FDI and Economic Growth in Malaysia

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Abstract: This study examines the causal relationship between foreign direct investment and economic growth. Methodology is based on the Toda-Yamamoto test for causality relationship and the bounds testing (ARDL). Time-series data covering the period 1970-2005 for Malaysia, the study found, in the case of Malaysia there is no strong evidence of a bi-directional causality and long-run relationship between FDI and economic growth. This suggests that FDI has indirect effect on economic growth in Malaysia.

JEL Classification: C32, F14, F21, F43, O1

Keywords: Foreign direct investment, Toda-Yamamoto test, bounds testing (ARDL), economic growth. Malaysia.

1. Introduction

The relationship between Foreign Direct Investment (FDI) and economic growth has been a topical issue for several decades. Policymakers in a large number of countries are engaged in creating all kinds of incentives (e.g. export processing zones and tax

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incentives) to attract FDI, because it is assumed to positively affect local economic development.

Explosion of growth in FDI over the 1990's, especially in the developing countries, has inspired a stream of literature focusing on the impact of FDI on the Dynamics of growth measured by GDP in the recipient country.

The relationship between foreign direct investment (FDI) and economic growth has motivated a voluminous empirical literature focusing on both industrial and developing countries. Neoclassical models of growth as well as endogenous growth models provide the basis for most of the empirical work on the FDI-growth relationship. The relationship has been studied by explaining four main channels: (i) determinants of growth, (ii) determinants of FDI, (iii) role of multinational firms in host countries, and (iv) direction of causality between the two variables.

Given that the relationship between FDI and growth may be complex and heterogeneous across countries, this paper highlights the potential for serious errors in the analysis of the relationship if unrealistic homogeneity assumptions are imposed in the econometric modeling. The main objective of this paper is, therefore, to test for the direction of causality between foreign direct investment inflows (FDI) and economic growth (GDP) in the case of Malaysia.

Here we look for one of the three possible types of causal relationship: 1) Growth-driven FDI, i.e. the case when the growth of the host country attracts FDI, 2) FDI-led growth, i.e. the case when the FDI improves the rate of growth of the host country and 3) the two way causal link between them (or possibly no causality at all).

The paper will contribute significantly to the literature by providing new and sturdy evidence on FDI-Growth relationship in Malaysia. We used an innovative and more robust 'Granger no causality test' method developed by Toda and Yamamoto (1995), (here after called T-Y) to test the direction of causality between the two variables and ARDL bounds test for long run relationship. These methodologies to the best of our knowledge go clearly beyond the existing literature on the subject in Malaysia.

2. Foreign Direct Investment and Economic Growth in Malaysia

Malaysia is a growing and relatively open economy. In 2007, the economy of Malaysia was the 29th largest economy in the world by purchasing power parity with gross domestic product for 2007 was estimated to be $357.9 billion (World Bank, 2007).

Malaysia has a consistent record of economic growth in GDP over the period 1970–2005, averaging an annual rate of about 7 per cent. Because of its open economy, externalities have had a major impact from time to time including the oil crises of the 1970s, the downturn in the electronics industry in the mid 1980s, and especially the Asian financial crisis of 1997. The impact of this crisis was still being felt early in the twenty-first century. Standards of living of the majority of the population were transformed over the 30-year period with the level of GDP per capita in 2000 being about four times that of 1970(figure1). The boom in the economy went uninterrupted from 1988 to 1996 when the economy grew by between 7 and 10 percent per annum. The main source of growth was the manufacturing sector whose share of GDP increased to 31.4 percent in 2005 (Ministry of Finance, 2006).

Foreign direct investment (FDI) has been seen as a key driver underlying the strong growth performance experienced by the Malaysian economy. Policy reforms, including 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, led to a surge of FDI in the late 1980s. To attract a larger inflow of FDI, the government introduced more liberal incentives including allowing a larger percentage of foreign equity ownership in enterprise under the Promotion of Investment Act (PIA), 1986. This effort resulted in a large inflow of FDI after 1987(the inflow of FDI grew at an annual average rate of 38.7 percent between 1986 and 1996).

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).

