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# Foreign Direct Investment and Manufacturing Growth: The Malaysian Experience

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**Abstract**

This paper examines the short and long run dynamics of Foreign Direct Investment (FDI) over the manufacturing growth in a developing country – Malaysia for the period of 1970-2003. Due to the small sample size, we used a fairly new cointegration method known as "bounds test" and the autoregressive distributed lag (ARDL) approach to estimate the short and long run production elasticity of FDI. Estimated FDI elasticity in the short and long run were found to be statistically significant. In the long run, a 1% increase in FDI contributes to 0.115% increase in manufacturing value added output in Malaysia. The model extracts the influence of FDI and technological progress towards manufacturing output. As a consequence of the results, strategies to enhance the competitiveness of Malaysian manufacturing sectors in the world of intense competition for FDI especially among the Asian economies like China and other ASEAN members is further recommended.

**Keywords**: Foreign Direct Investment, Manufacturing Growth, Autoregressive distributed lag

## 1. Introduction

Malaysian gross domestic product (GDP) grew at an average rate of 6.7% during 1971-1990 (Malaysia, 1971 & 1990) while during 1990-1999 Malaysia had the highest growth rate averaging 8.1% per annum outperforming other ASEAN economies (Azmat, 2002) One of the notable strategies of the government to spur its growth is by attracting foreign direct investment (FDI). Malaysia was one of the most active among the ASEAN countries in liberalizing its investment regime in the manufacturing sector during the 1980s and 1990s. Significant progress was seen during the 1980s under the administration of the former Prime Minister Dr. Mahathir Mohammad, where new joint venture projects (especially with Japanese and Korean) with the state owned enterprise were launched. In addition, with the promotion of the Investment Act in 1986, Malaysia experienced a huge influx of FDI in the manufacturing sector. This policy offered many incentives including pioneers status tax holidays, expanded investment tax allowances for expansion projects, tax deduction for export promotions, the establishment of Free Trade Zones and other types of incentives to draw FDI. In fact, Malaysia further improved trade liberalization by relaxing the restrictions over capital ownership of foreign companies hence improving the FDI flows into Malaysia in the late 1980s. Similarly tariff rates in Malaysia have declined considerably over the years (Urata, 1994).

It has been noted that Malaysia has emerged as one of the new dynamic Asian economies, which has become more competitive across a broad range of manufactured goods and managed to switch to higher value-added manufacturing products (Wilson, 2000). The outward oriented strategies have somehow progressed well in establishing the manufacturing sectors namely the electronic and electrical sectors. Hence, the success of the Malaysian manufacturing sectors can be partly attributed to its trade and FDI liberalization. Since the late 1970s the manufacturing sector has contributed significantly to the growth of the Malaysian economy. Its contribution to the export earnings accounted for 79% of the total export earning and nearly 33.4% of Malaysia's GDP in 2000 (Ministry of Finance, 2001).

Despite considerable number of studies examining the relationship between FDI and economic growth, it is found that studies emphasizing the impact of FDI on manufacturing sector growth is rather lacking specifically in the Malaysian context. Furthermore, it is more lucid to examine the impact of FDI on manufacturing sectors since huge influx of FDI inflows in Malaysia are directed towards the manufacturing sectors.

This paper further contributes in the following ways. First, we used a more recent time series data to quantify the link between FDI and manufacturing growth by examining the short and long run production elasticity of FDI on manufacturing sector. Second, we used a more robust method known as the "bounds test" to examine the cointegration between the dependent variable namely manufacturing value added output and its determinants. This method has the advantage of dealing with a small number of observations and does not require the regressors to be in the same order of integration. Therefore, serious questions concerning the robustness of the cointegration tests could be limited compared to other studies that used small observation (less than 100), which is extremely sensitive for Johansen's method.

In addition, few of the model specification problems mentioned by Carkovic & Levine (2002), which would lead to inaccurate estimation, were solved by adapting the ARDL model. For instance, this method controls the deficiency of other studies by considering the inclusion of lagged dependent variables in examining the short run dynamics of FDI. On the other hand, specifying the model specifically for the manufacturing sectors of Malaysia would avoid the biasness of the use of cross sectional data which normally leads to the failure to capture the country or firm specific effects (Carkovic & Levine[1], 2002; Dimelis, 2005). Moreover, the analysis proposed in this paper also makes it possible to explain the long-term dynamics.

