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The Impacts of Foreign Labour Entry on the Labour Productivity in the Malaysian Manufacturing Sector

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Improvement and strengthening of labour productivity is an important approach to accelerate the growth of the manufacturing sector in Malaysia. This study attempts to analyses the impacts of the entry of foreign workers on the labour productivity of the manufacturing sector in Malaysia. The analysis of this study employs the dynamic panel data method which combines time series and cross-section data. The data used was from the year 1990 to 2008, covering 15 selected sub-sectors in the Malaysia manufacturing sector. Core to the analysis in the study is the Pooled Mean Group (PMG) estimation model. The study found that foreign labour, local labour, capital intensity and foreign direct investment (FDI) have positive and significant effects on the labour productivity growth. The study differentiates between local and foreign labour into categories of skilled and unskilled labour. The findings indicated that unskilled foreign and local labour are negatively and significantly affect the growth of labour productivity in the long run. Inversely, skilled local and foreign labour had a significant and positive impact on the labour productivity growth. However, the contribution of foreign labour on labour productivity is smaller compared to the local labour.

1. Introduction

Labour productivity is an important, frequently emphasised element in any sector as part of an effort to keep a sector competitive in the global market. The growth of the industrial sector has been successful in increasing export and this effectively led to the innovation of new

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technologies and improvements in the internal management of firms. Since independence, Malaysia has experienced encouraging phases of economic development through various economic development policies and strategies. In fact, before the Asian financial crisis in the year 1997, the country is known as one of the rapidly growing economies on par with the developed economies in East Asia such as Japan, South Korea, Taiwan and Hong Kong (Ishak Yussof & Nor Aini, 2009). A rapidly growing manufacturing sector can speed up the growth of an economy due to its share in the Gross Domestic Product (GDP), job creation and foreign exchange. One of the most effective ways to further improve this sector is by improving labour productivity. The logic is simple; a higher productivity means that the same number of inputs can produce higher quantities of output. Sahar (2002) explains that a high labour productivity in the manufacturing sector can help create sustainable growth and development of a country.

Economic growth is an important determinant of national development and these are two interrelated concepts. A country can grow without developing, but to develop, a country needs to grow. Economic growth requires a combination of a number of factors, including labour, land, capital and technology being employed efficiently without waste. Labour - local and foreign - is an important part of this equation. In general, the rationale behind employing foreign labour is to fill the gap create by the shortage of labour supply in the local labour market especially in sectors like farming, construction, service, industrial and manufacturing. This is a short term solution according to Preibisch (2007). Nevertheless, the output generated through the foreign labour contributes positively to the country's export.

It must be noted that foreign labour has contributed to Malaysia's economic growth, especially with regard to the GDP and aggregate expenditure. The government has effectively prevented excessive increases in wages and inflation. The wages paid to the foreign workers are considerably lower than the what the locals receive. Despite the relatively lower wages, the foreign labour positively contribute to increase in demand (Borjas, 2006). However, being a short-term solution, the economy cannot continuously depend on the contributions of foreign workers. With the country looking to become a high earning economy by 2020, a switch of strategy is important and thus, rather than relying on the number of inputs, more emphasis should be given to increasing productivity of input.

An influx of foreign workers can affect an economy both positively and negatively. Its influence on the labour market depends on its role, whether as a substitute or a complement to the local workers. Borjas (1993) found a negative impact of foreign workers. However, he stressed that such negative influence is only valid for unskilled foreign labour. The direction of the effects of foreign worker entry on a market depends on their productivity. Highly productive, skilled foreign worker can immensely contribute to an (Hercowitz et al. 1999). On the other hand, unskilled foreign workers may have problems adapting and may end up needing more help than contributing. It is worth noting that several studies have been conducted on this topic but the results have been inconsistent. As such, the issue is very much inconclusive. It is therefore imperative for researchers to keep on studying the subject and more importantly on the factors that make the results so inconsistent.

Compared to more developed economies like China, Singapore and South Korea, our labour productivity is still relatively modest (Malaysia Productivity Corporation, 2013). A shortage of labour during the period of the 7th Malaysia Plan (7MP) has tightened the labour market and pushed wages up. As part of the effort to reduce the shortage, a programme was initiated to allow for foreign workers entry. It was, however, at that time, unclear how the influx of skilled and unskilled foreign workers can generate growth of the manufacturing sector in the longer term.

Overall, the study aims to contribute to the literature on this topic through its measurement method which was used to estimate the impact of foreign workers entry on labour productivity. The method is known as *Autoregressive Distributed Lag* (ARDL) dynamic panel test method using *Pooled Mean Group* (PMG) estimation model. This method allows the researcher to observe the relationship between the independent and dependent variables in the short and long terms. Furthermore, this study provides a more detailed insight by dividing the foreign labour into skilled and unskilled categories.

The objective of this study is to analyse the short and long term effects of foreign worker entry in general on the productivity of labour. The study also sought to examine the influences of the use of foreign and local, skilled and unskilled labour on the productivity of labour. This paper is organised into five sections, namely introduction, literature review, methodologies, research findings and the last part from this study is conclusions and suggestions.

