UNIVERSITY OF
STIRLING

# THE RETURNS TO EDUCATION IN MALAYSIA, 1995 – 2004

By

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# Abstract

Human capital development is a prerequisite for a knowledge-based economy and for sustaining economic growth. Capability and capacity in the management of new knowledge and technology is determined by the quality of human capital. With globalization, Malaysia faces ever increasing competition in trade and investment. Therefore, the workforce will have to be equipped with a strong base in education and training. Efforts should, therefore, be made to ensure that the education and training system has the capacity to enhance the quality of intellectual capital as well as expanding the human resource base.

In mainstream human capital theory, the basic principle is to measure the quality of human capital through some measure of educational achievement, such as years of schooling. It is generally assumed that more years in schooling improves the quality of human capital. Thus it is assumed by policy makers that an increased level of education will impact directly on labour market productivity. Concomitantly, policy makers argue that increasing the level of schooling will give an impact on wages. One of the obvious methods to assess the impact of investment in education is to calculate the rate of return to education. The overall impact of education on wages for society is described as the social rate of return and for the individual as the private rate of return. The major concern of this thesis is to assess the impact of investment in education on individuals. Thus I use a household income survey to estimate the private rate of return to Malaysian education from 1995 to 2004.

A recent important strand in human capital literature is concerned with the role of education in emerging economies. This study is not as well established as in developed economies. Malaysia, as one of the High-Performing Asian Economies

(HPAEs) over the past two decades, has experienced a steady growth with continuous improvement in the education system. Data and information collected on Malaysian education and earnings serve to provide an important indicator of the benefits from investment in education for this important economy. Previous data and analysis on returns were hampered by relatively few observations and other data inadequacies. This thesis offers estimates based on a consistent set of household income surveys from 1995 to 2004. Thus, the estimation is more consistent compared with previous findings. Moreover, this thesis estimates the returns using both a standard and an alternative approach, i.e. Instrumental Variable (IV) that has never been applied to the Malaysian data. This is important because the latter estimation not only reduces the potential bias but also shows the impact of school reform on the returns.

Additionally, returns to education using IV estimation are rarely compared between emerging economies and the developed countries. Such an analysis provides an indication of how important the human capital investment and educational reform have been at the current stage of development. Our results also provide new methodology for developing economies in estimating returns to education.

The standard approach to estimating returns is based on homogenous returns to education – everyone gets the same return to the same qualification. Our results from this homogenous returns model shows the private rate of return to education in Malaysia is about the world average. However, endogeneity in schooling, omitted variables and other factors, such as ability will produce potential bias in estimation. The heterogeneous returns model allows for varying returns across individuals. This thesis clarifies differences in returns to different individuals. The exogenous impact in the Malaysian education system, i.e. the schooling reform is used as an instrument. The results reveal that the returns from IV estimation were higher than the standard

approach. This result adds to literature by showing that OLS may underestimate the returns to education in the context of a developing country.

The literature on rates of return paints a complex picture of the theoretical frameworks, methods and even results of such studies. Many of the benefits of education are not easily measured and are often not even recognized by rate of return studies. It is important for rate of return studies to acknowledge the methodological limitations and explain that rates of return are only an imperfect proxy to education benefits, which should ideally be used in conjunction with other measures of educational results.

# Declaration

This thesis is submitted in fulfilment of requirements for the degree of Doctor of Philosophy (Economics) at the University of Stirling, Scotland, United Kingdom. I declare that this thesis is based on my original work except for quotations and citations which I have been duly acknowledge. I also declare that this thesis has not been previously or concurrently submitted, either in whole or part, for any other qualification at the University of Stirling or other institutions. I am responsible for any errors and omissions present in the thesis.

Signed

Ramlee Ismail

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# Table of Contents

# List of Tables

# List of Figures

# Abbreviations

| | |
|---|---|
| 2MP | Second Malaysian Plan 1971-1975 |
| 3MP | Third Malaysian Plan 1976-1980 |
| 4MP | Fourth Malaysian Plan 1981-1985 |
| 5MP | Fifth Malaysian Plan 1986-1990 |
| 6MP | Sixth Malaysian Plan 1991-1995 |
| 7MP | Seventh Malaysian Plan 1996-2000 |
| 8MP | Eighth Malaysian Plan 2001-2005 |
| 9MP | Ninth Malaysian Plan 2006-2010 |
| ADB | Asian Development Bank |
| ATE | Average Treatment Effect |
| ATNT | Average Treatment Effect on Non-Treated |
| ATT | Average Treatment Effect on Treated |
| DOS | Department of Statistics |
| EPU | Economic Planning Unit |
| HPAEs | High-Performing Asian Economies |
| HSE | Higher School Certificate |
| ICT | Information and Communication Technology |
| ISI | Import Substitution Industrialisation |
| LATE | Local Average Treatment Effect |
| LCE | Lower Secondary Examination |
| LFPR | Labour Force Participant Rate |
| MARA | *Majlis Amanah Rakyat* |
| MCE | Malaysian Certificate of Education |
| MEC | Malaysian Examination Council |

| | |
|---|---|
| MOE | Ministry of Education |
| MOF | Ministry of Finance |
| NAB | National Accreditation Board |
| NEP | New Economic Policy |
| NICs | Newly Industrialized Countries |
| NVP | National Vision Policy |
| OECD | Organization for Economic Co-operation and Development |
| OPP1 | First Outline Perspective Plan |
| OPP2 | Second Outline Perspective Plan |
| OPP3 | Third Outline Perspective Plan |
| PSD | Public Service Department |
| PURE | Public Finding and Privates Return to Education |
| RTE | Returns to Education |
| RTS | Returns to Schooling |

# CHAPTER 1 - INTRODUCTION

The economics of education caught the attention of many economists in early the 1960s. There was a great revitalization of interest in the concept of human capital - the idea that expenditure on education was a form of investment. Investment in education, just like investment in physical capital, increases the capacity of the nation. Investment in human capital improves the skill of the labour force, which in turn increases productivity. The economics of education seeks to quantify the benefits of education and to measure the contribution of education to economic growth. This new approach was considered to be the beginning of the development of an economic theory of education. Based on empirical research and empirical evidence this is new branch of economics (Blaug 1968) and has been described as "*the human investment revolution in economic thought*" by Bowman (1966).

Theories of economic growth, labour economics, and studies of the income distribution resulted from research into the economics of education (Woodwall 1972). Concern about the demand for education, the supply of educated manpower, and the efficiency of public expenditure as an objective of government policies contributed to a rapid growth in studies of the relationship between education and the economy. Blaug (1987, p.127) stated that '*the early 1970s witnessed a profound change in the dominant role of the economist in educational policy making*'. The rapid development in the economics of education has enabled us to understand several issues in human capital theory. Firstly, the role of education in economic development and its correlation with the economic growth. Secondly, the issue of financing education that relates to the cost and benefits. Finally, the role of educated manpower in economic

development and planning and its influence on the schooling system as well as the effect of education on income distribution.

The importance of education as a national investment and the question of how education should be financed was recognized and emphasized by earlier great classical economists such as Adam Smith, Alfred Marshall and John Stuart Mill. Adam Smith for instance, placed education at the fore of his thinking because it is the basis of good civil government and economic progress. This notion was also shared by Ricardo and Malthus who believed that education was a tool for inculcating habits (Woodhall 1987). However, Marshal, was closer to Smith's argument in 'The Principle of Economics' when he referred to education as a 'national investment' (Waizey 1968). From then on, the concept of economics of education and its relationship to economy was expanded rapidly as a new and interesting field of research by economists such as Becker, Schultz, Bowman and Mincer.

In Malaysia, human capital development is a prerequisite in the preparation of the country for a knowledge-based economy and sustaining economic growth. Capability and capacity in the management of new knowledge and technologies will be determined by the quality of its human capital. A competent and highly skilled labour force will be developed with strong ethical and moral values and commitment to excellence. With globalization, Malaysia will be facing more competition in trade and investment. Therefore, the workforce will have to be equipped with a strong base in education and training. It is also important to acquire a range of generic skills, such as communications and thinking abilities. In addition, a successful entry into the information age will enable the economy to take advantage of the opportunities arising from the information and technological revolution. However, the future will

depend on a dynamic and responsive education and training system to meet global changes. Education will be crucial in the creation of a knowledgeable manpower to support the new industries, economic activities, and to develop an information-rich society.

Human capital development will continue to remain a key strategy in ensuring that all Malaysians share in the nation's prosperity and develop a dynamic labour force that is globally competitive. The development of the human capital, in line with emerging technologies and globalization, will influence future growth trends in the demand for skills and expertise. It will create new economic opportunities that could be translated into income improvements for all Malaysians. Priority should, therefore, be given to increasing accessibility to quality education and training as well as to strengthening the human capital base to support the development of a knowledge-based economy during the National Vision Policy (NVP), 2001-2010.

The key to developing economic and social transformation mainly depends on the quality of human capital. Evidence from developed countries shows that this is a critical issue in the achievement of a better economic performance. In Malaysia, the education system focuses on a basic education in primary school and a wide opportunity in the next stage through regular, vocational and technical education schools. The third stage of education is more diversified. Human capital development has been the key thrust in economic and social policies for each five year development plan since 1970s. The further strengthening of Malaysia's human capital remains a major challenge in the 21$^{st}$ century in order to move away from the notion that Malaysia is a nation with a 'first class infrastructure, but third class mentality'. Hence, enhancing educational development is not only essential in meeting people's

basic rights but also in equipping the country to face future challenges. Therefore, the knowledge, innovation and, the quality of the nation's human capital will be the key determinants of Malaysia's future economic growth and development.

The transformation of the economy has increased demand for technological skills and expertise. The labour force should also be equipped with implied knowledge and a high level of thinking skills. Efforts should therefore be made to ensure that the education and training system has the capacity to enhance the quality of intellectual capital as well as expanding the human resource base. The development of human and intellectual capital relies on adequate and the efficient education and training. Moreover, it is important to produce and support the demands for not only skilled-workers but also for a labour resources that is, agile, flexible, competitive and mobile. The quality of the human capital can be measured in many ways, including expenditure on education and training, enrolment size and the output of higher education.

In human capital theory, the basic principle is to measure the quality of human capital through use of schooling as the parameter. A higher average number of years of schooling of the population give a higher quality of human capital. Indeed, increasing the level of the education received is the determining factor in the success of human capital policies. It is assumed to impact directly on labour market productivity. Concomitantly, most policy makers argue that increasing the level of schooling will have an impact on wages. Put simply, incomes would increase and inequality could be reduced. It is important to measure the impact of investment in education on its recipients and on the Malaysian economy, especially against the background of significant public investment in the education sector. One of the

methods used to assess the impact of investment in education is to calculate the rate of return. The causal effect of education on wages for the public is known as the social rate of return and for the individuals it is known as the private rate of return to education. However, the major concern of this thesis is the impacts of investment in education to individuals. In order to be consistent with the wide body of literature, the term of "private rate of return to education (RTE)" is used. It refers to the causal effect of education on earnings. Even though one could argue that, for the policy markers the social return is more important than the private rate of return, it is widely accepted that the impact of education on individuals is a part of the policy implication. The private rate of return to education or schooling, therefore, is the focus of this thesis and this reflects the dominance of the concept of returns to education in human capital theory.

This thesis is divided into eight chapters and is organized as follows. Chapter 1 provides an introduction, summarizing the whole thesis. Within this chapter, I highlight the essential content of each chapter.

Chapter 2 outlines the basic framework of the Malaysian economy and its achievements in the past four decades. It explains the function of education in the economic and social policies that stemmed from the New Economic Policy (NEP) under the Second Malaysian Plan, 1971-1975. The objectives of the NEP were to achieve national integration and unity and these were formulated within the context of a two-pronged strategy. The first was to reduce and eventually eradicate poverty by raising income levels and increasing employment opportunities for all Malaysians, irrespective of race. The second was intended to accelerate the process of restructuring Malaysian society to correct economic imbalances so as to reduce and

eventually eliminate the identification of race with economic function. The process of reducing poverty and restructuring society involves the modernization of rural life and the rapid and balanced growth of urban activities. Education is the key thrust to achieving these objectives. Also in this chapter, I highlight the role of government in providing the allocation of the annual budget for education. The allocation of expenditure to the education sector, relative to other sectors shows that education has been a top priority in economic and social development. Thus, it has become our aim and objective to estimate the benefits to the people. The main purpose of the thesis is to estimate the private rate of return to education. In addition, it also examines the effect of schooling on earnings differentials.

The development of the Malaysian education system in the pre- and post-independence era is described in Chapter 3. The policy and school reforms within this period were reflected in the changing role of education in economic and social development contexts. As in other countries, education in Malaysia is divided into three stages. These are primary, secondary and tertiary levels. The education development expenditure shows that tertiary education has received a higher portion of allocation in each five year plan since 1991. Infrastructures, facilities, and the educational delivery system have been very significantly expanded. Enrolment and output at different levels were increased, especially at the higher level of education. The strengthening of the human capital will continue to meet the demand for educated manpower after the economic transformation from secondary to the knowledge-based economy. The education and training system has been designed to fulfil the needs of economic and social policy. In this chapter, I also highlight the future issues and challenges in education.

Chapter 4 describes the related concepts and issues in human capital theory. It focuses on the economics of education, especially the concept of education as an investment. Therefore, the discussion consists of costs and benefits from education. Costs of education are both direct and indirect and the benefits are derived by individuals and by the society at large. This chapter discusses the emergence of the concept rate of returns to investment in education. The relationship between schooling and earnings is important to the theory. I describe how the earnings function was derived to estimate the returns to education in Malaysia.

Chapter 5 contains a survey of the literature in which returns to education are estimated using Ordinary Least Square (OLS). The evolution of the literature could be divided into three fundamental stages. The first stage arises from the seminal work on schooling and earnings of Becker (1964) and of Mincer (1974). Nowadays it is best known for developing a return to education equation that has dominated the literature in labour economics since 1970s. The schooling coefficient was widely accepted as the private rate of return to schooling. The second stage of the literature appeared after it was appreciated that schooling decisions were potentially affected by unobserved individuals' skill, tastes or learning environment. For example, family background effects on schooling choices may also correlate with earnings. The literature had been dominated completely by studies using an alternative approach, i.e. the Instrumental Variable (IV). The third stage of literature highlights heterogeneity in returns to education. That is, schooling decisions differ across individuals. More advanced techniques, such as "propensity matching methods and control function" were introduced in the literature. The term of years of schooling has also been used as "treated" in order to separate the different effects of schooling, either due to the individual's schooling choice or the impact of certain policies or unobserved factors.

However, at this stage, the literature is limited to developed countries, because their data on earnings and information related to education are very rich.

