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Abstract

Economic growth has been unevenly spread across states and territories in Malaysia, prompting the Government of Malaysia to devise ways of creating more balanced regional development. One means of achieving this outcome is to create an environment that encourages foreign firms to invest more heavily in less developed states. We analyse the regional distribution of FDI inflows into the manufacturing sector across 13 states and one federal territory using data for the years 1990, 1995 and 2000. Empirical results indicate that expanding market demand for output, higher labour productivity, more socio-economic development and increasing the area of industrial estates in the host state are significant determinants of FDI inflows in the manufacturing sector in Malaysia. Of the four explanatory variables, FDI inflows are most sensitive to labour productivity but are also quite sensitive to per capita GDP and the area of industrial estates. They are highly insensitive to the level of economic and social development of a state.

Key Words: regional development, foreign direct investment, industrial estates, market demand, Malaysia.

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1. Background of Analysis

The Government of Malaysia has long been concerned that economic growth in Malaysia has not benefited all states and territories evenly. It has put in place various regional development strategies and policies aimed at creating more balanced national economic development. A factor perpetuating uneven economic growth has been the regionally skewed distribution of foreign direct investment inflows. Inward foreign direct investment (FDI) in the manufacturing sector, in particular, has been unevenly spread across states and territories in Malaysia.[1] Selangor, Penang, Perak, Johor, Negeri Sembilan, Melaka, Kedah, Pahang, Terengganu and Sarawak received 97 per cent of total real FDI inflows into approved manufacturing projects during the ten years, 1991 to 2000, with each of these states receiving more than five per cent.

The aim of the analysis is to examine determinants of FDI inflows into the manufacturing sector across Malaysian states and territories, in order to identify key variables that the Government of Malaysia can influence to create a more even regional distribution of FDI. Time series data on explanatory variables for all states and federal territories were not available annually in the National Department of Statistics in Kuala Lumpur. As a result, this analysis uses FDI data only during the years 1990, 1995 and 2000.

[1] There are 13 states and three federal territories in Malaysia. Perlis, Kedah, Pulau Pinang/Penang, Perak, Selangor, Negeri Sembilan, Melaka and Johor are the states located in the western part of Peninsular Malaysia while Kelantan, Pahang and Terengganu are located in the eastern part of Peninsular Malaysia. Sabah and Sarawak, the other two states, are located on Borneo Island. The three federal territories are Kuala Lumpur and Putrajaya, located in the western part of Peninsular Malaysia, and Labuan Island, located near SabahKuala Lumpur and Labuan Island were proclaimed federal territories on 1 February 1974 and 16 April 1984, respectively. Putrajaya, a new federal territory, was declared on 1 February 2001.

2. Economic Model

The explanatory variables selected in the model of FDI inflows in the manufacturing sector in Malaysia are real state gross domestic Product (SGDP), real labour productivity (LP), a development composite index (DCI) and total hectares of industrial estates saleable to manufacturing firms (IE). The economic model of FDI (with expected signs of coefficients of explanatory variables) across the 13 states and one federal territory (Kuala Lumpur) is:

$$\text{FDI} = f(\underset{+}{\text{SGDP}}, \underset{+}{\text{LP}}, \underset{+}{\text{DCI}}, \underset{+}{\text{IE}}) \quad (1)$$

where

FDI is the inflow of real FDI in approved manufacturing projects by state and federal territory in Malaysia (in ringgit);

SGDP is the real state gross domestic product by state and federal territory in Malaysia (in million ringgit);

LP is real labour productivity by state and federal territory in Malaysia (in ringgit);

DCI is a development composite index by state and federal territory in Malaysia; and

IE is the total hectares of industrial estates saleable to manufacturing firms by state and federal territory in Malaysia.

The Government of Malaysia also provides support measures and fiscal incentives for FDI as part of its regional development program, which could not be fully quantified and hence are excluded from the model to be estimated. The definitions and expected signs of the explanatory variables are now explained, and reasons are given to support their inclusion.

State Gross Domestic Product (SGDP) (+)

It is a priority of the development policy of the Government of Malaysia that the income gap between the less developed states and more developed states should be narrowed. This should improve the capability of the citizens in less developed states to purchase more consumption goods and services in their markets.

