FOREIGN DIRECT INVESTMENT IN MANUFACTURING INDUSTRY OF MALAYSIA: AN EMPIRICAL STUDY

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ABSTRACT

Malaysia received substantial amounts of foreign direct investment (FDI) in its manufacturing industry over the past decades. The main aim of this study is to investigate the location-related determinants of FDI in the manufacturing industry of Malaysia. Generally, the results, obtained by using the ordinary least squares (OLS) and instrumental variable (IV) methods show education and infrastructure to have a significant positive impact on FDI. There is no strong evidence to suggest that market size or current account balance have a significant positive impact on FDI. There is some evidence that inflation is found to have a significant negative impact on FDI. The wage costs, interest rate and exchange rate are found to have a negative impact on FDI but are statistically insignificant.

KEYWORDS: Foreign Direct Investment; Malaysia; Location-Related; Manufacturing Industry;

INTRODUCTION

Research on foreign direct investment (FDI) is one of the most intensive areas of international economics in the last decade (Pan, 2003). Although there is a number of research on the determinants of FDI, the empirical study on FDI in developing countries, such as Malaysia is relatively scarce. Malaysia has received substantial amounts of FDI in its manufacturing industry over the past decades. In the 1978-1979 period, the average FDI in approved projects was Malaysian Ringgit (RM) 336.7 million. The average FDI in approved projects increased remarkably to RM1,697.3 million in the 1980-1989 period and RM13,309.3 in the 1990-1999 period. In the year 2000, FDI in approved projects was RM19,848.5 million. FDI in Malaysia was not much affected during the Asian financial crisis, 1997-1998. In the year 1996, FDI was RM31,081 million and increased to RM36,093 million in the year 1997. In the year 1998, FDI was RM32,471 million. In short, FDI in Malaysia was rather stable during the crisis. On the other hand, other forms of foreign investment, such as portfolio investment and foreign loan decreased significantly during the crisis (BNM, 2002). Thus, the crisis has indicated to us the importance of the role of FDI to the economy. FDI is different from other major forms of foreign investment in that it is motivated largely by the long term prospects of making profits in production activities that investors directly control. Generally, FDI has played an important role in the development of the manufacturing industry of Malaysia.

The manufacturing industry is an important engine of economic growth to the Malaysian economy. In the year 1987, it contributed to 19.8 per cent of gross domestic product (GDP). The contribution of the manufacturing industry to GDP increased to 24.6 per cent in the year 1990. In the year 2000, 33.4 per cent of GDP came from the manufacturing industry. The manufacturing industry also has contributed significantly to Malaysian exports. In the year 1987, manufactured exports, that is, exports of manufactured goods, machinery and transport equipment and miscellaneous manufactured articles contributed to 39.9 per cent of total exports. The contribution of manufactured exports to total exports increased to 53.6 per cent in the year 1990. In the year 2000, 77.4 per cent of total exports was manufactured (MOF, various issues). Today, Malaysia is one of the largest exporters of semiconductor devices, namely electrical goods and appliances. Furthermore, the manufacturing industry in Malaysia has generated a significant amount of employment to

the economy. In the year 1987, the manufacturing industry contributed to 15.5 per cent of total employment (928.9 thousands) in Malaysia and this increased to 19.9 per cent (1332.8 thousands) in the year 1990. In the year 2000, 22.8 per cent of total employment (2125.8 thousands) was contributed by manufacturing industry (MOF, various issues). The manufacturing industry is also an important source of technology transfer and foreign exchange earning to the country. In short, the manufacturing industry plays a pivotal role for the transformation and development of economy in the country.

Despite the importance of FDI to the manufacturing industry of Malaysia, there has been little empirical work on the determinants of FDI. Moreover, most of previous studies in the literature of the determinants of FDI were investigated using cross-sectional or panel data. The use of time series data for a single country offers an alternative approach to capture the relationship between FDI and its determinants (Erdal & Tatoglu, 2002). The determinants of FDI might change over time (Dunning, 1993). Identifying a set of factors that might enhance attractiveness of a country as a location for FDI is important for policy makers. The main aim of this study is to investigate the location-related determinants of FDI in the manufacturing industry of Malaysia over a period from 1980 to 2000.