1.1 Trend of Foreign Labour in Malaysia

Rapid economic development has led to rapid changes in the labour market. With demand for labour increasing more than the supply, there was a need to address this shortage by allowing entry of foreign workers into the domestic market. As a result, there has been a steady influx of foreign workers from various countries such as Indonesia, India, Nepal, Bangladesh and Filipina. Table 1 summarises the development of the entry of foreign workers into Malaysia from the year 2007 to 2011. It is clear, however, that while entry is still occurring, the numbers were declining steadily. Manufacturing sector recorded the highest inflow of foreign workers from year 2007 to year 2011 compared to other sectors. Local Electrical and Electronics (E &E) industry was the main sector contributing 55.9 percent of the country's exports and employs 28.8 percent of the national labour force (Prime Minister's Department, 2012). This industry has also successfully developed the ability and skills for the manufacturing sector, consumer electronics, and electronic and electrical components. Productivity generated by foreign labour has helped increase total exports and consequently contribute to the surplus in the balance of payments. Strong export revenue growth is directly driven by high export value. Therefore, the enhancement and strengthening of productivity is one approach that can be taken to accelerate the growth of the manufacturing sector in Malaysia.

Table 1: Number of foreign labour in Malaysia by sector , 2007-2011 ('000).

Sector	2007	2008	2009	2010	2011
Total	2,044,805	2,062,596	1,918,146	1,817,871	1,5730,61
Agriculture	165,698 (8.1)	186,967 (9)	181,660 (9.4)	231,515 (12.7)	152,325 (9.6)
Farming	337,503 (16.5)	333,900 (16.1)	318,250 (16.5)	266,196 (14.6)	299,217 (19)
Manufacturing	733,372 (35.8)	728,867 (35.3)	663,667 (34.5)	672,823 (37)	580,820 (36.9)
Construction	293,509 (14.3)	306,873 (14.8)	299,575 (15.6)	235,010 (12.9)	223,688 (14.2)
Service	200,428 (9.8)	212,630 (10.3)	203,639 (10.6)	165,258 (9)	132,919 (8.4)
House maid	314,295 (15.3)	293,359 (14.2)	251 355 (13.1)	247,069 (13.5)	184,092 (11.7)

Source: Ministry of Home Affairs, various years.
Note: Values in bracket are percentage.

In the duration of the 9MP, the government was committed to reform the labour market, with particular emphasis on the increased mobility of labour and increasing the skills of the workforce. Labour market reforms were essential to provide a platform for the country to continue to grow towards becoming a high income economy.

Table 2: Number of foreign labour by skill ('000) for the year 1990-2008

Year	Skilled	Unskilled
1990	9,154	86,847
1995	7,016	104,665
2000	6,986	198,876
2005	9,022	336,055
2008	11,245	421,985

Source: Department of Statistics Malaysia, various years.

Table 2 reports that the number of unskilled foreign workers has more than doubled in the 2000s compared to the 1990s (from 86,847 in 1990 to 198,876 in 2000). This influx of unskilled foreign workers can be attributed to the unwillingness of the locals to be involved in occupations which has the features of 3D (*Dirty, Dangerous, Difficult*).

Meanwhile, the number of skilled foreign labour has shown a steady decrease from the year 1990 until 2000 but steadily increased again until 2008. The skilled foreign workers are complements to the local skilled workers and a combination of both is needed to facilitate the growth of the economy towards becoming more competitive.

2. Literature Review

Productivity refers to the comparison between the output and the input used to produce it. The inputs for a business are resources within an organisation which include human capital, finances, etc. while output is the product produced using the available input (Braid 1983; Prokopenko 1987). Most of the definitions of productivity are related to the measurement of efficiency of input in the production of output and the measurement of effectiveness by observing the ratio between the actual output and the projected output (Pritchard, 1995).

Peri (2012) used the Cobb Douglas function to examine the long-term effects of the entry of foreign workers on the American labour market for the year 1960, 2000 and 2006. The findings indicate that foreign workers have a positive effect on the specialisation of local workers. Moreover, no evidence that foreign labour crowded-out employment, rather it encourages efficient specialisation and encourages better use of technology among the less skilled workers.

Huber et al. (2010), on the contrary, explains the entry of foreign workers in a more negative light. They explained that locals normally view foreigners as a threat to their employability. With increasing population and labour supply, such view is natural. They also studied on the roles of skilled foreign workers and how qualified they are for their jobs. They noted a positive contribution from the foreign workers on labour productivity in skill-intensive industries.

According to Zaleha et al (2011), the increasing entry of foreign workers into Malaysia is related to its strong economic growth. The *Cobb Douglas* production function was used as the basic to form their labour productivity model with the data ranging from the year 1972 to the year 2005. Their findings indicate that foreign workers contribute positively to the productivity of labour in this country with improvements of 0.172 percent in labour productivity with a 1 percent increase in foreign labour. However, their findings also showed a negative effect between labour productivity and capital labour ratio. This shows that the Malaysian manufacturing sector is still labour intensive in nature, since any increase in capital usage,will leads to increase in capital labour ratio and this negatively affects labour productivity.

