Foreign Direct Investment, Human Capital and Economic Growth in Malaysia

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23 November 2013

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Abstract

The international markets have been the major influence spurring economic growth and development in the Malaysian economy even until today. There were two sources of growth, namely foreign capital and exports of commodities. The government particularly beginning in 1971 moved to develop human capital stock by investing a large amount of public capital in the education sector. However, the growth of human capital did not become a significant catalyst for economic growth. Public and private expenditures for research and development (R&D) remained low compared to neighboring countries such as South Korea and Singapore. This paper examines the effects of Foreign Direct Investment (FDI) and Human Capital (HC) development on economic growth in Malaysia. This paper will also discuss the contribution of these two factors to Malaysia's economic growth for the period of 1980 - 2010 from three angles: Gross Domestic Products (GDP) growth, GDP per capita growth and technological change. (Total word: 150)

Keyword: Economic growth, Human Capital, Foreign Direct Investment, Education, Malaysia.

JEL Classification Code: I20, J40, O40, O49

1.0 Introduction

The considerable economic expansion of Malaysia since the 1970s until today has enhanced the living standards of the country's citizens. The living standards of Malaysians seem to be fairly high relative to its neighbours. The impressive economic growth and steady development is related to the diversification of the production sector by the government. The government reduced reliance on primary natural resources and agricultural products, and strengthened the manufacturing sector's development since the mid-1980s. Since 1990 Malaysia has become one of the fastest growing economies in the Southeast Asian region and is the third richest state after Brunei and Singapore. Malaysia has also become the world's third largest producer of integrated circuits and one of the leading producers of domestic (electrical) appliances.

The impact of the catastrophic financial crisis of 1997 – 1998 was a turning point in Malaysia's economic performance. The GDP slowed down considerably in the post-crisis years. Previous to this crisis, Malaysia had a consistent GDP growth record over the period of 1970–1997, on average of over 8% per year. During the period of 1998 to 2011 the country recorded annual GDP growth rates lower than 5%. The high degree of economic openness caused a major, negative impact to Malaysia's economic performance. The external shocks such as the oil crisis in 1973 and 1978-79; the collapse of commodity prices in the international commodity market in 1984 followed by a world-wide economic recession in 1984-1986; the Asian financial crisis of 1997-98; and the 2008 US financial crisis dented the Malaysian economy. The impact of the 1997 financial crisis on Malaysia's economy continued to resonate into the early 2000s (The World Bank, 2010: 18).

There are some views that Malaysia's economic boom was built on shaky and unsustainable foundations and that economic growth had become increasingly and more heavily reliant on foreign resources, both capital and unskilled labor. Malaysia's future economic progress could no longer be secured by reliance on cheap and unskilled labor. The limited and inadequate investment in human resources before 2000 hindered the development of greater industrial and technological capabilities in the country. The Malaysian government realized this and took action to tackle the issues through its development initiatives. These initiatives include the 5-year development plan, the 10^{th} and 11^{th} Malaysia Plans and the introduction of the New Economic Model as recommended in the Economic Transformation Program (ETP). Education was identified as one of the twelve key economic sectors that the government would heavily focus on under the ETP. To attract Malaysian talent and skilled workers working abroad, the Talent Corporation was established in early 2011. These aforementioned actions indicate a clear reflection of the Malaysian government's heavy reliance on human capital in order to achieve long-term and sustainable economic growth.

2.0 Malaysia's Economic Growth

Since independence in 1957 the Malaysian economy has been growing rapidly, with real GDP posting average annual growth rates of 4% in the period of 1956-60. The growth accelerated to nearly 6% during 1961-70 (Bank Negara Malaysia, 1994), and reached a peak of nearly 8% during 1971-80. However the growth rate declined 5.3% during 1981-85 due to the world economic recession during 1984-86. From the late 1980s to the early 1990s the economy surged to an average annual rate of over 9%, contracted by 6.1% in 1998 and then grew moderately in the following years. In 2004, the economy strengthened considerably with a growth rate of over 7% due to strong domestic demand and an improved external economy environment. In 2009, the Malaysia economy contracted by 1.6% due to the world financial crisis that swept the US economy in late 2008. In 2010, the

Malaysian economy bounced back to 7.2%. In general, the country has grown rapidly by international standards. Its GDP growth averaged close to 7% from 1971 to 2010 (Table 1). Gross Domestic Product (GDP) per capita measured in constant 1978 prices, more than tripled from RM2,870 in 1978 to RM8,916 in 2010. In the three decades from the 1970s to the 1990s Malaysia's economy experienced an annual GDP growth of 6.0 and close to a 3.7 growth in per capita income.

INSERT TABLE 1

3.0 Malaysia: Foreign Direct Investment and Human Capital

3.1 Foreign Direct Investment (FDI)

FDI has been seen as a key driver of Malaysia's strong growth performance throughout the period of 1960 to 1997 and 2000 to 2004. Policy reforms, including the introduction of the Investment Incentives Act 1968, the establishment of free trade zones in the early 1970s, and the provision of export incentives alongside the acceleration of economic liberalization policies during the 1980s were agreeable factors that caused substantial inflows of FDI into the country. The introduction of the Promotion of Investment Act 1986 led to a big surge of FDI particularly from 1987 to the early 1990s. During the period of 1960 to 1995, Malaysia was one of the most welcoming hosts to foreign direct investments among developing countries. However, the level of these investment flows has obviously varied widely over the period (Figure 1), while the contribution of FDI to total domestic capital formation has declined since 1997. The United Nations Conference on Trade and Development (UNCTAD) ranked Malaysia as the 6th largest destination for FDI in 1995, but in 2007 it ranked 71.