Chapter 6 – The empirical model of this thesis is based on the earnings specification to estimate the private rate of return to education. The basic model uses a standard approach in which the log of wages is the dependent variable, while the basic independent variable is years of schooling, experience and experience squared. The augmented model uses dummies for certificates or level of schooling, and other controlling variables to capture the impact of schooling on earnings differentials. These models are estimates using Ordinary Least Squares (OLS). The second approach was Instrumental Variable (IV), where an exogenous variable is used to alternate the years of schooling. The school reform in the Malaysian education system, whereby the English language was substituted by the Malaysian language is the selected instrument in the IV approach. This approach reduces potential bias in estimation. It also captures the impact of schooling on those who were influenced by the policy reforms. On top of that, the instrumental variable approach will provide the evidence of heterogeneous returns to schooling. In this chapter, I also put forward the extra model which will be used to investigate the incidence of over and under-education.

The data, variables and descriptive statistics are explained in the last section of this chapter. This study uses the cross sectional data from the household income survey, known as Malaysian Household Income Survey (HIS) from 1995 to 2004. The data is provided by Economic Planning Unit (EPU) in Malaysia. The sample of HIS1995 contains 14,726 observations or approximately 39.21 percent of the household heads in 1995. Meanwhile, the samples of HIS2002 and 2004 include

approximately 35.29 and 36.98 percent of the total household heads, respectively. For the purpose of this study, HIS is the best source from which to obtain data about earnings and education in a wide coverage. It consists of vital items for income and the highest level of formal education which is indicated by the level of schooling. Another schooling variable is the highest certificates obtained by the samples.

Chapter 7 describes the result of this study. The rate of return to education in Malaysia based on the homogenous return model is almost level with the world average and slightly higher than the Asian average. Substantially, the private rate of return to schooling for Malaysia is quite stable and declined by only half a percent after a decade. The wage gap between genders narrowed, but widened between rural and urban areas. Earning differentials between employees and self-employed contracted after a decade. Among the regions of Malaysia, this study found that the wage gaps are narrower within Peninsular Malaysia, but wider in the regions of Sabah and Sarawak. Meanwhile, marginal gross return to schooling by qualification reveals a lower return for the lower level of qualification between 1995 and 2004. For all levels of qualification, those who obtained pre-university and university levels enjoyed the highest returns. The results of estimation by years of schooling completed suggest signs of credentialism in the Malaysian labour market. The important result shown in this thesis, however, is that the returns to education are heterogeneous. Every person gets a different return. The results of IV estimation are higher than is indicated by the OLS. The higher return reveals the impact of the policy reform in the Malaysian education system. The change of the medium of instruction from English to the Malaysian language in government and government-aided schools in 1970 has had a significant impact on those affected by the policy. The estimation using instrumental variable with Malaysian data has added new evidence to the literature. It

supported the findings of the existing literature that estimates which apply the OLS to the earnings equation underestimate the rate of return to education. In our case, it refers to the Local Average Treatment Effect.

The conclusions of the thesis are summarized in the final chapter. The private rate of returns to education in Malaysia is not much different from the world average. The declining trends of returns to education after one decade are also in line with the average of world decline return. Furthermore, the estimates using IV is higher than estimate by OLS, which was found everywhere else. The main issue in this chapter is the impact of the study on the policy implications. I suggest some issues that are important, such as the returns to investment up to pre-university and higher education level are higher than secondary or primary education. The increasing wage gap between rural and urban areas is partly explained by educational provision, which means schooling in rural areas is lower than those in the urban. The most developed states and regions also showed a higher average of schooling than the less developed states. Consequently, they enjoyed higher returns to schooling on average. Even if they have the same qualification the individuals in the urban sector have higher return due to the labour market segmentation. In this chapter, I highlight also the opportunity for the further research. The main intention is to further investigate the rate of return to education in Malaysia by using the different data. The completed information on schooling, wages and true experience could be derived from the education department for each teacher and those in the education office. It gives us information that could be used to examine the measurement error in schooling that led to the bias estimation in OLS. However, the result could be limited to the private rate of return to education sector.

# CHAPTER 2 - ECONOMIC DEVELOPMENT AND EDUCATION

## 2.1 Introduction

Malaysia is a multicultural country that has been enjoying economic prosperity and social harmony for the past three decades[1]. This country has managed to reduce poverty drastically and lessen income inequality while achieving a rapid economic growth. Even though Malaysia lags behind the Asian Four Tigers, (Japan, South Korea, Singapore and Taiwan) its economic achievement and political stability of recent years have provided a strong chance to reach the vision of becoming a developed country in the year 2020. Malaysian economics, in particular the performance since independence will be discussed briefly in the first section of this chapter. The main focus is the economic transformation from a primary-based economy to one highly dependent on the modern sector.

The impact of the various successful development plans has enabled the country to achieve a higher per capita income and sustainable growth. In addition, the transformation from agricultural economy to manufacturing and services has given a great impact to the labour market both directly and indirectly. The emergence of the industrialization process has very significantly expanded employment and has given a wide range of opportunities for labour to increase real income. At the same time, with the human capital already high as compared to other developing countries in the

[1] Malaysia, which consists of Peninsular, Sabah and Sarawak, is located at Southeast Asia with the population of 27.17 millions people in 2007. Malaysia comprises of thirteen states and three Federal Territories, i.e. Kuala Lumpur, established in 1974, Labuan (1984) and Putrajaya (2001). By 2006, the *Bumiputra* or 'sons of the soil' accommodate 65 percent of the total population, while Chinese and Indian's shares are 26 percent and 8 percent respectively. While share of the other race is only 1 percent.

1960s, the country remains focused on educational spending, especially in providing a free education at the primary levels. The country has increased the availability and choices of secondary education through technical and vocational schools. The objectives are to supply more semi-skilled workers, and to meet an increasing demand in secondary sectors. Tertiary education was continuously developed to meet the demand for higher education. To sum up, education is a top priority in line with the development process in order to derive an economic and social fairness.

The structure of Malaysian economy has been changed gradually. It has moved from primary-based economy to the manufacturing and services, and recently towards a knowledge-based economy. In the early years of independence, the agricultural sector was dominant in generating national income. The impacts of economic liberalisation and industrialization in late 1980s have seen a high inflow of foreign investment. As a result, the manufacturing sector expanded rapidly and generated almost one quarter of national income. The government has given a high priority to industrialization progress and supports developed industrial areas such as the massive infrastructure projects, and free trade zones. The economic structural change has impacted strongly on the labour market in Malaysia. Increasing demands for semi and skilled workers influenced the function of education. The traditional roles of education to provide a universal education to reduce the incidence of poverty and promote national unity remain important. Economic transition, however, put more pressure on education programmes and training to supply adequate skilled workers.

This chapter is organised as follows. The second section discusses the Malaysian economic performance and development plans. It will focus mainly on New Economic Policy (NEP) 1970-1990, which can be regarded as the foundation for

Malaysia's present development objectives. The background and key thrust in the New Economic Policy will be discussed in detail in this chapter. In the next section the role of education as key factor in solving the traditional problems in the developing countries is discussed. The impact of education is believed to bring benefits to the people. Therefore, in the last section of this chapter the objectives of this thesis are described. It is to estimate the benefits on investment in education, i.e. the private rate of return to education.

## 2.2 Macroeconomic Performance

The World Bank (1993) classified Malaysia as one of the High-Performing Asian Economies (HPAEs) due to the country's rapid economic growth since 1960s with the real income per capita having been increased dramatically[2]. This has manifested itself, in the past, by the fact that the proportions of people living in absolute poverty have declined drastically. Learning from the past, the development policy in Malaysia was based on equitable growth, or growth with equity with respect to ethnicity and plurality. NEP was planned to achieve national integration with two-prong strategies, which are to reduce poverty and to correct economic imbalance.

Two major challenges for Malaysia after independence in 1957 were, firstly, to reduce and eventually to eradicate poverty; and secondly to restructure the society. The latter challenge is more difficult and complex. The objective was to correct economic imbalances so as to reduce and eventually eliminate the identification of

[2] World Bank (1993) had recognized Japan, The Republic of Korea, Singapore and Taiwan as four Asian Tigers and recently, China with it fast economic growth have joined the ranks of the high-income economies. Meanwhile, Malaysia, Indonesia and Thailand are the Newly Industrialized Countries (NICs). Four tigers plus China and NICs are known as High-Performing Asian Economies (HPAEs) in Asia.

race with economic function. This task involves modernisation of rural life with a rapid and balanced growth of urban and rural areas. After three decades, the incidence of poverty is reduced by a large portion and income inequality is remarkably narrow. Even though some numerical objectives were not achieved within the target period, such as a share ownership and income distribution, most of the macroeconomic indicators indicate real achievement.

Overall, the performance of the Malaysian economy during the first and second long-term plans has been highly satisfactory. Real Gross Domestic Product (GDP) grew at an average annual rate of 6.7 percent in 1971 to 1990 and 7.0 percent during the second long-term economic plan (EPU, OPP3 2001, p. 34). In monetary terms, the real GDP at MYR21.4 billions in 1970 was increased to MYR79.1 billions (in 1978 prices) at the end of NEP. In fact, the figure increased to MRY209.3 billions at the end of New Development Policy (NDP) 1990-2000. It was increased almost threefold (in the prices 1978) compared to the end of NEP period (EPU, 8MP 2001, p. 26). Per capita income was doubled from MYR6,298 to MYR13,359 at the end of The Second Outline Perspective Plan (OPP2), 1991-2000, which was increased at an average 7.8 percent per annum. During the Eight Plan period (2001-2006), gross domestic product in real terms grew at an average rate of 4.5 percent per annum. Per capita GNP in current terms increased by 5.7 per annum to RM17,687 in 2005 (EPU, 9MP 2006).

Several major world economic disturbances periodically adversely affected the rapid growth. The first oil crisis in 1973-1974, second oil crisis 1978-1979, global recession in 1985-1986 and recently the Asian financial crisis 1997-1999. In 1985, for example, the nation's growth path showed a negative figure. It resulted

particularly from the prolonged recession of the world economy following the second oil shock. The economy, however, recovered from 1986 onwards. It was mainly due to the adjustment efforts undertaken by the government and improvement of the world economy. Unfortunately, the Asian financial crisis in the late 1990s had a severe impact on the economic growth. The crisis reversed the long trend of reduction of poverty, estimated to have risen to approximately 7.6 percent of Malaysians in 1998. The majority of the new poor were expected to be from urban areas where the problem of retrenchment and unemployment was greater, especially among women (ADB 1999). Nevertheless, the government reacted automatically with economic management and recovery plans, for example, pegged the ringgit at 3.80 to the dollar, cut interest rates, imposed tight limits on transferring capital abroad by Malaysian resident and froze the repatriation of foreign portfolio capital for twelve months (Stiglitz 2002). As a result, this enabled the country to recover well, compared to other countries in the region.

As indicated in Table 2.1, Malaysian macroeconomic indicators displayed an economic transition from high dependence on natural resources to a strong performance in the manufacturing and services sectors. Over the OPP1 period (1971-1990), the primary sector (agriculture and mining) continued to be important to the economy. However, its share is anticipated to decline further at the end of the OPP3 (2001-2010). The share of the agriculture sector in GDP was 30.8 percent in year 1970, then, fell to 8.2 percent in 2005. In contrast, the share of GDP of the secondary sector, especially manufacturing, expanded from 13.4 percent in 1970 to 19.7 and 32.4 percent in 1990 and 2005, respectively.

**Table 2.1: The Selected Macroeconomic Indicators (%), Malaysia 1970-2005**

| Year | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 1997 | 2000 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Real GDP Growth** | **6.5** | **3.5** | **7.4** | **-1.0** | **11.5** | **9.4** | **7.7** | **8.3** | **6.0** |
| **Share in GDP** | | | | | | | | | |
| Agriculture | 30.8 | 27.2 | 22.2 | 20.8 | 18.7 | 15.5 | 11.9 | 8.9 | 8.2 |
| Manufacturing | 13.4 | 13.4 | 16.4 | 20.5 | 19.7 | 20.7 | 32.4 | 31.9 | 31.4 |
| Services | 45.6 | 47.5 | 48.2 | 44.3 | 47.4 | 44.3 | 44.8 | 53.9 | 58.1 |
| **Saving and Investment Ratio** | | | | | | | | | |
| Saving | 21.6 | 19.2 | 27.2 | 29.3 | 30.4 | 35.3 | 39.4 | 40.1 | 37.1 |
| Investment | 21.4 | 24.2 | 29.6 | 32.4 | 32.7 | 45.7 | 44.8 | 29.8 | 20.7 |
| Inflation | 1.9 | 2.1 | 7.1 | 0.4 | 3.1 | 5.3 | 2.6 | 1.6 | 3.0 |
| Current Account (% from GNP) | 0.02 | -1.6 | -3.5 | -2.1 | -4.8 | -1.0 | -6.3 | 10.3 | 16.4 |
| Openness[1] | 77.3 | 82.2 | 103.4 | 95.1 | 143.6 | 182.2 | 169.2 | 217.9 | 204.6 |
| Exchange Rate (MYR/USD)[2] | 3.08 | 2.26 | 2.28 | 2.58 | 2.72 | 2.54 | 2.48 | 3.80 | 3.80 |
| **Labour Force (Millions)** | **4.00** | **4.57** | **5.12** | **6.04** | **7.04** | **8.25** | **9.04** | **9.6** | **10.9** |
| **Participation Rates** | | | | | | | | | |
| Overall | 61.3 | 62.8 | 65.3 | 65.8 | 66.5 | 64.5 | 67.0 | 65.7 | 66.1 |
| Male | 81.8 | 83.0 | 87.6 | 87.4 | 85.7 | 83.8 | 85.7 | 85.7 | 85.2 |
| Female | 32.0 | 36.0 | 43.1 | 44.3 | 47.3 | 44.3 | 47.4 | 44.8 | 45.6 |
| Unemployment | 6.0[3] | 4.7[3] | 5.6 | 6.9 | 5.1 | 3.1 | 3.1 | 3.1 | 3.5 |

*Sources:* *Yussof, et al. 2000, Table 2.1, p.7.; Economics Report, Ministry of Finance, various issues; Malaysian Plans, various issues, ILO, 1970 & 1975.*

Notes: [1] The Openness was calculated by (Export + Import)/GNP.
[2] The exchange rate was fixed at USD1.00=MYR3.80 in 1997.
[3] Peninsular only.

The manufacturing sector overtook the share of agriculture in Malaysian GDP in 1987 and kept increasing gradually. The share of the services in GDP is higher compared to the other sectors but the growth did not expand as quickly as the manufacturing sector. This indicates that the economy still depends too much on the import of foreign services, such as freight, insurance and consultancy services (Yussof et al. 2000). At the same time, the trade balance could not compensate the service balance, causing a continuous deficit in the current account. However, other services such as tourism-related services, business, and technical and consultancy services were gradually established as new sources of growth.

