GR_{t-1} + \\ & n_{13} ER_{t-1} + n_{14} \ln M2_{t-1} + n_{15} \ln CTAX_{t-1} + n_{16} \ln GFCF_{t-1} + n_{17} \ln EG + \xi_t \end{aligned} \quad (2)$$

$$\Delta GR_t = \beta_0 + \sum_{j=1}^{k} \beta_{21} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{22} \Delta \ln FDI_{t-j} + \sum_{j=0}^{k} \beta_{23} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{24} \Delta \ln M2_{t-j} +$$
$$\sum_{j=0}^{k} \beta_{25} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{26} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{27} \Delta \ln EG + n_{21} GR_{t-1} + n_{22} \ln FDI_{t-1} + \quad (3)$$
$$n_{23} ER_{t-1} + n_{24} \ln M2_{t-1} + n_{25} \ln CTAX_{t-1} + n_{26} \ln GFCF_{t-1} + n_{27} \ln EG + \xi_t$$

$$\Delta ER_t = \beta_0 + \sum_{j=1}^{k} \beta_{31} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{32} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{33} \Delta \ln FDI_{t-j} + \sum_{j=0}^{k} \beta_{34} \Delta \ln M2_{t-j} +$$
$$\sum_{j=0}^{k} \beta_{35} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{36} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{37} \Delta \ln EG + n_{31} ER_{t-1} + n_{32} GR_{t-1} + \quad (4)$$
$$n_{33} \ln FDI_{t-1} + n_{34} \ln M2_{t-1} + n_{35} \ln CTAX_{t-1} + n_{36} \ln GFCF_{t-1} + n_{37} \ln EG + \xi_t$$

$$\Delta \ln M2_t = \beta_0 + \sum_{j=1}^{k} \beta_{41} \Delta \ln M2_{t-j} + \sum_{j=0}^{k} \beta_{42} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{43} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{44} \Delta \ln FDI_{t-j} +$$
$$\sum_{j=0}^{k} \beta_{45} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{46} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{47} \Delta \ln EG + n_{41} \ln M2_{t-1} + n_{42} GR_{t-1} + \quad (5)$$
$$n_{43} ER_{t-1} + n_{44} \ln FDI_{t-1} + n_{45} \ln CTAX_{t-1} + n_{46} \ln GFCF_{t-1} + n_{47} \ln EG + \xi_t$$

$$\Delta \ln CTAX_t = \beta_0 + \sum_{j=1}^{k} \beta_{51} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{52} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{53} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{54} \Delta \ln FDI_{t-j}$$
$$+ \sum_{j=0}^{k} \beta_{55} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{56} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{57} \Delta \ln EG + n_{51} \ln CTAX_{t-1} + n_{52} GR_{t-1} + \quad (6)$$
$$n_{53} ER_{t-1} + n_{54} \ln M2_{t-1} + n_{55} \ln FDI_{t-1} + n_{56} \ln GFCF_{t-1} + n_{57} \ln EG + \xi_t$$

$$\Delta \ln GFCF_t = \beta_0 + \sum_{j=1}^{k} \beta_{61} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{62} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{63} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{64} \Delta \ln M2_{t-j}$$
$$+ \sum_{j=0}^{k} \beta_{65} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{66} \Delta \ln FDI_{t-j} + \sum_{j=0}^{k} \beta_{67} \Delta \ln EG + n_{61} \ln GFCF_{t-1} + n_{62} GR_{t-1} + \quad (7)$$
$$n_{63} ER_{t-1} + n_{64} \ln M2_{t-1} + n_{65} \ln CTAX_{t-1} + n_{66} \ln FDI_{t-1} + n_{67} \ln EG + \xi_t$$

$$\Delta \ln EG_t = \beta_0 + \sum_{j=1}^{k} \beta_{71} \Delta \ln EG_{t-j} + \sum_{j=0}^{k} \beta_{72} \Delta GR_{t-j} + \sum_{j=0}^{k} \beta_{73} \Delta ER_{t-j} + \sum_{j=0}^{k} \beta_{74} \Delta \ln M2_{t-j} +$$
$$\sum_{j=0}^{k} \beta_{75} \Delta \ln CTAX_{t-j} + \sum_{j=0}^{k} \beta_{76} \Delta \ln GFCF_{t-j} + \sum_{j=0}^{k} \beta_{77} \Delta \ln FDI + n_{71} \ln EG_{t-1} + n_{72} GR_{t-1} + \quad (8)$$
$$n_{73} ER_{t-1} + n_{74} \ln M2_{t-1} + n_{75} \ln CTAX_{t-1} + n_{76} \ln GFCF_{t-1} + n_{77} \ln FDI + \xi_t$$

The terms with the summation signs in the above equations represents the error correction dynamics while the second part (terms with η_{ijs}) correspond to the long run relationship; denotes a first difference operator; ln represents natural logarithmic; β_0 is an intercept and ξ_t is a white noise.