The major areas of investment by foreign companies are in sectors such as electronics and electrical products, chemicals and chemical products, basic metal products, non-metallic mineral products, food manufacturing, plastic products, and scientific and measuring equipment.(Ministry of Finance, 2001).

Inward FDI performance index for Malaysia is less than of Inward FDI potential index which means in recent years Malaysia is not able to attract FDI as much as her actual potential (Table 1)

In fact FDI flows into Malaysia had decreased steadily and Malaysia was ranked 71 in 2007(UNCTAD ranked Malaysia as the sixth largest destination for FDI in 1995).

Table 1: Malaysia rankings by Inward FDI Performance Index, Inward FDI Potential Index (2005-2007).

Economy	Inward FDI performance index		Inward FDI potential index	
	2005	2007	2005	2007
Malaysia	67	71	41	40

Source: UNCTAD (2008).

Note: Ranking is that of the latest year available. Covering 141 economies. The potential index is based on 12 economic and policy variables.

In 2007 inward FDI flows to Malaysia were around US $ 8,043 millions , and it was 2.62% of total inward FDI inflow to Asia and Oceania and at that time share of china was 26.05%.(World investment report, 2008).

However, there has been a persistent decline in the ratio of FDI inflows to GDP since the early 1990s (figure2&3). While this disappointing pattern of development has become a major concern of researchers and policy makers. The Malaysian –American Electronics Industry(MAEI) argue that the fall in the flow of FDI into Malaysia is because her incentives are not competitive.

(Millions US$)

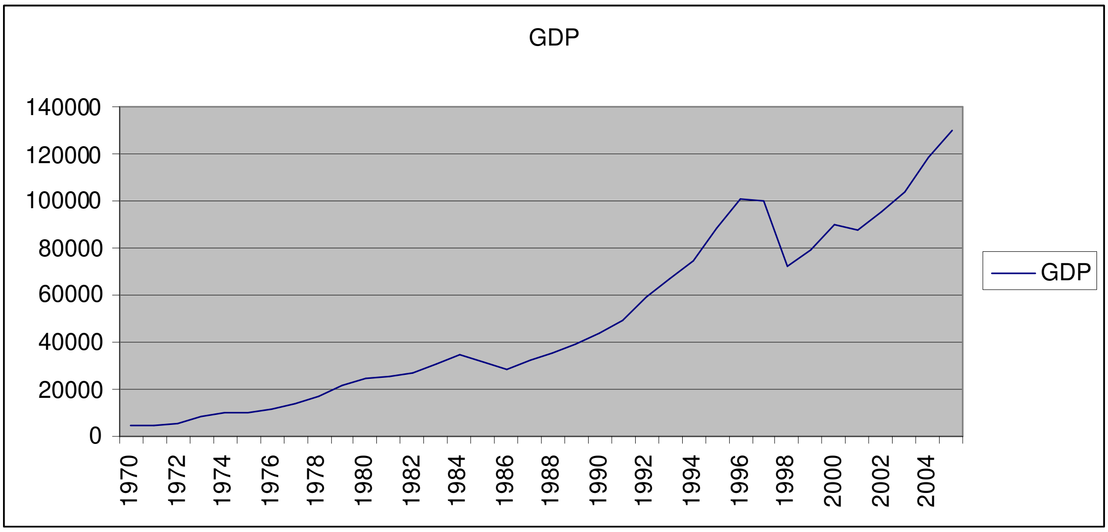

Figure 1: GDP in Malaysia (1970-2005)
Source: WDI (2006).