Annual inflows of FDI ranged from RM90-300 million in the 1960s, increased to RM0.3-1.4 billion in the 1970s, and RM2-3 billion in the early 1980s. In the early 1990s, the inflow

of FDI was between RM6-9 billion (Bank Negara Malaysia, 1994), before declining in the years 1997 to 2000. Concurrently, with the achievement of these high levels of FDI, national gross fixed capital formation generally rose during the same period. In the early 1960s, Malaysia relied on FDI for about a quarter of its gross fixed capital formation. However, from 2000 – 2010 the contribution of FDI to capital formation fell below 10% From 1960- 1999, FDI has been a key element in the development and expansion of the manufacturing sector.

INSERT FIGURE 1

The preceding discussion describes at least two issues that must be addressed with respect to foreign investment in the manufacturing sector. Before independence, Malaysia chose to rely more on foreign investment rather than importing technology for domestic firms. This may be disadvantageous in the long run for the reasons that FDI most likely stimulates less local learning than might the importation of technology to be adapted to local uses. This importation of technology would require local research and greater local involvement in development. As education levels rise in Malaysia, the capacity to absorb and develop new technologies will undoubtedly evolve. Certain biases do exist that favor foreign investors such limited exemptions from equity constraints. But foreign investors also bring export marketing power as well as foreign savings. Any attempts to introduce a bias in the opposite direction could consequently prove quite costly. The major issue may be whether anything constructive can be undertaken to enhance learning from foreign investments.

3.2 Human Capital

Human capital and its contributions is one of the most problematic areas to estimate and analyze. This is mainly due to different approaches and views on how to measure levels of human capital development and its contributions. This might be the reason why there have

been mixed views on the effects of human capital development on Malaysia's economy and how much and in what ways human capital contributes to the country's growth. In general, human capital is represented by a highly skilled, talented, educated and innovative workforce. Generally, human capital embodies huge potential and ultimate power toward achieving sustainable growth and development, especially through adopting and creating new technologies considered by mainstream economics at the present to be the sole engine of long-term, sustainable economic growth.

Since the 1960s human capital increased rapidly in Malaysia and in the other fast growing economies of East Asia. Rapid increases in enrollment at primary and secondary levels of formal education as well as improved job training are major contributions to the economic success of the region. An obvious indicator of a country's human capital development is the proportion of total resources (public funds) it devotes to education. However, this is not a perfect indicator. Table 2 provides international comparisons of public spending on education for Malaysia and selected countries. The Malaysian government spent about 6% of its total public expenditure to GDP in 1985. The ratio declined in 2008 to about 4.1%. Compared to other countries government expenditures on education on average was much higher than selected countries as shown in Table 2. But in terms of percentage of total expenditures on education to total public spending, other countries spend more than Malaysia.

INSERT TABLE 2 AND 3

Tables 2 and 3 do not indicate any lack of governmental commitment to education in Malaysia in terms of the overall allocation of resources. What this suggests is that if reforms are required they are more likely related to the structure of the educational system than to the total educational expenditure. Educational attainments of the labor force are widely

rendered as a better parameter representing human capital in a country than government expenditures (Table 3). Where there is an increase in the proportion of those workers with tertiary education, this somewhat shows that there is insufficient supply to meet the growing demand for a highly skilled workforce. By 2010, the proportion was at 24% of the labor force but this is still much lower compared to the levels achieved by developed countries in 2003 such as Japan (36%), the United States of America (41%), Ireland (43%) and Finland (36%). Other indicators for human capital include school enrollment statistics, the structure of the educational curriculum along with fields of study, education institutions' levels of development and spending on R&D.

4.0 Literature Review

There is an ample number of empirical works on relationships between FDI, human capital and economic growth. In order to better understand these relationships, this section is divided into three sub-sections discussing impacts of FDI and human capital on economic growth

4.1 FDI and Economic Growth

In selected literature on economic growth, FDI can boost a country's economic growth and development (Findlay, 1978; Romer, 1993). However, findings from empirical studies on different countries and various levels of economic progress, methods and periods show that the relationship between FDI and economic growth is uncertain. For example, a number of studies report an insignificant effect of FDI on growth in developing host countries, while other studies find that the effect of FDI on economic growth to be strong in the case of other developing countries, specifically in the Southeast Asian region. On the other hand, studies conducted at the firm level tend to generally show different results from those

conducted at the macroeconomic level. Generally there are an ample number of studies showing that FDI inflows lead to higher per capita GDP, higher economic growth rates and higher productivity growth. For instance, Blomström, et al (1994) examined the effect of FDI inflows on the average growth rate of per capita income for a sample of 78 developing and 23 developed countries. The results show the effect of FDI inflows to be significant and positive. Although the effect was statistically insignificant for developing countries with lower per capita income, this was attributed to lower capabilities of those in least developed countries to learn from Multinational Enterprises (MNEs). The reason for this lower capability is that domestic enterprises in the least developed countries are too far behind in their levels of technological expertise and skills to be either imitators of or suppliers to MNEs.