Table 2.1 also depicts that Malaysia has undergone a wider in saving-investment gap since the 1970s. As a result the internal finances were not enough to support the requirement for economic development. However, this country has never

been in serious foreign debt so far. In fact, national saving was higher than investment in the year 2000. During the Ninth Malaysian Plan period, the high level of savings was maintained at an average 36.3 percent to GNP (EPU, 9MP 2006). It enabled the country to finance its economic growth from domestic sources. Investment as a percentage of GNP declined from 29.8 percent in 2000 to 20.7 percent in 2005, resulting in a surplus resource balance at 16.4 percent to GNP in 2005. In terms of consumption and expenditure by both private and public sectors, there has been gradual growth over the period of 1970 to 2005 despite the global economic turmoil in the mid-1980s and late 1990s which had slightly decreased the growth rate. During the period of 1971 to 2005, private and public investment expenditure fluctuated, in which private investment declined dramatically after the financial crisis. However, public investment to some extent has managed to offset the decline and played a crucial role in generating the economic growth. For example, while the private investment had a negative growth, public investment grew from 6.7 to 9.8 percent in 1996-2000 and 2001-05 respectively (EPU, 9MP 2006).

Besides the successful economic and social policies, progress remains under the shadow of the problem of how to divide the "Malaysian cake" fairly. The background of economic and social policy of this country is heavily influenced by steps taken since 1970s. The challenge of a multi-ethnic society with marked imbalances between the racial groups, rural or urban population as well as poverty, are the major factors influencing any policy in the past and the future. In order to accomplish and maintain the economic progress and political stability, Malaysia has to be able to overcome these challenges.

## 2.3 The Transformation of Malaysian Economy

Prior to 1970, the Malaysian economy was based on the primary sector. But it had all the characteristics required for a rapid and sustained growth from the platform of a well-developed infrastructure in the past colonial era. An efficient administrative mechanism enabled the country to become the world's largest producer for tin and rubber which contributed to nearly 70 percent of the total earnings, 28 percent of the government's revenue and covered 30 percent of employment (Anand 1983). Abundance of natural sources has provided great opportunities for the country to progress in its development and increase its per capita income since independence from British in 1957.

The development programmes took into consideration the country's ethnic and cultural diversity in order to sustain the political stability and to reduce geographical inequalities along with economic progress[3]. This is due to differences in interest which emerged between the three major ethnic groups before the transfer of power from the British. The basic differences were the political and economic power, with the Malays dominating the former and the Chinese dominating most of the latter. An understanding between these ethnic groups is referred to as "the social contract"; the non-Malays were granted the citizenship rights and freedom to pursue their economic objectives without interference. In return, the Malays became entitled to certain privileges, such as land ownership, licences and permits[4].

[3] During the mid nineteenth century, a multiracial society in Malaysia was begun with a large scale of migration into Peninsular Malaysia by Chinese and Indians. This happened during the period of British colonists expanding their rule over the whole Peninsular Malaysia. The demand for labor in new economic activities, i.e. rubber and tin mining kept the migrant flowing because the indigenous Malays were satisfied in the subsistence sector of paddy at that time. The total number of migrant became almost half of the entire population in early 1930s. See, details in Anand (1983).

[4] The privileges for the Malays and natives people in Malaysian Constitution were described in details in Article number 153.

Generally, this basic concept of the social contract at the time of independence was understood and accepted and it is reflected in the country's constitution. The constitution takes into account the multiracial nature of the society and the differences in economic status of the Malays and the non-Malay communities. A balance is required based on divisions of responsibilities and functions: the economic prominence of the non-Malays was balanced by the political supremacy of the Malays. While the laissez-faire environment has allowed the continuation of non-Malay predominance in commercial and industrial spheres, the constitution has protected the political supremacy of the Malays by giving them preferential access to the civil service and by granting certain rights to Malay rulers. Unfortunately, the economic and political differences between races widened after one decade of independence. Experience from the race riot on May 13$^{th}$ 1969 after the unexpected result of general election along with economic imbalance, poverty and tension between races became an enormous lesson for the development of economic and political policies in the future. Starting from that point, planners and policy makers began to recognise that short and long-term development strategies could not be achieved by economics alone. Policy makers needed to ensure that growth with equity which involved social elements become the thrust of the growth's path.

The Malaysian economy in the early years of independence was primary based on commodities with rubber and tin providing the major contribution for the GDP. Economic progress driven by the private sector was highly dependent on foreign trade to generate foreign exchange income to fund the country's development. At the same time, the government attempted to diversify and modernise agriculture, emphasizing the industrial resources based within rubber and tin. The first economic

transformation was the agricultural diversification and primary-based industrialization in the early 1970s.

The second economic transition in Malaysia took place in the late 1970s and early 80s after the country experienced a high and sustained growth. The implementation of the NEP became the trade mark of the break point in the development plan. During the era of 1980s to 1990s, economic structural adjustment with liberalization, improved investment policies and incentives to provide a better economic environment for the private sector gave rise to economic growth. The government undertook several administrative and institutional reforms in order to enhance the efficiency of the public sector. The government also started to privatise the activities, agencies and enterprises that belonged to the country. The manufacturing sector became a major component in GDP with the fastest growth at 10.4 percent per annum and overtook the agriculture figures in 1987, for the very first time.

The nineties started with the declaration of Vision 2020 towards a developed nation in the year 2020. It was a challenging decade for human resource development. This is because the economic transformation towards greater industrialization depends not only on capital resources and technological development, but also on the quality of available human resources. The task of creating and nurturing such manpower will depend on a pragmatic education and training delivery system that is sensitive to future changes, the needs of the market. The education system was aimed at producing quality and skilled manpower that would make Malaysia more competitive in the region. The new dimensions also consisted of emphasis on employment creation, eradication of hardcore poverty, and to promoting more participation from

private sectors. The National Vision Policy (NVP) was formulated in the beginning of the new millennium. It incorporated the key strategies of the NEP and the NDP, which emphasizes balanced development. The new and important policy thrust is developing Malaysia into a knowledge-based society.

## 2.4 Structural Change: Demand for and Supply of Labour

Economic development and sectoral change from primary based economics towards modern diversified sectors required change in demand and supply of labour. Demand for skilled and educated workers increased to fill the needs of new sectors. After the manufacturing and service sectors became the main engine of growth in Malaysia, the quantity and quality of the labour force were further enhanced in terms of readiness, ingenuity, innovation and capacity to absorb and adapt to the changes. In addition, the supplies of labour had to provide effective support to growth.

The labour composition changes in Malaysia started in the mid-19$^{th}$ century, under the British rule. The development of tin mining in the country brought large-scale migration from southern China. A little later, the invention of the automobile in the world market had accelerated the demand for the natural rubber. Apparently, the opening and increasing rubber plantations due to the high demand of rubber in the world market led to importation of contract labourers from southern India (Snograss 1996). Migration from both sources continued until the late 1930s when the Japanese occupied the country. However, migration gradually reduced the indigenous Malay to minority status and the country started to become a multiethnic society. Simultaneously, occupational patterns in the country, strongly marked by ethnicity,

began and the trend continued until the emergence of "identification of race by economic function".

Structural changes from agricultural based economics to the modern sector had begun in the 1950s after a massive growth of industrialisation. The main objective in the industrialisation strategy was not solely to accelerate economic growth, but also to modernise and urbanise the rural areas under the socio-economic restructuring of society. The first phase of industrialisation, called the Import Substitution Industrialisation (ISI) covered the period 1958-1970, followed by the second phase of industrialisation after 1970. In the second phase, the country moved aggressively into an export-oriented (EO) strategy to attract foreign investors involved in labour intensive manufacturing[5]. That strategy became successful and in the mid 1980s, turned the country into the largest exporter of semi-conductors and electronics.

Industrialisation had a great impact on the ethnic restructuring policy in which a large number of Malays moved from the rural settlement to urban areas. During the period of 1970-80 of 2.4 million people migrating within Peninsular Malaysia, two thirds were Malay and female migrants were almost equal in number to their male counterparts[6]. This phenomenon was due to the high demand of labour which reflected the strong growth of labour intensive industries, such as electronics, garments and textiles. Rajah (2002) reported that employment in export-oriented (EO) manufacturing was 72.1 percent in 1971 and increased to 78.1 in 1997. Meanwhile,

[5] The export-oriented strategy can be divided into two stages. The first stage covered the period of 1980-85 and the second stage referred to the period of 1985-2000 after the implementation of the Industrial Master Plan 1986.

[6] The impact of modernism in agriculture and new land development brought a large scale of migration to rural areas. In 1981-90, nearly 0.8 millions hectares were developed by several agencies such as Federal Land Consolidation and Rehabilitation Authority (FELCRA), Federal Land Development Authority (FELDA), Rubber Industries Smallholders Development Authority (RISDA) and State Agencies. These agencies involved in rubber, palm oil and cocoa plantation under the eradication of rural poverty programs.

average annual growth of labour productivity, which was 12.5 percent during the period 1971-79, declined sharply to 3.9 percent within 1979-85. The average annual growth of labour productivity was -7.0 percent during the period 1985-90 but increased dramatically to 19.1 percent in the period 1990-1997. Overall, the average annual growth of labour productivity increased by about 7.4 percent from 1985 to 1997[7]. However, the emergence of labour intensive industries only created a secondary labour market, dominated by unskilled or semi-skilled workers with low wages, and contributed to inter-sectoral transference of poverty (Mehmet 1988). It also contributed to the increased incidence of females in the workplace.

The early economic transformation saw changes in the labour composition. In 1980, the number of persons employed in agriculture were 1.91 million (Hashim 1997), declining to 1.29 million in 2004 (EPU, Malaysia 2004). On the other hand, the number of persons employed in manufacturing increased from 0.755 million to 2.18 million during the same period. The boost in manufacturing in early the 1990s created a stronger demand for labour, which led to serious labour shortages especially in skilled and semi-skilled workers. The government allowed the import of foreign unskilled workers on a selective basis to absorb the surplus of labour demand, particularly in the manufacturing and construction sectors. Consequently, foreign workers with work permits formed 9.5 percent of the labour force in 2003[8].

During the period of 1991 to 2003, employment opportunities expanded with an average annual growth rate of around 3.3 percent. Meanwhile, the labour force

[7] For details, see Rajah 2002, Table 10 and 11, p. 29.

[8] The ratio of foreign workers to local labour increased from 9.3:100 in 2000 to 11.7:100 in 2003. The percentage of the foreign workers percent involved in manufacturing sector was 31.5, 29.3 percent in plantation, 6.7 percent in services and 18.9 percent in domestic maids. Meanwhile, highly skilled foreign workers or Expatriates were accounted as 9.7 percent of foreign labour and involved in a higher level of occupation, such as managers, consultants, lecturers, engineers and trainers.

participant rate increased at an average of 3.1 or 3.2 percent per annum, which meant that the demand for labour grew faster than the growth of labour force. Therefore, the unemployment rate remained low at 3.1 percent at the end of the period. This period also witnessed a structural change in employment because of the increasing new technology and capital intensive manufacturing. The higher demand for skilled and educated workers was due to the very significant growth of occupations in the professional and technical, managerial and administrative categories. These created 28.8 percent of the new jobs during the period of 1990 to 2000 (EPU, Malaysia 2001a). Within the same period, the labour productivity[9] rate was 3.6 percent per annum and was higher than the overall increase of wages, which was 1.5 percent per annum. Overall, the quality of labour greatly improved when the proportion of labour force with tertiary education, technical and vocational training and secondary education increased by about 4 percent per annum from 2000 to 2003 respectively[10].

Since human resource was the key factor of the economic development, the government undertook appropriate efforts through various strategies and programmes to increase the supply of highly skilled and knowledgeable workers with the expansion of education and training. The education system was restructured and reengineered to enable students to acquire a higher level of tacit and implicit knowledge, critical thinking and entrepreneurial skills by improving the curriculum, quality and delivery of teaching. Training centres were developed by involving the private sector to explore the multi-disciplines and new knowledge. Therefore, education policies and facilities kept growing to impart skills and knowledge not only

[9] Labour productivity was measured by Growth Domestic Product (GDP) divided by the total number of workers, i.e. GDP per worker.

[10] The proportion of labour force with tertiary education increased from 13.9 percent in 2000 to 17.1 percent in 2003. Meanwhile, the labour force with the secondary education in 2003 was 56.2 percent (EPU, Mid-term Review of 8MP 2003).

in the common school but through numerous vocational and technical educational centres in order to meet manpower requirement effectively. These centres also served to enhance the productivity of the labour force.

## 2.5 Education

Education is a basic need and human right. It also gives people choices regarding the kind of lives that they wish to lead. In 1990, "World Conference on Education for All" at Jomtien, Thailand recognised that education should be a priority with minimal standards at primary education in each country. United Nation (2000) made the declaration that education is the second goal in the Millennium Development Goals (MDGs) after the elimination of extreme poverty and hunger, with the theme "Achieve Universal Primary Education" in order to achieve the target by 2015, where children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. According to the report from the United Nation (2005), in five regions, 90 percent of children or more are enrolled in primary schools although maintaining these high levels - and reaching the remaining few who are out of school - has sometimes been difficult. For example, Sub-Saharan Africa has made tremendous progress after 15 years of commitment to the declaration, but still has over a third of its children out of school. In five African countries, less than half the children of primary school age are enrolled. In Southern Asia, Oceania and Western Asia, enrolment is also lagging, with about 20 percent of children out of school.

## 2.6 Education in Economic and Social Context

The simple explanation of the direct impact from education to the economics and socials context in which education will provide economic benefits (Hanushek 2005; Snograss 1980) builds strong societies and polities, and improved health (Cohen 1995; Cohen & Bloom 2005). It also has been recognised that education is strongly related to achieving greater social and political equity. The increased number of skilled workers through education and training would increase income per capita, reduce the incidence of poverty and, finally reduce inequality between young and old, male and female, rich and poor. The quality of human capital depends on the education and training of the workers. Those who completed higher level of schooling and obtained higher qualifications would earn more than the people with less education.

Many papers have explained that schooling opportunities are not only affected by "free education" provided by the government but suggested that family background is also a major factor contributing to schooling decisions[11]. Parents' education, income level, status and factors associated with family background have affected the length and quality of schooling for their children. High-income families have more opportunities to obtain education through tuition, extra classes, and better environmental and education facilities. In contrast, poor families will require free education that is provided by the state but they still may not participate because they cannot afford to raise extra expenses in education such as transportation, non-tuition fees, school uniforms and etc. It would be expected that the demand for education would be inversely related to these direct and indirect costs (opportunity cost being at

[11] For examples UNESCO (1968); Robinson & Vaizey (1966); Mazumdar (1981) and Psacharopoulos & Woodhall (1985).

school). The higher the cost of schooling, the lower would be the demand for schooling, everything being equal.