The F-test or Wald test is used to test on the existence of long run relationship. If the computed F-test is higher than the upper bound, the null hypothesis of no co-integration is rejected. If F-test is lower than the lower bound then the null hypothesis cannot be rejected. Meanwhile, if the F-test lies between the lower and the upper bounds, conclusive decision inference cannot be made. Once the co-integration is confirmed, the further two steps procedure in ARDL is taken to estimate the models. The first step is to estimate the long run relationship between LFDI, GR, ER, LM2, LCTAX, LGFCF and LEG in equation (2) until equation (8). Second step is to estimate the association of ARDL error correction models.

H_0 (No long run relationship)	H_1 (A long run relationship)
$n_{11}= n_{12}= n_{13}= n_{14}=n_{15}=n_{16}=n_{17}= 0$	at least one $n_{ij} \neq 0$
$n_{21}= n_{22}= n_{23}= n_{24}=n_{25}=n_{26}=n_{27}= 0$	at least one $n_{ij} \neq 0$
$n_{31}= n_{32}= n_{33}= n_{34}=n_{35}=n_{36}=n_{37}= 0$	at least one $n_{ij} \neq 0$
$n_{41}= n_{42}= n_{43}= n_{44}=n_{45}=n_{46}=n_{47}= 0$	at least one $n_{ij} \neq 0$
$n_{51}= n_{52}= n_{53}= n_{54}=n_{55}=n_{56}=n_{57}= 0$	at least one $n_{ij} \neq 0$
$n_{61}= n_{62}= n_{63}= n_{64}=n_{65}=n_{66}=n_{67}= 0$	at least one $n_{ij} \neq 0$
$n_{71}= n_{72}= n_{73}= n_{74}=n_{75}=n_{76}=n_{77}= 0$	at least one $n_{ij} \neq 0$

Empirical results:

Unit-Root Tests:

In this section we analyses the time series properties of the data during the 1970-2009 period. The unit root tests are used to assess the order of integration of the variables. According to Pesaran & Pesaran, (1997), the ARDL bounds testing procedure can be applied irrespective of whether the variables are I(0) or I(1). Therefore, in order to confirm that the data are stable, the Augmented Dickey-Fuller (ADF) unit root test was carried out to tests the null of unit root against the alternative of stationary. This test was performed on both level and first differences of all variables. The results in level and first differences are reported in Table 1.

Table 1: Results of ADF Tests for Unit Roots

	ADF	
Variables	Level	1st Diff
LFDI	-0.22188	-4.11481**
GR	-5.39002***	-7.73435***
ER	-2.78432	-6.31301***
LM2	-2.74627	-4.50276***
LCTAX	-1.83197	-5.33224***
LGFCF	-1.57166	-5.27003***
LEG	-0.54377	-7.13847***

Note: *,**,*** denotes significance level of 10%, 5%, 1%, respectively

The results show that we could not reject the null hypothesis of unit roots for all variables in level forms except for GR. However, the null hypothesis was rejected when the ADF test was applied to the first differences of each variable. The first differences of LFDI, GR, ER, LM2, LCTAX, LGFCF and LEG are stationary and indicating that these variables are in fact stationary of order one, *I*(1). Since all variables are stationary after first differencing, it is appropriate to test whether the variables are co-integrated or not.

The second step is to test for the presence of the long run relationship through the bounds testing approach. The results of the ARDL bounds test in regard to Malaysia are reported in Table 2. In the equations (2), (3) and (5) with LFDI, GR and LM2 as dependent variables, we note that the computed F-statistics for Malaysia is above the upper bound critical values provided by Narayan (2005). Hence, we have strong evidence to reject the null hypothesis of no co-integration at 1%, 5% and 10% significance level, respectively. It shows that there was a long run relationship between LFDI, GR, ER, LM2 and LGFCF for LFDI Model, GR Model and LM2 Model.