Findings in the majority of studies that look at the relationship between FDI and economic growth suggest that FDI is an important source of capital, that FDI complements domestic investments and is usually associated with new job opportunities and enhancement of technology transfer. This statement is supported by De Gregorio (1992) who analyzed 12 Latin American countries from 1950-1985. De Gregorio found that there is a positive and significant effect of FDI on the economic growth of countries in the study. De Gregorio also found that the productivity of FDI was higher than that of domestic investment. Blomström (1986) showed that the manufacturing sector in Mexico with a higher degree of foreign ownership accelerated productivity growth at a rapid pace. Nair-Reichert and Weinhold (2001) found that there is a causal link between FDI and growth. Wang (2002) disaggregated the types of FDI inflows to that which would most likely contribute to economic growth significantly in Asia. Wang's study of 12 Asian economies over the period 1987-97 found that only FDI in the manufacturing sector has a significant and

positive impact on economic growth and contributed positive spillover effects of FDI to the countries in the study.

Findlay (1978) found that FDI increases technical progress in the host country in the form of offering advanced technologies, styles of management practices and marketing, accounting approaches and other areas related to corporate development of local firms. Similarly, Romer (1993) stressed that FDI can ease the transfer of technology and know-how to poor countries with possible substantial spillover effects. These two studies suggest the positive contribution of FDI to growth through technological spillover and enhancement. There are several studies showing that the relationship between FDI and economic growth varies under different conditions. For example, Lipsey and Sjoholm (2004) summarize that a specific country and specific factors of industry are very important in determining technology spillover. In other words, Lipsey and Sjoholm studies do not support the overall conclusion that FDI induces substantial spillover effects for the economy. Based on a sample of 15 developed and 17 developing countries for the period 1970-90, De Mello (1990) showed a strong relationship between FDI, capital accumulation, output and productivity growth. However, the study found varying effect of FDI on capital accumulation and the Total Factor of Productivity (TFP) growth across developed and developing countries. The impact of FDI was positive on TFP growth in developed countries but negative in developing countries while the pattern was reversed in the effect upon capital accumulation. De Mello infers from these findings that the extent to which FDI is growth-enhancing depends on the degree of complementarity between FDI and domestic investment, whereby the degree of substitutability between foreign and domestic capital appears to be greater in technologically advanced countries than in developing countries so that the latter may have difficulty in using and diffusing new technologies of MNEs.

In the case of developing countries, Agosin and Mayer (2000) found that FDI inflows had a crowd-in effect on domestic investments during the period 1970-95. However, in the case of Latin American countries Agosin and Mayer found a crowd-out effect. In the case of African countries, Agosin and Mayer found that FDI had a neutral effect on domestic investments. The empirical findings from Alfaro, et al (2003) suggest that FDI in the primary sector exerts a negative effect on economic growth, while investments in the manufacturing sector exert a positive one with ambiguous effect in the services sector. Furthermore, a sufficient progress of financial markets development enhances the positive impact of FDI on economic growth (Alfaro, et al., 2003). Balasubramanyam, Salisu, and Sapsford (1996) argue that trade openness is the crucial factor for obtaining positive growth effects of FDI. Based on a sample of 41 developing countries Hien (1992) reported that there was an insignificant effect of FDI inflows on medium term economic growth of per capita income. Chowdhury and Mavrotas (2005) examined the causal link between FDI and economic growth for Chile, Malaysia and Thailand. For Malaysia and Thailand there was a strong bi-directional causality between the two variables. However, Duasa (2007) indicated that FDI does not directly cause economic growth in Malaysia. Karimi and Yusop (2009) also found that there is no strong evidence of a bi-directional causality and long-run relationship between FDI and economic growth for Malaysia. But Karimi and Yusop stated that FDI has an indirect effect on economic growth in Malaysia specifically through human capital and technology spillover.

4.2 Human Capital and Economic Growth

Modern growth theory maintains that the accumulation of human capital is an important contributor to economic growth. There are several studies that have explored the effects and relationship of a better-equipped and better-qualified workforce on economic growth. Generally, findings show that the higher the level of an individual's education, the higher his or her productivity, employment rate and earnings. In this context, education is deemed as an investment that enables individuals to be equipped with knowledge and skills that improve employability and productive capacities that would lead to higher earnings in the future.

In Malaysia, there are a few studies that attempt to explain the impact of human capital on economic growth. Gan and Soon (1996) utilized the Mankiw-Romer-Weil model to derive the implied capital and labor shares in the aggregate value-added for the Malaysian economy. The study found that the average capital share during the period of 1974-94 was 0.4 and this implied labor share was 0.6. Gan and Soon inferred that the rapid pace of the growth output of the Malaysian economy during 1974 to 1994 was driven mainly by capital accumulation, which accounted for 48% of growth. However, the employment growth was about 30%. Economic growth in Malaysia during that period was extensive in form or input-driven. In another study Gan and Soon (1998) argued that with a greater accumulation of human capital along with more efficient financial sector and wider export opportunities, the impact of diminishing returns from capital accumulation can be delayed. Gan and Soon argued in the Malaysian case that human capital and market opportunities affect the productivity of fixed investments and capital accumulation that can ensure that Malaysia could attain a reasonable high rate of growth. The study conducted a regression on the

determinants of per capital GDP growth for the period 1974-94. In the equation wherein educational attainment (a proxy for human capital or skilled labor) is included, the coefficient of the investment ratio was doubled indicating that the productivity of the educational investment is enhanced substantially by the presence of human capital variables in the equation. Gan and Soon further found that the inclusion of other factors, namely export orientation and financial deepening enhances the coefficient of the investment ratio even further. Their study concluded that although Malaysia's economic growth is primarily input-driven and despite diminishing returns of capital, it would still take a long time for growth to be substantially slower. The incremental impact on growth from additional physical investment was still substantial. However Gan and Soon stressed that a greater accumulation of human capital and other factors that lead to a larger capital elasticity can make an even longer period of high growth possible before diminishing returns of capital create a slow down to growth.