(Millions US$)

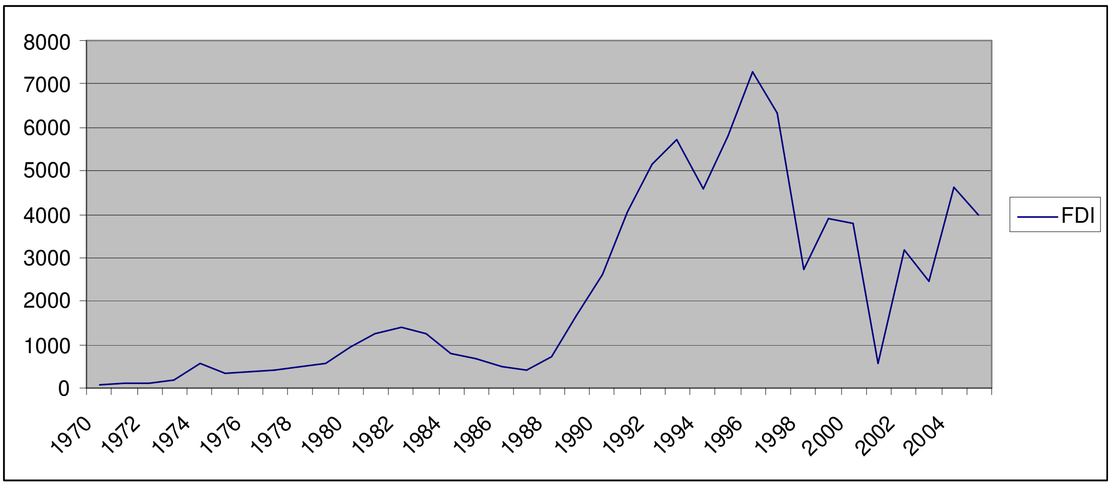

Figure 2: FDI inflows in Malaysia (1970-2005)

Source: UNCTAD (2006).

3. Literature Review

A large number of empirical studies on the role of FDI in host countries suggest that FDI is an important source of capital, complements domestic private investment, is usually associated with new job opportunities and enhancement of technology transfer, and boosts overall economic growth in host countries.

De Mello (1999) attempted to find support for an FDI-led growth hypothesis when time series analysis and panel data estimation for a sample of 32 OECD and non- OECD countries covering the period 1970-1990 were made. He estimates the impact of FDI on capital accumulation and output growth in the recipient economy.

Nair-Reichert and Weinhold (2001) apply mixed fixed and random estimation to examine the relationship between FDI and growth in developing countries and find that there is a causal link between FDI and growth.

Ericsson and Irandoust (2001) examined the causal effects between FDI growth and output growth for the four OECD countries applying a multi-country framework to data from Denmark, Finland, Norway and Sweden. The authors failed to detect any causal relationship between FDI and output growth for Denmark and Finland. They suggested that the specific dynamics and nature of FDI entering these countries could be responsible for these no-causality results.

Liu et al (2002) tested the existence of a long-run relationship among economic growth, foreign direct investment and trade in China. Using a cointegration framework with quarterly data for exports, imports, FDI and growth from 1981 to 1997, the research found the existence of a bi -directional causal relationship among FDI, growth, and exports.

Chakraborty and Basu (2002) utilize the technique of cointegration and error- correction modeling to examine the link between FDI and economic growth in India. The results suggest that GDP in India is not Granger caused by FDI, and the causality runs more from GDP to FDI.

Wang (2002) explores the kinds of FDI inflow most likely contribute significantly to economic growth. Using data from 12 Asian economies over the period of 1987-1997, she found that only FDI in the manufacturing sector has a significant and positive impact on economic growth and attributes this positive contribution to FDIs' spillover effects.

Hsiao and Shen (2003) find a feedback association between FDI and GDP in their time-series analysis of the data from China. Using data on 80 countries for the period 1971–95, Choe (2003) detects two-way causation between FDI and growth, but the effects are more apparent from growth to FDI.

Chowdhury and Mavrotas(2005) examined the causal relationship between FDI and economic growth for three developing countries, namely Chile, Malaysia and Thailand. They found that it is GDP that causes FDI in the case of Chile and not *vice versa*, while for both Malaysia and Thailand, there is a strong evidence of a bi-directional causality between the two variables.

Duasa (2007), examined the causality between FDI and output growth in Malaysia, the study found 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, vice versa, but FDI does contribute to stability of growth as growth contributes to stability of FDI.

The results from these bilateral causality tests are mixed. This again indicates that the relationship between FDI and economic growth is far from straightforward. It varies across countries and time periods. In addition, there are some drawbacks to the causality tests reviewed above. Most of these studies employ Granger causality tests in the framework.