Llull (2008), meanwhile, is of the opinion that an immigration of workers into a country adversely affect the country's productivity. The argument is that the entry of foreign worker into a firm lowers its average wage. The estimation took into account the effects of inverse causality. The researcher also analysed the impact of foreign labour on a country's per capita GDP. The findings showed a negative and insignificant impact on productivity. On the contrary, Chia (2011) argues that foreign workers can increase a country's GDP and simultaneously fill the needs for workers in Singapore. However, the study also mentioned that dependence on foreign workers can slow down economic restructuring and ultimately affect national productivity adversely. At the end of the study, the researcher advised the Singaporean government to reduce its dependency on foreign workers to improve its productivity.

FDI is an important role in the development process in many countries. FDI generally provides capital and technology to developing countries. Hale and Long (2006) found that there were positive effects on labour productivity as a result of the spill-over effects of FDI. They used a survey of 1,500 firms in China to determine whether there are technology spill-overs from foreign firms to domestic firms in the same city and the same industry. The same outcome was found from the study by Salim and Bloch (2009), found that FDI is an important contributor to the growth of the chemical industry in Indonesia.Tanna (2009) studied the relations between FDI and the changes in productivity of banks. Using data between the years 2000 and 2004 which was obtained through observation method covering 566 commercial banks, the analysis was conducted in two stages - firstly, a non-parametric Malmquist method was used to explain the changes in TFP for bank's efficiencies of scale, and secondly to explain the changes in technology. An analysis was also conducted to examine the influences of FDI on productivity. The study found that FDI has a negative effect in the short term, but affect productivity positively in the long term. This finding is consistent with the Malmquist analysis.

Meanwhile, Mohammad Sharif Karimi and Zulkormain (2009) examine the relationship between FDI and productivity growth using the Todo-Yamamoto test to understand the causality relation and *bounds testing* (ARDL). They used data between 1970 and 2005 in Malaysia. They found that there is no strong evidence for *bi-directional causality* and long-term relationship between FDI and productivity growth. Thangavelu and Owyong (2003) studied the relationship between export performance and productivity growth in the Singapore manufacturing sector. A panel data of 10 major industries in the manufacturing sector were analysed for the duration between 1974 and 1995. The findings suggest that growth in labour productivity helps improve export growth for sub-sectors of selected industries. They also found that FDI-intensive industries contribute more to labour productivity in the manufacturing sector than industries which are not FDI-intensive.

Rahmah et al (2012) states that globalisation and technological advancement increase the demand for high-quality labour. The researcher examined the impact of globalisation on labour productivity in the manufacturing sector in Malaysia. This study examined 5 sub-industries, namely production, processing and preservation of meat, fisheries, fruits, vegetables, oil and fat (151), manufacturing of refined petroleum products (232), basic chemical manufacturing (241), iron and steel manufacturing, office machinery manufacturing, accounting and computing machinery (300) as well as the manufacturing of electric valves and tubes and other electronic components, component (321). Data used include duration of time from the year 1985 to 2007. This study uses the data panel method choosing between fixed effects to examine the relationship between labour productivity and capital labour ratio, export import ratio, FDI, technology transfer and foreign labour. The study found that globalisation indicators such as FDI and openness of an economy has a negative and significant effect on labour productivity. Meanwhile, capital labour ratio significantly influences labour productivity growth in the manufacturing sector in general as well as its sub-sectors.

3. Methodology

The analysis in this study uses dynamic panel data methods that combine time series data (t) and cross-sectional data (n) with *t* larger than *n*. *n* is the 15 sub-sectors in the manufacturing sector based on 5-

digit Standard Industrial Classification Malaysia (MSIC), while *t* is 19 years from the year 1990 until 2008. The data used in this study are a secondary data obtained from the Manufacturing Industry Survey conducted by the Department of Statistics (DOS). Other data used were obtained from the Ministry of International Trade and Industry (MITI) and Malaysian Industrial Development Authority (MIDA). The data was analysed using the software Stata 10.1. The approach used in the analysis was *Pooled Mean Group* (PMG) regression. The study also employed the Hausman Test to help value the statistical model between the *Mean Group* (MG) and PMG to choose the more suitable model for the available data. To test the stationary of data, the unit root test was conducted based on the standards of Augmented Dickey Fuller (ADF) and Philips Perron (PP). Labour productivity is derived from the total output divided by total labour. Next, the productivity obtained was assigned as the dependent variable while independent variables are composed of capital intensity, FDI and labour types of foreign and domestic labour. For each category of labour, they will be split into two groups - skilled and unskilled workers.

The dependent variable in this study is labour productivity. In this study, the output value (production) of 15 sub-sectors of manufacturing is used, with real production value deduced with Producer Price Index (PPI) year 2000=100 as the base year. The independent variable used is capital intensity (KL) which is the total fixed asset owned by firms in January divided by the number of labour involved in the manufacturing sub-sector, FDI, total number of foreign labour and local labour. The skill category variable is divided into skilled and unskilled labour. Skills refer to their abilities and education levels.

