Chapter 5: Results and Discussion

i.1 Introduction

The empirical results are presented with a discussion on the statistical significance of the regression coefficients, the reliability of the regression findings and its implications to the study.

5.2 ADF Test Results

Table 5: Unit Root Test on Time Series		
Time Series Variables	ADF Test Statistic	Order of Integration
G	-3.622324**	1
GL	-4.237713*	1
LNGX	-4.649593*	1
LNTTL	-5.277635*	1
LNPIY	-2.817473***	1
LNPIY1	-2.695611***	1
LNREXL	-2.955342***	1

* Reject hypothesis of a unit root at 99% level
**Reject hypothesis of a unit root at 95% level
*** Reject hypothesis of unit root at 90% level

Unit root test is run on all the variables. The results show that most of the variables are of order integration of 1. ADF statistic of GL, LNGX, LNTTL reject null hypothesis at 99% confidence level. The variable G rejects the null hypothesis at 95% confidence level while LNPIY, LNPIY1, LNREXL reject the null hypothesis at 90% confidence level. As explained in the previous chapter, the regression of one

nonstationary series with another nonstationary series will render the t and F test procedure invalid.

However, the linear combination of two random walk variables becomes stationary (Gujarati, 1995). For example, if Y is I(1) and another series X is I(1), they are cointegrated. Therefore, the regression maintains the long term relationship between the variables and avoids being "spurious". Nevertheless, a stationary test on regression residuals is still necessary in order to show that the regression conforms to a cointegrating regression.

5.3 Stationarity Test on Residuals

Since unit root tests show that most of the time series variables are I(1), the first order differences can be applied to all the equations unless there is evidence that the residuals from those equations are I(0) or stationary.

The stationarity test of the residuals yield the following results:

Table 6: Unit Root Test on Residuals		
Equation	ADF Test Statistic	Order of Integration
Manufacturing Output	-5.696259*	0
Export	-2.588037**	0
Import	-4.494567*	0
Employment	-2.532968**	0

where * reject the hypothesis of a unit root at 99% confidence level
   ** reject the hypothesis of a unit root at 95% confidence level

ADF statistic of the manufacturing output growth equation and the import equation reject the null hypothesis at the 99% confidence level, while the ADF statistic from the export and employment equations reject the null hypothesis at the 95% confidence level.

Based on the above results, the residuals of all the equations are I(0) or stationary. Hence, the OLS method may be applied to estimate these equations.

5.4   Manufacturing Output Growth Equation

Table 7: Results for Manufacturing Output Growth Equation

Variables	Coefficient	T-statistic
FDIY	-1.1010***	-1.610
	(0.6838)	
FDIY1	0.9017 ***	1.410
	(0.6396)	
PIY	-1.5534	-1.091
	(1.4236)	
PIY1	1.0448	0.708
	(1.4758)	
GL	0.8611 *	3.859
	(0.2231)	
GX	0.0033	0.018
	(0.1891)	

$R^2 = 0.68$

Note: * significant at 99% confidence level
   *** significant at 90% confidence level

FDIY   - Share of foreign direct investment in total manufacturing output
FDIY1 - Lagged FDIY
PIY   - Share of public investment in total manufacturing output
PIY1 - Lagged PIY
GL   - Growth rate of labour
GX   - Growth rate of exports

Brackets show standard errors

The manufacturing output growth equation was estimated using OLS method. From Table 7, the OLS procedure produced three significant coefficients out of six variables. The current FDI share to manufacturing output and the lagged FDI share to output have significant coefficients at 90% confidence level. Whereas the growth rate of labour exhibited a significant coefficient at 99% confidence level. The current FDI share to manufacturing output with a negative sign indicated that the impact of FDI seems to be cyclical. This implied that the flows of FDI would not have an immediate effect on the growth of manufacturing output but that the effect is delayed to the next period. This may due to the adaptation process of foreign companies to the local industry environment as well as the technological lag faced by the local industry partners, therefore manufacturing growth will only be affected by lagged FDI flows.

Another reason for the existence of the negative sign on the manufacturing output could lie in the manner in which data is collected and classified here. The study is based only on the data of manufacturing FDI in approved projects and this may underestimate the total amount of FDI in the country. Moreover, the reinvested profits which appears to be an important source of funds for foreign firms was not included in

the data. Such data collection shortcomings may affect the assessment of the impact of FDI on manufacturing growth.