4. Theoretical Framework

FDI is thought to be growth-enhancing mainly through the capital, technology and know-how that it brings into the recipient country. By transferring knowledge, FDI will increase the existing stock of knowledge in the host country through labour training, transfer of skills, and the transfer of new managerial and organizational practice. FDI will also promote the use of more advance technologies by domestic firms through capital accumulation in the domestic country (De Mello, 1997, 1999). Finally, FDI is thought to open up export markets and to promote domestic investments through the technological spillovers and the resulting productivity increase.

In theory there are several potential ways in which FDI can promote economic growth. For example, Solow-type standard neoclassical growth models suggest that FDI increases the capital stock and thus growth in the host economy by financing capital formation (Brems, 1970). Admittedly, in neoclassical growth models with diminishing returns to capital, FDI has only a "short-run" growth effect as countries move towards a new steady state. Accordingly, the impact of FDI on growth is identical to that of domestic investment. In contrast, in endogenous growth models, FDI is generally assumed to be more productive than domestic investment, since FDI encourages the incorporation of new technologies in the production function of the host economy (Borensztein et al., 1998). In this view, FDI-related technological spillovers offset the effects of diminishing returns to capital and keep the economy on a long-term growth path. Moreover, endogenous growth models imply that FDI can promote long-run growth by augmenting the existing stock of knowledge in the host economy through labour training and skill acquisition, on the one hand, and through the introduction of alternative management practices and organizational arrangements on the other (see, e.g., de Mello, 1997)·Thus, through capital accumulation and knowledge spillovers, FDI may play an important role for economic growth.

5. Methodology and Data

.In this study for test causality and relationship between FDI and GDP two models were constructed, reflecting two different methods to test for Granger causality: an autoregressive distributed lag (ARDL) model and a vector autoregressive (VAR) model with augmented lag order to allow for the implementation of the Toda-Yamamoto test. The two models are well known in applied econometrics and are therefore very briefly described in the following paragraphs.

-ARDL model

Autoregressive distributed lag (ARDL) models were commonplace in energy analysis until the 1980s. Then the introduction of unit root and cointegration methods, which found that some regressions may be spurious if the time series properties of variables are not examined, almost dismissed the ARDL model as inappropriate. The ‘revival’ of ARDL methods came in the late 1990s with the aid of work by Pesaran, Shin and Smith (see e.g. Pesaran et al., 2001), and recently many analysts have used it for Granger causality tests.

The ARDL approach involves testing whether a long-run relationship exists among the variables involved in a model. For this purpose, abounds testing approach has been developed (Pesaran et al., 2001). In accordance with that method, the FDI led growth system is initially modeled with the following equation:

$$\Delta lnGDP=\beta 0+\sum_{i=1}^{m} \beta 1i\Delta lnGDPt\text{-}i+\sum_{j=0}^{n} \beta 2j\Delta lnFDI\ t\text{-}j+\beta 3lnGDPt\text{-}1+\beta 4lnFDIt\text{-}1\varepsilon t \qquad \text{Eq (1)}$$

Where lnGDP and lnFDI are, respectively, the logarithm of gross domestic product in Malaysia and foreign direct investment inflow in Malaysia and εt is assumed to be a white noise error process.

The null hypothesis of 'no long-run relationship' is tested with the aid of an F-test of the joint significance of the lagged level coefficients of Eq (1):

$H0: \beta 3 = \beta 4 = 0$ against $H1: \beta 3 \neq 0, \beta 4 \neq 0$

Pesaran et al. (2001) have proved that the distribution of this F-statistic is non-standard irrespective of whether the regressors are I(0) or I(1), and have tabulated the appropriate critical values. Depending on the number of regressors and on whether an intercept and/or a time trend is included in the equation, a pair of critical values is provided, which constitute an upper and a lower bound respectively. If the F-statistic is greater than the upper bound, the null hypothesis is clearly rejected and a long-run relationship exists among the test variables. If the F-statistic is smaller than the lower bound, then the null cannot be rejected and estimation can continue assuming no long-run relationship. If the statistic falls between the two bounds, then the result is inconclusive; it is only at this stage that the analyst may need to conduct unit root tests in order to proceed (Pesaran and Pesaran, 1997).