This study is organised as follows: Section 2 presents FDI in Malaysia. Section 3 discusses the location-related determinants of FDI. Section 4 outlines the methodology and data. Section 5 presents the empirical results and discussions. The last section provides some concluding remarks of this study.

FOREIGN DIRECT INVESTMENT IN MALAYSIA

Malaysia received substantial amounts of FDI over the past decades. The average FDI in Malaysia over the period from 1985 to 1995 was US dollar 2.9 billion, which is higher than other ASEAN-4 countries, namely Thailand, Indonesia and the Philippines. The average FDI in Thailand, Indonesia and the Philippines over a period from 1985 to 1995 was 1.4, 1.4 and 0.7 billions of US dollar, respectively. Generally, FDI in Malaysia over the period from 1997 to 2000 were also higher than other ASEAN-4 countries, except the years 1998 and 1999, FDI in Malaysia were lower than FDI in Thailand. FDI in Malaysia in the year 1997 was US dollar 6.5 billions and US dollar 5.5 billions in the year 2000 (UNCTAD, 2001). In short, Malaysia is one of the successful stories in attracting FDI in ASEAN-4 countries.

FDI has contributed to high percentages of gross fixed capital formation in Malaysia. The contribution of FDI in gross fixed capital formation was 15.1 per cent in the year 1997, 13.9 per cent in the year 1998 and 20.1 per cent in the year 1999. The stock of FDI in Malaysia has also increased over time. In the year 1985, the stock of FDI in Malaysia was US dollar 7.4 billion. The amount increased to US dollar 10.3 billions in the year 1990 and US dollar 54.3 billions in the year 2000. Moreover, FDI has contributed to a high portion of GDP in Malaysia. The stock of FDI as a percentage of GDP in the year 1985 was 23.7 per cent. The stock of FDI over GDP rose from 24.1 per cent in the year 1990 to 65.3 per cent in the year 1999 (UNCTAD, 2001). Generally, FDI plays an important role in the Malaysian economy.

The main sources of FDI in the manufacturing industry of Malaysia have changed over time. In the 1978-1979 period, Japan, the United Kingdom (UK) and the United States (US) were the main sources of FDI in manufacturing industry of Malaysia, which accounted 51.5 per cent of total FDI in manufacturing industry of Malaysia. In the 1980s, Japan was the most important source of FDI while Singapore was the second and the UK and the US were third and fourth, respectively. In the early 1990s, Taiwan became the most important source of FDI in Malaysia. Nevertheless, FDI from the US and Japan were also important. In the middle of the 1990s until 2000, the US was the most important source of FDI. This is followed by Japan and Singapore. On the whole, the US, Japan and Singapore are the important sources of FDI (MOF, various issues).

In the 1978-1979 period, FDI in manufacturing the industry of Malaysia was mainly in the sectors of electrical and electronic, petroleum, and food, which accounted 78.3 per cent of total FDI in manufacturing industry of Malaysia. In the 1980s, FDI was mainly in sectors, such as electrical and electronic, chemical and non-metallic. In the 1990s, electrical and electronic, petroleum and chemical were the most important sectors for

FDI. In the year 2000, electrical and petroleum were the main sectors to attract FDI. Generally, FDI in the manufacturing industry of Malaysia was mainly in electrical and electronic, petroleum and chemical (MOF, various issues). One of the main reasons why that Malaysia is a hub of electrical and electronic manufacturing is the existence of pool of well trained and disciplined labour force with relatively low wage. Furthermore, Malaysia has been given incentives (fiscal and monetary) and equipped necessary infrastructures for the need of investment. The appreciation of the Japanese Yen, trade friction of Japan and Asian newly industrialised economies (NIEs) with the US and European Union countries and the increasing wage rates in Japan and Asian NIEs in the middle of the 1980s, amongst others, have contributed to a massive relocation of labour-intensive industries, particularly electrical and electronic industry from Japan and Asian NIEs to Malaysia (Chung-Sok & Jung Soo, 1998). FDI in Malaysia increased its exports and assisted the transformation of the economy from a commodity based to a manufacturing based and contributed to economic growth and development.