Gan and Soon (1998) also developed a series of equations to evaluate the sources of trend TFP growth in Malaysia for the period 1974-1994. Their estimation indicated that technological catching-up constituted a substantial component of TFP growth. Gan and Soon also stated that education has contributed substantially to productivity growth. Based on regression results this study showed that a 10% increase in the primary enrollment rate would raise TFP growth by 0.3%, while a similar increase in the upper secondary school enrolment rate would enhance productivity growth by 0.4%. The results also showed that a 10% increase in export ratio raised TFP growth by 0.7% while a 10% decline in the growth of labor force would raise TFP growth by 0.13% suggesting that a more rapid increase in the number of workers entering the workforce will lower the average experience level and make it less urgent for firms to institute productivity enhancing measures. Lucas and Verry

(1999) estimated earnings equations using individual data relevant to Peninsular Malaysia in 1988. Their study found a positive relationship between the number of years of schooling and training programmes on the one hand, and higher earnings on the other. Additionally, Lucas and Verry found that higher levels of education are associated with higher productivity. However, their results showed that primary and lower secondary schooling in Malaysia did little to add to the productivity of wageworkers.

4.3 Causal relationship between FDI and Human Capital

There are an ample number of studies to explain the causality between FDI and human capital, as well as the relationship between FDI and human capital, and economic growth and productivity. In general, most of the studies conclude that there is a link between human capital and education with economic growth. Noorbakhsh, et al (2001), for example, mention that developing countries may attract FDI by pursuing policies that raise the level of local skills and building up human resource capabilities. Their research found that human capital is one of the major determinants of FDI inflow. Saggi (2000) stressed that spillover from FDI requires adequate human capital stock in order for spillover to be feasible. Dunning (1993) mentions that the determinants of FDI are dynamic and of relative importance that changes over time. Dunning argues that human capital matters are quite significant when FDI is concentrated in higher technology and more knowledge-based activities, while it matters less when FDI is primarily seeking low-cost labor. Pfeffermann and Madarassy (1992) inferred that it is more important to have a pool of well-educated workers and a pool of skilled labor. Having these two pools is advantageous with the rapid advancements of manufacturing technology engaged in knowledge and skills-intensive industries, fulfilling demands of multinational firms involved in high-technology industries.

Tavares and Teixeira (2006) have tested whether human capital is a relevant determinant of FDI in Portugal. Using a large-scale survey of 475 firms located in Portugal, and controlling variables such as a firm's size, age and industry, as well as strategic location for R&D and export intensities and linkages with human capital (collaboration with universities), Tavares and Teixeira found that human capital correlated with FDI attraction positively and significantly. In the case of China, Wei (1995) found that there was a positive correlation between the inflow of FDI and the stock of human capital. Blomström and Kokko (2003) suggested that there is a causality between FDI and human capital, for example, that FDI may promote human capital formation. Dunning (1988) and Slaughter (2002) argued that the level of education and skills of the workforce is bound to influence both the magnitude and types of FDI inflows in a host economy. Similarly, Zhang and Markusen (1999) suggested that the availability of skilled labor in the host country has a direct effect on the volume of FDI inflows.

In a more recent study, Amitendu and Shounkie (2007) investigated FDI inflows for 14 Asian countries for the period 1994-2003. Their study suggests that Asian countries with well-developed technological capabilities to innovate, develop and effectively apply new technologies through R&D activities have an advantage in attracting FDI compared to other developing economies that do not have these capabilities. Moreover, in the case of India, Amitendu and Shounkie found that the relationship between technological competency and FDI attraction was more apparent between 1991 and 2006. These studies clearly demonstrate the importance of R&D activities in promoting technological capabilities and human capital, which in turn may attract FDI and boost economic growth. Jajri (2007) examined total factor productivity (TFP) and its determining factors in Malaysia for the period 1971–2004. Jajri's study concluded that the TFP growth for the entire period was not

encouraging due to a negative contribution from technical efficiency. He suggested that the Malaysian economy was operating below its maximum potential output level. Jajri also stressed that Malaysia's high economic growth might not be sustained on a long-run basis. Hence, the Malaysian economy needs to enhance its productivity-based catching-up capability, by ramping up the effective use of human capital, that is, increasing the number of skilled workers to operate more sophisticated technology, and adopt new technology.

5.0 Endogenous Growth Theory, FDI and Human Capital

The neo-classical theory of growth pioneered by Solow (1956) and Swan (1956), herewith Solow model, states that the accumulation of physical capital is not able to explain the large growth of output per person over time. This is due to geographical differences, differences in income and levels of technological progress, and the absence of positive economic externalities. The Solow model shows that long-run economic growth cannot rely only on the accumulation of physical capital. An increase in fixed investments without an accompanying expansion in the labor force would only lead to a transitory acceleration of output per capita. Given that an economy's labor force cannot be increased without limit, there is another factor that can produce and sustain the high rate of economic growth. One of the main sources of long-run growth is technological progress. Technological progress here is the "residual" of economic growth that cannot be attributed to growth in capital or labor. This residual is known as "Solow residual" or "Total Factor Productivity". The residual is related to an increase in know-how or knowledge, discovery of new ideas, or an increase in economic efficiency. However, the Solow growth model does not explain the source of this "technological progress". Thus, this technical progress is often called "unexplained" or "exogenous".