3.1 Model Specification

Productivity can be defined as the value or the quantity of output that can be generated by all units of input. Outputs are products or service produced by the organisation. In other words, productivity is a concept that describes the relationship between the output produced by an organization with the inputs used. In a nutshell, it measures the efficiency and effectiveness of each unit of input.

To produce a labour productivity model, this analysis employs the Cobb Douglas production function as basic which can be written as follow:

$$Y = A K^{\beta 1} L^{\beta 2} \qquad (1)$$

With, Y is total output, A, β1 and β2 are the parameters, K is value of capital stock and L is total number of labour. The assumption made is that $\beta 1+\beta 2 \neq 1$, i.e. returns to scale. Two scenarios can take place ; $\beta 1+\beta 2>1$ i.e increased returns to scale (IRS) or $\beta 1+\beta 2<1$ i.e. decreased returns to scale (DRS). Marginal labour production can be explained using equation (1) on labour;

$$\frac{\partial Y}{\partial L} = \beta_2 AK^{\beta 1} L^{\beta 2-1} = \frac{1}{L} \beta_2 AK^{\beta 1} L^{\beta 2} = \beta_2 \frac{AK^{\beta 1} L^{\beta 2}}{L} = \beta_2 \frac{Y}{L} \qquad (2)$$

Or, $$\frac{\partial Y}{\partial L} = \beta_2 \frac{Y}{L} \qquad (3)$$

Quantity Y/L is the average productivity of labour. It therefore becomes clear that average production of labour Y/L is the labour productivity. Hence, the labour productivity equation is as follows:

$$\beta_2 \frac{Y}{L} = \frac{\partial Y}{\partial L} \qquad \frac{Y}{L} = \frac{\partial Y}{\partial L} \frac{1}{\beta_2} \qquad (4)$$

Replace $\frac{\partial Y}{\partial L}$ from equation (2), thus equation (4) becomes

$$\frac{Y}{L} = \beta_2 \frac{AK^{\beta 1} L^{\beta 2}}{L} \frac{1}{\beta_2} = AK^{\beta 1} L^{\beta 2-1} \quad \frac{Y}{L} = A \left(\frac{K}{L}\right)^{\beta 1} L^{\beta 1+\beta 2-1} \qquad (5)$$

In the form of a logarithm, equation (5) can be written as :

$$\text{In} \left(\frac{Y}{L}\right) = \text{In } A + \beta_1 \text{ In} \left(\frac{K}{L}\right) + (\beta_1 + \beta_2 - 1)\text{In } L \qquad (6)$$

3.2 Estimation Model

a. ARDL Model

In this study, the dynamic panel data analysis involves a large number of cross-sectional data (n) and time series data (t) observations. PMG based on Autoregressive Distributed Lag (ARDL) panel model can determine the short-term and long-term relationship of a model. By using this estimation, the intersection, the slope coefficient and standard deviation are allowed to differentiate the entire group. Assume ARDL (*p*, *q*$_1$, ...*q*$_k$), the dynamic panel equation can be written as below: -

$$\Delta y_{it} = \phi_i y_{i,t-1} + \beta_i^{'} x_{i,t-1} + \sum_{j=1}^{p-1} \lambda^{*}_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}^{'} \Delta x_{i,t-j} + \mu_i + u_{it} \qquad (7)$$

With y_{it} as the dependent variable i.e. productivity (Y/L), X_{it} as vektor *k x 1* as the qualifier variable, μ_i representing effects of specific groups (fixed effects), ϕ_i as the multiplier for dependent variable lag, β_i as the multiplier vector *k x 1* qualifier variable, $\lambda^{*}_{i\,j}$ multiplier for dependent variable at *lagged first-difference*s and $y_{i,j}$ is the vector multiplier *k x 1* for qualifier variable at *lagged first-differences* and the value *lagged* and *i* is the manufacturing sub-sector and *t* is the year.

The main assumption of the ARDL model is that u_{ij} is *independently distributed* with mean value equals to 0 and standadrd deviation $\delta^2 > 0$. It further assumes that *error correction term* (ec) $\phi_i < 0$ for all i , meaning that there exist a long-term relationship between $y_{it}$and x_{it}. The long-term relationship can also be written as follows:

$$y_{it} = \theta'_{ij} x_{ij} + \eta_{ij} i = 1,2, \ldots\ldots N; t = 1,2, \ldots\ldots T \qquad (8)$$

With $\theta'_{ij} = -\frac{\beta_{t'}}{\phi_i}$ being the multiplier vector k x 1 which is the long-term coeeficient and η_{ij} is stationary with the probability of *non-zero mean* which involves fixed effects. Equation (7) can be re-written in the VECM (*Vector Error Correction Model*) system as follows:

$$\Delta y_{it} = \phi_i \eta_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij}\ \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{i,j}\, \Delta x_{i,t-j} + \mu_i + \mu_{it} \qquad (9)$$

With $\eta_{i,t-1}$ as the error variable generated from the long term equation in (8), ϕ_i as the *error correction term* to adjust the balance in the long term. If ϕ_i =0, then there is no long term relationship between the dependent and independent variables. The parameter must be expected to be significantly negative under the main assumption which shows that the variables returns to balance in the long term.