For poor people, therefore, direct and indirect primary costs of schooling often represent a major burden and real financial constraint even in some countries where the tuition fees are free. In Africa for example, the average, cost of sending a child to primary school is typically in excess of 20 percent of per capita income (Todaro 1990). Furthermore, Das et al. (2004) found that the households' educational expenditures showed non-fee expenditures by the family are seven times the corresponding expenditure on education fees in the African region. In Thailand, households spent on average 695 baths per year to all non-tuition items (Tsang & Kidchanpansich 1992). In Chile, Tsang (2002) reported the average of private costs of primary school under public administration was about 173,575 pesos. In Malaysia, the costs of primary are approximately half of the costs of secondary schooling (UNESCO 2002).

Where educational expenditure of money and time are made, productivity will improve. A longer year of schooling results in more productive and the opportunity of gaining higher pay. In a social context, the intended role of education in Malaysia is to promote national integration and unity. It is important to ensure political stability and a harmonized society in the multiracial country. The education system was restructured and reengineered gradually. It was to enable the society to use a common system. Priority was given to using the national language by all Malaysians as a fundamental for national unity. More than that, educational reform stresses the importance of national integration with the creation of a common curriculum, national schools and the implementation of a common medium of instruction. It was also to

instil values in line with Malaysian national ideology (EPU, 1976, 1981 & 1986). At the same time, education was a tool of poverty eradication by raising income levels and increasing employment opportunities for all Malaysians, irrespective of race. These strategies are described in the Malaysia development plan.

## 2.7 Malaysian Development Plan

The first economic planning in Malaysia started in 1950 and is known as the Draft Development of Malaya. Table 2.2 depicts the various plans starting from the first draft of development programs during pre-independence until the latest framework towards a developed country in the next decade. The tough challenges of the development plans are to ensure that policies, strategies, managements and implementation are well thought-out with the plural society in mind, to enhance political stability and economic progress.

Development plans in Malaysia can be divided into three major phases. During 1970 to 1990, The First Outline Perspective Plan (OPP1), 1970-1990, was formulated to reduce poverty, unemployment, and economic disparities among ethnic groups. Using this as a framework, the Government has implemented four development plans from The Second Malaysia Plan (1971-75) to the Fifth Malaysia Plan (1986-90). National unity and integration were the major thrusts in economic progress, expansion and diversity. Along with the efforts to create modern economic activities, priority is also given to enhancing primary sectors productivity through modern agriculture techniques, improved marketing strategies and financial assistance. Simultaneously, improvement of services, such as housing, education,

health, and public utilities, were necessary to assist in raising the living standards of the poor.

**Table 2.2: Malaysia's Development Planning Framework**

| 1950-1970<br>Pre-NEP | OPP1[1]<br>1971-1990<br>New Economic Policy (NEP) | OPP2[2]<br>1991-2000<br>National Development Policy (NDP) | OPP3[3]<br>2001-2010<br>National Vision Policy(NVP) |
|---|---|---|---|
| Draft Development Plan of Malaya (1950-1955)<br>Progress Report on Development Plan (1950-1952)<br>General Plan of Development (1956-1960)<br>Second Five Year Plan (1960-1965)<br>First Malaysian Plan (1966-1970) | Second Malaysian Plan (1971-1975)<br>Third Malaysian Plan (1976-1980)<br>Fourth Malaysian Plan (1981-1985)<br>Fifth Malaysian Plan (1986-1990) | Sixth Malaysian Plan (1991-1995)<br>Seventh Malaysian Plan (1996-2000) | Eighth Malaysian Plan (2001-2005)<br>Ninth Malaysian Plan (2006-2010) |

Notes: [1] The First Outline Perspective Plan (1971-1990)
[2] The Second Outline Perspective Plan (1991-2000)
[3] The Third Outline Perspective Plan (2001-2010)

The second long-term plan is The Second Outline Perspective Plan or OPP2 (1990-2000), introduced after the New Economic Policy (NEP). It is also known as National Development Policy (NDP) in which it maintains the basic strategies of NEP - growth with equity, with several adjustments made to it. The significant adjustments in this plan are, first a shift from anti-poverty strategy to the eradication of hard-core poverty and second, increasing the participation of the rural in the modern economic sector. The government also made efforts to encourage the private sectors to generate economic growth and income, along with an emphasis on human resource improvement as a primary instrument for achieving growth with equality. Then, Vision 2020 commenced shortly after the Sixth Malaysian Plan (EPU, 6MP 1991); to become a developed country in its own mould by 2020 as the national objective.

The National Vision Policy (NVP) or OPP3 (2001-2010) which builds upon and maintains the hard work of the NEP and NDP incorporates the Vision 2020 objective of transforming Malaysia into fully developed country by 2020. The public sector provides the supportive environment and ensures the achievement of the socio-economic objectives, while the private sector plays the essential role of leading economic growth. The key strategies include developing a knowledge based-economy, enhancing information and communication technologies, emphasizing human resource development, and accelerating the key economic sectors towards more efficient production and value added activities. At the same time, fostering unity and a spirit of patriotism remain as one of the key thrusts of the development plan.

## 2.8 New Economic Policy (NEP) 1971-1990

The Second Malaysia Plan (2MP) is considered to be the most crucial of the policy planning that shaped the country. In this five-year plan, special political, economic and social policies were developed to bring the country to the desired direction. The policy is called the New Economic Policy (NEP). The main focus of the New Economic Policy was to achieve national integration and unity and this was formulated within the context of the two-pronged strategy. First, to reduce and eventually eradicate poverty by raising income levels and increasing employment opportunities for all Malaysians, irrespective of race and second, to accelerate the process of restructuring Malaysian society to correct economic imbalances so as to reduce and eventually eliminate the identification of race by economic function.

### 2.8.1 Eradication of Poverty

Poverty is the major cause of social discontentment in all states. It exists in both urban and rural areas and afflicts all racial and religious groups. It brings with it a vicious and self-reinforcing cycle of ignorance, suffering, low productivity and neglect. Since poverty can disrupt national unity, the eradication of poverty, irrespective of race, constitutes an important objective of the NEP. Poverty is associated with those who are unemployed, underemployed and those who are engaged in activities where productivity is so low, that the standards are well below the national average. The eradication of poverty would remove the barrier to the creation of a united and just society. Policies and programmes under the 2MP to achieve the objective of eradicating poverty are directed through the comprehensive strategies.

Three crucial strategies were as follows. First, to increase the productivity and the income of those in low productivity occupations through the adoption of modern techniques and better use of facilities. Secondly, to increase opportunities for inter-sector movements from low productivity to higher activities in new land development schemes, modern fishing and forestry projects and in commerce, industry and modern services; also, the provision of financial and technical assistance, educational and training opportunities and organisational arrangements to facilitate movements into these modern sectors. This strategy is very important because the labour market segmentation partly determines the earnings in different sectors of the market in Malaysia (Mazumdar & Ahmed 1978; Mehmet 1982). Finally, to provide a wide range of free or subsidised social services especially designed to raise the living standards of low-income groups. Such services included public housing projects, subsidised rates for electricity, water and transportation, health and medical services,

improved educational opportunities and increased recreational and community facilities (EPU, 2MP 1971).

In the Third Malaysia Plan (3MP) 1976-1980, the objectives of the NEP had been detailed quantitatively. The poverty rate would be decreased from 49.5 percent (1970) to 16.6 percent (1990). The poverty rate in urban and rural areas would be decreased from 58.7 percent and 23.3 percent (1970) to 23.0 percent and 9.1 percent (1990) respectively (EPU, 3MP 1976). After completion of NEP, the incidence of poverty was reduced significantly, while income inequality was also narrowed. The incidence of poverty declined from 49.5 percent in 1970 to 15.0 percent in 1990 in Peninsular Malaysia, which was better than the target (16.6 percent), then, decreased drastically to 5.1 in 2002[12]. The number of poor households decreased from about 1.1 million in 1970 to about 0.6146 million in 1990. Urban poverty decreased from 7.1 percent in 1990 to 2.0 percent in 2002, at the same time rural poverty declined 21.1 percent to 11.4 percent during the same period.

The mean monthly household income increased from MYR264 in 1970 to MYR1,167 in 1990[13]. In addition, during the 7MP 1990-1995, the mean monthly gross household income rose to MYR2,007 with an average of 9.5 percent per annum. The increase was due to more female workers becoming involved in the modern sector, especially in manufacturing and government services. Furthermore, the improvement in facilities, infrastructure and technical support in the agriculture sector also contributed to increasing the incomes for the poor, which are mainly the Malays and indigenous groups. At the same time, it was also made possible by the greater

[12] The target under NDP was to reduce the incidence of poverty to 7.2 percent and the incidence of hardcore poverty to 0.5 percent in 2000.

[13] These figures are for Peninsular Malaysia only. Meanwhile, Sabah and Sarawak also show the same trend, which were increased from MYR513 to MYR1,148, and MYR427 to MYR1,208 respectively during this period.

employment opportunities for all Malaysian. Besides, with the effort to increase all income levels for all groups, income differentials are expected to be wider in the coming years even if the Gini coefficient is tightened but in the absolute term the income disparity was bigger in the NEP period. The Gini coefficient recorded at 0.52 point in 1970 could be considered to represent a clearly undesirable pattern of in income distribution (Faaland, Parkinson & Saliman 1990). Then, it declined to its lowest point in 1999 when the figure reached to 0.443. However, the Gini coefficient rose again to 0.461 in 2002, back to the level of late 1980s after an economic downturn slowed down the Malaysian economic growth (MOF, 2004).

Albeit the *Bumiputra*'s mean household income grew at an average rate of 9.3 percent during 1990-1995, in absolute term (MYR1,600) it was only similar to the mean income of Chinese household in 1990. It merely meant that the *Bumiputra* was lagging five years behind. With the growth rate at 10 percent over the period, the mean household income for the Chinese reached the figure of MYR2,895 in 1995.

**Table 2.3: Mean Monthly Household Incomes by Ethnic Group (MYR), 1957-2004[1]**

| Ethnic Group and Strata | 1957/8 | 1967/8 | 1970 | 1984 | 1987 | 1990[2] | 1995[3] | 1999 | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| Bumiputra | 144 | 130 | 172 | 852 | 868 | 940 | 1,600 | 1,984 | 2,711 |
| Chinese | 272 | 321 | 394 | 1,502 | 1,430 | 1,631 | 2,895 | 3,456 | 4,437 |
| Indians | 217 | 253 | 304 | 1,094 | 1,089 | 1,209 | 2,153 | 2,702 | 3,456 |
| Others | n.a | 839 | 813 | n.a | n.a | 955 | 1,274 | 1,371 | 2,312 |
| Malaysia | 199 | 217 | 264 | 1,095 | 1,074 | 1,167 | 2,007 | 2,472 | 3,249 |
| Rural | 170 | 114 | 200 | n.a | n.a | 951 | 1,300 | 1,718 | 1,875 |
| Urban | 261 | 283 | 428 | n.a | n.a | 1,617 | 2,596 | 3,103 | 3,956 |

*Sources: Anand, 1983, Table 2.2, p. 36; Malaysian Plans, various issues.*

Notes: [1] In current prices.
[2] Refers to 1989.
[3] Figure for 1995 based on the preliminary data of the Household Income Survey.

Table 2.3 depicts the mean of monthly household income from 1957 to 2004. Household income for the *Bumiputra* grew slower than the Chinese and Indians in the

past three decades, consequently the imbalance between these three major races widened accordingly. As indicated by absolute figures in Table 2.3, *Bumiputra* and non-*Bumiputra* income disparity seemed to be reduced after the completion of the first long-term plan. For example, in 1970, the disparity ratio between *Bumiputra*-Chinese was 1:2.29, and declined to 1:1.74 after the completion of the NEP period.

According to the report in the Third Malaysian Plan 1976-1980 (p.5), the Malays only received MYR43 per month or one half of the Chinese at MYR68, while Indians gained MYR57 or about 70 percent more than the *Bumiputras* in terms of per capita income. Then, the disparity widened after the second long-term plan where the ratio was 1:1.80 in 2002. The widened disparity among these groups was contributed by the difference in growth of income in the top 20 percent and bottom 40 percent of households. In the meantime, the middle 40 percent of households showed a similar rate of household incomes for these groups. As compared to another group, i.e. Indians, the disparity somewhat declined after completion of NEP in which the ratio was at 1:1.76 in 1970, then decreased to 1:1.29 in 1990, then 1.28 in 2002 (EPU, 7MP 2001). During the Eighth Malaysian Plan 2001-2005 (8MP), the household income of all groups increased, as shown by Table 2.3. The income disparity ratio between *Bumiputra* and non-*Bumiputra* was narrowed. However, the disparity continued to widen in absolute terms. Meanwhile, the ratio between urban and rural households deteriorated from 1:1.70 in 1990 to 1.2.11 in 2004.

### 2.8.2 Restructuring Society and Economic Imbalance

The second prong of the NEP was aimed at restructuring the society so that the present identification of race with particular forms of economic activity would be

eliminated. The plan outlined policies and programmes to modernise rural life, encourage a rapid and balanced growth of urban activities, provided improved education and training programmes at all levels. And above all, to ensure the creation of Malay commercial and industrial community in all categories and at all operation levels, so that within one generation the Malays and other indigenous people could become full partners in the economic life of the nation. These policies and programmes were to be implemented in such a manner that no one would be deprived of his or her rights, privileges, income, jobs or opportunities. Furthermore, it also covered all necessary opportunities for more education; better jobs and higher income to the disadvantaged, the sum total of such opportunities open to all Malaysians were expanded rapidly. This expansion was an essential element in the NEP.

In terms of employment reshuffle, the NEP had expected the workforce structure, in every economic sector and level of employment, to reach a level that is parallel to the structure of Malaysia's population. For the years 1970 to 1990, the division of *Bumiputra* workforce in the primary sectors was planned to decrease from 67.6 percent to 61.4 percent but in the secondary sector, it was to increase from 30.8 percent to 51.9 percent while the tertiary sector from 37.9 percent to 48.8 percent. On the other hand, the Chinese workforce was planned to decrease from 59.9 percent to 38.1 percent in the secondary sector and from 48.3 percent to 39.0 percent in the tertiary sector, but to gradually increase from 21.4 percent to 28.3 percent in the primary sector. The division for the Indian ethnics was to change and be within the range of 10-12 percent for all sectors.

