

Determinants of Foreign Direct Investment in Malaysia: What Matters Most?

Nursuhaili Shahrudin¹, Zarinah Yusof^{2 +} and NurulHuda Mohd. Satar³

This paper examines the determinants of foreign direct investment in Malaysia from 1970-2008. The causality and dynamic relationship between foreign direct investment (FDI) and its key determinants is identified using an autoregressive distributed lag (ARDL) framework. The result suggests that among the variables, financial development and economic growth contribute positively to the inflow of foreign direct investment in Malaysia. The evidence provides strong policy recommendation on sustaining high growth and financial deepening in Malaysia.

Keywords: foreign direct investment, cointegration, autoregressive distributed lag, long-run relationship

1. Introduction

Malaysia is one of the countries in Asia that has benefited from strong foreign direct investment inflow. FDI was a major source of growth for manufacturing development in Malaysia that mainly targeted for the export market. The economy relied on the foreign fund as a major source of capital, modern technology and technical skills. Globalization, international financial integration and expansion of global production have intensified FDI. The inflow of FDI was only US\$94 million in the early 1970s but increased dramatically in 1996 with US\$7,297 million. It dropped to US\$2,714 million in 1998 due to the 1997 financial crisis but recovered strongly with the highest FDI inflows of US\$8,403 million in 2003 as Malaysia was able to maintain its attractiveness as a FDI location.

Reviewing the literature, some past studies found mixed evidence of FDI and its key determinants relationship (Hooi, 2008; Sahoo, 2006; Hsiao and Hsiao, 2004; Asiedu, 2002; Billington, 1999; Edwards, 1990). A plausible explanation for this is different countries characteristics offers different results. The determinants may affect differently in different countries. Financial development, wage rates, income, economic growth, government spending on infrastructure, openness, exchange rate, inflation rate and corporate tax are among the variables commonly analyze in the FDI dynamic. In Malaysia, study by Ang (2008) detects the significant effect of the variables in five models that that takes turn excluding some of the variables via 2SLS estimation. Although the analysis was based on error correction model, the issue of cointegration and error correction representation of the model was not addressed. Thus, the aim of this paper is to investigate the determinants of FDI in Malaysia during the period 1970-2008 using an autoregressive distributed lag (ARDL) technique. Specifically, it seeks to identify the most important variables that affect the FDI in Malaysia via the cointegration analysis.

2. Methodology and Data

2.1. Autoregressive distributed lag (ARDL)

Many macroeconomics variables are nonstationary in their level form and a liner combination of nonstationary variables does not imply that all the variables are cointegrated. An autoregressive distributed lag model allows cointegration at different orders of integration and is a robust estimation in a small sample data. Failure to model appropriately the relationship may not give accurate results of the relationship and this is crucial especially when it involves with policy recommendations. The existence of long-run relationship between FDI and selected macroeconomics variable is modeled as follows.

¹ Faculty of Economics and Administration, University Malaya, 50603, Kuala Lumpur, Malaysia

² Faculty of Economics and Administration, University Malaya, 50603, Kuala Lumpur, Malaysia

³ Faculty of Economics and Administration, University Malaya, 50603, Kuala Lumpur, Malaysia

$$Lfdi = f(Lm2, Lgdp, gro, Ldev, open, Lexc, tax, infl, crisis)$$

Where L refers to variable in logarithmic form, fdi is the foreign direct investment inflows (RM million), $m2$ is the money supply, a proxy for financial market development, gdp represents the market size of the economy (RM million) and gro is the growth rate of gross domestic product (%). Government infrastructure expenditure (RM million) is represented by variable dev , $open$ is the ratio of import and export over GDP which measures economic openness, exc is the exchange rate (RM/USD), tax is the corporate tax (%), $infl$ is inflation rate (%) and $crisis$ is a dummy variable represents the effect of Asian financial crisis (1998=0 and otherwise=1). The hypothesized sign of $Lm2, Lgdp, gro, Ldev, open, Lexc$ is positive and negative for $tax, infl, crisis$ variables. (1)