In the mid 1980s, a new growth theory suggested by Romer (1986, 1987), Lucas (1988, 1990), and Mankiw, Romer and Weil (1992) treated economic growth rates as endogenous. The key assumption in this theory is that increasing returns to scale can be made possible by sustaining an increase in investments in both human and physical capital. These investments would create a permanent increase in the economic growth rate of an economy. Endogenous theories of growth emphasize the role of human capital (Lucas, 1990). The differences in productivity among nations are subject to the differences in the skill levels and the abilities of workers to use technology. Another important argument put forth in the theory refers to the effect of technology 'spillovers' on economic growth (Aghion and Howitt 1998; Howitt 2000). The effects of technology 'spillovers' are indirectly associated to the effects of technological change on the economy.

The new economic growth models imply that FDI can affect growth endogenously if increasing returns in production via externalities and spillover effects are generated. Therefore, the endogenous theory focuses on externalities arising from human and physical capital accumulation as major forces behind long-term productivity growth. Proponents of this theory view technological progress not as given or a product of non-market forces as quoted in Solow Model but as a product of economic activity. Proponents hold that unlike physical objects, knowledge and technology are not bound by diminishing returns to scale, but instead drive the process of growth. This is in contrast to the exogenous economic growth model that the impact of FDI on the growth rate of output is constrained by the existence of diminishing returns to the physical capital, in which FDI affects only the level of income and leaves the long-run growth rate unchanged (Solow, 1957; De Mello, 1997).

The endogenous growth theory has shown that diminishing returns to capital can be delayed or completely avoided if human capital is added into the production function alongside physical capital and unskilled labor (Soon and Nagaraj, 1998). Barro and Sala-i-Martin (1992) describe that the presence of human capital slows down diminishing returns to physical capital while in the growth model suggested by Rebelo (1991), the production function retains its constant returns to scale while capital is no longer subject to diminishing returns. The adoption and application of advanced technologies spillover mentioned earlier require the accumulation of a substantial amount of human capital in the host economy. This means that the stock of human capital in the host country acts as a limit to the absorptive capability of that country's economy (Borensztein, et al., 1998). The quality of the labor force is subject to its accumulated experience, and vis-à-vis the education system. This quality of labor will determine an economy's ability to adapt old technology along with new learning and creation of new ideas. In other words, high quality human capital is a major factor that can absorb technological spillovers resulting from FDI, and thus is a key determinant of the effects of FDI upon economic growth. FDI is considered as an important source of knowledge and technological diffusion. FDI can contribute significantly to human capital through several possible channels such as introducing new management practices and organizational arrangements, and providing labor training. The impact on R&D could stimulate innovation thereby contributing to the growth of the host country (Grossman and Helpman, 1991; Calvo and Robles, 2003). Therefore, we can safely say that factors such as increasing returns to scale, innovation, trade openness, R&D, and human capital formation are key factors in explaining the growth process.

It is worth mentioning that human capital is an important absorbent of technology brought by MNCs as long as the latter brings a significant contribution to economic growth and as

long as indigenous technological development is not established. To be truly competitive requires a complete shift from being recipients of foreign technology to being technology innovators. In our model which is based on the endogenous growth theory, FDI is envisaged to have two effects on economic growth: The first is a direct effect through the increase in capital stock in terms of financing capital formation. FDI contributes to growth directly the same way domestic capital contributes to growth. The second impact is indirect, through the 'spillover' effect. FDI here is assumed to be more productive than domestic investment. FDI promotes growth through enhancing human capital and encouraging new technologies in the host country by diffusing managerial skills, marketing techniques, labor training and skill acquisition, stimulating R&D activities, and promoting exports. Technology and knowledge spillovers will offset the effects of diminishing returns to capital and keep the economy on a long-term growth path. Human capital is assumed to affect growth directly by local workers who learn the technology and new knowledge from MNC firms.

5.1 Empirical Model

The main objective of this paper is to study the contributions of FDI and human capital on economic growth in Malaysia for the period 1981-2010. FDI is assumed to contribute to economic growth in two ways: through capital accumulation, and through technology adaptation (spillover effect). Similarly, human capital is understood to be the labor force with tertiary education. Human capital is assumed to contribute to economic growth in two ways: as a quantity of labor employed (or demanded labor as an input in the model), and in quality through higher productivity and technological adaptation. Based on these statements, therefore we assume the following: (a) Capital stock consists of two components, domestic capital (K) and foreign direct investment (FDI); (b) Labor force (L)

is disaggregated into two categories- labor force with tertiary education (HC), and unskilled labor (UL). The first category represents the high-knowledge workforce, or human capital (HC). Therefore L = HC+ UL.

In order to examine the effects of FDI and human capital on economic growth in the case of Malaysia we have constructed three sets of models. The first model estimates the contributions of FDI and human capital on real GDP growth for the period 1980-2010. In this model other variables are included such as domestic capital, unskilled labor (indicated by labor force with lower than tertiary education qualifications), and exports. The variable of exports is included in the model due to the variable associated to FDI substantially in the case of Malaysia. The second model investigates the effects of FDI and human capital on the economy from a different angle that is the effect on the growth of per capita GDP. To estimate the effects of domestic capital, FDI and exports are converted to "per worker" terms. The third model measures the impact of FDI and human capital on productivity and technology. We assume that the residual from the second model represents the technological progress or productivity herewith as a total factor of productivity-TFP. Then the TFP is regressed with FDI and human capital.