Actually, the debate on whether foreign capital inflows significantly correlate with the growth in LDC countries still continues. According to Lall & Streeten (1977), the latest and comprehensive tests seem to show that growth resulted from the increase in domestic savings and aid, but not with the net inflow of foreign investment. In addition, what seems to be capable to explain the results of the study here is, the conclusion they made concerning the impact of foreign investment on growth: *the stock of foreign capital seems in general to exert a clear and significant negative impact on growth. Further interpretation is that foreign capital inflows generally help growth but that the structural effects of direct foreign investment tend to retard it* (Lall & Streeten, 1977).

The manufacturing growth will increase 0.9% when there is a 1% increase in the lagged FDI. The growth rate of labour in the manufacturing sector has a positive effect on manufacturing growth which is consistent with the theory. The manufacturing output will grow by 0.86% when there is a 1% increase in labour growth rate.

The coefficients of current public investment on fixed capital, the lagged public investment and the growth rate of export are insignificant. This implies that public investment and manufacturing export growth rate do not have significant impact on manufacturing output growth. The underlying reason for the insignificant role of

public investment in the growth of the manufacturing sector may be due to inefficiency and poor investments in some manufacturing projects. The sign of current public investment has a negative sign suggesting that private growth may be "crowded-out".

In terms of magnitude, lagged FDI has a larger effect on manufacturing growth than the growth rate of labour. This is given that the coefficient of lagged FDI is 0.90 compared to 0.86 for growth rate of labour. This implies that foreign direct investment lagged one period has a greater impact on manufacturing growth than the growth rate of labour. Therefore, although FDI does not produce an immediate effect on manufacturing growth, the cumulative stocks of FDI do play a significant role in affecting the output growth. Hence, policy makers should take into consideration effective ways to further attract inflows of FDI as well as the efficient use of these FDI stocks which are already present in the economy.

The R^2 of the manufacturing output growth equation is 0.68. The implication is that 68% of the variation in the output growth , G is explained by FDIY, FDIY1, PIY, PIY1, GL and GX.

5.5 Export Equation

Table 8 : Results for Export Equation

Variables	Coefficient	T-statistic
FDIY	1.3780* (0.5049)	2.729

REXL	0.02612	0.461
	(0.0570)	
IMY1	0.4815	0.893
	(0.5394)	

$R^2 = 0.35$

Where * Significant at 99% confidence level

FDIY - Share of foreign direct investment in total manufacturing output
REXL - Real exchange rate
IMY1 - Ratio of manufacturing imports to total manufacturing output lagged one period
Brackets show standard error

From the Table 8, FDI as a ratio to manufacturing output has a significant positive impact on export supply, expressed as the ratio of exports to output. Whereas, the other two variables do not have significant effects on exports although these two variables have theoretically consistent signs of coefficients. The exports of manufacturing sector will increase 1.4% when there is a 1% increase in the ratio of FDI to output. This is also consistent with the hypothesis that export oriented FDI would tend to increase exports of goods. This is also a general phenomenon observed in the participation of MNCs in international trade, where the frequent intra-firm trade among MNCs will boost both the imports and exports of host countries.

The real exchange rate (REXL) and the lagged ratio of imports to manufacturing output did not influence the export supply significantly although both coefficients are in accordance with the hypotheses mentioned previously. That is, both real exchange rate and imports as a ratio to output with one period lagged has a positive link with FDI. When comparing the coefficient magnitudes of each variable on exports,

it is noticed that FDI still has the greatest magnitude effect on exports with coefficient of 1.38 compared to 0.03 , 0.48 for REXL and IMY1 respectively. The implication drawn is that the FDI as an influence on exports remain large and significant compared with real exchange rate and imports. As we have mentioned earlier, that the intra-firm activities of MNCs and export-oriented type of most of the FDI were responsible for the result above.

The R^2 obtained from the export equation is relatively low, that is 0.35. This implies that only 35% of the variation of the dependent variable, ratio of real manufacturing export to manufacturing output is explained by the regressors : FDIY, REXL and IMY1. Although the fit is not entirely satisfactory, the equation manages to capture the key features and relationships earlier hypothesised.