THE LOCATION-RELATED DETERMINANTS OF FOREIGN DIRECT INVESTMENT

Dunning (1993) argued that location is one of the important factors for attracting FDI. The literature of the location-related determinants of FDI proposes a few important factors that affect FDI, such as the wage costs, interest rate, infrastructure, human capital, exchange rate and market size. Some of the factors are likely to affect all types of FDI. Nevertheless, the different strategic objectives implicit in vertical FDI and horizontal FDI suggest that some factors might affect one type of FDI more than the other (Ewe-Ghee, 2001).

The lower the factor costs of production, the more attractive they are to FDI. Therefore, the higher the wage costs is likely to defer FDI and the relationship between FDI and the wage costs is expected to be negative. Cheng and Kwan (2000) found the real wage costs have a significant negative impact on FDI in China.

Interest rate is a measure of the cost of capital. A higher interest rate implies a more costly investment and therefore, a higher interest rate is likely to defer FDI and the relationship between FDI and the interest rate is expected to be negative (Erdal & Tatoglu, 2002; Love & Lage-Hidalgo, 2000).

The better the infrastructure of the host country, the more attractive it is to FDI. A good infrastructure will facilitate activities of production and also the distribution of output. Therefore, the relationship between FDI and better infrastructure is expected to be positive. Most of the empirical studies concluded that their infrastructure proxy (or proxies) has a significant positive impact on FDI (Billington, 1999; Cheng & Kwan, 2000).

The better the human capital, the more attractive it is to FDI. The hypothesis that the human capital in the host country is a determinant of FDI in developing countries has been embodied in theoretical literature (Dunning, 1993; Lucas, 1990; Zhang & Markusen, 1999). Therefore, the relationship between FDI and better the human capital is expected to be positive.

Exchange rate movements can influence FDI by affecting the currency cost of acquiring an asset abroad (Froot & Stein, 1991). For example, a decrease in domestic currency value against foreign currency value or depreciation of domestic exchange rate will make it less expensive for a foreign investor to invest in the domestic country as the cost of acquiring asset becomes cheaper. Thus, depreciation of exchange rate of a country will make inflows of FDI in that country rise (Erdal & Tatoglu, 2002; Kerr & Peter, 2001; Love & Lage-Hidalgo, 2000).

Generally, the larger the market size of the host country, the more attractive it is to FDI. A large market size is conducive to increase in demand for the products and services. Moreover, a large market size allows the achievement of economies of scale (Caves, 1971; Erdal & Tatoglu, 2002). Most studies in the literature suggest that the market size, expressed by real GDP or GDP per capita is found mostly to have a significant positive impact on FDI (Billington, 1999; Cheng & Kwan, 2000).

Most studies in the literature of the determinants of FDI are investigated using cross-sectional or panel data. Nevertheless, there are some studies that are investigated using time-series data, such as Yang, Groenewold and Tcha (2000), Love and Lage-Hidalgo (2000), Kerr and Peter (2001) and Erdal and Tatoglu (2002), amongst others.

METHODOLOGY AND DATA

The discussion of the location-related determinants of FDI in the previous section suggests that FDI could be estimated as:[1]

$$\Delta \ln FDI_t = \beta_{10} + \beta_{11} \Delta \ln C_t + \beta_{12} \Delta \ln INFRA_t + \beta_{13} \Delta \ln EDU_t + \beta_{14} \Delta \ln ER_t + \beta_{15} \Delta \ln GNI_t + u_{1,t} \quad (1)$$

where Δ is the first difference operator; ln is logarithm; FDI_t is foreign direct investment; C_t is cost of production in the host country; $INFRA_t$ is the infrastructure; EDU_t is the education, a proxy for human capital; ER_t is the exchange rate; GNI_t is the market size and $u_{1,t}$ is a disturbance term. There are three measures of the cost of production in the host country to be considered in this study, that is the wage costs (W_t), interest rate (R_t) and inflation (INF_t). More specifically, there are four models to be estimated:[2]