Consequently, Malaysia was chosen as the country of choice in our analysis for two reasons. First, Malaysia has successfully moved into the second tier of newly industrialized economies owing to its manufacturing growth via FDI. Likewise, Malaysia has also relied heavily on FDI compared to long-term borrowings (Kiong and Jomo, 2005). Second, significant FDI inflows were evident in the manufacturing sectors especially from Japan, South Korea, US, Singapore and other European countries.

As a whole, this paper contributes to the existing literature by providing new empirical evidence concerning the FDI-led growth hypothesis within the manufacturing sectors. From a policy perspective, the results of this paper may serve as a useful platform to formulate series of new agenda for FDI policies. The rest of the paper is organized as follows. The next section examines the existing literature on FDI, section 3 presents the model specification and preliminary tests while in Section 4 and 5, the data source and empirical results are presented. Finally, section 6 contributes in terms of policy implications and followed by the conclusion.

**2. Literature Review**

A wide range of literatures is available on the issue of the impact of FDI on economic growth. By employing the production function, these studies use a range of methodologies; e.g. Granger causality test, panel data estimation and error correction model. In this section, we review the most recent studies linking FDI and economic growth.

Marwah and Tavakoli (2004) examined the effect of FDI and imports on economic growth in four ASEAN countries. The elasticity of the estimated production function of FDI was found to be significant in explaining the economic growth of all the four countries. Estimated foreign capital elasticity was found to be 0.086 while import contributed 0.443 to growth in the case of Malaysia. Clearly, they conclude that both FDI and imports had a significant impact on growth.

Recent study by Li and Liu (2005), on the other hand, uses the panel data of 84 countries to investigate the influence of FDI on economic growth. The study found a significant relationship between FDI and economic growth. Additionally, a stronger relationship was extracted when FDI is interacted with human capital. The reason being that stronger human capital poses better absorptive capacities due to the complementary nature of the FDI and human capital, most importantly for the developing countries. Kiong and Jomo (2005), on the other hand, examined the influences of FDI on Malaysian economy. The same conclusion emerged in their study. However, while positive effects of FDI on growth were found, the study cautioned that the net effect of FDI could be limited when FDI affects the domestic saving rate negatively.

In contrast, there have been several studies indicating a negative or no relationship between FDI and growth. Study by Akinlo (2004) that investigated the impact of FDI on economic growth in Nigeria using the ECM showed an insignificant negative influence of FDI on growth. The author further argued that extractive FDI might not extract significant impact on growth compared to the manufacturing FDI. Additionally, FDI may influence growth negatively once there is an evidence of the foreign investors transferring profits, or other investment gains to their home country. Other noteworthy studies examining the influences of FDI employs the Granger causality test (Kholdy, 1995; Nair-Reichert and Weinhold, 2001) but the results vary according to country, method used and time frame under study.

The mixed results concerning the linkages may have been the consequence of using different sample size, methodologies and partly due to the degree of aggregation where most of the studies were relating FDI to total economy activities e.g. to the growth of the nation measured by GDP. Given these limitations, our aim in this paper is to test the FDI led growth hypothesis within the manufacturing sectors, which deem to be more appropriate in the case of Malaysia. Due to the over reliance on FDI in propelling the Malaysian manufacturing sectors, it is expected that FDI would contribute significantly in a positive way.

**3. Model Specification**

In this section, we describe the empirical method used to examine the relationship between FDI and the growth of manufacturing sector for Malaysia from 1970 to 2003. We characterized the production function for the manufacturing sector as follows:

$$VA_t = f(Cap_t, Lab_t, Fdi_t, t) \tag{1}$$

where $VA_t$ is the manufacturing value added output at period *t*. *Cap*, *Lab*, and *Fdi*, represent fixed capital stocks and labour inputs, and manufacturing foreign direct investments, respectively. The variable *t* in (1) is the linear trend representing the Hicks neutral technical progress. Although, analyzing the influence of other factors such as human capital, and research and development would be interesting, quality and reliable data for manufacturing prove to be the main constraint.