The influence of market size on FDI inflows in a host economy is central to the theory of location posited by Vernon (1974), Caves (1982) and Dunning (1993). Strong market demand in an economy encourages oligopolistic multinational firms to locate their innovation-related activities there. Johanson and Wiedersheim-Paul (1975) and Bell and Young (1998) also considered market size a positive influence on FDI inflows. This influence highlights the importance of regional development policies and strategies for strengthening income levels in the state and territories of Malaysia. Increasing people's income levels raises their capability to purchase goods and services in the state or territory domestic market. An increase in the level of income thereby leads to an increase in aggregate demand for output as consumption demand increases with income. This, in turn, leads to an increase in the aggregate supply of output to achieve market equilibrium (Dornbusch, Fischer and Kearney 1995:61-63).

GDP is a useful proxy for market demand under this 'market hypothesis'. It is the sum of final expenditures that include private consumption, government consumption, gross fixed capital formation, increase or decrease in stocks, and exports of good and services less imports of goods and services. SGDP is defined as the share of the Malaysian gross domestic product (GDP) contributed by a state or territory. Data on SGDP in real terms were calculated by using data on the GDP deflator of Malaysia at base year 1990=100.

A high demand for output in a state or territory market stimulates foreign firms to increase their supply of output in the state's manufacturing sector. The sign on the coefficient of SGDP in this analysis is therefore expected to be positive, meaning that a larger market size should encourage more foreign investment into the state or federal territory.

Labour Productivity (+)

Foreign firms may be induced to establish their production facilities in a host economy that has a relatively high level of productivity. Magee (1977) put forward a case for a positive relation between productivity and FDI, arguing that multinational firms cannot appropriate high returns from their capital flows if productivity is low in the host economy. Dunning (1993) observed that productivity is one of the locational advantages that must be possessed by a host economy. If labour productivity increases in the host state or federal territory in Malaysia, foreign firms should be willing to increase their investment activities to benefit from lower average labour cost. Thus, a higher level of productivity should lead to higher inward FDI in the state or federal territory.

Data were initially sought on real labour productivity in the manufacturing sector across states and federal territory, but total employment figures were not available by sector. Data on real labour productivity in the general economy were obtained by dividing SGDP by total employment, with base year 1990=100.

Development Composite Index (+)

The more developed a state or territory is, the greater the confidence foreign investors would be expected that have in their capacity to earn profits from their production activities. Since the major thrust of regional development in Malaysia is to enhance regional balance in social

and economic development, the Government is attempting to orchestrate more rapid development of the less developed states. The aims of its strategies are clear. They include increased human capital, diversification of the economic base and the provision of better infrastructure and modern amenities to provide opportunities for people to increase their income and improve their quality of life.

The definition of the development composite index (DCI) is taken from the national report of the Third Outline Perspective Plan 2001-2010. The Government of Malaysia (2001a:107-108) defined DCI is an average score of ten selected socio-economic indicators. Per capita SGDP (in ringgit), unemployment rate (%), urbanisation rate (%), registered cars and motorcycles per 1,000 population and telephone per 1,000 population are categorised as economic indicators while poverty incidence (%), population provided with piped water (%), population provided with electricity (%), infant mortality rate per 1,000 live births and number of doctors per 10,000 population are categorised as social indicators. Data on the index (base year 1990=100) for the years 1990 and 2000 were taken directly from the Government of Malaysia (2001a:107-108).

The DCI is used by the Government to measure the level of development of states and classify them into more and less developed states under the regional development policy. Based on the index, the Government has grouped Kuala Lumpur, Selangor, Penang, Perak, Johor, Negeri Sembilan and Melaka as more developed states. Less developed states comprise Kedah, Pahang Kelantan, Terengganu, Perlis, Sabah and Sarawak.

A major component of DCI is per capita SGDP, which is already closely represented in the economic model by the SGDP variable. It was therefore decided to purge DCI of this component and call the adjusted variable, DCIR, the adjusted development composite index.

More developed states are expected to receive greater amounts of FDI inflows than less developed states. Foreign firms have more confidence to invest in states where employees have higher levels of human capital and general infrastructure, communication networks and other utilities are more developed. The growth of cities and higher market demand for output with the raised purchasing power of local people should bring more profits to FDI activities in the manufacturing sector in the more developed states and territories.