Table 2: Bounds Test Results Based on Eq. (2), (3) and (5)

F-statistics	Equation 2 3.4024*	Equation 3 5.6019***	Equation 5 7.8791***
1% I(0)	3.505	3.505	3.505
I(1)	5.121	5.121	5.121
5% I(0)	2.618	2.618	2.618
I(1)	3.863	3.863	3.863
10% I(0)	2.218	2.218	2.218
I(1)	3.314	3.314	3.314

Notes: *,** and *** indicate 10%, 5% and 1% level of significance, respectively.The test statistics of the bound tests are compared against the critical values reported in Pesaran et al. (2001).

Table 3 presents the long run estimation results. We estimated 7 separate models for the period of 1970 to 2009. We used the $\overline{R}^2$ criterion to find the coefficient of the level variables. The results for Malaysia indicated that there is existence of long run co-integrating relationships among the variables. Based on the Johansen and Juselius Co-integration test, there is one co-integrating relationship among the variables in LFDI Model, GR Model and LM2 Model. For the LFDI model, all estimated coefficients are statistically significant, except for GR. The estimated coefficients have correct signs as expected except for LGFCF and LEG. In a

meantime, all estimated coefficients are statistically significant, except for LFDI and LGFCF for LM2 model. On the other hand, only LCTAX is statistically significant for GR model.

Table 3: Long-run estimation results

LFDI Model						
$LFDI_t = 13.03 - 0.142GR_{t-1} +$		$1.614ER_{t-1} +$	$14.07LM2_{t-1} -$	$4.14LCTAX_{t-1} -$	$4.311LGFCF_{t-1} -$	$10.85LEG_{t-1}$
SE:	(0.126)	(0.872)	(4.365)	(2.013)	(1.164)	(3.884)
t :	(1.125)	(-1.851)	(-3.225)	(2.059)	(3.704)	(2.794)
GR Model						
$GR_t = 6.587 - 0.0024LFDI_{t-1} -$		$1.209ER_{t-1} -$	$2.055LM2_{t-1}+$	$5.907LCTAX_{t-1} -$	$3.147LGFCF_{t-1} +$	$0.170LEG_{t-1}$
SE:	(0.430)	(1.129)	(3.861)	(1.639)	(1.539)	(4.361)
t :	(0.006)	(1.071)	(0.532)	(-3.603)	(2.046)	(-0.039)
LM2 Model						
$LM2_t = 1.19 + 0.019LFDI_{t-1} -$		$0.034GR_{t-1} +$	$0.206ER_{t-1}-$	$0.415LCTAX_{t-1} +$	$0.008LGFCF_{t-1} -$	$1.004LEG_{t-1}$
SE:	(0.024)	(0.012)	(0.042)	(0.092)	(0.115)	(0.099)
t:	(-0.782)	(2.899)	(-4.971)	(4.504)	(-0.067)	(10.099)

The estimated Error Correction Models for Short Run Analysis are presented and discussed in the following:

Table 4: The error correction representation for the selected ARDL model

LFDI Model;

$$\Delta lnFDI_t = 11.45 - 0.05\Delta GR_t - 0.01\Delta ER_t - 1.05\Delta ER^{***}_{t-1} - 1.53^{*}_{t-2} + 9.35\Delta lnM2^{**}_t + 2.07\Delta lnM2_{t-1} + 8.05\Delta lnM2^{*}_{t-2} - 1.06\Delta lnCTAX_t + 2.23\Delta lnCTAX^{*}_{t-1} + 2.03\Delta lnCTAX^{*}_{t-2} - 2.38\Delta lnGFCF^{**}_t + 2.7\Delta lnGFCF^{***}_{t-1} + 14.67\Delta lnEG^{*}_t - 0.878ECT^{***}_{t-1} + \xi_t$$

$\bar{R}^2 = 0.682$, F-statitstics = 5.801, SSE = 0.456, $EC_{t-1} = -0.498$
$\chi^2_{sc} = 0.123$; $\chi^2_{nor} = 0.458$; $\chi^2_{het} = 0.539$,

GR Model:

$$\Delta GR_t = 21.93 + 0.099\Delta lnFDI_t - 0.47\Delta ER_t - 25.86\Delta lnM2^{***}_t + 5.95\Delta lnCTAX^{**}_t - 10.56\Delta lnGFCF^{***}_t - 8.46\Delta lnEG_t - 1.1ECT^{***}_{t-1} + \xi_t$$