Hence, in writing the above specification, we used the unrestricted intercept and with trend (Case V in Pesaran et al. , 2001) and it can be written as an Autoregressive Distributed Lagged, ARDL[p, q, r, s] model such as:

$$\begin{aligned}\Delta InVA_t &= a_0 + a_1 t + \sum_{i=1}^{p} b_{1i}\Delta InVA_{t-i} + \sum_{i=0}^{q} b_{2i}\Delta InL_{t-i} + \sum_{i=0}^{r} b_{3i}\Delta InK_{t-i} + \sum_{i=0}^{s} b_{4i}\Delta InFDI_{t-i} + \\ &c_1 InVA_{t-1} + c_2 InL_{t-1} + c_3 InK_{t-1} + c_4 InFDI_{t-1} + \varepsilon_t\end{aligned} \tag{2}$$

where, $\Delta$ is the first difference operator and *In* for the natural logarithm of the respective variables.

Using the specification in (2), we can test if *InVA* is co-moving with the regressors. The test is called the 'bounds test' proposed in Pesaran et al. (2001). Mah (2000) indicated that this cointegration test is more reliable compared to Johansen and Juselius (1990), which usually requires larger sample size. Indeed "bound test" to cointegration does not pose a strict classification of regressors to be in the same order. To test the absence of a long run relationship between *InVA* and its determinants we restrict the coefficient of $c_1$, $c_2$, $c_3$ and $c_4$ to be zero against the alternative by conducting a restricted F-test (or Wald test). Hence, the null and alternative hypotheses are as follows:

Ho: $c_1 = c_2 = c_3 = c_4 = 0$ (no long run relationship between *InVA* and its determinants)

$H_1$: $c_1 \neq 0; c_2 \neq 0; c_3 \neq 0; c_4 \neq 0$ (there is long run relationship between *InVA* and its determinants)

The asymptotic distribution of the test statistics are non-standard regardless of whether the variables are *I (0)* or *I (1)*. For this purpose Pesaran et al. (2001) computed two sets of asymptotic critical values where the first set assumes variables to be *I(0)* and the other as *I(1)* which is known as lower bounds(LCB) and upper bounds (UCB) critical values respectively. Decisions on whether cointegration exists between *InVA* and its regressors are then made based on the following criteria;

Computed F statistics > UCB: Reject the null hypothesis

Computed F statistics < LCB: Fail to reject the null hypothesis

Computed F statistics value between LCB and UCB: Results are inconclusive

Once there is evidence of cointegration it implies that *InVA* and its determinants have a stable long-run relationship. Consequently, in the next step we used the two-step strategy of the ARDL method proposed in Pesaran and Shin (1997) to estimate the long run and short run coefficients (elasticities) for our model. The long run estimation follows the following $\text{ARDL}[p, q, r, s]$ model:

$$InVA_t = a_0 + a_1 t + \sum_{i=1}^{p} b_{1i} InVA_{t-i} + \sum_{i=0}^{q} b_{2i} InL_{t-i} + \sum_{i=0}^{r} b_{3i} InK_{t-i} + \sum_{i=0}^{s} b_{4i} InFDI_{t-i} + + \vartheta_t \quad (3)$$

Constructing an error correction model of the following form derives the short-run elasticities:

$$\Delta InVA_t = a_0 + a_1 \Delta t + \sum_{i=1}^{p} b_{1i} \Delta InVA_{t-i} + \sum_{i=0}^{q} b_{2i} \Delta InL_{t-i} + \sum_{i=0}^{r} b_{3i} \Delta InK_{t-i} + \sum_{i=0}^{s} b_{4i} \Delta InFDI_{t-i} + + \psi ECM_{t-1} + \omega_t \quad (4)$$

Here the *b*'s are the coefficients relating to the short run dynamics of the convergence to equilibrium and $\psi$ measures the speed of adjustment. To estimate the model we used different lag length. To avoid the loss of degree of freedom the maximum selection of lag does not exceed 3. We used the Akaike Information Criterion (AIC) to choose the appropriate lag length for the ARDL model.

**4. Data Sources**

In this paper, we used annual data from 1970 to 2003 and the data on manufacturing value added output, fixed capital stocks and number of worker for the manufacturing sector was obtained from various issues of Yearbook of Statistics and Malaysian Economic Statistics-Time Series published by Department of Statistics, Malaysia. Data on FDI was obtained from Malaysian Industrial Development Authority. For capital stocks, we used fixed capital stocks due to data limitation on capital expenditure. For the labor (L) due to limited data series on man-hours, we used number of workers. Value added output, fixed capital stocks and FDI was deflated with manufacturing commodity producer price index respectively. All the data was expressed in logarithm indicating that each of the estimated coefficients represents the elasticity. Past literatures suggested that all the regressors to have a positive relationship with *InVA*. We also examined the order of integration of the variables using both the Augmented Dicky Fuller (ADF) and the Phillip-Perron (PP) unit root test (only PP is reported to conserve space).