Based on the aforementioned description we developed three model sets. These three models are within the framework of the endogenous growth model. The main production function of this model is the function of stocks, of domestic capital, foreign capital, unskilled labor, human capital, productivity and exports. Following is the mentioned production function.

$$Y = F\,(K, UL, FDI, HC, EXP) \qquad 1.0$$

Where Y is output, K is the domestic capital, UL is unskilled labor, FDI is foreign direct investment, HC is human capital, and EXP is exports. We transform the function to the Cobb-Douglas production function. So that the function would be read as:

$$Y_t = A_t \; K_t^{\alpha} UL_t^{1-\alpha} FDI_t^{\lambda} HC_t^{\gamma} EXP_t^{\varphi} \qquad 1.1$$

We rewrite the equation in logs form with respect to time and obtain the following regression equation:

$$\mathbf{Y = a + \alpha K + \gamma HC + (1 - \alpha) UL + \lambda FDI + \varphi EXP + e} \qquad \mathbf{(1.3)}$$

This equation decomposes the growth rate of output into growth rate of Total Factor of Productivity (TFP) plus a weighted sum of the growth rates of the other variables. Theoretically, all parameters are expected to have positive signs.

The second model takes the same variables, but in per capita terms:

$$\mathbf{yp = a_0 + a_1 k + a_2 HC + a_3 fdi + a_4 exp + u} \qquad \mathbf{(1.4)}$$

The third model is aimed at measuring the contribution of FDI and human capital in technological progress (TFP):

$$\mathbf{Tech = a_0 + a_1 HC + a_2 fdi + a_3 exp + o} \qquad \mathbf{(1.5)}$$

Where **Y** = Real GDP in 1978 prices (RM billion); **L** = Labor Force (employed + unemployed) (million); **P** = Population (million); **HC** = Labor Force with tertiary education; **UL** = Unskilled Labor (L - HC); **yp** = Real GDP per capita in 1978 prices (Y/P); **FDI** = Foreign Direct Investment (RM billion); **fdi** = FDI/L; **EXP** = Exports of goods and services (RM billion); **K** = Gross Domestic Capital Formation (RM billion); **e, u, o** = Error Terms;

Tech = u_1 (Technology) (equation 1 from regression 2) (u_1 is assumed to be the Technology – the unexplained part by the included variables)

The main three regression equations (1, 2 and 3) are further broken down into a number of equations, as presented in Table 6, 7 and 8. Based on the three sets of models we test the following hypothesis: (1) FDI and human capital positively affect the growth of gross domestic product (GDP); (2) FDI and Human capital positively affect economic growth GDP per capita and; (3) FDI and human capital significantly contribute to technological progress.

6.0 Analysis and Results

Our analysis can be grouped into three categories: the effects of FDI and human capital on GDP growth in Malaysia, the effects of FDI per worker and human capital on per capita GDP growth, and the effects of FDI per worker and human capital on technological progress. A set of regression equations is structured to deal with each of these relationships.

We use simple ordinary least square (OLS) regressions based on annual data covering a period of 31 years from 1980 to 2010. All the data is in level terms, but then we took logs of the levels. Before running the regressions we first had to establish the variables as stationary, or convert non-stationary variables into stationary ones. We begin our analysis by employing two standard unit root tests to determine the stationarity of the series or its order of integration —Augmented Dickey Fuller (ADF) and Phillips and Perron (PP) tests. The data did not pass the ADF and PP tests. However, when taking the first difference, all variables passed both tests and were found to be integrated at order *I*(1) as shown in Table 4. Given that all the underlying variables share common integration properties we can

proceed to testing for the presence of a long-run cointegrating relationship between the variables.

We also applied the Johansen test to test for the presence of a cointegrating vector among the nonstationary series as suggested by Johansen and Juselius (1990). The assumption imposed on the cointegration equations is linear deterministic trend in data. Table 5 reports the estimated trace and maximum test statistics. Overall, the cointegration test results shown in Table 5 confirm that there exists at least one cointegrating relationship among the three variables. This allows one to estimate the long-run relationship and the Error Correction Models (ECMs). The rule of thumb says that if the economic time series is found to be cointegrated an econometric framework for an ECM representation can be specified. The error-correction process can reconcile the long-run equilibrium with disequilibrium behavior in the short-run, which allows testing for short-term or dynamic causality.

INSER TABLE 4, and 5

6.1 Regression Model 1, 2 and 3

The results of the regression of the first model are shown in Table 6. The results of the first set of regression equations unexpectedly show an insignificant effect for FDI on GDP growth. This result is unexpected and not in line with the results of most of the literature discussing this topic in Malaysia previously. The FDI data was re-examined, re-tested and restructured in different shapes, but the same result was produced. There was no significant effect of FDI on GDP growth. However, this might be related to the high volatility of FDI, and to the period during which the study was conducted in reference to this study's literature review showing that the impact of FDI could vary from one period to another. On the other hand, the results show that human capital had a positive effect on GDP growth results that are in line with our expectations. However, what can be seen is that the

contribution of lower-skilled labor to GDP growth was more significant. This implies that the economy is performing at a lower productivity level than it could be than if it depended on higher skilled/educated labor and that there is room for Malaysia to increase its capacity by focusing more on human capital. The term U-HAT is included in the model as part of forming the Error Correction Model (ECM). This is called the error correction term, the residual from the cointegration relationship, lagged one time period, and tested to be stationary in the level. The ECM was formed here because there was evidence of cointegration between the independent variables. The error correction term, U-HAT1 in our model, indicates the speed at which the model returns to equilibrium following an exogenous shock. The negative sign indicates convergence towards equilibrium.