Industrial Estates (+)

Provision of infrastructure is important to increase the inflows of FDI into a host economy by enabling foreign firms to keep transportation and communication costs low. Dunning (1993) argued that low transport and communication costs are a locational factor explaining FDI in a host economy. Krugman's (1991) model of geographic concentration of production activities highlighted the importance of the transportation network to get wider market access to the firms in a manufacturing belt.

The provision of industrial estates is one important avenue for state governments to improve infrastructural facilities and access by foreign manufacturing corporations in the manufacturing sector to input and product markets. All firms in industrial estates are fully equipped with facilities such as roads, electricity, water supplies and telecommunications that create an environment conducive to investment activities in industrial areas and lower their costs of capital investment. The expected positive sign means an increase in industrial estates should lead to more foreign investment flows into the state or federal territory.

Data on total hectares of industrial estates are a proxy for the localised provision of infrastructure facilities. There are several kinds of data on industrial estates in Malaysia, such

as number of industrial estates available (regardless of their size), planned total hectares of industrial estates that exclude housing areas, total hectares of industrial estates that have been developed, total hectares of industrial estates saleable and total hectares of industrial estates that have been allocated or sold to manufacturing firms. We selected data on total hectares of industrial estates developed by the government agencies (i.e. the State Economic Development Corporations, Regional Development and Port Authorities and Municipalities) that can readily be sold to manufacturing firms. This indicator is the most comprehensive definition of local infrastructure facilities provided to manufacturing firms.

3. Sources of Data and Construction of Missing Observations

Data on FDI inflows and industrial estates were obtained from the Malaysian Industrial Development Authority (MIDA 1995). Data on SGDP, labour productivity and DCI are from national reports in the Seventh and Eighth Malaysia Plans (1996-2000 and 2001–2005, respectively) (Government of Malaysia 1996, 2001a), the Second and Third Outline Perspective Plans (OPP2 1991-2000 and OPP3 2001-2010 (Government of Malaysia 1991, 2001b), respectively) and the Department of Statistics Malaysia (various issues). The national reports were prepared by the Department of Prime Minister.

Data on real FDI inflows across states and federal territories were recalculated by using the country's annual GDP deflator (IMF various issues) at the base year 1990=100. This procedure enabled the relevant data on explanatory variables to be valued in real terms at the base year.

Data on DCI in 1995 had to be interpolated due to their unavailability in the report of the Third Outline Perspective Plan 2001-2010. To estimate the missing observations of DCI in

1995, the original data on every socio-economic component in 1990, 1995 and 2000 were gathered from the national reports mentioned above. The 1990 data at base year 1978=100 and the 1995 and 2000 data at base year 1987=100 for the component of per capita SGDP were recalculated to be at the standardised base year 1990=100. The national GDP deflator published by IMF (various issues) was utilised in the computation.

Data on the urbanisation rate in 1990 were available only in the form of an index. To calculate the original data for each state, the urbanisation rate of 2000 was multiplied by the ratio of the urbanisation indices for 1990 and 2000.

Data on six components of DCI in 2000 (namely, telephones per 1000 population, incidence of poverty, population provided with piped water, population provided with electricity, infant mortality rate per 1000 live births and number of doctors per 10 000 population) were also only available in index form for all states. Component data for these indices were calculated following a similar procedure to that used for the 1990 urbanisation rate by multiplying the component data in 1990 by the ratio of the respective 2000 and 1990 indices.

The ten DCI components for 1995 were obtained by estimating a model of DCI in 1990 and 2000:

$$DCI_{i1990,\,2000} = \beta_0 + \beta_1 X_{1i1990,\,2000} + \ldots + \beta_{10} X_{10i1990,\,2000} + u_{i1990,\,2000} \qquad (2)$$

where

β_0 is the constant term and β_1, ..., β_{10} are the coefficients that measure the DCI with respect to the explanatory variables, X_1, …, X_{10} (10 components of the DCI) at the cross-sectional unit of i.

The stochastic disturbance term, u, is assumed to be independently and normally distributed with zero mean and constant variance.