$$\Delta \ln FDI_t = \beta_{20} + \beta_{21} \Delta \ln W_t + \beta_{22} \Delta \ln INFRA_t + \beta_{23} \Delta \ln EDU_t + \beta_{24} \Delta \ln ER_t + \beta_{25} \Delta \ln GNI_t + u_{2,t} \quad (1a)$$

$$\Delta \ln FDI_t = \beta_{30} + \beta_{31} \Delta \ln W_t + \beta_{32} \Delta R_t + \beta_{33} \Delta \ln INFRA_t + \beta_{34} \Delta \ln EDU_t + \beta_{35} \Delta \ln ER_t + \beta_{36} \Delta \ln GNI_t + u_{3,t} \quad (1b)$$

$$\Delta \ln FDI_t = \beta_{40} + \beta_{41} \Delta \ln W_t + \beta_{42} \Delta R_t + \beta_{43} \Delta \ln INF_t + \beta_{44} \Delta \ln INFRA_t + \beta_{45} \Delta \ln EDU_t + \beta_{46} \Delta CA_t + \beta_{47} \Delta GNI_t + u_{4,t} \quad (1c)$$

$$\Delta \ln FDI_t = \beta_{50} + \beta_{51} \Delta \ln INF_t + \beta_{52} \Delta \ln INFRA_t + \beta_{53} \Delta \ln EDU_t + \beta_{54} \Delta CA_t + \beta_{55} \Delta \ln GNI_t + u_{5,t} \quad (1d)$$

where CA_t is current account balance and $u_{2,t}$, $u_{3,t}$, $u_{4,t}$ and $u_{5,t}$ are a disturbance term, respectively. The above models are named as Model 1, Model 2, Model 3 and Model 4, respectively. Model 2 is the same as Model 1, except it includes an additional explanatory variable, that is, interest rate. Model 3 is the same as Model 2, except includes inflation as additional variable and also current account balance is used to replace exchange rate in the estimation. Model 4 is the same as Model 3, except it excludes wage costs and interest rate in the estimation. The discussion of the location-related determinants of FDI suggests that $INFRA_t$, EDU_t and GNI_t are expected to have a positive impact on FDI_t. On the other hand, W_t, R_t, INF_t and ER_t are expected to have a negative impact on FDI_t. CA_t is expected to have a positive impact on FDI_t since an increase in current account balance is usually viewed as an indication of a more healthy economy, therefore encouraging more FDI.

The sample period of this study is from 1980 to 2000. All variables, except the interest rate is expressed in logarithm. All the data were obtained from MOF (various issues), except where noted. FDI_t is foreign direct investment, expressed as the amount of foreign investment in approved projects in manufacturing industry divided by the GDP deflator (1995 = 100). In other words, this study examines inflows of FDI from all countries in manufacturing industry of Malaysia. The GDP deflator was obtained from *International Financial Statistics*, International Monetary Fund (IMF). W_t is the wage costs, expressed as salaries and wages paid per employment of manufacturing industry divided by the GDP deflator. R_t is the interest rate, expressed as the average of commercial banks' based lending rate divided by the GDP deflator. INF_t is the inflation,

[1]This study estimates the determinants of total FDI in manufacturing industry of Malaysia. The model is expressed in the level form. Billington (1999) and Li and Liu (2004), amongst others, estimated the FDI models, which are in the level form.
[2]One purpose of estimating a set of regressions is to examine the consistency of coefficients estimated.

expressed as annual rate of inflation, which is calculated from consumer price index (1995 = 100) (IMF).[3] $INFRA_t$ is the infrastructure, expressed as total road in Malaysia (thousand kilometre). EDU_t is the education, a proxy for human capital, expressed as the ratio of total Malaysian federal government education development expenditure to its GDP.[4,5] ER_t is the exchange rate, expressed as real effective exchange rate (1995 = 100) (IMF).[6] CA_t is current account balance (RM millions) (IMF). GNI_t is the market size, expressed as nominal gross national income divided by the GDP deflator.[7,8]