5.6 Import Equation

Table 9 : Results for Import Equation		
Variables	Coefficient	T-Statistic
FDIY	0.6277 * (0.2348)	2.674
REXL	-0.0934* (0.0239)	-3.912
TTL	0.6161 ** (0.2488)	2.476
XY	0.1217 (0.1029)	1.183
IMY1	-0.0709 (0.2619)	-0.270
R^2 = 0.68		

Where * Significant at 99% confidence level

** Significant at 95% confidence level

FDIY - Share of foreign direct investment in total manufacturing output
REXL - Real exchange rate
TTL - Terms of trade
XY - Share of manufacturing exports in total manufacturing output
IMY1 - Ratio of manufacturing imports to total manufacturing output lagged one period

Brackets show standard error

Table 9 shows the results of the Import equation. The regression produced three significant coefficients out of five variables. The three significant coefficients belong to the share of FDI to manufacturing output(FDIY), real exchange rate (REXL) and terms of trade(TTL). The imports of manufacturing expressed as the ratio of imports to manufacturing output will increase 0.6% when there is a 1% increase in the share of FDI to manufacturing output. This supports the hypothesis discussed earlier that an inflow of FDI would directly stimulate imports. This is because inflows of FDI is often accompanied with an increase in the import of raw materials and capital equipment that would otherwise not have taken place.

An increase of 1% in real exchange rate will tend to decrease the volume of imports by 0.09%. Depreciation of the real exchange rate will cause the import price to rise relative to local prices. As a consequence, the volume of imports decreases. Terms of trade (TTL) yield a positive impact on imports of manufacturing goods. With a 1 % improvement in the terms of trade, imports will increase by 0.6%. This is due to the reason that with an improvement in the terms of trade, the export earned revenue will be used to increase the volume of imports. The ratio of the export to manufacturing output and the lagged import to manufacturing output did not yield significant results.

This seems to implicate that current imports were not affected by either exports or lagged imports.

In terms of contribution of independent variables on dependent variable, imports as a ratio to output (IMY), we found that FDI as a share to output has the greatest magnitude effect on imports which registered coefficient of 0.63 compared with 0.09, 0.62, 0.12 and 0.07 for REXL, TTL, XY and IMY1 respectively. This is consistent with the hypothesis that FDI would increase the import dependency of host countries and may deteriorate the balance of payment deficits of the recipient country. This is attributable to the increase imports of intermediate goods such as capital equipment by MNCs given that Malaysia local industries are incapable to fulfil the requirement of MNCs, in terms of quality as well as quantity. However, to what extent that FDI would affect the balance of payment of one country depends on the magnitude effects of FDI on both imports and exports. In the summary section, we will try to make a comparison of the impacts of FDI on both imports and exports.

The R^2 obtained from the regression is 0.68, which represents a better fit compared with the export equation. This indicates that the sample regression fits the data fairly well where 68% of the variation in the IMY can be explained by the regressors: FDIY, REXL, TTL, XY and IMY1.

5.7   Employment Equation

Table 10 : Results for Employment Equation

Variables	Coefficients	T-statistic
LNW	-0.6667* (0.062)	-10.749
LNFDI1	0.0253#	1.022
$R^2 = 0.97$		

*Significant at 99% confidence level
Insignificant

LNW   - Log real wages
LNFDI1   - Log foreign direct investment lagged one period

The long run equation derived from estimates of Table 10 is:

$$Ln\ L = LnQ + 7.74 - 0.67 lnW - 0.33\ (0.025 lnFDI1)$$

Estimates for the production function's elasticity of substitution is $\sigma = 0.67$ and the coefficient of the productivity term is $\lambda_{FDI} = 0.025$. The signs of the coefficients for both wages and FDI are consistent with the hypotheses discussed in the preceding chapters. That is, real wages have a negative link with labour demand whereas FDI is positively linked to labour demand. The increase of real wages will increase the cost of labour in the labour market, therefore decrease the demand for labour by employers in the manufacturing sector. The inflows of FDI theoretically will increase the employment in the sector given the increase in the numbers of foreign affiliates and factories in the country.

However, the test statistic fails to prove that the FDI has a significant impact on technical progress as well as the labour demand in the manufacturing sector. One of the reasons is that FDI is mostly involved in high technology focused industries such as electrical and semiconductor industries compared with labour intensive industries such as textiles or food industries. Therefore, it is not surprising that FDI has no significant impact on employment demand in the country. As λ_{FDI} also indicates the impact of FDI on total factor productivity (TFP) (Dees, 1998) which is a measure of the role of FDI in the technology progress, the conclusion we can make is FDI does not play a significant role in the technology progress in this country.

In terms of magnitude, it is noticed that wages have a greater magnitude effect than lagged FDI. When there is a 1% increase in the real wages, labour demand will decrease by 0.67%. In comparison, for FDI, as λ_{FDI} is 0.025, this implies that in absolute term, when lagged FDI increase 1%, employment demand (L) will increase by 0.03%.