2.2. Estimating model

The econometrics model of the causality of FDI and its key determinants is as follows:

$$Lfdi_t = \alpha_0 + \beta_1 Lm2_t + \beta_2 Lgdp_t + \beta_3 gro_t + \beta_4 Ldev_t + \beta_5 open_t + \beta_6 Lexc_t + \beta_7 tax_t + \beta_8 infl_t + \beta_9 crisis_t + \varepsilon_t \quad (1)$$

In testing the existence of the long-run relationship (cointegration), the error correction versions of the ARDL framework for equation (1) is given by equation (2).

$$\begin{aligned} \Delta Lfdi_t = & \beta_0 + \sum_{i=1}^n b_i \Delta Lfdi_{t-i} + \sum_{i=1}^n c_i \Delta Lm2_{t-i} + \sum_{i=1}^n d_i \Delta Lgdp_{t-i} + \sum_{i=1}^n e_i \Delta gro_{t-i} + \sum_{i=1}^n f_i \Delta Ldev_{t-i} \\ & + \sum_{i=1}^n g_i \Delta open_{t-i} + \sum_{i=1}^n h_i \Delta Lexc_{t-i} + \sum_{i=1}^n j_i \Delta tax_{t-i} + \sum_{i=1}^n k_i \Delta infl_{t-i} + \sum_{i=1}^n l_i \Delta crisis_{t-i} \\ & + \delta_1 Lfdi_{t-1} + \delta_2 Lm2_{t-1} + \delta_3 Lgdp_{t-1} + \delta_4 gro_{t-1} + \delta_5 Ldev_{t-1} + \delta_6 open_{t-1} + \delta_7 Lexc_{t-1} \\ & + \delta_8 tax_{t-1} + \delta_9 infl_{t-1} + \delta_{10} crisis_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

Equation (3) presents the error correction version of the ARDL framework when the variables are $Lfdi, Lm2$ and gro .

$$\begin{aligned} \Delta Lfdi_t = & \lambda_0 + \sum_{i=1}^n m_i \Delta Lfdi_{t-i} + \sum_{i=1}^n p_i \Delta Lm2_{t-i} + \sum_{i=1}^n q_i \Delta gro_{t-i} + \delta_1 Lfdi_{t-1} + \delta_2 Lm2_{t-1} \\ & + \delta_3 gro_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

To test for the existence of any long-run relationship we test whether all $\sum_i \delta_i = 0$.¹

2.3. Data

Data spanning from 1970-2008 are obtained from various sources of publications. Data on FDI, rate of growth, openness, and government development expenditure are taken from various issues of *Bank Negara Malaysia Reports*. *International Financial Statistics* provides data on exchange rate, money supply, and inflation rate. Statutory corporate tax data is taken from the *Department of Inland Revenue Annual Reports*.

3. Findings

The results for unit root test using Augmented Dickey Fuller (ADF) test suggests that all of our variables are I(1) except gro and $infl$ which are I(0). This test suggests an ARDL approach is the appropriate method of estimation of the relationship since the variables are mixture of I(1) and I(0). Next we estimate equation (1) to determine the existence of any long-run relationship between FDI and other macroeconomic variables. The calculated F -statistics for cointegration test is shown in Table 1 for equation (1) as full model. The F -test

has a non-standard distribution. The critical value bounds for F-test are computed by Pesaran et al (1997). If the computed F-test statistic exceeds their respective upper critical values there is evidence of a long-run relationship between the variables if the. On the other hand, the null hypothesis of no cointegration cannot be rejected if the test statistics less than the lower bound critical values. The hypothesis remains inconclusive if the F-statistic lies between the upper and lower bound of the critical values.