The long-run relationship test is equivalent to the cointegration test. If such a relationship is found in Eq (1) according to the bounds test described above, this would imply long-run causality from FDI to GDP. Short-run causality in the same direction can be tested through a standard Wald or F-test for the joint significance of coefficients $\beta 2$. To test causality from GDP to FDI, one has to formulate an equation similar to Eq (1) but using *FDI* as the dependent variable and *GDP* as the exogenous one and employ the same tests as outlined above.

- The Toda-Yamamoto approach

Toda and Yamamoto (1995) have developed a simple procedure that involves testing for Granger non-causality in level VARs irrespective of whether the variables are integrated, cointegrated or not. For this purpose, a VAR is estimated not with its 'true' lag order k but with lag order of ($k+d$), where d is the maximal potential order of integration of the variables. Then, Granger causality is tested by performing hypothesis tests in the VAR ignoring the additional lags $k+1, \ldots, k+d$. Toda and Yamamoto proved that in such a case linear and nonlinear restrictions can be tested using standard asymptotic theory. This method, which like the ARDL technique avoids the low-power unit root and cointegration pre-tests, has recently been applied in several causality studies.

Following Seabra and Flach (2005), the T-Y Granger no-causality test is implemented in this study by estimating the following Causality VAR system :

$$\ln GDP_t = \theta_1 + \sum_{i=1}^{k+d\max} \beta_{1i} \ln GDP_{t-1} + \sum_{i=1}^{k+d\max} \lambda_{1i} \ln FDI_{t-1} + \mu_{1t} \quad \text{Eq (3)}$$

$$\ln FDI_t = \theta_2 + \sum_{i=1}^{k+d\max} \beta_{2i} \ln FDI_{t-1} + \sum_{i=1}^{k+d\max} \lambda_{2i} \ln GDP_{t-1} + \mu_{2t} \quad \text{Eq (4)}$$

Where lnGDP and lnFDI are, respectively, the logarithm of gross domestic product in Malaysia and foreign direct investment inflow in Malaysia and *k* is the optimal lag order, *d* is the maximal order of integration of the variables in the system and μ1 and μ2 are error terms that are assumed to be white noise. Each variable is regressed on each other variable lagged from one (1) to the *k+dmax* lags in the system.

7. Data:

The GDP and foreign direct investment inflows for Malaysia were taken from the World Bank's World Development Indicators 2006 CD ROM, and online WDI from World Bank website.

Annual time series data covering the period 1970-2005 for which data was available was used.

6. Estimation and Results

Before applying the ARDL test and the T-Y no-causality test in the augmented VAR (*k+dmax*), we first establish the maximal integration order (*dmax*) of the variables by carrying out an Augmented Dickey- Fuller (ADF) unit root tests on the GDP growth and FDI series in their log-levels and log differenced forms. The results, reported in Table 2 indicate that real GDP growth and FDI ratio are non-stationary in their respective levels. Then again, after first differencing the variables, the null hypothesis of a unit root in the

ADF tests were rejected at the 1% significance level for both series. Thus the two variables are integrated of order one, I(1).

Table 2: Results of ADF Tests for Unit-Roots in GDP and FDI

	ADF test	
Variables	*Levels*	*1st Difference*
ln*GDP*	*-2.413985*	*-4.229152**
ln*FDI*	*-2.038667*	-7.434461*

Notes: The optimal lags for conducting the ADF tests were determined by AIC (Akaike information criteria). * indicate significance at the 1% levels.

Following that the FDI series is integrated of order one, the cointegration (long-run) relationship between them was also established using the Johansen maximum likelihood (ML) cointegration test run relationship between GDP and FDI for the whole sample period . Results from the cointegration analysis are presented in Table 3 a cointegrating relationship is found for FDI and GDP , This implies the existence of long-term causality, whose direction is not yet clear however.

(Two time series variables are said to be cointegrated if each of the series taken individually is non-stationary with integration of order one, i.e. I(1), while the linear combination of the series are stationary with integration of order zero, i.e. I(0).)