In the NEP, there was no specific quantitative target stated for equity restructuring, which only documented that "within a period of the 20 years, Malays

and indigenous people will manage and own at least 30 percent of the total commercial and industrial activities in all categories and scales of operation", (EPU, 2MP 1971, pp. 41-42). Nevertheless, the mid-term review and the later five year plan were detailed with the figure and quantitative targets. The division of capital share ownership in limited companies was planned to vary from the ratios 2.4: 34.3: 63.3 (*Bumiputra*: non-*Bumiputra*: foreigners) in 1970 to 30:40:30 in 1990 respectively. In the 1970s and 1980s, the economic accomplishment was magnificent, with growth around 8 percent per annum due to the result of continued strong prices for major export commodities. The macroeconomic performance was satisfactory, but the income disparity between racial groups needed to be worked out. The share of equity was far from reaching the target of 16 percent for *Bumiputra* in 1980 as set in the First Outline Perspective Plan (OPP1). It only increased from 4.3 percent in 1971 to 12.4 percent in 1990 as shown in Table 2.4. Compared to the other group, the equity share held by other Malaysians grew from 34 percent to almost 40 percent during the same period as against the target 40 percent in 1990 (EPU, 5MP 1986).

The model of development in Malaysia is based on growth with equity, or more specific as a growth with equitable distribution. The objectives and strategies of NEP and NDP remain the core driving force in the new millennium development plan. The National Vision Policy which was launched under Vision 2020 focuses on building a resilient and competitive nation incorporating the previous plans and strategies. The new dimension in the millennium plan is to develop the nation with a knowledge-based society, generating endogenous economic driven growth, and achieving the 30 percent *Bumiputra* participation by 2010. Simultaneously, the government also considered alternative and immediate recovery plans to absorb the

world economic and social uncertainty such as the Middle East turbulence, unexpected diseases (such as SARS)[14] to ensure economic growth and social stability.

**Table 2.4: Selected Socio-Economic Targets and Achievements in the Restructuring of Society, 1970 – 2005**

| Ownership of Equity in the Corporate Sector[1] | 1970 | 1990 | 2000 | 2005[2] |
|---|---|---|---|---|
| Bumiputra | 2.4 | 19.3 (30.0) | 18.9 | 18.9 |
| Non-Bumiputra | 34.3 | 46.8 (40.0) | 41.3 | 40.6 |
| Foreigners | 63.3 | 25.4 (20.0) | 31.3 | 32.5 |
| Nominee Company | | 8.5 | 8.5 | 8.0 |
| Bumiputra Employment by Sector[3] (% of total employment) | | | | |
| Agricultural & Forestry, Livestock & Fishery | 64.6 | 67.9 | 75.0 | 74.9 |
| Mining & Quarrying | 2.3 | 51.9 | 63.2 | 63.3 |
| Manufacturing | 6.0 | 46.4 | 53.9 | 54.5 |
| Construction | n.a | 34.9 | 44.0 | 43.9 |
| Electricity, Gas & Water | n.a | 70.2 | 72.2 | 72.3 |
| Transport, Storage & Communication | n.a | 49.0 | 56.2 | 56.2 |
| Wholesale & Retail Trade, Hotels & Restaurants | n.a | 54.5 | 40.4 | 40.5 |
| Finance, Insurance, Real Estate & Business Services | n.a | 41.1 | 45.8 | 45.8 |
| Other Services | 17.9 | 64.7 | 68.2 | 69.5 |
| Bumiputra Employment in High Occupational Categories (% of total employment) | | | | |
| Professional & Technical | 47.2 | 60.5 (50.0) | 63.8 | n.a |
| Administrative & Managerial | 22.4 | 28.7 (49.3) | 36.9 | n.a |
| Bumiputra Registered Professional[4] (% each profession) | | | | |
| Accountant | *a* | 11.2 | 15.9 | 20.8 |
| Architect | *a* | 27.6 | 42.1 | 45.3 |
| Doctor | *a* | 27.8 | 36.9 | 36.7 |
| Dentist | *a* | 24.3 | 35.2 | 44.4 |
| Veterinary Surgeon | *a* | 35.6 | 41.7 | 39.0 |
| Engineer | *a* | 13.1 | 42.6 | 46.0 |
| Surveyor | n.a | 44.7 | 45.1 | 48.2 |
| Lawyer | n.a | 22.3 | 32.3 | 38.0 |

*Sources: OPP1, 1976; OPP3, 2001; Midterm Review 8MP, 2003, Table 3-5, 3-9, 3-9; Malaysia, Economic Planning Unit, 2004.*

Notes:
[1] Exclude shares held by Federal and State Governments
[2] The figures for Ownership of equity were referred to 2004, while the figures of employment by sector referred to 2002.
[3] The target to achieve in 1st OPP was classified by primary, secondary and tertiary sectors which are 67.6, 30.8 and 37.9 percent respectively in 1970 to 61.4, 51.9 and 48.4 in 1990.
[4] Refers to the year 1999
*a* In 1970, Malays members of the these professional groups in Peninsular Malaysia was 225 and made up less than five percent of he total membership of the groups, which are 4576.
Numbers in parenthesis are the target of NEP.

The private sector is encouraged to increase investment and be more dynamic in the economic activities, while the government expanded the strengthening of

[14] SARS stands for the Serve Acute Respiratory Syndrome which has caused economic and social loss in East and South East Asia during the beginning of the new millennium.

competitiveness, developing the new sources of growth and enhancing the effectiveness of the delivery system.

## 2.9 The Role of Education in Policy Response

During the NEP era, education expanded rapidly, and one of the major factors was to achieve the two-pronged objectives of the NEP. Policies in human resource development contain strategies and programmes to continuously upgrade and improve the education, training programmes and facilities to meet the changing skill requirements. As stated in the OPP1 (p.62), the policies, programmes and projects related to human resource development should be designed specially to:

> *(viii) Expand education and training facilities, other social services and physical infrastructure of the country to effectively support to attainment of the above objectives* (EPU, OPP1 1971, p.62).

Education is recognised as tool of sustainable and long lasting effect on the poverty eradication and equitable growth. In the OPP2 and OPP3, the education policies kept pace extensively; especially to upgrade social mobility hoping that finally it would reduce inequality and poverty. Substantially, the past three decades have seen tremendous changes in education facilities, infrastructure, access and opportunities. In order to promote an equitable society by raising income levels and quality of life, the government implemented various support programmes to assist students from rural areas, especially poor families, to ensure that they accessed better facilities and

educational opportunities. For example, in 2001 to 2004 RM2,265 millions were allocated to education support programmes and assistances[15].

The Education Development Plan 2001-2010 was commenced, incorporated and operationalised in the OPP3. It was based on four key elements; to increase access to education; to increase equity in education; improve the quality of education; and finally to improve efficiency and effectiveness in education management (Malaysia, 2004)[16]. Special emphasis was placed on improving the quality of education and facilities in schools to reduce the problems of high dropout rates at the primary and secondary levels, especially in the rural areas, and thus improve the employment prospects of school leavers, and facilitate their training at the higher levels of the education system. It also emphasized the development of mathematics, science, manipulative and communicative skills as well as proficiency in English and other foreign languages so that school leavers can be more readily acceptable for employment and further training by their employers.

A high priority towards human resource development was assisted by the huge allocation of expenditure under the public sector programme. The government expenditure in education was raised dramatically, emphasising the government's effort to make education a priority in the development programs. Table 2.5 shows the education sector received the major share of the federal government's expenditure on social services and it rose sharply over the years. The expenditure on the education sector increased significantly from 6.1 percent in 1970 to 34.6 percent in 2002 but to

[15] The support programs are the Supplementary Food Schemes (RMT), School Milk Programs (PSS), and Trust Fund for Poor Students (KWAPM), RM120 One-off Assistance, Tuition Voucher Scheme (SBT), Textbook Loan Scheme (SPBT) and Scholarship. These supporting and assistance programs are benefiting to more than 8.19 million students.

[16] The detail discussion of the education programs will be discussed in the next chapter.

some extent declined in 2004 and 2005 due to the government's plan towards a balanced budget in the future.

**Table 2.5: Federal Government Development Expenditure by Sector, 1970-2006 (% of Total Development Expenditure)**

| Sector | 1970 | 1980 | 1990 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| Security[2] | 23.7 | 16.4 | 9.9 | 8.3 | 9.3 | 12.0 | 15.3 | 13.9 | 15.67 | 16.71 |
| Social Services | 11.2 | 15.9 | 24.5 | 39.6 | 4.37 | 50.2 | 45.0 | 34.5 | 27.60 | 29.70 |
| Education | 6.1 | 7.5 | 15.3 | 25.4 | 29.4 | 34.6 | 25.9 | 14.4 | 11.22 | 15.00 |
| Health | 2.8 | 1.1 | 4.3 | 4.6 | 4.5 | 4.2 | 6.8 | 8.5 | 3.95 | 3.87 |
| Housing | - | 4.0 | 0.4 | 4.3 | 3.6 | 5.0 | 4.9 | 4.2 | 5.67 | 5.66 |
| Others | - | 3.3 | 4.5 | 5.4 | 6.2 | 6.4 | 7.4 | 7.4 | 6.77 | 5.18 |
| Economic Services | 62.2 | 64.8 | 62.7 | 41.7 | 36.1 | 34.6 | 35.0 | 43.0 | 46.20 | 42.97 |
| Agriculture and rural development | 27.3 | 15.2 | 12.1 | 4.2 | 4.0 | 3.8 | 4.1 | 8.6 | 8.32 | 10.99 |
| Public utilities | 2.8 | 8.9 | 7.5 | 5.4 | 3.1 | 5.0 | 2.3 | 5.6 | 6.31 | 6.38 |
| Trade and industry | 13.8 | 20.8 | 25.5 | 13.1 | 13.7 | 9.7 | 8.8 | 5.2 | 5.71 | 8.61 |
| Transport | 11.0 | 13.8 | 17.3 | 17.4 | 14.3 | 15.0 | 18.7 | 22.5 | 24.39 | 16.23 |
| Communication | 7.3 | 5.7 | 0.0 | 0.8 | 0.9 | 0.8 | 1.0 | 0.4 | 0.44 | 0.10 |
| Others | - | - | 0.3 | 0.6 | 0.1 | 0.3 | 0.1 | 0.7 | 1.04 | 0.66 |
| General administration | 2.9 | 3.0 | 2.9 | 10.4 | 10.9 | 3.2 | 4.7 | 8.6 | 10.52 | 10.61 |

*Sources: Economic Report, Malaysia, various years.*
Notes: [1] Revised estimate
[2] Included defence and internal security.

Table 2.6 reveals the proportion of the government's spending on education for both developments and operations. The operating expenditure in education was between 20 and 25 percent of the total development and operating expenditure. In absolute terms, however, the operating expenditure has increased more than double within a decade. The operating expenditure was MYR10,398 millions in 1996 increased to MYR21,592 millions in 2005. It was indicated that the government spent a lot in preparing, training and recruiting more quality teachers to ensure effectiveness in providing higher quality in education[17]. Recently, the Ministry of Education has

[17] As a result from the development of the teacher's training and recruiting, the teacher-student ratio in Malaysia in 2001 was 1:18, which is better than some developed countries, such as Japan (1:21), United Kingdom (1:20), except US (1:16), (OECD, Paris 2004). In addition, the teacher-student ratio in the rural area is 1:16 compared to the national ratio at 1:17 in 2004, which reflected that the education policy is on the right track to ensure the poor and rural students will have the opportunities for a quality education.

applied an allocation of MYR1.14 billions in the Ninth Malaysian Plan (9MP) which is to be used to develop education for the rural areas. The objective was to reduce the education opportunities and facilities gap between the rural and urban areas (*Berita Harian*, 14th Sept. 2005).

**Table 2.6: Development and Operating Expenditure on Education (MYR millions), 1996-2005**

| Year | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|
| Development[1] | 2,091 | 2,521 | 2,915 | 3,865 | 3,907 | 10,363 | 12,436 | 10,193 | 4,494 | 2,817 |
| | (14.3) | (16.0) | (16.1) | (17.1) | (15.6) | (29.4) | (34.6) | (25.9) | (14.4) | (10.0) |
| Operating[1] | 10,398 | 10,360 | 10,528 | 11,458 | 12,036 | 14,422 | 16,982 | 19,033 | 20,790 | 21,592 |
| | (23.69) | (23.19) | (23.61) | (24.54) | (20.68) | (22.62) | (24.72) | (25.30) | (22.74) | (24.22) |
| Total[2] | 14,628 | 15,749 | 18,103 | 22,614 | 25,286 | 35,235 | 35,997 | 39,353 | 31,131 | 28,304 |
| (Development) | (4.1) | (7.7) | (14.9) | (24.9) | (11.6) | (26.1) | (2.1) | (9.4) | (-20.9) | (-9.1) |
| Total[2] | 43,865 | 44,665 | 44,585 | 46,699 | 58,206 | 63,757 | 68,699 | 75,224 | 91,524 | 89,141 |
| (Operating) | (19.9) | (1.8) | (-0.2) | (4.7) | (24.6) | (12.8) | (7.8) | (9.5) | (21.7) | (-2.6) |

*Sources: Malaysia, Ministry of Finance, Economic Report, various years.*
Note: [1] Numbers in parenthesis are the percentage from the total development and operating expenditures.
[2] Numbers in the parenthesis are the annual growth rate of the development and operating expenditures.

Investment in human capital has been given greater emphasis in economic and social policies. It was important to sustain economic resilience and growth, and to drive the economic transformation from natural-based to the knowledge-based economy. In this regard, the human capital policy development thrusts are in; undertaking comprehensive improvement in education and training delivery system; strengthening national schools; implementing measures to bridge the performance gap between rural and urban areas; providing more opportunities and access to quality of education; strengthening national unity in developing the society and; enhancing the

forum for engagement and consultation between the government, private sectors, parent and community in human capital development (EPU, 9MP 2006, p.248).

## 2.10 Policy Issues

Why is investment in education a priority? Apparently, the simple answer could be explained by the history of the developed countries. It has shown that education is a catalyst for economic development. Some countries developed earlier than others because they take hold of the knowledge, which creates technologies and new knowledge. Studies have shown the handsome returns to various forms of human capital accumulation are basic education, research, training, learning-by-doing and capacity building (Psacharopoulos & Woodhall 1985). It is also enriches people's understanding of themselves and the world that will improve the quality of their lives and leads to broad social benefits to individuals and society (Solmon 1987).

Education raises people's productivity and creativity and promotes entrepreneurship and technological advances, demonstrated in countries from Malaysia to Bolivia to Ghana (World Bank 1991). The real question, then, is when and how can education bring high payoffs. While these theories have incorporated human capital or education as an important input to growth, empirical evidence is still far from unanimous and conclusive. Numerous studies, some using cross-country data, have investigated the relationship between formal education and economic growth in developing countries (Hicks 1987). While many studies found out that an additional year of education per person in the labour force increased real output or growth rates (World Bank 1991; 1993 for example), a few studies revealed that human capital accumulation had a significant negative or an insignificant impact on

economic or productivity growth. Columbo et al. (2004) found that a country with literacy scores of 1 percent higher than the average, experiences an increase in per capita GDP growth of 1.5 percentages point[18].