Intervals order in the ARDL model is determined using either the information criteria of Akaike (AIC) or Schwartz Bayesian (SBC) before the chosen model is estimated using the *ordinary least squares* method. Although the estimated value obtained is the same, the standard deviation estimation of the model chosen by AIC is smaller. However, the interval order chosen by AIC is higher that the one chosen by SBC.

b. Estimation Model

To identify the short-term and long-term relationships between foreign labour entry on labour productivity, the model below was estimated:-

Model 1

$$\Delta In\left(\frac{Y}{L}\right)_{it} = \beta_0 + \phi_{1i}\ln\left(\frac{Y}{L}\right)_{i,t-1} + \beta'_1\, InLw_{i,t-1} + \beta'_2\, InFw_{i,t-1} + \beta'_3\, In\left(\frac{K}{L}\right)_{i,t-1}$$
$$+ \beta'_4\, InFDI_{i,t-1} + \sum_{j=1}^{p-1}\lambda_{1j}\Delta\ln\left(\frac{Y}{L}\right)_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{11,j}\Delta InLw_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{21,j}\,\Delta InFw_{i,t-j}$$
$$+ \sum_{j=0}^{q-1}\delta^*_{31,j}\Delta In\left(\frac{K}{L}\right)_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{41,j}\Delta InFDI_{i,t-j} + \varepsilon_{1t} \qquad (10)$$

Model 2

$$\Delta In\left(\frac{Y}{L}\right)_{it} = \alpha_0 + \phi_{2i}\ln\left(\frac{Y}{L}\right)_{i,t-1} + \alpha'_1 InskillLw_{i,t-1} + \alpha'_2\, InunskillLw_{i,t-1} + \alpha'_3\, InskillFw_{i,t-1}$$
$$+ \alpha'_4\, InunskilLFw_{i,t-1} + \alpha'_5\, InFDI_{i,t-1} + \alpha'_6\, In\left(\frac{K}{L}\right)_{i,t-1} + \sum_{j=1}^{p-1}\lambda_{2j}\Delta In\left(\frac{Y}{L}\right)_{i,t-j}$$
$$+ \sum_{j=0}^{q-1}\delta^*_{12,j}\Delta InskillLw_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{22,j}\Delta InunskillLw_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{32j}\Delta InskillFw_{i,t-j}$$
$$+ \sum_{j=0}^{q-1}\delta^*_{42,j}\Delta InunskillLw_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{52,j}\Delta In\left(\frac{K}{L}\right)_{i,t-j} + \sum_{j=0}^{q-1}\delta^*_{62,j}\Delta InFDI_{i,t-j} + \varepsilon_{2t} \qquad (11)$$

c. Unit Root Test

The unit root test is conducted to observe the stationary level of every variable tested. A variable is said to be stationary if the mean and variance is constant over time. It can be stationary either at the levels or difference. Every variable in a regression equation should be stationary at the same level, i.e. either being stationary at level or difference, for instance at the first difference. This condition must be fulfilled for the estimation to be valid. Otherwise, a false regression estimation is produced which may produce good estimation results, but in reality there exists no relationship. In this study, the Augmented Dickey Fuller (ADF) and Philip Perrons (PP) methods of unit root test are used.

d. Hausman Test

Hausman Test is an econometric statistics named in conjunction with Jerry A. Hausman. Hausman Test is applied to choose the estimation Mean Group (MG) or Pooled Mean Group (PMG). If under the null hypothesis, the difference in the estimated coefficients between the MG and PMG are not much different, or in other words the value of chi-square ($\chi 2$) not significant, then the PMG is more efficient. This test helps evaluate if a statistical model corresponds to the data used.

4. Research Findings

4.1 Labour Productivity Growth in the Malaysian Manufacturing Sector

A finding on the growth of labour productivity in the manufacturing sector in Malaysia is shown in Table 3. On the whole, labour productivity growth in the manufacturing sector experienced uneven growth.

Table 3: Labour productivity growth for the manufacturing sector in Malaysia, 1990-2008

Duration	Productivity value (RM'000)	Growth rate (%)
1990-1995	40659.94	20.7
1996-2000	32949.09	16.7
2001-2005	67724.83	34.5
2006-2008	54827.64	27.9

Source: Department of statistics Malaysia, various years.