THE RESULTS AND DISCUSSIONS

The market size might also be influenced by FDI and therefore, it is not an exogenous variable.[9] Thus, the estimation by using the ordinary least squares (OLS) method is biased and inconsistent. Thereby, the estimation shall be carried-out by using the instrumental variable (IV) method. In this study, the instruments for the market size are growth rates of the employment and real gross fixed capital formation. The results of the OLS and IV methods are reported in Table 1. On the whole, the results of the OLS and IV methods show that the education is found to affect FDI positively and is statistically significant. Thus, a higher level of education is expected to attract more FDI. Cheng and Kwan (2000), Noorbakhsh, Paloni and Youssef. (2001), amongst others, also found the importance of the education in attracting FDI. Infrastructure is also found to have a positive impact on FDI and is statistically significant. Therefore, the better the infrastructure of the host country, the more attractive it is to FDI.

Wage costs, interest rate, inflation and exchange rate are all found to have a negative impact on FDI, but are statistically insignificant. The market size and current account balance are found to have a positive impact on FDI but are statistically insignificant. Erdal and Tatoglu (2002) also found the insignificance of market size in their study. The insignificance of market size might partly be because FDI in manufacturing industry of Malaysia is mainly for the purpose of exporting or vertical type in nature. A big portion of FDI in manufacturing industry of Malaysia is concentrated in the area which is called free trade zone. Firms in the zone produce mainly for export. On the other hand, inflows of FDI in China and other emerging economies are mainly for the purpose of capturing the domestic market (Cheng & Kwan, 2000; Li & Liu, 2004). On the whole, the results suggest that the education is the most important determinant of FDI in manufacturing industry of Malaysia. The wage and material costs make up a smaller component of total costs, while the availability of skilled manpowers and good communication facilities is more relevant (Dunning, 1993: 144). Generally, the results of the four estimated models show that using the inflation as a proxy of the cost of production in the host country out performs the wage costs and interest rate. Moreover, the use of current account balance instead of exchange rate produces a better goodness of fit for the estimated model. Thus, Model 4 is the best model.

In the 1980s and 1990s, Malaysia actively promoted export-orientation policy with the main aim of increasing exports and promoting economic growth. Malaysia, amongst others, improved the infrastructure, with the aim to attract FDI. Furthermore, the availability of a pool of relatively cheap and well trained labour attracted FDI, particularly for the type of labour intensive industries such as electrical and electronic. The tight labour market in the 1990s and the rise of countries relatively rich endowment with labour such as China and Vietnam and globalisation, the focus of attracting FDI in Malaysia shall be shifted to FDI in high value-added

[3]Inflation is computed from IMF data as they are in the same base year as other data used in this study (1995 = 100).
[4]Significant financial resources are required for high-quality education at high enrolment rates. However, high spending is not necessarily a sign of either a high level or a significant rise in human capital (Beraheim, 2005).
[5]The higher the ratio, the more resources are allocated to develop more and better facilities of education, which could be implied that more and better human capital can be produced.
[6]Real effective exchange rate is obtained directly from *International Financial Statistics*, IMF.
[7]The correlation between the GDP deflator and consumer price index in Malaysia is high. For the 1970-2000 period, the Pearson correlation of the GDP deflator (1995 = 100) and consumer price index (1995 = 100) in Malaysia was 0.99 (IMF). Thus, the two series were almost moving in the same direction.
[8]The trends of GDP and GNI are about the same for the case of Malaysia.
[9]Li and Liu (2004: 394) examined the determinants of FDI using panel data over the period from 1970 to 1999 and reported that endogeneity of FDI is not detected in either the first half or whole sample period, but occurs in the second half. FDI and economic growth are interdetermined in relatively recent year.

activities, including industries in high technology, research and development (R&D) and knowledge-intensive.

In order to attract FDI in high value-added activities, it is no longer sufficient for the host country to have a single location-related determinant. FDI in high value-added activities seek not only cost reduction and bigger market shares, but also seek to technology and innovative capacity. These resources, as distinct from natural resources are human made. Thus, human capital is an important factor to attract FDI in a globalising world economy. Countries to have a pool of human capital become more attractive to FDI. Malaysia is upgrading its human capital for the need of national development in order to achieve the status of a developed country by the year 2020 with the vision, which is called Vision 2020. The move to upgrading human capital is also for the purpose of maintaining Malaysia as a hub for FDI in this region. Moreover, other factors which are important to attract FDI are such as clustering of economic activity, infrastructure facilities, access to regional market and competitive pricing of relevant resources and facilities.[10] The successful story of Malaysia in attracting FDI could be an example for other developing countries.