Nevertheless, hundreds of studies in many countries; over different times, using the numerous data and methods, confirmed that investments in education benefits the people directly and indirectly. Indeed, the private rate of return to education increased around 6 percent for an additional year of schooling in developed countries and its return in developing countries could reach two digits (Psacharopoulos 1994). Furthermore, investment in basic human capital will gain the benefits for the social as well, either in terms of education externalities such as increasing the quality of life, or monetary value from the taxpayers. Thus, the private and social rate of returns is the basic discussion in return of investment in human capital and become an increasing interest to the economists in the role of education in economic progress at both the macro and micro levels. However, a return of investment in human capital in Malaysia is not well documented.

Based on this scenario, it is very important to conduct a comprehensive study in human capital, especially after a significant progress and development of education in a country like Malaysia, which is considered as new emerging economy. As a key factor in development, education has played a major role for the past three decades in solving the traditional problems in developing countries, such as poverty, high unemployment rates, and for Malaysia the more crucial income inequality. After Independence, the government made the effort to reduce income inequality, with a huge expenditure in preparing infrastructures, facilities, opportunities and continuous

[18] See also Baldacci et al. (2004) for the linking between social spending, human capital and growth. It will be discussed further in education and economic growth in Chapter 3.

training and recruiting. In a nutshell, education plays the crucial role in the Malaysian economics, political and social policies, but has it worked? Therefore, a study in return to investment in education should be carried out frequently in order to investigate the impact this particular policy.

Learning from the past, NEP, the break point of development policy 35 years ago was the foundation of the development policies today, and to the future to ensure political stability. With education as a tool, it is imperative to estimate the returns to education for the different groups after the implementation of NEP in 1970. How far has education been able to reduce the income inequality after more than 30 years of implementation with the various programmes and opportunities?

The increase in awareness of education investment in developed countries arose a long time ago. It has been shown in many studies that were conducted and a number of economics of education centres were developed to do research in this field (Bowman 1968; Blaug 1987) . Thus, most of the empirical work on human capital has been restricted to the conditions of developed countries. On the other hand, interest in returns to education in developing countries, such as Malaysia, is low by comparison. Perhaps, the difficulty of obtaining data is one of the reasons for the relative lack of interest. However, it is obvious that investment in education has been recognised and has become a top priority. Thus, it would be interesting to investigate how robust the theory and its associated models are in conditions regarded as transformation of Malaysia economy. Accordingly, this thesis focuses on examining, via a large data set, the private rate of return to education over a decade in Malaysia. How well does the earnings function of the human capital theory explain the earnings variation and

inequality in Malaysia? Do the returns to education follow a declining trend as shown in the developed countries?

Additionally, the work incorporates with estimates of the private rate of returns to education in Malaysia by groups of individuals with different types of socio-economic background. This area of research concentrates, in particular, on differences between rural and urban areas. It is important also to estimate the trend of earnings differential between wage earners and self-employed with different levels of education. Simultaneously, the study will differentiate between the returns to education at primary, secondary and tertiary levels. The full objectives of this study can be summarized as follows:

a. To estimate the average private rate of return to education (RTE) in Malaysia from 1995 to 2004.

b. To investigate how well the model specifications fit with the Malaysian data.

c. To estimate the private rate of return to education by level of education, i.e. primary, secondary and tertiary education.

d. To investigate the impact of school reforms to the returns to education by using an Instrumental Variable approach.

e. To investigate the wage gap between groups; i.e. self-employed and employees, urban and rural areas and regions.

f. To examine the incidence of over and under-education and the wage gap to those adequately educated.

The findings from this study would be useful for at least three major purposes. Firstly, the results would be helpful as a guide to education policy in Malaysia, particularly in relation to efficient allocation of scarce resources between the different levels of educations and how funding and access to different levels affects equity. Secondly, they would contribute to the debate as whether the pattern of rates of returns to education provided by previous studies do hold for Malaysia, given the current labour market conditions in this country. Lastly, they would provide a test of the empirical usefulness of the human capital model in the Malaysian economics in transition. The exogenous impact in the Malaysian education system, i.e. the schooling reform is used as the instrument of IV. It could be considered as an important value-added research of returns to education in Malaysia. The results can also be added as new evidence from this emerging economy to the literature in the economics of education.

## 2.11 Conclusion

The picture of Malaysian development is based on the lesson from the past and the country's background. Equitable growth or growth with equity is the key thrust of the development policies which was introduced in the most important policy, NEP, and turned out to be a national objective in each policy. Integration, solidarity, and political stability could be achieved if the multiracial society shared the balanced wealth. Besides, to eliminate the incidence of poverty, income inequality is a crucial issue to be corrected through continuous assorted strategies in the country's economic development plans. Even though the economic achievement in the past three decades was recognised as one of the higher performance economic achievements in Asia, the

economic imbalance among racial groups remain to be a major challenge in the future.

Education is already accepted as a vehicle for economic growth and plays a major role in order to eradicate the incidence of poverty. Furthermore, in the Malaysia context, education is not only a vehicle to foster economic growth and reduce poverty, but it is also essential to promote harmony and racial integration. Thus, it is unquestionable why the government has increased its allocation for education in the annual budget that can be used to upgrade the infrastructures, facilities and variety of opportunities especially for the rural areas. The next chapter will discuss in depth the human capital development and progress over the past three decades. It will deal with the Malaysian education system and its schooling reforms to meet the needs of economic transformation from primary to the secondary and the tertiary-based economy.

# CHAPTER 3 - HUMAN CAPITAL DEVELOPMENT

## 3.1 Introduction

Prior to independence, Malaysia's education system kept on changing to suit the needs and demand of the colonist. These changes became more aggressive when the country began to start preparing for its independence. Currently, the education system is more flexible, highly developed and is appropriate to fulfil the needs of new challenges and changes in the borderless world. Investment in human capital has been given a greater emphasis in Malaysian development plans. It is very important to sustain economic resilience and growth, drive a knowledge-based economy and to foster a community with the accomplished value system. Thus, the human capital development policy thrust is undertaking a comprehensive improvement of the education delivery systems.

This chapter is organised as follows. The first section reviews the changes in the education system in Malaysia from pre independence through post independence, and also the new challenges and changes towards producing a developed country by 2020. A brief history of the education system is very important. It is based on the role of education, with the main objective of achieving national unity and development through education. Then, education has changed in order to fulfil the needs of economic progress. The second section describes the current education system. It emphasises the level and years of schooling, mainly focussing on the public education system. Officially, schooling in Malaysia starts at the age of 7. However, enrolment at pre-school, at age of 4 to 6 years, is significantly important in preparing the student for entrance to primary education. The private sector plays an important role in providing education at pre-school level. However, the government has increased its

efforts recently by providing an allocation for adequate infrastructures for pre-school education. This is part of the education strategy to reduce the education gap between rural and urban areas. The students will complete primary education in 6 years. Secondary education starts at 13 and will be completed within 5 years. While, the upper secondary or post secondary take two years time to prepare for higher education. In higher education, students are given between 4 and 6 years for completion depending on course choice.

The third section describes human capital development. Firstly, it is focussed on the allocation and expenditure on education for the past two decades. Secondly, I address the development and progress of primary, secondary and tertiary education. It provides information on the enrolment and output of certain levels of schooling. In the next section, I discuss the demand and supply of labour. The labour participant rate of the Sixth to Ninth Malaysian Plans are highlighted. The demand and supply of labour within sectors and occupations are described in this section.

## 3.2 Education in Pre Independence in Malaysia

During the British colonial era before 1957, there was no uniformity in the formal education system in Malaysia. There were separate schools provided by various groups of interested parties with different instruction media, curricula, methods and standards. Two types of schools were established during this period. Firstly was the school known as the English medium school; it was western oriented and was run by the government, individuals and missionary societies. The earliest English schools in Malaysia were started in the Straits Settlements of Penang, Malacca and Singapore. The oldest English medium school is the Penang Free School which was established

in 1816, followed by Malacca High School. The second type of school was called the Malay vernacular school which was also provided by the government and run freely. At the same time, the Chinese and Tamil vernacular schools were also set up by their respective communities.

Secondary education was limited during this period and was only accessible in English medium schools, mission schools and independent Chinese schools. As for the Malay and Tamil medium schools, they were limited to primary school level only. Any parents who intended to continue their children's education to secondary school had no alternative but to transfer them to the English medium school. For them to be able to go to these schools, they were required to attend special Malay classes in an English medium school at the end of the third or fourth year of the Malay primary school (MOE 2001).

Higher education was developed under British colonial rule to train the required personnel for the Malaysian Civil Service; however the higher ranking senior posts were filled by Europeans. The first non-teaching higher institution was established in 1905 known as the King Edward VII College of Medicine in Singapore. The second was the Raffles College also established in Singapore in 1928 and further upgraded to the University of Malaya in 1949. During this period, several tertiary education institutions were established such as the Technical College (1946) and the College of Agriculture (1947). Those who completed a tertiary education at this time were likely to have a better job and position with higher incomes, especially as civil servants. Substantially, no uniformity and inequality in schooling opportunity at this point of time, was the beginning of income disparity in Malaysia.

In the 1950s, the spirit of patriotism and aspiration of self government emerged and several committees were established to look into the development of the education system. The popular committees involved in the process of building up the country's education system were Barnes, 1950 and Fenn-Wu, 1951. As a result, The Education Ordinance 1952 was formed. However, another committee was also set up in 1956 to upgrade the 1952 education ordinance. In this new committee, two principles were added; the Malaysian language as a medium of instruction and education for all. On the other hand, the other languages and cultures of many Malaysian races were not peripheral and will be preserved and developed continuously. The recommendations of this committee contained in the Report of the Education Committee 1956 (commonly referred to the Razak Report) formed the basis of the Education Ordinance of 1957, which laid the foundation for the National Education Policy (MOE 2001).

## 3.3 Post Independence and School Reforms

The post-independence era was the basic starting point for the foundation, continuous changing and the development of the Malaysian education system today. The early years of independence was the period of reconstruction intended to build the nation in the Malaysian mould. At that point of time it was thought to be very important to integrate the multiracial society and to build up a strong nation. The basis of that unity was to be laid by the school and education system. It was an important objective of the education policy to bring together all races by gradually making the Malaysian language as the medium of instruction, as addressed in the Razak Report, 1957. This report was reviewed by the Review Committee (known as the Rahman Talib Report,

1960) which suggested that the public accepts the education policy proposed by a previous report. The recommendations from both reports were important sources for the most significant shift in Malaysian education that led to the implementation of the new Education Act in 1961. The act also provided comprehensive and universal free education whereby all students were granted automatic promotion up to Form 3 (Grade 9) in secondary schools (MOE 1980).

The first impact of changes was the upgrading the various types of primary schools to national schools. Subsequently, gradual implementation of the Act has seen the overall changes from the British education system to the Malaysian education system, with the Malaysian outlook and orientation. The second impact of the legislation was the introduction of the Malaysian language as the official medium of instruction in all government schools. It was started in Primary 1 in 1970, and continued thereafter. At the end of 1978, all schools were using the Malaysian language as the medium of instruction and in the mid-1980s the universities followed suit. This was a significant change in the Malaysian education system. The adoption of the Malaysian language at all levels was considered necessary to ensure that the education system became a tool for the integration agenda as discussed in Chapter 2. It also aimed to promote nationhood and national identity starting from the grassroots level (Neville 1998). On top of that, the school reforms will give better opportunities to people in rural settlements and to poor families in the enhancement of their level of schooling. Furthermore, it was seen as the main tool to be used in the eradication of poverty, narrowing and eventually closing the education gap between regions and races, as well as integrating the education systems of the Sabah and Sarawak states with the national system (Okposin et al. 2005).

In the 1970s, the education system also reflected the changes in the light of labour market changes in which there was great emphasis on science and technology. Technical and vocational courses were also popular due to the higher demand for skilled and semi-skilled labour. The curriculum also changed tremendously by adapting the syllabus to the changing needs of the nation, especially the adapting of the curriculum to fulfil the development needs of the country. Besides progress in human development, the crucial educational function remains the promotion of the unity of this country (Rahimah 1998).

The year 1979 was the second turning point in the history of education in Malaysia when the government felt that the educational system should be revised in order to ensure the changes met the development progress of its nation. A Cabinet Committee was set up to revise the Implementation of the Educational Policy 1979 and the committee suggested that the primary school curriculum had to be reviewed (MOE 1979, Cabinet Committee Report, Recommendation 2a). As a result, the national education curriculum was revised and a new curriculum was designed. The New Primary School Curriculum (KBSR being its local acronym)[19] was implemented in 1983 and this was followed by the Integrated Secondary School Curriculum (KBSM)[20] in 1989. The leading element of KBSM curriculum was the integrated approach which entailed the integration of knowledge, skills and values; the integration of theory and practice; the integration of curriculum and co-curriculum; and the school culture (MOE 1989)[21]. Three strategies were developed to achieve the

[19] KBSR was piloted in 1983 and implemented nationwide during the same year. The new curriculum was introduced as a full approach of child centred teaching strategies with more student participants in learning and it was emphasized on reading, writing and arithmetic.

[20] KBSM is a continuation of the KBSR, which is the integrated approach emphasized on balanced development of the spiritual, intellectual, emotional and physical domain as stated in education philosophy. The curricular strategies were included the values, language and thinking skill across curriculum.

[21] The foundation of the curriculum changes at both the primary and secondary levels was The National Education Philosophy, "*Education in Malaysia is an on-going effort towards further developing the*

'perfectionist' philosophy via implementation of integrated value across the curriculum; language across curriculum and thinking across curriculum (Ratnavadivell 1999).

The last decade of the twentieth century witnessed an extraordinary and accelerating change in the Malaysian education system. Due to liberalisation, the globalisation process and advances in information technologies, the Malaysian education system has had to maintain a pace parallel to the international process. A balanced and integrated approach has been taken to make sure that the nation is not left behind in terms of technological development. The country should move at the same pace and should also grab the emerging opportunities of new technologies, economic and social progress, by re-structuring and re-focusing, as well as reforming, its education system towards the market needs, and to meet global competition. In order to do this, some changes had to be made and, accordingly, several adjustments were carried out such as the Education Act 1961 being replaced by the Education Act 1996. Furthermore, some educational legislation was enacted and amended to support the new aspiration to achieve a developed nation by 2020. The important legislation educational institutions are University and Universities Colleges 1996, Private Higher Education Institution Act 1996, National Accreditation Board 1996, National Council on Higher Education 1996 and National Higher Education Fund Board 1996.