Table 11 : White's Heteroscedasticity Test

Equations	White's Test(R^2)	Heteroscedasticity
Output Growth equation	14.69	non- existence
Export equation	7.25	non-existence
Import equation	9.56	non-existence
Employment equation	8.74	non-existence

To check if there is a heteroscedasticity problem, White's test is applied to all the equations. The R^2s obtained from the White's test are multiplied by the size of the sample. The figures are then compared to the Chi-Square values obtained from the Chi-Square (χ^2) table. We reject the H_0 of homoscesdasticity if $nR^2 > \chi^2_{0.01; P}$ where p is the degree of freedom of each equation. Table 11 shows the calculated nR^2 and when compared to the Chi-square(χ^2) values for each equation, all the values are smaller than 26.22, 16.81, 23.21 and 13.28 respectively. Therefore, we cannot reject the null hypothesis of homoscesdasticity and the problem of heteroscesdasticity does not exist in all the equations.

5.8   Summary of Findings

Table 12: Summary of Findings of the Impact of FDI	
Equations	**Coefficient of FDIY**
Manufacturing Growth Equation	-1.1010***(FDIY)
	0.9017***(FDIY1)
Export Equation	1.3780*
Import Equation	0.6277*
Employment Equation	0.0253# (lnFDI1)

Where * Significant at 99% confidence level

'*Significant at 90% confidence level

#Insignificant

Table 12 shows the summary of the findings from the empirical analysis. The flows of FDI generate impact which varies from 0.03% to 1.38% depending on the models of equation. From the Table 12, the employment generation is the least responsive to FDI, indicating that FDI has negligible impact on employment generation in the manufacturing sector. The insignificance could be due to relatively high capital intensity in the manufacturing sector which was satisfied only through the imports of machinery. Therefore, the stock of FDI (LNFDI1) has no significant effect on employment volume in the sector. Consequently, demand for labour resulting from the increase of production productivity was not significantly altered.

The highly technical operations in FDI is one of the factors that deters the significant increase in employment demand. This is the case when only skilled workers are highly demanded, where they represented only a small proportion of workers out of our unemployment pool. Since employment generation is an important component in the output growth of manufacturing sector, indirectly this implies that FDI does not have as strong an effect on the growth of manufacturing sector as expected.

In comparisons, exports and imports of manufacturing sector are affected by FDI more significantly than employment. Between the two, the share of FDI to manufacturing output has a greater impact on manufacturing exports than manufacturing imports. This supports the hypothesis that export – oriented FDI tends to be pro-export. The significant impact of FDI on exports and imports also supports the view that international trade and FDI have become closely inter-linked (World Investment Report,

1992). Therefore, the role of FDI in the growth of manufacturing sector through international trade is obvious. However, the balance of payment effect as a result of the increase in both exports and imports is not negligible since this will affect the foreign reserves of the country and the ability of the government to finance country development projects.

Compared with the exports and imports, the impact of FDI on manufacturing output growth is indirect. This is showed by the manufacturing growth equation results, the current FDI flows generate a negative impact on output growth. The positive effect only reflected in the lagged FDI flows. This suggests that perhaps FDI is not as critical as previously believed in increasing output growth. Another possibility is that the effect of FDI is slow, given the time lag between investment and production. It takes, on the average, 12-18 months before an FDI project can materialise and 24-30 months before it can operate at full capacity (Ariff & Yokohama, 1992).

The results also suggest that although theoretically FDI contributes to capital formation in the host countries which is a determinant of economic growth, the quality of FDI and the presence of other determinants of growth as well as non-economic factors such as the political and cultural framework within which economic elements operate are not less important. The qualitative features of FDI refer to the efficiency of investment and also the linkage effects of FDI on local industry.

Based on the employment equation, it shows that the impact of FDI on workforce is insignificant (indicated by the coefficient of LNFDI1). Rather, the impact of FDI on manufacturing growth was established through the expansionary impact of FDI on exports and probably private investment (based on the high ratio of FDI over private investment) and through this, on the level of output as showed in the results.

The linkage effects established by Multinational Corporations (MNCs) are important for technology transfer, development of human resource and foreign trade (World Investment Report, 1992). Based on the relatively small effect of FDI on output growth, we have reason to believe that the linkage effects established by MNCs or FDI in Malaysia is not strong. This is supported by 1992 World Investment Report which stated that the observed few local linkages in Malaysia is attribute to the absence of a strong entrepreneurial class and the concentration on export-oriented FDI within free trade zones (World Investment Report, 1992).