**5. Empirical Results**

Based on the results in Table 1, it is found that all the variables were to be *random walk,* which was indicated by the non-stationarity of the variables at their levels. The series becomes stationary after the first differences signifying that all series are integrated of order one *I(1).*

Based on bounds test (Table 2), the computed F-statistics exceeds the upper critical values indicating a rejection of the null hypothesis of no cointegration between *InVA* and its determinants. Hence, there is a strong indication that fixed capital stock, labor and FDI serves as the long run forcing variables in explaining the growth of the manufacturing value added output in Malaysia.

Table 3 shows the estimated long-run coefficients for the ARDL model. All the determinants are found to have correct signs. In the long run, fixed capital was found to have a positive impact on the manufacturing value added output, however was not statistically significant. Owing to the data limitation on investment, the use of fixed capital to proxy investment and not capital per se may have contributed to the insignificant results.

On the other hand, labor has a positive and significant impact on manufacturing value added output (significant at the 1% significant level). Manufacturing value added output increase by 0.90% as results of 1% increase in labor. The higher contribution of labor is not surprising given that many of the manufacturing sectors in Malaysia are still labor intensive.

The contribution of FDI towards manufacturing value added output was positive and statistical significant at 1% level. The elasticity is 0.084 indicating that 1% increase in FDI contributed to a 0.084% increase in manufacturing value added output. In terms of technical progress, its contribution was significant but very much lower (only increases manufacturing value added output by 0.046%) that the other determinants. This is acceptable since although Malaysian manufacturing sectors has managed to accumulate capital stocks, over the years it is found that mastery of these technologies are still low among the manufacturing sectors. This may due to the low absorptive capabilities in the manufacturing sectors. Mahadevan (2001, 2002) and Tham (1996, 1997) have also showed the low level of productivity in manufacturing sector using the total factor productivity (TFP) approach.

Table 4 shows the short run dynamics and the adjustment towards the long run equilibrium. The specification suggest a good fit with $R^2$ of 0.938 suggesting that 94% of variation in manufacturing value added output is explained by the determinants. As a whole the fixed capital, technical progress and FDI have a positive and significant (at 10% and 1% respectively) impact on manufacturing value added output. On the other hand, labor is found to have significant positive effect on manufacturing value added output.

The lagged terms of fixed capital and labor shows a significant negative impact on manufacturing value added. This means, in the short run, additional capital and workers are not enhancing the manufacturing growth. This may due to the nature of diminishing returns facing the sectors in the short run. Alternatively, lack of skills, lack of mastery of operation as well as management knowledge, low productivity and the like may have contributed to the negative outcomes.

The statistically significance of the error-correction term (ECM) confirms the presence of long run equilibrium between the manufacturing value added output and the regressors namely fixed capital, labor and FDI (also confirms our previous cointegration analysis). It is found that the *ECM* is between 0 and –1 and is statistically significant at the 1% significance level. This implies that, the error correction process converges monotonically to the equilibrium path relatively quickly (0.908%).

**6. Policy Implications**

On the basis of the empirical analysis (the ARDL approach) it is found that FDI plays an important role in determining the progress of the Malaysian manufacturing firms. Hence, the mobility of FDI could ultimately alter the progress of the manufacturing sectors. Given the increasing trend of modular production systems, the mobility of multinationals operations has increased. For instance, China's cost advantage cum with huge domestic demand had increased the potential of shifting among foreign investors[2]. Indeed, in recent years it was evident that few of the contract manufacturers have shifted their operation from Malaysia to China. Although, the Chinese and Indian markets provide much catalyst for growth, the foreign investors strategies to tap the fast growing Asia Pacific region namely regions near to Malaysia would inevitably bring FDI into Malaysia. With the ready availability of good infrastructure, political stability and moderate overall cost, Malaysia is still attractive for FDI provided that the other potential areas are further developed.