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*potential of individual in a holistic integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally, physically balance and harmonies, based on firm on belief in and devotion of God. Such and effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving a high level of personal well-being as well as being able to contribute, to the betterment of the society and nation at large",* (MOE 1993).

## 3.4 The Schooling System

Currently, the Malaysian education system consists of pre-school, primary school, secondary school and higher learning institutions. The overall picture of the education system as practised in Malaysia today is described in Appendix 1, Table 1A. The level of schooling in Malaysia is highlighted as follows. In particular, the years of schooling and the certificates which could be obtained by students at each level of education.

### 3.4.1 Pre-School

The main purpose of pre-school is to provide a basic education for young children before they go on to formal education. The pre-school begins at the age of 5 or 6 at a government kindergarten, a non-government agency or a private sector kindergarten. The objectives of pre-school education are to foster love for the country, instil moral values, and develop character, develop basic communication skills, respect the national language, acquire the basics of the English language, appreciate physical activities and finally, to develop critical thinking skills through enquiry and the use of all the senses (MOE 2001).

Prior to 1992, the Ministry of Education was not active in providing pre-school education and this task was conducted by other government agencies such as the Ministry of Rural Development and the Ministry of Unity and Development, particularly in rural areas. Meanwhile, the private sector played a crucial role in providing early education in urban areas. In order to provide more opportunities in early education and to reduce the education gap between rural and urban areas, the Ministry of Education started to implement its own pre-school education in 1992, and

the number of classes increased to 1,132 in 2000. Out of this number, 15 classes cater for 'special needs' children. However, the enrolment for pre-school was estimated at only 64 percent for the age 4 to 6 cohort in year 2000 (Hassan 2003). In 2003, total enrolment at pre-school level was 323,000 or 19.1 percent of children in the 4 to 6 cohort, compared with 271,966 or 16.7 percent in 2000 at the local public institution (EPU, Malaysia 2004). To improve and strengthen the pre-school education, the Education Act (1996) was amended in 2001 to provide a standard for curriculum, facilities, training and retraining of teachers. In 2005, total enrolment at the pre-school in public centres was 0.424 million, compared with 173,350 in 1990. The annual growth rate between year 1990 and 2005 was 9.65 percent (EPU, Malaysia 2006).

### 3.4.2 Primary School

Primary education starts at seven and ends within six years. The structure of primary education in Malaysia can be divided into two phases. The first phase is from Year One to Year Three and the second phase is from Year Four to Year Six. During the first phase, students will go through the curriculum to master the 3Rs; i.e. for Reading, Writing and Calculating (Arithmetic) to be used in daily life. For the first three years in primary schooling, it is hoped that students will also know how to develop their personality, attitude and social values.

During the second phase, i.e. from Year Four to Year Six, mastery of the 3Rs is reinforced and emphasised by acquisition of general knowledge, pre-vocational education, and development of personality, attitude and social values as well. Over the six years of primary education, students will be assessed by continuous school-based assessment until, at the end of Year Six; they will experience the first National

Examination known as Primary School Achievement Test (UPSR) to evaluate their performance. Primary schooling takes 6 years to complete. All students are automatically promoted to secondary school after completion 6 years in primary school.

### 3.4.3 Secondary School

The normal duration of secondary schooling is 5 years but it is divided into two levels. Level one refers to Form 1, 2 and 3 (Lower Secondary) and level two refers to from Form 4 and 5 (Upper Secondary). Under the New Integrated Secondary School Curriculum, secondary school offers a comprehensive education programme with a wide range of subjects from the arts and sciences to vocational and technological education with a practical basis. At the same time, several religious schools and special education schools offer secondary education to provide an alternative for special skills in technology, literacy and knowledge, such as Smart School, that was introduced in 1996. During this period, students in the government schools must sit two national examinations at the end of each level; namely Lower Secondary Examination (LCE) at the end of level one, and Malaysian Certificate of Education (MCE) after finishing level two.

The Upper Secondary Education offers choices to students to fulfil their needs, skills and interests in career development. They can move into more specialised fields of study, ranging from arts and science stream, to technical and vocational subjects, or religious schools. Students will be given a range of choices in upper secondary education but in practice they will be guided to choose the appropriate stream or subjects depending on their Lower Secondary Examination result. Better students are

given the opportunity to join "good schools" such as MARA Junior Colleges, National Boarding Schools, National Religious Secondary Schools or schools specializing in sports, depending on their interests, and needs, as well as career path.

Besides these schools, another choice is to enter Technical and Vocational Schools which offer core and elective subjects in various technical and vocational combinations. The purpose is to prepare students to pursue their study to technical and engineering tertiary education, or to enable them to take up a career as technical and semi-skilled workers. They have two years to prepare themselves for the third national examination, which is the Malaysian Certificate of Education (MCE).

The lower and upper secondary education are the crucial stage in schooling continuity. The result of the LCE has given a significant impact to the schooling choices at the upper secondary. Some students tend to be left out from school at this level because they did not obtain a good result or certain level of achievement. A streaming system will put them in humanity and social science at the upper secondary level which does not meet their interest and inspiration. Furthermore, it will influence their achievement at the upper secondary level. As a result, they may drop out at lower secondary and those with a lower quality of achievement at upper secondary will affect their opportunity to get better pay in the job market. It is because the evidence shows that better-educated people are more likely to be employed. Moreover, in Malaysia, labour participation rates increase with the level of education. Better qualifications also attract higher wages for individuals. The wage differences are large, reflecting a wage spread in a labour market and possibly higher returns to schooling. Evidence from the civil servant wage scheme indicates that the basic salary of university graduate is three time higher than those with upper secondary

certificates. Therefore, it is very important to think of a possible strategy to ensure the drop out rate at lower and upper secondary levels are very minimal.

## 3.5 Post-secondary School

Post-secondary Education offers school leavers or students the opportunity to continue their studies after completing five years of secondary education. The options in secondary education are not only in the academic field but also in various studies including matriculation, technical and vocational, and short term courses. These courses were conducted by government and, non-government agencies, or in the private sector. There are four types of post-secondary education and training programmes. Firstly, form six education is a continuation of the five years academic schooling (secondary level) to help students prepare themselves to qualify to go to the university. It takes two years to complete the post-secondary education either in science or arts stream before they can sit for the Higher School Certificate (HSC), conducted by the Malaysian Examination Council. The open certificate is an essential entry requirement for certain courses in public universities and is also accepted as pre-requisite for various courses in private colleges. Furthermore, this certificate is recognised by professional examination bodies' world wide because it is accredited by the University Of Cambridge Local Examination Syndicate Of England. The number of student's enrolling for post-secondary education (form six) in the government and government aided schools increased from 63,250 in 1990 to 88,580 in 2005, or 74.01 percent of the total post-secondary enrolments. Meanwhile, pre-diploma and pre-university courses have grown dramatically since 1990 when student enrolment was at 10,730, and increased to 31,107 in 2005; i.e. it more than doubled

within this period. This included students who joined the matriculation courses. It grew about 13 percent per annum between 1990 and 2005 (EPU, Malaysia 2006).

The matriculation courses are a pre-university programme designed for students who achieved good results in the Malaysian Certificate of Education. They will need to complete this programme before they can enter a higher learning institution offering various professional courses. Prior to June 1999, the matriculation programme was conducted by the local public universities but then was managed by the Ministry of Education, under the Matriculation Division excluding the University of Malaya matriculation programme. Students have a choice of specialization in pure science, physical science and accountancy depending on their upper secondary qualification or certificate. This programme takes between one and half and two years to complete.

Thirdly, broad-based education and training programmes for upper secondary leavers are provided by the government, through polytechnics. The polytechnics offer a wide range of full time and part time courses from field engineering, commerce, tourism, and hotel and catering to graphics and industrial design, apparel and fashion. Most of the courses take two years to complete and students then will have the choice to either enter the job market or to pursue further studies at local universities or abroad. Apart from training centres, Polytechnics also play major roles in producing skilled workers or manpower as technical assistants in various engineering fields, and junior and middle level executives in commercial and service sectors. They (polytechnics) also provide relevant technologies and entrepreneurial education and training to upgrade the basic skills in the particular field. Furthermore, polytechnics are also agents in promoting collaboration with the private sectors and research and

development programmes. Recently, student enrolment at certificate and diploma courses in local the public education has grown significantly.

Finally, post education and training are also offered by other government agencies and the private sectors in order to fulfil the country's demands and needs. Various programmes are conducted by several ministries, including the Ministry of Health, the Ministry of Youth & Sport, and the Ministry of Development of Entrepreneurship. From that, there are also many joint venture programmes between government agencies and foreign bodies; for examples The German Malaysian Institute (GMI), The British Malaysian Institute (BMI), The Malaysian France Institute and Japan-Malaysia Technical Institute. The total intake into advanced training centres, including the collaborative institutes as mentioned above was increased from 1,637 in 2000 to 2,380 in 2003. However these numbers are too low to meet the demands. Generally, the collaborative projects focus on high and advanced technical professional courses, particularly in the field of engineering and information technology. On the other hand, those who want to study abroad can enter the matriculation programmes offered by foreign universities and colleges likes the South Australian Matriculation Program, The American University Programmes and the Canadian Matriculation Programmes.

## 3.6 Higher Education

Higher education in Malaysia has expanded enormously over the last thirty years through the establishment of first and second tier institutions in both the public and private sectors. The number of public universities (and colleges) increased from 9 in 1990 to 71 in 2005, including four university colleges, which were set up during The

Eighth Malaysian Plan 2001-2005[22]. The university colleges focused on specific areas of study, especially on engineering as well as technology and related areas, emphasising hands-on experience using the experiential and action learning process (Malaysia 2003).

The length of study in higher education (i.e. refers to public universities) at degree level depends on the type of courses. In general, there are two types of courses. Short-term courses consists of the specific area such as art, social science and humanity, business and other courses. These courses will take between 3.5 to 4 years to complete. Long-term courses refers to technical and science such engineering, medical, pure sciences and etc. These courses need between 5 and 6 years to complete.

The rapid expansion has been fuelled by a strong social demand for higher education, seen as the main avenue for social mobility and social justice, and facilitated by the universalization of secondary education. Essentially, higher wages for university graduates in the market was the main factor to attract young people in higher education. At the same time the large number of qualified students, especially from rural areas and low income families have "an opportunity", as a result of the financial assistance provided by the National Higher Education Fund (NHEF). To further the accessibility, NHEF was increased by MYR1 billion in to MYR3.1 billions at the end of the Eighth Malaysian Plan and has benefited up to 401,130 students (EPU, Mid-term Review of 8MP 2003).

[22] The dramatic increased of public higher learning institution in 2005 was contributed by the increasing number of the community colleges and polytechnics. Meanwhile, the total number of public universities was 11 since the last decade.

All efforts to develop high quality tertiary education were supported by private sector participation, to meet the demand for higher education, particularly after the implementation of the Higher Learning Institutions Acts 1996. The private sector provide multiple choices of education and training opportunities, in the fields of engineering, information and communication technologies, business study, medicine and creative media. At the end of 2002, the number of private institution was 534, of which 9 were universities, 4 were branch campuses of foreign universities and 521 were colleges. The number of students enrolling at these private universities and colleges was 294,600 (MOF 2004), a sevenfold increase compared to the year 1990 (only 35,600 students). By 2005, the total number of private higher learning institutions was 630 (EPU, 9MP 2006).

In a nutshell, the regular education system in Malaysia provides 6 years of schooling in primary, 5 and 2 years in secondary and post secondary respectively. Meanwhile, years of schooling in higher education are 4 years, on average. Therefore, if one sums up all years of schooling to be completed until higher education, these will be 17 years of schooling. In human capital theory, year of schooling is main factor in estimating the returns to education. It was suggested there is a positive correlation between schooling and earnings. Those who obtained a higher level of schooling will get a higher income. This relationship is described in the next chapter, meanwhile, Chapter 5 provides the evidence from studies in many countries. However, the trend of returns to schooling, either decrease or increase over time depending on the demand for and supply of labour. The next section, discusses the human capital development in Malaysia, including demand for and supply of labour.

## 3.7 Human Capital Development: Allocation and Expenditure

The Federal government prepared a significant allocation and expenditure to develop and enhance the human capital in each five year plan. The amount of expenditure and allocation in human capital development for the past two decades is shown in Table 3.1. The expenditure for education and training during the 6MP was MYR7 billions or 13 percent of the total public expenditure (EPU, 8MP 1996). While the total expenditure for human capital development in 7MP was approximately MYR17.5 billions. During 8MP, the priority of human capital development is to increase the supply of manpower with required academic, technical and extra-functional skills to prepare labour force for a knowledge-based economy.

**Table 3.1: Development Allocation and Expenditure for Education and Training, 1991 – 2010 (MYR million)**

| Programme | 6MP (1991-1995) | 7MP (1996-2000) | 8MP (2001-2005) | 9MP (2006-2010) | Annual Growth Rate [a] 1990 -2010 (%) |
|---|---|---|---|---|---|
| | Expenditure | Expenditure | Expenditure | Allocation | |
| **Education** | **6,982.1** | **17,542.2** | **37,992.0** | **40,356.5** | **23.90** |
| Pre-school | 58.0 | 107.5 | 215.7 | 807.3 | 64.59 |
| Primary Education | 1,127.1 | 2,631.8 | 5,369.3 | 4,837.3 | 16.46 |
| Secondary Education | 1,909.0 | 5,317.5 | 8,748.1 | 6,792.8 | 12.79 |
| Government & Government-aid School | 1,475.4 | 3,853.7 | 7,931.2 | 5,549.1 | 13.81 |
| MARA Junior Science College | 28.7 | 707.2 | 433.1 | 614.5 | 102.06 |
| Technical & Vocational Schools | 404.9 | 756.6 | 383.8 | 629.2 | 2.77 |
| Tertiary Education | 3,039.4 | 5,005.1 | 13,403.9 | 16,069.0 | 21.43 |
| Teacher Education | 155.6 | 332.5 | 1,368.1 | 577.7 | 13.56 |
| Other Educational Support Programme | 693.0 | 4,147.8 | 8,816.9 | 11,272.4 | 76.33 |
| **Training** | **581.0** | **2,181.9** | **4,450.9** | **4,792.6** | **36.24** |
| Industrial Training | 370.0 | 1,827.0 | 3,930.6 | 4,103.6 | 50.45 |
| Commercial Training | 14.0 | 71.2 | 158.6 | 179.5 | 59.11 |
| Management Training | 197.0 | 283.7 | 361.7 | 509.5 | 7.93 |
| ***Total*** | ***7,563.1*** | ***19,724.1*** | ***42,372.9*** | ***45,149.1*** | ***24.85*** |

*Sources: Seventh Malaysian Plan, 1996-2000 (1996); Eight Malaysian Plan, 2001-2006 (2001); Mid-term Review 8MP (2003); Ninth Malaysian Plan, 2006-2010 (2006).*
Note: [a] Calculated by author.