For the duration 1990-1995, the economy recorded a growth in labour productivity of 20.7 percent. As for duration 1996-2000 labour productivity growth declined by 0.4. percent. The sharp fall in domestic demand following the 1997 financial crisis contributed to the decline in labour productivity growth (National Productivity Corporation, 2002). Government initiatives through the Eighth Malaysia Plan (8MP) to enhance labour productivity include encouraging higher private investment in research and development (R & D), increasing higher education enrolment, increasing the number of skilled workers and knowledgeable workforce, improve skills and capacity related to technology and promote the use of information and communication technology (ICT). As a result, the contribution of labour productivity rebounded in 2001-2005 period by 34.5 percent. The increase was about 17.8 percent higher compared to the duration 1996-2000. However, for the duration 2006-2008 once again there is a decline in labour productivity due to the global economic slowdown in year 2008.

a. Unit Root Test Analysis

Based on the analysis as reported in Table 4, the unit root test for both procedures ADF and PP show that all the variables are stationary in the first difference $I(1)$ at both without trend and trend i.e. at 1 percent, 5 percent and 10 percent significance levels. This shows that a false regression can be avoided since all the variables are stationary at first level of differentiation with trend. Since the panel data was not stationary at level $I(0)$ but was stationary at first difference, there is a possible long-term relationship between panel data. These findings corroborate those of Husin Abdullah and Ferayuliani Yuliyusman (2011) and Widiyant et al (2012).

b. Hausman Test Analysis

Based on the analysis, the results of the Hausman Test for the first model are shown in Table 5. It was found that for the first model the chi squared (chi2) is 0.16, Prob> chi2 = 0.9971. This means that Hausman Test is not significant. The PMG estimation model is more efficient than the MG. Meanwhile, the results of the Hausman Test for the second model are shown in Table 6b. The chi squared (chi2) is 0.36 and Prob> chi2 = 0.9990. Thus, the PMG estimation model is more efficient than the MG estimation model.

c. Analysis of Dynamic panel data test estimation *Pooled Mean Group* (PMG) for First Model

PMG estimation has been conducted and the results from the first PMG estimation model are shown in Table 5. Results from the first estimation model using ARDL (0,2,3,0,1) found that in the short term, the error correction term (*ec*) is negative 0.19 and is significant at significance level of 5 percent. The negative *ec* value reflects the existence of long-term relationships in the model. In the short term, the results showed that only the variable KL give significant and positive results in relation to labour productivity. A 1 percent increase in KL will increase labour productivity by 0.46 percent. The variable FW, LW, and FDI are negatively related and do not significantly affect labour productivity. According Hercowitz et al. (1999) the negative contribution of foreign and domestic labour on labour productivity growth is only in the short run. This is because they need to take time to adapt to the labour market or a new job. FDI inflows into the manufacturing sector in Malaysia bring with it technology from the country of origin. In the short run, labour is less able to absorb and apply the technology brought in, which means that the technology cannot be used efficiently. This tends to change over time.

In the long run, all variables studied showed significant effects with labour productivity at the significance level of 1 percent. This is observable in Table 4 for FW where the coefficient value is positive 0.17. In other words, a 1 percent increase in FW increases labour productivity by 0.17 percent. The positive effects of foreign labour supports the findings by Peri (2012) and Kangasniemi et al. (2009). FDI also positively contributes to labour productivity in the long term with a

0.14 percent increase in productivity with any 1 percent increase in FDI. Ram and Zhang (2002), who used data from the year 1990 cross-sectional data, also found the same relationship. The variables LW and KL also showed the same relationship with coefficients of 1.15 and 0.289. The findings on the variable KL disagrees with the findings in Zaleha et al (2011). They argued that KL and labour productivity are inversely related.

d. Analysis of Dynamic Panel Data Test *Pooled Mean Group* (PMG) Etimation for the Second Model

In the second estimation model, the findings have been shown in Tables 6a and 6b. Foreign labour and local labour were broken down into two types of labour by skill type for each type of labour. Foreign and local labour who work in administrative and professional occupations, technical and supervisory are classified into skilled labour. While the labour involved in clerical, general employment and production are classified unskilled labour. The results from both estimation models using ARDL (0,0,1,0,0,2,0) found that in the short term, the *ec* is negative 0.24 and is significant at 5 percent significance level. The negative *ec* value reflects the existence of long-term relationships in the model studied. In other words, the existence of a long term relationship between the independent variable and labour productivity in the second estimation model.

In the short run, the analysis showed that skilled foreign workers (SkillFW), skilled local labour (SkillLW), unskilled foreign labour (UnskillFW) and unskilled local labour (UnskillLW) all have negative but not significant influence on labour productivity. These results suggest that there is no difference between the productivity of both labour for skilled and unskilled category in influencing labour productivity growth. For the category of skilled labour, these findings are not consistent with the human capital theory where skilled workers are able to contribute to higher levels of productivity. Level of skills possessed by the skilled labour are mostly at the most basic level and is more operations and production oriented, and this may reduce their influence on the productivity of the organization represented (Rahmah Ismail et al, 2003) .Besides, variables KL and FDI show positive influence but are also not significant.