Until now, it is notable that policy concerning FDI liberalization in Malaysia is still tailored towards providing incentives and other forms of aids for the foreign investors. We suggest that the next viable policy direction of Malaysia should focus on providing the needed complementary assets realizing the importance of FDI and labor force in the long run. On the other hand, strategies to enhance the lack of technical progress are further recommended. Hence, the policy recommendation in this section is solely tailored towards enhancing complementary assets in which Malaysia is relatively weak. Three core strategic thrusts in developing the complementary assets is our emphasis.

First, strategic trust should focus on improving productivity and innovative capabilities[3] of the manufacturing sectors. The contribution of technical progress in this paper showed only a marginal significant impact towards the manufacturing sectors. In addition, quality FDI can only be attracted if the host country has the ability to improve the manufacturing outputs through productivity gain rather than depending on the traditional factor of production. Thus, creation of technical and management support centers for the manufacturing sectors especially for the small medium enterprise (SMEs) could provide a catalyst for productivity improvement. These centers can play a key role in assisting manufacturers to develop strategic partnership, product development, accounting and marketing supports.

Although most often, innovation literature follows the neo classical arguments, in a developing country, building innovative capabilities requires the government's intervention. This is due to the lack of private participation in R&D. Owing to the lack of techno-entrepreneurship culture (unlike Singapore) incentives in a form of tax reduction, research grants, sharing R&D facilities between government agencies and the private firms, linking public institutions and manufacturing firms, and strengthening the abilities of science parks and technology incubators is vital. With these strong innovative infrastructures, chances to attract FDI would improve. There is also an urgent need to revise the research grants awarded to the public institutions – Intensification of Research in Priority Areas (IRPA) research grants, industrial grants and university capabilities in supporting the national innovation systems. Due to the low return on investment[4] of IRPA grants, efforts also should be focused on providing seed and commercialization funding. Indeed, venture capitalist activities (e.g. technology brokers) should be further fostered. On the other hand, more efforts should be given in establishing better monitoring systems and selection of grant recipients especially in relation to the industrial grants given to the SMEs. In terms of building universities capabilities, universities need to identify their own nice R&D areas and divert more R&D efforts in developing pool of expertise in those areas. Reluctance of foreign investors to invest is also due to lack of intellectual property right concern. Government's role in increasing awareness in IPR could create confidence among foreign investors to invest in R&D in Malaysia.

Secondly, the heavy reliance on labor among manufacturers as shown by our estimation and to attract more FDI will require the development of strong human capital stocks. To build better human capital stocks, the level of education and skill should be further improved. For instance, due to the development of high tech human capital[5], many information, communication and technology (ICT) and pharmaceutical transnational corporations (TNCs) were attracted to diversify their R&D activities in India (UNTAD, 2005). On the other hand, with weak science and technology platform (e.g. scientist and engineers, low level of enrollments in S&T fields) compared to China and Singapore would also mean that Malaysia would find itself too difficult to attract quality FDIs. Furthermore, the mismatch between the industrial requirements and the skill level provided by the education institutions need to be further improved. Although, the government has granted the establishment of many private colleges and universities in an effort to improve the knowledge content of its workers, still it is found that many of these mushrooming institutions are still skewed towards offering business (rather the science and technology which is scared) related programs. In fact, strengthening the education institutions is greatly needed. These supporting institutions would have the potential to further boost the comparative advantage of the manufacturing sectors.

As a whole, we suggest that strategies be focused on improving the coordination efforts between the education institutions and the industrial needs, enhancing the number of available scientist and engineers and provide more science and technology based programs with sufficient practical and industrial training components. Just establishing education institution does not grantee success thus recruiting quality teaching staff and placing right students in the right program is paramount important. Improving the establishment of network of foreign universities affiliation with local institutions is vital.

Third, the capability of local supplier especially those who serve the foreign investors need to be strengthened via network cohesion. Efficiency improvement through network of linkages is important for many manufacturing firms[6]. This strategy is indeed in support with the clustering development approach which emphasized inter-firm and intra firm linkages. Indeed the failure of Proton's supplier in upgrading technology capabilities was due to their under developed inter firm sub-contracting networks. Establishing a strong supply chain via horizontal and vertical integration would mean limiting foreign investors from moving out and encouraging more local content indirectly. Hence, the government needs to emphasize on developing well-built regional cluster areas apart from Penang[7] and Klang Valley. However, this strong linkages can only be established when the foreign investors realize that local suppliers are capable of delivering and fulfilling their needs. A strong social capital e.g. trust should be fostered between foreign investors and the local suppliers. For example, the role of government and trust have enhanced the learning and innovation capabilities among the information hardware industries in Taiwan (Rasiah & Lin, 2005)

## 7. Conclusion

The contribution of FDI towards the progress of manufacturing sectors has been examined. The empirical investigation found that FDI has played an important role in stimulating the growth of the manufacturing sectors in Malaysia. In addition, the results showed that labor and technological progress has positively contributed to the growth. As a whole, since FDI have become increasingly important, the policy direction focusing on human capital, improving productivity and innovative capabilities of the manufacturing sectors and strengthening the supporting industries and institutions are proposed. This is turn will promote and make Malaysia as an attractive destination for FDI.