$\bar{R}^2 = 0.818$, F-statitstics = 22.42, SSE = 2.075, $EC_{t-1} = -1.1$
$\chi^2_{sc} = 0.202$; $\chi^2_{nor} = 0.782$; $\chi^2_{het} = 0.429$

LM2 Model;

$$\Delta lnM2_t = 0.839 + 0.02\Delta lnFDI^{*}_t - 0.03\Delta lnFDI^{***}_{t-1} - 0.06\Delta lnFDI^{***}_{t-2} - 0.006\Delta GR^{**}_t + 0.006\Delta GR_{t-1} + 0.02\Delta ER_t - 0.015\Delta ER_{t-1} - 0.05\Delta ER^{*}_{t-2} + 0.11\Delta lnCTAX^{*}_t + 0.19\Delta lnCTAX^{***}_{t-1} + 0.17\Delta lnCTAX^{***}_{t-2} + 0.04\Delta lnGFCF_t + 0.07\Delta lnGFCF_{t-1} - 0.09\Delta lnGFCF^{*}_{t-2} + 0.24\Delta lnEG_t + 1.27\Delta lnEG^{**}_{t-1} - 0.705ECT^{***}_{t-1} + \xi_t$$

$\bar{R}^2 = 0.91$, F-statitstics = 21.27, SSE = 0.02, $EC_{t-1} = -0.705$
$\chi^2_{sc} = 0.122$; $\chi^2_{nor} = 0.409$; $\chi^2_{het} = 0.688$

Short run estimation results in the error correction representations of LFDI model, GR model and LM2 model are provided in Table 4. The error correction terms (EC_{t-1}) of the LFDI model, GR model and LM2 model are statistically significant at 1% level with appropriate sign (negative), verifying the established co-integrating relationships among the variables. The coefficients of EC_{t-1} measures the speed of adjustment back to the long run equilibrium after a short run shock. The absolute values of the coefficients of EC_{t-1} in 3 models are quite high, indicating the fairly high speed adjustment to the long run equilibrium following short run shocks. For example, the coefficient of EC_{t-1} is 0.498 in the case of LFDI Model. This implies that, nearly 50% of the disequilibria in FDI of the previous year's shock adjust back to the long run equilibrium in the current year. The results of the diagnostic tests are presented in the lower part of Table 4, shows no evidence of serial correlation, normality or heteroscedasticity. Structural stability of the models is examined using the CUSUM and CUSUM of squares tests on the recursive residuals and are well within the 5% confidence interval band. This implies that all coefficients in the ECM model are stable.

Conclusions:

The current paper investigated factors influencing Foreign Direct investment in Malaysia for the 1970–2009 period. The ARDL approach was employed to determine the short run and long run relationships of FDI, GR,

ER, M2, GFCF, CTAX and EG. The F-statistics indicate that the null hypothesis of no co-integration at 1% cannot be accepted for LFDI model, GR model and LM2 model. The negative sign in these three equations are statistically significant at 1% level, thus confirming the existence of long run relationship among the variables.

It can be concluded that long run relationship between FDI, GDP growth rate, exchange rate, money supply, gross fixed capital formation, corporate tax and electricity generation does exist in Malaysia. The implication of the co-integration among the variables studied would imply that all series in the model move together in the long run. The positive significant sign of ER, M2, and negative sign of CTAX in the long run demonstrate that these macroeconomic variables are important in explaining FDI in Malaysia. This means that FDI is an important indicator as endogenous variables.

The results are consistent with the findings documented by Ang, (2008) & Shahrudin et. al (2008), where the bound testing for a restricted model revealed that there was a significant positive relationship between FDI and money supply (M2), since M2 denotes as money supply, used as a proxy for financial development. Thus, the financial development is an important factor attracting foreign investor to the Malaysia. Whereas, Yol & Teng (2009), indicate that FDI flows in Malaysia are positively influenced by real exchange rate. Consistent with the prediction of the ER hypothesis, ER is found to have a significant positive impact on FDI inflows. In this respect, the depreciation of a host country's currency tends to reduce the multinational company cost. Ang, (2008), also indicate that FDI flows in Malaysia are negatively influenced by corporate tax. Hence, higher corporate tax rate appears to discourage FDI inflows.