However, in the long run, the study found that all types of labour according to skill levels indicate relationship with labour productivity and are all significant at 1 percent significance level. The results obtained are that SkillFW and SkillLW are positively related to productivity growth and the values of the coefficient are 0.035 and 0.45 respectively. According Rahmah Ismail et al. (2003), professional foreign labours are necessary because they can motivate increase in output. In fact, the recruitment of skilled and experienced, knowledgeable foreign worker in the manufacturing industry is essential for smoothing and accelerating the process of transfer of modern technology. On the other hand, UnskillFW and UnskillLW showed a negative relationship with productivity growth. This can be seen from the obtained coefficients of -0.13 and -0.086. The negative coefficient for the variable UnskillFW and UnskillLW means that a 1 percent increase of UnskillFW and UnskillLW will reduce labour productivity by 0.13 percent and 0.086 percent respectively. George Borjas (2006), using case studies in the United States, concluded that migrant workers contribute a negative impact on labour productivity of American, especially those with low skills. Similarly, KL and FDI respectively relate positively with labour productivity and the coefficients are 0.36 and 0.0085.

5. Conclusions and Suggestions

The study found that overall, in the short run, local and foreign labour force labour contribute negatively but are both not significant to the growth of labour productivity. In contrast, in the long run, both have a positive relationship with labour productivity growth. The labour productivity increase is a good omen toward achieving a high-income country status by the year 2020, due to the increase in total output produced. When broken down by type of labour skill categories, only migrant labourers and skilled local labour have positive and significant relationship with labour productivity in the long term. In other words, foreign and local recruitment of skilled labour is necessary because they can lead to increase in productivity. Meanwhile, with regard to variable KL, it was found that in the long run, it has a positive impact on labour productivity growth of the manufacturing sector. Similarly, the FDI variable indicated a positive relationship with labour productivity in the long term. The findings support previous studies which argue that FDI intensive industries contribute more to productivity than those which are not FDI intensive (Thangavelu and Owyong, 2003).

The study concludes that high-skilled foreign workers are needed to help develop the manufacturing sector in Malaysia. Recruitment of unskilled foreign labour should be reduced and replaced with the use of local labour to fill labour shortages. In order to decrease the dependence on foreign labour, especially unskilled foreign labour, the government has undertaken several efforts. Among them are efforts to attract expertise from other countries and Malaysians who are working in other countries to return home and work in Malaysia to improve the various sectors especially the R&D sector. These measures should be strengthened from time to time so that results can be obtained continuously and the implementation can be more effective. The demand for knowledge workers, a category that includes senior officials and managers, professionals, technicians and associate professionals is expected to increase at an average rate of 2.5 percent per annum (Malaysia, 2006).

The introduction of a minimum wage by the government does not only benefit local labour, it is also aimed at reducing Malaysia's dependence on foreign labour especially unskilled foreign labour. Higher minimum wages lead to increased cost to the employer. Such circumstances would indirectly force employers to reduce the use of foreign labour and thus pave the way to greater employment of local labour. Moreover, in encouraging more local labour into the workforce in labour, especially in the farming sector, the government is always trying to upgrade facilities and provide the basic infrastructure including residential estate (National Productivity Corporation, 2011).

This study also presents a number of steps that can be taken into account to assist policy makers in designing a strategy to reduce dependence on foreign labour. The researcher suggests that the policy maker step up efforts to streamline the recruitment of foreign labour and the levy system, revise the wage system, and provide better benefits to increase the chances of retaining local labour in selected sectors. The government should review the policies, strategies, laws and procedures relating to the employment and wages of highly skilled foreign expertise of in select occupations. Firms are also encouraged to implement productivity-linked salary system. Through innovation and exploitation of new ideas, added value can be obtained using the same human capital and the same amount of other resources. Investment in science, research and education can also serve as an engine of innovation for the economy.

FDI will be continue to be a catalyst to improve the R&D ability and as a source of technology transfer. Private sector actors are urged to forge strategic alliances with foreign partners to ensure that their R&D activities are not out of touch with the outside world. The government should continue to identify and provide assistance to multinational companies with R&D capabilities in strategic areas to invest in Malaysia. In addition, the incentive mechanism for FDI should be revised to give priority to those with new, updated R&D capabilities and with value-added to be located in Malaysia.

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Table 4: Results for Unit root test ADF and PP