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**Notes**

Note 1. See Carkovic & Levine, 2002 for more details.

Note 2. China and India have leapt up the competitiveness ranking from 31 to 19 and 39 to 29, respectively (IMD, 2006).

Note 3. In 2001, innovation capability index of Malaysia (0.467) is still far below that of Singapore (0.748) and Thailand (0.488) (UNTAD, 2005).

Note 4. Level of technological commercialization is still low (5.1%) given the high R&D investment through IRPA grants.

Note 5. It is also true in the case of Singapore, where although cost of operation is relatively high compared to Malaysia, strong presence of knowledge workforce and high innovation capabilities managed to attract FDI.

Note 6. Strong local capabilities can also foster R&D centers to be located in Malaysia. Many of the products were exported to Singapore and re-imported into Malaysia due to lack of local supplier capabilities.

Note 7. Strong intermediary role of Penang Development Corporation has contributed to the synergies created in this cluster.

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Table 1. Phillip-Perron Tests

| | Log Levels | | Log differences | |
|---|---|---|---|---|
| | without trend | with trend | without trend | with trend |
| InVA | -1.6988 | -1.7274 | -4.7572* | -5.1634* |
| InK | -2.5697 | -0.7762 | -3.5856** | -4.5580* |
| InL | -1.7632 | -2.2808 | -6.0138* | -6.2306* |
| InFDI | -2.0305 | -2.4633 | -7.0446* | -7.2347* |

* and ** denotes significant level at 1% and 5% respectively. The optimal lag was chosen using the Newey-West automatic truncation lag (Newey and West (1994))

Table 2. Cointegration Test based on bounds test4

| | |
|---|---|
| Computed F Statistic (lag =2) | 12.742 |
| Upper Bound<br>Lower Bound | 4.329<br>3.189 |

5% critical value for upper (UCB) and lower bound (LCB) are based on Pesaran and Pesaran using unrestricted intercept and trend in the model

Table 3. Estimated Long Run Coefficients using the ARDL Approach

| Regressor | Coefficient | T-Ratio |
|---|---|---|
| InK | 0.11902 | 1.512 |
| InL | 0.90167 | 11.082* |
| InFDI | 0.08360 | 4.4968* |
| T | 0.04627 | 3.957* |

* significant at 1% level.

Table 4. Error Correction Representation for the Selected ARDL Model

| Regressor | Coefficient | T-Ratio |
|---|---|---|
| $\Delta$ $InVA_{t-1}$ | 0.18225 | 1.698 |
| $\Delta$ InK | 0.23415 | 1.839*** |
| $\Delta$ $InK_{t-1}$ | -0.33418 | -3.209* |
| $\Delta$ $InK_{t-2}$ | -0.56231 | -4.515* |
| $\Delta$ InL | 0.24874 | 2.9303* |
| $\Delta$ $InL_{t-1}$ | -0.50971 | -4.4097* |
| $\Delta$ $InL_{t-2}$ | -0.22989 | -2.8166** |
| $\Delta$ InFDI | 0.075919 | 4.7811* |
| $\Delta$ T | 0.042017 | 3.8191* |
| $Ecm_{t-1}$ | -0.90810 | -8.0746* |
| R-Squared | 0.93834 | |
| R-Bar-Squared | 0.89724 | |
| ecm = InVa -.111902*InK -.90167*InL -.08360*InFDI + 4.7499*C -.046269*T | | |

We followed Pesaran and Pesaran (1997) and applied the CUSUM and CUSUMSQ proposed by Brown et al (1975) to inspect the stability of the long run and short run coefficient. The line was within the 5% significant level, indicating no evidence of any structural instability. Plot of CUSUM and CUSUMSQ can be obtained from the author upon request.