Table 7 shows the results of the second regression set. Again, the effect of FDI per worker on GDP per capita growth is not significant. One reason for this result, in addition to the reasons mentioned above, could be a huge negative impact of FDI recorded in the past few years and that domestic forces replaced its effect on growth in the last ten years, specifically after the 1997-1998 crisis. Human capital again shows a significant effect on the growth of GDP per capita during the period. Exports also showed a positive effect on growth at a 10% level. However, it is very clear from the regressions that the economic growth of the Malaysian economy has been mainly driven by domestic capital accumulation.

Regression Model 3 is conducted as an attempt to discover the effects of FDI and human capital on per capita GDP growth and technology parameters. The results are shown in Table 8. As can be seen from the table, none of the independent variables, namely human capital, FDI per worker and exports per worker show a significant effect on 'residual' growth. It is difficult to envisage that exports in Malaysia did not contribute to productivity

and higher technology during the period especially since exports constituted about 95 to 120 per cent of GDP during the period 1995-2010.

INSERT TABLE 6, 7 and 8

7.0 Conclusion

Economic growth and its determinants has been a main focus in the past few decades especially in developing countries. Generally, there are two theories that explain the sources of economic growth, namely: the exogenous growth theory and the endogenous growth theory. However, numerous empirical studies examined these determinants, and it is commonly agreed that many factors determine economic growth. FDI and human capital are two of the factors that have recently been primary foci in the study of economic growth. However, there have been mixed results utilizing these two factors. Our study focuses mainly on FDI and human capital to examine their effects on economic growth in Malaysia. The aim is to contribute to the body of literature addressing the effect of FDI and human capital on economic growth in Malaysia particularly based on a more recent period than previous studies. We utilized the OLS method and annual data covering the period 1980-2010 and constructed three regression models to examine the relationships. The key findings of this study are as follows:

1. There was no significant impact of FDI on economic growth in Malaysia during the period 1980 to 2010. This implies that economic growth for Malaysia could be attributed to other factors during this period. While these findings contrast with previous studies examining this topic, the differences in findings may be due to different periods covered by the earlier studies. This could imply that the Malaysian economy has shifted from depending on FDI to other factors. The findings in this study show that human capital is one of these other factors.

2. As expected, human capital has had a positive and significant impact on growth during the period of 1980 to 2010. In the long term, a 1% increase in highly skilled labor is associated with a rise of approximately 0.25% increase in GDP and approximately 0.33% in GDP per capital. However, the results also show that Malaysia has been heavily reliant on capital accumulation and low-skilled labor for economic growth. For example, our results show that a 1% increase in low skilled labor is associated with an approximate 0.41% increase in GDP. At the same time, capital accumulation contributed approximately 0.16% for a 1% increase in both GDP and GDP per capita.

3. The Malaysian economy heavily relies on low skilled labor relative to highly skilled, technologically capable labor. This dichotomy suggests a serious warning signal to the government regarding the sources of growth for Malaysia's economy. According to the Solow neo-classical growth model diminishing returns will eventually set in and stagnate growth in the economy. Based on this study, our recommendation is that the way to sustain economic growth is through technological and human capital development. Malaysia must focus more on these two factors, particularly human capital, if there is to be sustainable long-term economic growth.

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TOTAL WORD- MAIN TEXT PLUS REFERENCE= 8072

Table 1: Malaysia: Gross Domestic Product (GDP) growth (%)

Year	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10
First	6.5	11.6	6.9	1.2	8.7	8.6	0.3	5.9
Second	9.4	7.8	5.6	5.2	7.8	7.7	4.1	6.7
Third	11.7	6.7	6.3	8.9	8.3	-7.4	5.3	4.6
Fourth	8.3	9.3	7.6	9.2	9.2	5.8	7.1	-1.6*
Fifth	0.8	7.8	1.0	9.7	9.6	7.5	5.0	7.2*
Average	**7.3**	**8.6**	**5.1**	**6.7**	**8.7**	**4.4**	**4.4**	**5.7**

Sources: Malaysia, Ministry of Finance, Economic Report, various issues.

Table 2: Malaysia: Spending on Education, 1985 – 2008

		Malaysia	Singapore	Korea	Thailand	Japan	US
Public expenditure on education	**Year**						
As % of GDP							
	1985	6.0	4.4	4.2	n/a	5.2	6.3
	2000	6.0	n/a	3.8[a]	5.4	3.7	5.0[a]
	2008	4.1	2.6	4.8	3.8	3.4	5.5
As % of total government expenditure							
	1985	16.3	9.6[b]	28.2	n/a	18.1	n/a
	2000	26.7	n/a	13.1[a]	31.0	10.5	n/a
	2008	17.2	15.3	15.8	20.5	9.4	13.8

[a]1999, [b]1983

Source: World Bank online data (www.worldbank.org)

Table 3: Malaysia: Educational Profile of Labour Force, 1990-2010 (%)

Highest level achieved	1990	2000	2005	2010
Primary	33.8	27.2	26.9	20.2
Lower & middle secondary	57.4	58.8	54.8	55.6
Tertiary	8.8	14	18.2	24.2
Total	100	100	100	100

Source: Department of Statistics, Labour Force Survey, 2011.