Variable	ADF		Philips Perron (PP)	
	Without Trend	Trend	Without Trend	Trend
	Level			
InLW	-1.6890 (0.2300)	-2.0667 (0.2369)	-1.7100 (0.2299)	1.8953 (0.2370)
InFW	-0.5659 (0.1933)	-1.7679 (0.2164)	-0.2466 (0.1932)	-1.6063 (0.2064)
lnSkillLW	-2.6450 (0.2131)	-3.7204 (0.2600)	-2.6445 (0.2100)	-3.7200 (0.2555)
lnSkillFW	-3.0741 (0.2436)	-3.6774 (0.2524)	-3.8573 (0.2440)	-4.5720 (0.2500)
lnUnSkillLW	-1.3650 (0.1700)	1.7900 (0.1744)	-1.4161 (0.1672)	1.8000 (0.1744)
lnUnskillFW	0.3158 (0.0881)	-2.0631 (0.1774)	0.8032 (0.0900)	-1.9858 (0.1774)
lnKL	-2.4111 (0.1850)	-2.0066 (0.2313)	-2.3556 (0.1845)	-1.9332 (0.2310)
lnFDI	-4.4193 (0.2490)	-4.2835 (0.2578)	-4.4202 (0.2491)	-4.2838 (0.2577)
	Difference			
	Without Trend	Trend	Without Trend	Trend
InLW	-7.5267 (0.1886)***	-10.8000 (0.1420)***	-6.6781 (0.1890)***	12.1981 (0.1410)***
InFW	-5.5500 (0.2413)**	-6.3010 (0.2414)**	-5.5400 (0.2403)**	-7.8247 (0.2424)***
lnSkillLW	-6.7111 (0.2235)***	-6.5311 (0.2310)**	-12.3400 (0.2235)***	-16.0802 (0.2206)**
lnSkillFW	-7.0468 (0.2709)***	-8.1492 (0.2715)***	-7.1000 (0.2710)***	-8.6363 (0.2710)***
lnUnSkillLW	-4.0310 (0.2578)*	-4.0861 (0.2650)*	-4.0312 (0.2577)*	-3.2977 (0.2648)*
lnUnskillFW	-4.1910 (0.2673)*	-4.5616 (0.2940)**	-2.6666 (0.2700)*	-3.7104 (0.2939)**
lnKL	-4.8425 (0.2536)**	-4.4287 (0.5767)*	-5.0787 (0.2540)*	-12.1316 (0.2528)***
lnFDI	-6.9469 (0.2196)***	-6.7336 (0.2269)**	-16.9683 (0.2197)***	-18.3393 (0.2270)**

Note: ***, **, and *is significant at 1% , 5%, and 10% significance level. Upper value is the coefficient value, the value in bracket is the standard deviation.

Table 5: Results of Labour productivity estimation using first model *Pooled Mean Group* (PMG**).**

DEPENDENT VARIABLE: Productivity Growth (In Y/L)	**Model 01: ARDL (0,2,3,0,1)**
Short term effect	
ΔlnFW	-0.0037
	(0.0573)
ΔlnLW	-0.3251
	(0.418)
ΔlnKL	0.4552
	(0.1046)***
ΔlnFDI	-0.001
	(0.0167)
Constant	0.5745
	(0.2266)**
Error Correction Term (ec)	**-0.1861**
	(0.043)**
Long term effect	
lnFW	0.1711
	(0.0516)***
lnLW	1.1519
	(0.3374)***
lnKL	0.2894
	(0.0547)***
lnFDI	0.1384
	(0.0192)***
Hausman Test	**chi2(4)= (b-B)'[(V_b-V_B)^(-1)](b-B)**
	= 0.16 **Prob>chi2 =0.9971**

Note: Lag order is chosen based on AIC (Akaine Information Criteria).*** Significant at 1% significance level, ** Significant at 5% significance level and *Significant at 10% significance level. Upper value is the coefficient value, the value in bracket is the standard deviation.

Table 6a: Results of Labour productivity estimation using second model *Pooled Mean Group* (PMG**).**

DEPENDENT VARIABLE Productivity growth (In Y/L)	**Model 02: ARDL (0, 0, 1, 0, 0, 2, 0)**
Short-term effect	
ΔInSkillFW	-0.0251
	(0.0454)
ΔInUnskillFW	-0.0283
	(0.0452)
ΔInSkillLW	-0.4145
	(0.5161)
ΔUnskillLW	-0.0214
	(0.0515)
ΔInKL	0.0374
	(0.1004)
ΔInFDI	0.0136
	(0.0291)
Constant	0.4105
	(0.1907)**
Error Correction Term (ec)	**-0.2417**
	(0.1527)**

Note: Lag order is chosen based on AIC (Akaine Information Criteria).*** Significant at 1% level, ** Significant at 5% significance level and *Significant at 10% significance level. Upper value is the coefficient value, the value in bracket is the standard deviation.

Table 6b: Results of Labour productivity estimation using second model *Pooled Mean Group* (PMG)

DEPENDENT VARIABLE Productivity Gowth (In Y/L)	**Model 02: ARDL (0,0,1,0,0,2,0)**
Long term effect	
InSkillFW	0.0345
	(0.0068)***
InUnskillFW	-0.125
	(0.0360)***
InSkillLW	0.447
	(0.0103)***
InUnskillLW	-0.0863
	(0.0151)***
InKL	0.3614
	(0.0105)***
InFDI	0.0085
	(0.0028)**
Hausman Test	**chi2(6) =(b-B)'[(V_b-V_B)^(-1)](b-B)**
	=0.38
	Prob>chi2=0.9990

Note: Lag order is chosen based on AIC (Akaine Information Criteria).*** Significant at 1% level, ** Significant at 5% significance level and *Significant at 10% significance level. Upper value is the coefficient value, the value in bracket is the standard deviation.