The calculated *F*-statistic $F(Lfdi|Lm2, Lgdp, gro, Ldev, open, Lexc, tax, infl, crisis)$ is 1.1557 which is less than the lower bound critical value at 5% level of significance. This implies that the null hypothesis of no cointegration cannot be rejected and hence there is no cointegration among the variables in equation (1). The process for testing the existence of a long run relationship using bound testing is repeated for the other variables combination by dropping some of the variables in each of the equation. Finally, the presence of cointegration is detected when $F(Lfdi|Lm2, gro)$. The *F*-statistics of Wald test for $F(Lfdi|Lm2, gro)$ is 4.8644 which exceeds the upper bound critical value at 5% level of significance. Therefore, the null hypothesis of no cointegration can be rejected. The result shows that there is long-run relationship exists among the variables *Lfdi*, *Lm2* and *gro*.

Value	Lag	Bound Critical Values (with an intercept and no trend)		Outcome
		I(0)	I(1)	
$F(Lfdi Lm2, Lgdp, gro, Ldev, open, Lexc, tax, infl, crisis)$				
1.1557	1	2.163	3.349	No cointegration
$F(Lfdi Lm2, gro, Ldev, open, Lexc, tax, infl, crisis)$				
1.2812	1	2.272	3.447	No cointegration
$F(Lfdi Lm2, gro, Ldev, open, tax, infl, crisis)$				
1.5850	1	2.365	3.553	No cointegration
$F(Lfdi Lm2, gro, Ldev, open, infl, crisis)$				
1.2677	1	2.476	3.646	No cointegration
$F(Lfdi Lm2, gro, Ldev, infl, crisis)$				
1.6270	1	2.649	3.805	No cointegration
$F(Lfdi Lm2, gro, Ldev, crisis)$				
2.5079	1	2.850	4.049	No cointegration
$F(Lfdi Lm2, gro, crisis)$				
3.4268	1	3.219	4.378	Inconclusive
$F(Lfdi Lm2, gro, Ldev)$				
3.4697	1	3.219	4.378	Inconclusive
$F(Lfdi Lm2, tax)$				
1.7309	1	3.793	4.855	No cointegration
$F(Lfdi Lm2, gro)$				
4.8644	1	3.793	4.855	Cointegration

Note:.. represent statistical significance at the 5% level

Table 1: Cointegration Relationship

If the long run relationship is assumed exist in the equation (1), the ARDL model log-run results for equation (1) is given in Table (2). the estimated coefficients show that only market size proxies by real GDP is statistically significant and has right sign. Economic uncertainty proxies by inflation rate and corporate tax although statistically significant but the signs are inconsistent with a priori expectation.

Eq. (1): ARDL (1, 1, 0, 0, 0, 0, 0, 0, 0) selected based on AIC.

Regressor	Coefficient	Standard Error	t-ratio	P value
Lm2	-3.4232**	1.4605	-2.3438	0.027

Lgdp	9.6492***	3.3548	2.8762	0.008
gro	-0.9871	0.0437	-0.0226	0.982
Ldev	0.4047	0.3201	1.2643	0.217
open	0.0108	0.0102	1.0537	0.302
Lexc	-0.0740	1.0845	-0.0682	0.946
tax	23.0261**	9.8803	2.3305	0.028
infl	0.0896**	0.0431	2.0794	0.048
crisis	0.0591	0.8602	0.0687	0.946
Constant	-83.1991***	27.9153	-2.9804	0.006

Note: ***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively.

Table 2: The Estimated Long-Run Coefficients in ARDL Model (Full Model)

Obviously the finding of this paper shows that FDI has a long run relationship with financial development and and growth rate. Therefore it is necessary to apply next step that is the ARDL approach to cointegration to estimate the long-term coefficients and ECM.. Table 3 presents the ARDL (1, 0, 1) model long-run results where the order of the distributed lag on the dependent variable was selected by AIC.

The empirical results of the long-run model show that both money supply (*Lm2*) and growth rate (*gro*) are important determinants of FDI inflow in Malaysia. The signs of the coefficient of money supply and growth rate are consistent with prior expectation and statistically significant at the 1% and 5% level significance, respectively. It is concluded that financial development and growth rate are the key variables affecting FDI from this long-run link. The estimated coefficients suggest that a 1% increase in the money supply and GDP growth rate attract FDI inflows into the country by approximately 0.9% and 0.2%, respectively. The coefficients reports in this paper are greater than reveals by Ang (2008). In his analysis, the effect of financial development is about 0.5% - 0.6%, while the growth rate increases FDI by .09% - .03%. Although he found openness has the largest effects but this is not supported in another model when the openness variable is dropped. On the contrary, he finds that the real exchange rate has the biggest impact on FDI. The findings are not stable as they are not from a single estimation.