Table 4: ADF and PP tests

	ADF		PP	
	Levels	**First-Differenced**	**Levels**	**First-Differenced**
Y	-0.013	-0.829	-0.013	-0.829
K	-0.056	-1.044	-0.056	-1.044
HC	-0.001	-1.015	-0.001	-1.015
UL	-0.090	-2.122	-0.048	-1.052
FDI	-0.043	-0.723	0.019	-0.759
EXP	-0.014	-0.880	-0.014	-0.880

All data are at 1% significance level

Table 5: Johansen Cointegration Tests

	Trend and Intercept			
Hypothesized number of CE	λ Trace statistics	5% critical value	Λ Max statistics	5% critical value
None	135.497 *	95.753	41.527 *	40.077
At most 1	93.969 *	69.818	40.245 *	33.876
At most 2	53.724 *	47.856	22.697	27.584
At most 3	31.027 *	29.797	17.442	21.131
At most 4	13.584	15.494	9.157	14.264
At most 5	4.427 *	3.841	4.427*	3.841
* denotes significance at 5%				

Table 6: FDI, Human Capital and GDP Growth in Malaysia, 1980 - 2010

Variables	Coefficients					
	1	**2**	**3**	**4**	**5**	**6**
Constant	0.010	0.0207	0.017	0.010	0.009	0.004
K	0.164*			0.172*	0.165*	0.154*
	(0.017)			(0.018)	(0.017)	(0.016)
HC	0.208***	0.1374		0.287**	0.196***	0.255**
	(0.114)	(0.245)		(0.126)	(0.115)	(0.107)
UL	0.380***		0.866**		0.442**	0.414**
	(0.199)		(0.408)		(0.205)	(0.178)
FDI		0.0007	-0.001	0.000	-0.001	-0.002
		(0.003)	(0.003)	(0.001)	(0.001)	(0.001)
EXP						0.079**
						(0.035)
UHAT1(-1)	-0.492*	-0.146	-0.132	-0.481**	-0.562*	-0.875*
	(0.168)	(0.118)	(0.105)	(0.195)	(0.193)	(0.204)
R2	0.8157	0.0599	0.1644	0.7847	0.8179	0.8691
Adjusted R2	0.7862	-0.0485	0.0680	0.7502	0.7800	0.8349
S.E. of Regression	0.0078	0.0174	0.0164	0.0085	0.0079	0.0069
F-Statistic	27.6745	0.5528	1.7057	22.7798	21.5649	25.4589
DW Statistic	1.9684	1.5451	1.6331	1.7642	1.9971	1.9375

(1) The dependent variable is GDP growth.
(2) *, ** and *** indicate significance at 1%, 5% and 10% levels, respectively.
(3) Figures in parentheses are the standard error.

Table 7: FDI, Human Capital and Per Capita GDP Growth in Malaysia, 1980 – 2010

Variables	Coefficients				
	1	2	3	4	5
Constant	0.011	0.003	0.011	0.002	-0.002
k	0.168*	0.167*	0.167*	0.170*	0.159*
	(0.020)	(0.017)	(0.021)	(0.017)	(0.016)
HC		0.271**		0.284**	0.335*
		(0.107)		(0.109)	(0.111)
fdi			-0.001	-0.002	-0.002
			(0.002)	(0.002)	(0.002)
exp					0.068***
					(0.036)
UHAT1(-1)	-0.054***	-0.583*	-0.052	-0.640*	-0.825*
	(0.032)	(0.174)	(0.043)	(0.187)	(0.186)
R2	0.7287	0.8058	0.7167	0.8111	0.8503
Adjusted R2	0.7086	0.7834	0.6840	0.7809	0.8191
S.E. of Regression	0.0090	0.0077	0.0094	0.0078	0.0071
F-Statistic	36.2717	35.9714	21.9292	26.8453	27.2709
DW Statistic	2.3000	1.8074	2.2000	1.8463	1.9161

(1) The dependent variable is per capita GDP growth.
(2) *, ** and *** indicate significance at 1%, 5% and 10% levels, respectively.
(3) Figures in parentheses are the standard error.

Table 8: FDI, Human Capital and Technology in Malaysia, 1980 – 2010

Variables	Coefficients			
	1	2	3	4
Constant	-0.005	0.000	-0.006	-0.007
HC	0.157		0.164	0.192
	(0.113)		(0.115)	(0.134)
fdi		-0.001	-0.001	-0.001
		(0.002)	(0.002)	(0.002)
exp				0.017
				(0.041)
R2	0.646	0.039	0.734	0.797
Adjusted R2	0.311	0.316	0.048	0.264
S.E. of Regression	0.085	0.088	0.087	0.088
F-Statistic	19.337	01.097	10.705	7.508
DW Statistic	2.1429	2.3258	2.1911	2.2819

(1) The dependent variable TFP, or Technology assumed as the residual from the second regression model, equation 1.
(3) Figures in parentheses are the standard error.

Figure 1: Malaysia. Inflow of FDI, 1980 – 2010 (RM million)

Source: Department of Statistics, Malaysia