5.9 Policy Implications

With respect to the insignificant impact of FDI on manufacturing growth, active promotion policies should be adopted in order to increase the viability of investment environment in the country. In this sense, relaxing certain foreign investment constraints with respect to repatriation of profits is worth considering. There is no zero-sum game in the case of foreign investment, as host countries are expecting benefits from

foreign direct investment, so too, do foreign investors expect to gain profits from their investment. In addition to this, a review of current investment incentives is deemed necessary in order to capture the effects of these incentives on FDI flows.

Malaysia offers a wide range of investment incentives including tax holidays, investment tax allowance, reinvestment allowance and a variety of export incentives. " Some of the incentives might have been necessary at the beginning stage of industrialisation drive such as export incentives, but the rationale for their continued existence needs to be re-examined" [1]. In this regard, it is important to take into account the revenue forgone and balance of payment constraint resulted from the implementation of inappropriate investment incentives. The FDI flows is attracted by other factors as well beside tax incentives. Factors such as political stability, sound macroeconomic management track record, policy consistency and institutional and physical infrastructure are crucial to attract foreign investors. Investment incentives which are based on performance of investment projects rather than the size of capital per se seem to be more relevant to economic development of Malaysia. The performance criteria may include the growth of output, the ratio of exports to output, employment generation, R&D expenditures, investment in human capital, technology transfers, and domestic content (Ariff & Yokohama, 1992).

As an effort to decrease the imports and increase the exports by foreign affiliates and reduce the balance of payment deficits, strategies to strengthen the linkages

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[1] Ariff, M & Yokohama, H (eds), 1992, *Foreign Direct Investment in Malaysia*, Tokyo: Institute of Developing Economies, p.21.

between MNCs and local enterprises should be implemented. The study has already revealed that the linkages effect of FDI is not significant, therefore there is an urgent need to establish the linkages between Multinational Corporations and local small and medium industries (SMI). Policies can support and strengthen this linkage, especially those policies that support and encourage local enterpreneurship. This is intended to build a relative strong local supplier industry network which is capable of meeting the requirement in terms of input procurement of the MNCs, especially in terms of high-tech inputs and intermediate goods and also the supply of producer services. These could include a reduction in red-tape on new business or industry formation, provide business and industrial training to potential new business entrants and employees in small and medium-size enterprises and establishment of programmes to encourage MNCs to purchase locally.

Another urgent task that should be played by government authority is to encourage the establishments of intermediate goods industries through appropriate investment incentives. This is a necessary move in the light of the shortage of intermediate goods supplies, especially in order to fulfil the requirement of MNCs. This would also help to reduce the dependency of MNCs on the imports of intermediate goods and thus increase foreign reserves of our country.

Realising that the impact of FDI on employment demand is less than as expected, policies focusing on training of local workers and narrowing the technological gap in order to fulfil the requirement of MNCs should be adopted. The training

programmes should be relevant to the industry environment. The collaboration of both sides (MNCs and government) to provide training for local workers needs to be encouraged as well.

5.10 Conclusion

The stationarity test on residuals of all the equations are of order integration of 0 or stationary. Therefore OLS method still can be applied in these equations. The empirical results show that FDI generate positive and significant impact on manufacturing exports and imports. However, the impact of FDI on manufacturing output growth is not as critical and direct as expected since the effect can only be felt in the next period of output production. Whereas, the impact of FDI on employment generation is insignificant.

A relative high capital intensity FDI is suggested to be responsible to the insignificant impact of FDI on employment generation. The slow adaptation process of FDI projects, the data collection shortcomings and also the existence of other non-economic factors are the possible reasons for the less than critical impact of FDI on manufacturing output growth. The highly significant impact of FDI on both exports and imports suggested that FDI not only helped to boost the exports of the manufacturing sector, it increased the imports of this sector as well. Thus, in the policy implications section, it is suggested that in order to reduce import dependency of the sector, policy to

strengthen the linkages between local intermediate inputs suppliers and MNCs should be adopted. A review of current incentives is deemed timely in order to attract the flows of FDI effectively. Finally, it is suggested to upgrade the human resource standard for the intention to meet the requirement of MNCs as well as to increase the numbers of employees employed by them. This is timely in view of the competitive efforts showed by the other Asia countries in attracting FDI such as China.