From a policy point of view, the results suggest that the level of financial development is a major factor attracting foreign investor to the country in the short-run as well as the long-run. The implication is that, advancement in financial market mechanism is indeed important in Malaysia. Meanwhile, FDI flows are positively influenced by domestic investment (GFCF), corporate tax (CTAX) and electricity generation (EG); and negatively influenced by exchange rate (ER) in the short run. Interestingly, the results also suggest that there is a unidirectional flow from FDI to economic growth (GR) in the short run.

So far as the researchers' knowledge is concerned the current study may be regarded as unique as it uses a new term, i.e. green field investment to represent FDI. Besides, we include electricity generation (EG) as a proxy of energy supply or basic necessity for the country. It is consistent with the hypothesis, where EG is found to have a significant positive impact on FDI inflows but only in the short run. The results of this study are confined to the 1970–2009 period. Further analysis may be preceded by incorporating longer sample period and other variables that may potentially affect the FDI. Generally there seems to be a significant relationship between FDI and explanatory variables; however the determinants may affect differently across countries. Although the directions or magnitudes differ across countries and times, the empirical studies generally agree that FDI has a significant impact on economic growth either in the short run or long run. As such, a better understanding of FDI is vital for devising strategies to promote short and long economic development plans, especially for developing countries.

Appendix 1: Literature Review

Country	Empirical work	Study period	Causal relationship	Methodology
Chile, Malaysia, Thailand	Abdur Chowdhury and George Mavrotas (2005)	1969 - 2000	FDI ↔ GDP	Toda Yamamoto
Asian 4	Yasmine Merican(2009)	1970 - 2001	FDI → GDP	Error-correction
Asia	Frank S.T. Hsiao and Mei-Chu W. Hsiao (2006)	1986 - 2004	FDI → GDP	VAR
Malaysia	Karimi, M. S., & Yusop Z., (2009)	1970 - 2005	FDI – GDP (indirect)	ARDL Toda Yamamoto
Malaysia	Jarita Duasa (2007)	1975 - 2005	No causality	Toda Yamamoto & GARCH
South Korea	Pahlavani, M., Harvie, C., (2006)	1980 - 2005	No cointegration	ARDL
Malaysia	James B. Ang (2008)	1960 - 2005	FDI ↔ GDP	Unrestricted ECM
Malaysia & China	Chee-Keong Choong, Siew-Yong Lam (2010)	1970 - 2006	FDI ← GDP	Error-correction Granger causality
Malaysia	Marial A. Yol, Ngie Teng Teng (2009)	1975 - 2006	FDI ← GDP	Error-correction
South Korea	Yeo et. al (2007)	1993 – 2006	FDI → GDP	Cross sectional time series
Malaysia	Nursuhaili Shahrudin, Zarinah Yusof and NurulHuda Mohd. Satar (2008)	1970 - 2008	FDI ← GDP	Error-correction

REFERENCES

Ang, J.B., 2008. Determinants of foreign direct investment in Malaysia, *Journal of Policy Modeling*, 30: 185-189.

Bank Negara Malaysia, *Annual Report*, various issues, Kuala Lumpur, Malaysia.

Bekhet, H.A. and N.S. Othman, 2010. Analyzing the elasticities of electricity price for rural and urban area in Malaysia: Non-linear approach, ICOSCD2010, Proceeding, UPM, Malaysia.

Bekhet, H.A. and N.S. Othman, 2011. Assessing the Elasticities of Electricity Consumption for rural and urban areas in Malaysia: A Non-linear approach, International Journal of Economics and Finance, 3(1): 208-217.

Bekhet, H.A. and N.Y. Yusof, 2009. Assessing the relationship between oil prices, energy consumption and macroeconomics performance in Malaysia: Co-integration and vector error correction model (VECM) approach, International Business Research, 2: 152-175.

Borensztein, E., J. de Gregorio, J-W. Lee, 1998. How does foreign direct investment affect economic growth?, *Journal of International Economics*, 45: 115-135.

Carkovic, M and R. Levine, 2003. "Does Foreign Direct Investment Accelerate Economic Growth?" Working Paper, Minneapolis: University of Minnesota, USA.

Chakrabarti, C and P. Basu, 2002. "Foreign Direct Investment and Growth in India: A Co-integration Approach," *Applied Economics*, 34(9): 1061-1073.