Table 3:Johansen ML Cointegration Test Results for GDP and FDI

Cointegration with restricted intercepts and no trends in the VAR Stochastic Matrix

Null hypothesis	Maximum Eigenvalue	5% critical value	Trace Statistic	5% critical value
r = 0	0.239264	14.26460	15.68277 **	15.49471
r<= 1	0.182715	3.841466	6.658308	3.841466

** denotes rejection of the null hypothesis at 5% significance level.

-Toda-Yamamoto test

Finally, we conducted the T-Y Granger causality test using a modified Wald (MWald) test to verify if the coefficients λ1 and λ2 of the lagged variables are significantly different from zero in the respective equations 3 and 4. After determining that the most appropriate lag length as k=2 and dmax=1 The results of the T-Y causality test are reported in Table 3 for all the estimated period.

Table 4: Toda-Yamamoto Granger No-causality Test Results

equation	WALD TEST
FDI does not Granger cause GDP	0.189187 (0.9097)
GDP does not Granger cause FDI	4.169751 (0.1243)

Note: The figures in parentheses are the p-values.

From the results the p-values in Table 4show the probability that the independent variable in regression is not equal to zero. So the null hypothesis that "*FDI does not Granger causes GDP*" and "*GDP does not Granger causes FD*I" were not rejected for the sample period, Therefore there isn't a strong evidence of a bi-directional causality between the two variables.

-ARDL Bounds Test

The first step in the ARDL approach is to estimate Equation (2) using ordinary least square (OLS). The F-test has a non-standard distribution which depends upon (i) whether variables included in the ARDL model are I(0) or I(1),(,i i) the number of regressors, and (iii) whether the ARDL model contains an intercept and a trend. Critical values are reported by Pesaran and Pesaran (1997) and Pesaran *et al.* (2001). However, these critical values are generated for sample sizes of 500 and 1000 observations and 20,000 and 40,000 replications, respectively. Given the relatively small sample size in our study (36 observations), therefore we used of calculated critical values by Narayan(2004) using small sample size between 30 and 80 observations.

If the computed F-statistics lies above the upper level of the band, the null is rejected, indicating cointegration. If the computed F-statistics lies below the lower level band, the null cannot be rejected, supporting the absence of cointegration. If the statistics fall within the band, inference would be inconclusive.

The result of ARDL Bounds test (Table 5 shows that test statistic falls below the lower critical value so the null hypothesis no long-run relationship cannot be rejected, therefore there is not long-run relationship between FDI and GDP in Malaysia.

Table 5: Bounds Tests for the Existence of Cointegration

Test Statistic	Lag	Significance Level	Bound Critical Value (no trend)	
F-Statistic	1	1%	5.754	6.483
Value		5%	3.993	4.533
2.612053		10%	3.247	3.773

Note: The critical value is taken from Narayan (2004).

7. Conclusion

The paper has tested the direction of causality between FDI and growth in Malaysia .

Our empirical findings based on the Toda-Yamamoto causality test seem to suggest that there is not a strong evidence of a bi-directional causality between GDP and FDI. Based on these results the assumption that FDI case growth, vice versa, raised some doubts. Also according to bounds tests there is not long-run relationship between FDI and GDP in Malaysia.

Therefore other Increased attention needs also to be given to the overall role of growth (and the quality of growth) as a crucial determinant of FDI along with the quality of human capital, TFP (total factor of productivity) infrastructure, and we think the role of FDI on growth in Malaysia should be in indirect relationship between those two variables, such as technology transfer and productivity because In the case of technologies, FDI is expected to be a potential source of productivity gains via spillovers to domestic firms. Also the causality between FDI and GDP is not matter. Most importantly, the performance of one variable does contribute to stability of another variable. (We recommend this topic for future studies about FDI and economic growth in Malaysia).

There are a range of possible factors that ensure that FDI promotes or hinders economic growth .The factors are likely to differ between countries and between types of FDI and sectors of destination. For example, the effects of FDI manufacturing might differ from those in extractive sectors which again might differ from FDI that is result of privatization of state-owned enterprise.

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