Equation (3): ARDL (1, 0, 1) selected based on AIC.

Regressor	Coefficient	Standard Error	t-ratio	p-value
Lm2	0.8843***	0.0997	8.8667	0.000
gro	0.1863**	0.0696	2.6777	0.011
Constant	- 2.7682**	1.3370	- 2.0705	0.046

Note: ***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively.

Table 3: The Estimated Long-Run Coefficients in ARDL

Table 4 shows that the error correction term (ect) is highly significant at 1% level of significance. The speed of adjustment implied by the ect coefficient is 35%. The short run model provides information on how the dependent variable, FDI adjusts to restore long-run equilibrium in response to the disturbances. Approximately, 35% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year. The coefficients of *dLm2* and *dgro* are statistically significant with expected signs for the short-run dynamics of *dLfdi*. This indicates that financial market development and economic growth have a significant impact on FDI in the long run and the short run FDI function does respond well in the model.

ARDL (1, 0, 1) selected based on AIC.

Regressor	Coefficient	Standard Error	t-ratio	p-value
Constant	- 0.9644**	0.4995	- 1.9308	0.062
dLm2	0.3081***	0.1032	2.9856	0.005
dgro	0.0371**	0.0139	2.6712	0.012
ect (-1)	- 0.3484***	0.1137	- 3.0641	0.004

Note: ***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively.

Table 4: Error Correction Representation

4. Conclusion

This study attempts to further explore the short run and long run coefficients of the determinants of FDI in Malaysia over the period 1970 to 2008. Unfortunately, recent estimates of the causality between FDI inflow and its determinants, namely financial development and economic growth are not appropriately estimating the long-run relationship of the variables. Cointegration relationship among the variables are not tested using any technique of cointegration. In this study, the bound testing for a restricted model revealed that there is a significant positive relationship between FDI and money supply and growth rate. The positively significant sign of money supply and growth rate in short-run and long-run demonstrates that money supply and GDP growth rate are important in explaining FDI in Malaysia. Since we are using money supply, M2, as a proxy for financial development, 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 this country. In contrast with previous findings, we found that GDP growth does play an important role in attracting foreign investment to this country.

5. References

- [1] Ang, J. B., 2009. Foreign direct investment and its impact on the Thai economy: the role of financial development. *Journal of Economics and Finance*, **33**: 316-323.
- [2] Ang, J.B., 2008. Determinants of foreign direct investment in Malaysia. *Journal of Policy Modelling*, **30**: 185-189.
- [3] Asiedu, E. 2002. On the Determinants of Foreign Direct Investment Developing Countries: Is Africa Different? *World Development*, 30 (1): 107-119.
- [4] Bank Negara Malaysia. Annual Report, various issues.
- [5] Billington, N. 1999. The location of foreign direct investment: An empirical analysis. *Applied Economics*, 31 (1), 65-76.
- [6] Edwards, S. (1990). Capital flows, foreign direct investment, and debt-equity swaps in developing countries. *NBER Working Paper*, no. 3497.
- [7] Hooi, H.L., 2008. The impact of foreign direct investment on the growth of manufacturing sector in Malaysia. *International Applied Economics and Management Letters*, **1** (1): 41-45.
- [8] Hsio, F. S.T. & Hsiao, M. W. 2004. The chaotic attractor of foreign direct investment-Why China? A panel data analysis. *Journal of Asian Economics*, 15 (4): 641-670.
- [9] Pesaran, M. H. and Pesaran, B. 1997. *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford: Oxford University Press.
- [10] Sahoo, P. 2006. Foreign Direct Investment in South Asia: Policy, Trends, Impact and Determinants. *ADB Institute Discussion Paper No. 56*.