A regression with the POOL command of SHAZAM (White 1997) was run on the DCI model to obtain the estimated coefficients. A large Buse R-squared of 0.9998 shows that the model is a very good estimator for DCI data on 1995 in that only 0.02 per cent of the variation in DCI in 1990 and 2000 is explained by other factors outside the model.

The DCI model for 1995 was formed using the estimated coefficients in equation (2):

$$DCI_{i1995} = \beta_0 + \beta_1 X_{1\,i1995} + ... + \beta_{10} X_{10\,i1995} + u_{i1995} \quad (3)$$

Equation (3) was estimated to predict data on DCI for 1995 for each state and the federal territory.

Per capita SGDP was then omitted from the DCI variable by regressing per capita SGDP on DCI to obtain the residuals, which are designated the adjusted DCI (DCIR). The DCIR variable replaces the DCI variable in the model of FDI specified in equation (1).

Two F-tests were performed to test whether intercept dummies and interaction terms should be included in the FDI model. For this purpose, two additional ordinary least squares regressions were run with the following models:

$$FDI_{it} = \beta_0 + \beta_1 SGDP_{it} + \beta_2 LP_{it} + \beta_3 DCIR_{it} + \beta_4 IE_{it} + \gamma_1 D_{1t} + ... + \gamma_{13} D_{13t} + \varphi_1 (T_{it} * SGDP_{it}) + \varphi_2 (T_{it} * LP_{it}) + \varphi_3 (T_{it} * DCI_{it}) + \varphi_4 (T_{it} * IE_{it}) + u_{it} \quad (4)$$

$$FDI_{it} = \beta_0 + \beta_1 SGDP_{it} + \beta_2 LP_{it} + \beta_3 DCIR_{it} + \beta_4 IE_{it} + \gamma_1 D_{1t} + \ldots + \gamma_{13} D_{13t} + u_{it} \quad (5)$$

where

$D_1, \ldots, D_{13}$ are 13 dummy variables for states with Kuala Lumpur designated the base, with slope coefficients represented by $\gamma_1, \ldots, \gamma_{13}$.

$T_{it}*SGDP_{it}$, $T_{it}*LP_{it}$, $T_{it}*DCIR_{it}$ and $T_{it}*IE_{it}$ are the interaction terms between the time factor and the explanatory variables, with slope coefficients represented by φ_1, φ_2, φ_3 and φ_4.

Results showed no evidence to suggest an intercept effect in the FDI model, indicating that the intercepts are homogeneous across states and federal territory. There is also no evidence of an interaction effect, indicating that the slope and time coefficients are simultaneously homogeneous across states and federal territory.

The final econometric model using panel data on FDI across states and federal territory was estimated as a single linear model:

$$FDI_{it} = \beta_0 + \beta_1 SGDP_{it} + \beta_2 LP_{it} + \beta_3 DCIR_{it} + \beta_4 IE_{it} + u_{it} \quad (6)$$

where

β_0 is the intercept and β_1, β_2, β_3 and β_4 are the coefficients that measure the FDI responsiveness with respect to the explanatory variables at cross-sectional unit i and time period t ($i = 1, \ldots 14$; $t = 1990, 1995, 2000$).

The estimation of coefficients in this model was undertaken using a feasible generalised least squares procedure. This means that the estimated model allows for cross-sectional heteroskedasticity and time-wise autoregressive behaviour in the error term (White, 1997:269).

4. Results and Discussion

The estimated coefficients from the estimated model are displayed in Table 1. Using one-tail tests, the coefficients on all four explanatory variables are significant at least at the five per cent level of significance. The Buse R-squared value of 0.642 indicates that 64.2 per cent of the variation in FDI across Malaysian states is explained by the four explanatory variables. The model has therefore fitted the data quite well given that regional support measures and fiscal incentives for FDI provided by the Government of Malaysia were excluded from the estimated model.

Real State Gross Domestic Product

The SGDP variable has an estimated elasticity at means of 0.32, which means a 10 per cent increase in SGDP results in a 3.2 per cent increase in inward FDI to that state. This result is consistent with the market hypothesis in that a positive sign suggests that foreign firms have higher investments in those Malaysian states that have expanding market demand for their output. Increasing market size in a state is therefore quite an effective way of encouraging FDI.