Choe, J.I., 2003. "Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth?" *Review of Development Economics*, 7(1): 44-57.

Choong C.K., S.Y. Lam, 2010. The Determinants of Foreign Direct Investment in Malaysia: A Revisit, *Global Economic Review*, 39(2): 175-195.

Chowdhury, A. G. Mavrotas, 2009. "FDI and Growth: A Causal Relationship," WIDER Research Paper, *The World Economy*, 29(1): 9-19.

Duasa, J., 2007. Malaysian Foreign Direct Investment and Growth: Does Stability Matter?, *Journal of Economic Cooperation*, 28(2): 83-98.

Falki, N., 2009. Impact of FDI on Economic Growth in Pakistan, *International Review of Business Research Papers*, 5(5): 110-120.

Hsiao, C., & Y. Shen, 2003. "Foreign Direct Investment and Economic Growth: The Importance of Institutions and Urbanization", *Economic Development & Cultural Change*, 51(4): 883-896.

Hsiao, F.S.T., and M.C.W. Hsiao, 2006. FDI, exports, and GDP in East and Southeast Asia—Panel data versus time-series causality analyses, *Journal of Asian Economics,* 17(6): 1082-1106.

http://www.investopedia.com/terms/g/greenfield.asp

International Monetary Fund (IMF), 2006. *Balance of Payments Statistics Yearbook*, 2003.

Karimi, M.S., Z. Yusop, 2009. FDI and Economic Growth in Malaysia, *MPRA* (Munich Personal RePEc Archive) Paper No. 14999.

Krishna, *et al.,* 2009. Determinants of foreign direct investment and volatility in South East Asian economies, J*ournal of the Asia Pacific Economy*, 14(3): 246-261.

Liu, et al., 2002. Relationships between economic growth, foreign direct investment and trade: evidence from China, *Applied Economics*, 34(11): 1433-1440.

Lucas, R.E.B., 1993. On the determinants of direct foreign investment: Evidence from East and Southeast Asia, *World Development,* 21(3): 391-406.

Masron, T.A., R. Kamaruddin, 2009. Macroeconomic Synchronization and Foreign Direct Investment Inflow into ASEAN: Evidence from Malaysia's Experiences, *International Business Research*, 2(3).

Masud M.R. *et al.,* 2008. Findings of the Quarterly Survey of International Investment and Services, *Department of Statistics Malaysia*, Malaysia.

Merican, Y., 2009. Foreign Direct Investment and Growth in ASEAN-4 Nations, *International Journal of Business Management,* 4(5): 46-62.

Ministry of Finance, 2001. *Economic Reports*, Malaysia.

Mithani, D.A.M., S. Ahmad and A.M. Saifudin, 2008. Foreign Direct Investment in Malaysia: Trends and Prospects, *International Review of Business Research Papers*, 4(1): 249-258.

Nair-Reichert, U. and D. Weinhold, 2000. Causality Tests for Cross-country Panels: New Look at FDI and Economic Growth in Developing Countries. *Oxford Bulletin of Economics and Statistics*, 63(2): 153-171.

Narayan, P.K., 2005. The saving and investment nexus for China: evidence from co-integration test. *Applied Economics*, 37(17): 1979-1990.

Pesaran, M.H., Y. Shin, R.J. Smith, 2001. Bound testing approaches to the analysis of level relationship. *Journal of Applied Econometrics*, 16: 289-326.

Pesaran, M.H. and Y.S. Shin, 1995. Long run Structural Modeling, Cambridge Working Papers in Economics, University of Cambridge, UK.

UNCTAD, 2008. *World Investment Report,* Geneva, United Nations.

United Nations (UNCTAD), Foreign Direct Investment, Conference on Trade and Development, Online Statistics. http://stats.unctad.org/fdi.

Vadlamannati, K.C., A. Tamazian, L.R. Irala, 2009. Determinants of foreign direct investment and volatility in South East Asian economies, Journal of the Asia Pacific Economy, 14(3): 246-261.

Wang, M., 2002. Manufacturing FDI and Economic Growth: Evidence from Asian Economies, Department of Economics, University of Oregon Mimeo.

Yol, M.A, & N. Teng, 2009. Estimating the Domestic Determinants of Foreign Direct Investment Flows in Malaysia: Evidence from Co-integration and Error-Correction Model, *Journal Pengurusan,* 28: 3-22.

http://www.investopedia.com/terms/g/greenfield.asp