CONCLUDING REMARKS

The main aim of this study is to investigate the location-related determinants of FDI in manufacturing industry of Malaysia using time series data. This study estimates four models using the OLS and IV methods. Generally, the results show that good education and infrastructure attract FDI positively. The larger the market size and positive current account balance are expected to attract FDI positively. On the other hand, an increase in wage costs, interest rate, inflation and exchange rate discourages FDI. The results in this study confirm the many determinants of FDI in developing countries. More specifically, the determinants are infrastructure and education.

[10]Transparency and anti corruption, which are not discussed in this study, are potentially important in attracting inflows of FDI in a country.

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Table 1

The Results of the OLS and IV Methods

Model	1	1#	2	2#
constant	-0.310	-0.373	-0.081	-0.111
	(-1.008)	(-1.046)	(-0.247)	(-0.301)
Δ ln W_t	-0.616	-0.433	-	-
	(-0.261)	(-0.179)		
Δ R_t	-0.022	-0.025	-	-
	(-0.288)	(-0.327)		
Δ ln CPI_t	-	-	-6.787	-6.623
			(-1.129)	(-1.089)
Δ ln $INFRA_t$	2.771	2.685	3.383	3.314
	(1.703)	(1.629)	(2.118)*	(2.015)
Δ ln EDU_t	0.987	0.981	1.088	1.090
	(2.042)*	(2.026)*	(2.498)*	(2.499)*
Δ ln ER_t	-2.786	-3.152	-2.239	-2.404
	(-1.187)	(-1.225)	(-1.092)	(-1.068)
Δ ln GNI_t	5.135	6.008	4.473	4.873
	(1.419)	(1.367)	(1.389)	(1.240)
Adj. R^2	0.330	-	0.422	-
Adj. GR^2	-	0.323	-	0.406
LM	0.197	0.263	1.559	1.674
Reset	4.200*	4.203*	2.413	2.060
Normal	2.567	3.180	1.333	1.554
Hetero	0.266	0.447	0.374	0.444
Sargan	-	1.377	-	1.503

Model	3	3#	4	4#
constant	-0.065	-0.293	-0.070	-0.246
	(-0.191)	(-0.686)	(-0.251)	(-0.740)
Δ ln W_t	0.758	1.706	-	-
	(0.305)	(0.617)		
Δ R_t	0.028	0.024	-	-
	(0.352)	(0.285)		
Δ ln CPI_t	-13.477	-15.722	-11.465	-12.552
	(-1.810)	(-1.950)	(-2.095)	(-2.193)*
Δ ln $INFRA_t$	4.812	5.234	4.598	4.721
	(2.785)*	(2.840)*	(3.187)**	(3.173)**
Δ ln EDU_t	1.414	1.538	1.364	1.494
	(2.964)*	(3.012)**	(3.196)**	(3.274)**
Δ CA_t	0.002	0.003	0.002	0.003
	(1.372)	(1.625)	(1.513)	(1.797)
Δ ln GNI_t	6.631	10.499	6.230	9.412
	(1.567)	(1.747)	(1.746)	(1.967)
Adj. R^2	0.382	-	0.461	-
Adj. GR^2	-	0.423	-	0.501
LM	0.004	0.042	0.005	0.032
Reset	0.643	0.040	0.407	0.096
Normal	0.755	0.360	1.768	2.024
Hetero	0.798	0.998	0.693	0.772
Sargan	-	0.004	-	0.003

Notes: Adj. R^2 is the adjusted R^2. Adj. GR^2 is the adjusted generalised R^2. LM is the Lagrange Multiplier test of residual serial correlation. Reset is the test of functional form. Normal is the test of the normality of residual. Hetero is test of

heteroscedasticity. Sargan is the test of the validity of the instruments. # denotes the IV method. ** Denotes significance at the 1% level. * Denotes significance at the 5% level.