Real Labour Productivity

The estimated elasticity at means of labour productivity, 0.81, is the highest among the four coefficients on the explanatory variables. Its positive sign supports the theoretical expectation that increased labour productivity leads to increased FDI inflows because foreign firms can expect a lower cost of production in the host state. This result is consistent with analyses of

the effects of labour productivity or total factor productivity on FDI inflows between other countries and Malaysia, and between industries within Malaysia (Abdul Karim 2004).

Table 1: Estimates of the Determinants of Inward FDI across States and Territories in Malaysia, 1990, 1995 and 2000

Variable	Estimated coefficient	Standard error	t-ratio	p-value	Elasticity at means
Real state gross domestic product (SGDP)	37626*	22320	1.686	0.046	0.3192
Real labour productivity (LP)	53502**	17330	3.088	0.001	0.8065
Development composite index residual (DCIR)	0.271E+09*	0.132E+09	2.053	0.020	0.0086
Total hectares of industrial estates saleable (IE)	351780**	111400	3.158	0.001	0.3854
Constant	-0.79E+09**	0.218E+09	-3.628	0.000	-0.7102

Notes: Buse R-square = 0.642
F (from mean) = 18.832 (p-value = 0.000).
* Significant at the 5 per cent level
** Significant at the 1 per cent level.
The p-values are appropriate for one-sided hypothesis tests for all variables.

Labour productivity can be improved by upgrading labour skills and efficiency in the production of goods and services (MIDA 2001). State governments that are lagging in their ability to attract FDI could provide various training programs for workers in their state so that they can be accepted in the manufacturing job market, especially by the private sector.

Private firms in such states could also be encouraged to undertake their own in-house and on-the-job training programs to improve the skills of their workers.

Adjusted Development Composite Index

The adjusted development composite index has the expected positive sign, suggesting that foreign firms will engage in more investment activities in those states that are more developed. This result provides the Government of Malaysia with hope that it could create a virtuous circle by investing in development programs in less developed states to encourage foreign direct investment that in turn creates further development in these states.

Unfortunately, the adjusted development composite index variable has an estimated elasticity at means of only 0.009. This very low elasticity, which is easily is the lowest among the explanatory variables, suggests that such development programs would take a long time to have a noticeable impact on inward FDI. A more cost-effective approach for the Government is to focus infrastructural development more sharply through industrial estates.

Industrial Estates

The estimated elasticity at means for industrial estates, 0.39, suggests that 3.9 per cent more FDI will flow into a state for a 10 per cent increase in the area of industrial estates. Foreign firms expect to be able to reduce the cost of their investments in Malaysian operations if they can take advantage of facilities provided by state governments in the industrial estates.

This elasticity is much higher than the elasticity for DCIR, reported above. It suggests that, from the viewpoint of Malaysia's regional development policy, more projects on industrial estates should be established in the less developed states. The private sector should also be

encouraged to develop more industrial estates. Increasing the number and size of industrial estates is expected to expand investment activities of foreign firms that create more jobs for local people. In addition, maintaining and improving (where necessary) the quality of infrastructural facilities in existing industrial estates should also fulfil the strategy of promoting FDI flows into a state. Industrial estates can have spillover effects by providing townships in rural areas with better infrastructure and services thereby encouraging more domestic investment, especially among small- and medium-sized industries in these areas. This process can in turn provide an impetus for more FDI in industrial activities.

5. Conclusion

This analysis of the regional distribution of FDI inflows across 13 states and one federal territory in Malaysia uses data for the years 1990, 1995 and 2000. Four explanatory variables were included in an estimated linear model and all were found significant in influencing FDI inflows in the expected positive direction.

These empirical results indicate that expanding market demand for output, higher labour productivity, more socio-economic development and increasing the area of industrial estates in the host state are significant determinants of FDI inflows in the manufacturing sector in Malaysia. Overall, the model of FDI is reasonably reliable.

Of the four explanatory variables, FDI is most sensitive to labour productivity but it is also quite sensitive to per capita GDP and the area of industrial estates. It is highly insensitive to the level of economic and social development of a state. Raising labour productivity and increasing the area of industrial estates in less developed states appear the most cost-effective ways to increase FDI inflows in the short to medium term. These measures, along with the

stimulatory economic effects of the increased FDI, should in turn increase market size and overall state development, setting in train a virtuous cycle of raising living standards in less developed states.

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