Education and training programmes will be directed towards increasing accessibility, improving quality and reducing the performance gap between rural and urban areas. In line with the greater focus on human capital development, the government spent more than MYR37 billions during the 8MP period. Meanwhile, the allocation for the 9MP was increased to MYR40.35 billions. The Ministry of Education (MOE), along with other ministries[23] will be responsible for providing a greater access for the quality of pre-school, primary and secondary education, while the Ministry of Higher Education will undertake the responsibility for greater access to tertiary education.

## 3.8 Human Capital Progress: Education Programmes

The impact of increasing the amount of allocation and expenditure on human capital development enables the country to increase accessibility, strengthen the delivery system and improve the quality of education. The progress of the human capital over the past two decades has been shown by the increasing number of enrolments in primary, secondary and tertiary education. The outputs of certificate, diploma and degree level were increased significantly.

### 3.8.1 Primary Education

In the 1990s, the development of primary education strategies was aimed at expanding capacity, improving existing facilities, increasing accessibility to better education for the children (including the disabled), and improving student achievement, particularly in rural areas. As a result, primary school enrolment

[23] Includes Ministry of Higher Education (MOHE), Ministry of Human Resources (MOHR), Ministry of Entrepreneur and Co-operative Development (MOECD) and Ministry of Youth and Sport (MOYS).

increased by 16.7 percent from 2.4 millions in 1990 to 2.8 millions in 1995 (EPU, 7MP 1996). Despite the success of universal education achievement, the numbers dropping out in primary school is quite large. During the same period, the total dropping out was 18,000; i.e. 4.0 percent did not complete primary education. Thus, in the 7MP, aggressive educational support programmes were provided, such as text book loan, scholarships, and hostel facilities; especially in the rural areas. New schools were constructed to replace dilapidated classrooms and to accommodate the increasing numbers of students, as well as providing a more conducive learning environment. As a result, the percentage of overcrowded schools nationwide declined from 18 percent in 2000 to 14 percent in 2003. The completed 9,930 new classrooms in 2005 contributed to an improved classroom ratio from 1:0.90 in year 2000 to 1:092 in 2005. The number of student enrolments increased from 2.9 millions in 2000 to 3.04 millions in 2005.

### 3.8.2 Secondary Education

According to the 7MP (1996), enrolment at secondary education level increased by 23.73 percent from about 1.3 millions in 1990 to 1.6 millions in 1995. At the lower secondary level, enrolment increased by 19.17 percent. The result is an improvement in the transition rate from primary education to secondary education from 83 percent in 1990 to 84.5 percent in 1995. The gradual implementation of extended basic education from 9 years to 11 years has contributed to increasing enrolment at the upper secondary education level. As a result, the transition rate from lower secondary education to secondary education improved from 68 percent in 1990 to 83 percent in 1995 (EPU, 7MP 1996). Enrolment at upper secondary level increased from 0.37 millions in 1990 to 0.50 millions in 1995.

During the 7MP, the increase in allocation for human capital development allowed the provision of more infrastructures for secondary education. Within this period, 6,808 new classrooms were built. Student enrolment at secondary level (lower and upper secondary education) increased from 1.63 millions to approximately 2.02 million, or 19.0 percent in 2000. Meanwhile, the classroom ratio reduced from 1:0.76 in 1995 to 1:083 in 2000. Overcrowded classes also reduced, from 14 percent to 12 percent in 2000. In 2005, the number of student enrolments at secondary level increased to 2.1 millions. The proportion of science stream students increased from 32.2 percent in 2000 to 45.6 percent in 2005. The number of students in technical and vocational increased to 81,887 or about 16.5 percent compared to 1990. The enrolment annual growth rate for Vocational and Technical School is 10.98 percent.

Apart from that, continuous efforts will be undertaken by the government to improve accessibility, enhance quality as well as improve teaching and learning facilities. Efforts have also been made to reduce the performance gap between rural and urban schools, by upgrading teaching and learning facilities, by providing more laboratories, information and technology infrastructures. Teaching methods are continuously revised; e.g. by retraining teachers through workshops, seminars, training and more computer-aided learning. The number of non-graduate teachers has declined dramatically due to the government policy to achieve the target of making all secondary teachers and 25 percent primary school teachers graduates by 2010.

### 3.8.3 Tertiary Education

In 1990, enrolment at this level was 122,360 students. Of the total in 1990, 47.76 percent were in the degree courses, 26.17 percent were diploma, while teacher

education was 17.77 percent and the rest were certificate levels. The total enrolment was increased to 171,561 (including teacher's education) students in 1995. However, the proportion of students in science and technical courses only increased by 4 percent (41 and 45 percent in 1990 and 1995, respectively).

**Table 3.2: Enrolment and Output for Diploma and Certificate Courses, 1990-2005 (persons)[a]**

| Courses | Enrolment | | | | Output | | |
|---|---|---|---|---|---|---|---|
| | 1990 (%) | 1995 (%) | 2000 (%) | 2005 (%) | 6MP (1996-2000) (%) | 7MP (2001-2005) (%) | 8MP (2001-2005) (%) |
| **DIPLOMA** | | | | | | | |
| Arts | 17,050 | 23,330 | 39,872 | 55,961 | 18,690 | 43,206 | 51,449 |
| | (53) | (50) | (43.2) | (37.8) | (47) | (56.7) | (41.9) |
| Art & Humanities[1] | 1,590 | 3,370 | 2,476 | 3,621 | 3,770 | 5,372 | 5,372 |
| Economics & Business[2] | 15,460 | 19,960 | 37,126 | 52,340 | 14,920 | 46,077 | 46,077 |
| Science | 6,190 | 8,860 | 17,024 | 22,945 | 7,060 | 13,317 | 31682 |
| | (19) | (19) | (18.4) | (15.5) | (18) | (17.5) | (25.8) |
| Agriculture & Related Science[3] | 2,290 | 1,690 | 2,071 | 2,400 | 2,130 | 3,055 | 3,776 |
| Others[4] | 3,900 | 7,170 | 14,953 | 20,545 | 4,930 | 10,262 | 27,906 |
| Technical | 8,780 | 14,290 | 35,421 | 69,119 | 14,120 | 19,636 | 39,603 |
| | (28) | (31) | (38.4) | (46.7) | (35) | | |
| Engineering | 6,010 | 11,040 | 27,421 | 2,400 | 11,620 | 12,466 | 28,608 |
| Architecture, Town Planning & Survey | 2,210 | 2,660 | 6,710 | 20,545 | 2,190 | 6,152 | 8,978 |
| Others[5] | 560 | 1,040 | 1,281 | 5,529 | 310 | 1,018 | 2,017 |
| **Total** | **32,020** | **46,480** | **92,308** | **148,025** | **39,870** | **76,159** | **122,734** |
| **(%)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** |
| **CERTIFICATE** | | | | | | | |
| Arts | 1,750 | 3,360 | 6,325 | 21,434 | 7,760 | 5,494 | 10,831 |
| | (76.0) | (20.0) | (22.5) | (24.1) | (26.0) | (55.2) | (60.6) |
| Art & Humanities[1] | 440 | 610 | 1,392 | 4,749 | 1,300 | 554 | 559 |
| Economics & Business[2] | 1,310 | 2,750 | 4,933 | 16,685 | 6,460 | 4,940 | 10,272 |
| Science[4] | 720 | 1170 | 1,008 | 2,110 | 4,500 | 1,873 | 4,433 |
| | | (7.0) | (3.5) | (2.4) | (15) | (18.8) | (24.8) |
| Technical | 7,680 | 12,550 | 20,821 | 65,304 | 17,520 | 2,582 | 2,610 |
| | (76) | (73) | (74.0) | (73.5) | (59) | (1,163) | (14.6) |
| Engineering | 6,450 | 10,880 | 20,396 | 64,516 | 15,350 | 1,163 | 1,935 |
| Architecture, Town Planning & Survey | 1,230 | 1,670 | 4,25 | 7,88 | 2,170 | 1,419 | 675 |
| **Total** | **10,150** | **17,080** | **28,154** | **88,848** | **29,780** | **9,949** | **17,874** |
| **(%)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** |

*Source: Mid-Term Review of the Eight Malaysia Plan 2001-2005, 2003.*

Notes: [a] From local public educational institution.

[1] Includes Islamic studies, languages, literature, Malay culture, social science and education.

[2] Includes accountancy, agri-business, business management and resources economics.

[3] Includes home science and human development.

[4] Includes applied science, environmental studies, food technologies and science with education. Also includes biology, chemistry, maths, physics others for year 1990 to 1995.

[5] Includes property management.

At the end of 7MP, enrolment at tertiary level was 321,733. Of the total enrolment, 201,271 were enrolled at degree level, while 92,308 and 28,254 students were enrolled at diploma and certificate levels, respectively (Table 3.2). However, the proportion of science and technical students only at 52.0 percent, increased less than 10 percent compared to the previous five year plan. It remains critical to fulfil the needs of the labour market. The target ratio of enrolment for science and technical courses to arts stream was 60:40. To achieve this objective, greater access to tertiary education was expanded. The new universities, college university, branch campus and community colleges were established, while, existing universities and colleges were expanded especially for science and technical courses.

The total of public universities and colleges increased from 22 to 71 in 2005. The large increase in the total number of public tertiary education was achieved by increases in college universities and community colleges, while, the number of public universities remains at 11, in 2005. On the other hand, the total number of private colleges and universities in 2005 was 630. As a result, enrolment at all levels of study in public and private tertiary education institutions increased to 731,698 in 2005. Of the total, 16.2 percent were enrolled at post-graduate level. The average annual growth rate of student enrolment during 8MP period at degree level was 4.4 and 13.00 percent year for public and private tertiary education, respectively (EPU, 8MP 2001).

Table 3.3 shows the enrolment and output for degree courses from local public tertiary education. The total output from tertiary education increased from 65,470 in 6MP to 292,378 at the end of 8MP. During the 8MP, 46.1 percent was the output from the arts courses. Meanwhile, the output of science and technical courses were 31.3 and 22.6 percent respectively. Even though the output of tertiary education has been

increased significantly in the past two decades, the mismatch between demand and supply become an important issue. The output of art and humanities were greater relative to science and technical courses. On the other hand, the demand in the labour market is higher for the latter. The demand for and supply of labour is discussed in the following section.

**Table 3.3: Enrolment and Output for First Degree Courses, 1990-2005**

| Courses | Enrolment | | | | Output | | |
|---|---|---|---|---|---|---|---|
| | 1990 (%) | 1995 (%) | 2000 (%) | 2005 (%) | 6MP (1996-2000) (%) | 7MP (2001-2005) (%) | 8MP (2001-2005) (%) |
| **Arts** | **31,220 (59.0)** | **44,886 (59.3)** | **81,914 (48.0)** | **103,846 (42.2)** | **38,270 (58.0)** | **78,433 (57.7)** | **134,764 (46.1)** |
| Art & Humanities[1] | 17,790 | 22,262 | 27,372 | 33,019 | 22,160 | 40,612 | 64,187 |
| Economics & Business[2] | 11,320 | 20,072 | 37,875 | 50,522 | 13,770 | 34,261 | 65,252 |
| Law | 2,110 | 2,552 | 3,909 | 5,116 | 2,340 | 3,560 | 5,325 |
| Others[3] | - | - | 12,398 | 15,189 | - | - | - |
| **Science** | **14,460 (27.0)** | **18,171 (24.0)** | **49,575 (29.0)** | **71,897 (29.4)** | **17,370 (27.0)** | **34,805 (25.6)** | **91,607 (31.3)** |
| Medicine & Dentistry[4] | 2,380 | 3,738 | 6,908 | 8,656 | 2,900 | 4,019 | 7,716 |
| Agriculture & Related Science[5] | 1,610 | 2,472 | 4,908 | 5,961 | 1,430 | 4,409 | 8,935 |
| Pure Science[6] | 4,610 | 4,032 | 9,081 | 14,739 | 3,600 | 6,502 | 17,408 |
| Computer Science & Information Technology | | - | 15,051 | 22,199 | - | | |
| Others[7] | 5,860 | 7,929 | 13,494 | 22,199 | 9,440 | 19,875 | 57,548 |
| **Technical** | **7,130 (14.0)** | **12,652 (16.7)** | **39,305 (23.0)** | **68,784 (28.1)** | **9,830 (25.0)** | **22,765 (16.7)** | **66,007 (22.6)** |
| Engineering | 5,520 | 9,756 | 31,494 | 57,684 | 6,420 | 16,980 | 53,822 |
| Architecture, Town Planning & Survey | 940 | 1,397 | 4,682 | 7,920 | 1,570 | 3,201 | 8,302 |
| Others[8] | 670 | 1,499 | 3,129 | 3,180 | 1,840 | 2,584 | 3,883 |
| **Total** | **52,810** | **75,709** | **170,794** | **244,527** | **65,470** | **136,003** | **292,378** |
| **(%)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** |

*Source: Mid-Term Review of the Eight Malaysia Plan, 2001-2005, 2003.*

Notes: [a] From local public educational institution.
[1] Includes Islamic studies, languages, literature, Malay culture, social science and education.
[2] Includes accountancy, agri-business, business management and resources economics.
[3] Includes art and communications.
[4] Includes pharmacy.
[5] Includes home science and human development.
[6] Refers to biology, chemistry, mathematics and physics.
[7] Includes applied science, environmental studies, food technology and science with education.
[8] Includes property management.

## 3.9 Labour Force and Employment

The population of Malaysia grew at an average annual rate of 2.7 percent from 13.74 million in 1980 to 18.40 million in 1990. During the Seventh Malaysian Plan, 1996-2000, the annual growth rate declined to 2.4 percent. In year the 2000, the population was 23.26 millions. The rate of population growth continued slowly downward with the decline of fertility rate as the country progressed toward a developed nation. The total population in 2007 was 27.17 and it is projected to increase to 28.96 millions in 2010, growing at 1.6 percent per annum. Meanwhile the life expectancy at birth of population improved, with male life expectancy increasing from 70.0 years in 2000 to 70.6 in 2005, and female life expectancy increasing from 75.1 to 76.6 during the same period.

There was significant improvement in the quality of the labour force over the past two decades. In 1995, about 55 percent of the labour force had undergone secondary education; while the proportion with tertiary education was about 6.3 percent (EPU, 7MP 2001). The Labour Force Survey conducted by the Department of Statistics in 2003, showed that the proportion of labour force with secondary education increased to 56.2 percent, with 12.2 percent having a vocational and technical training. The percentage of labour force with tertiary education increased from 13.9 percent in 2000 to 17.1 percent in 2003 (EPU, Mid-term Review of 8MP 2003). In 2005, the share of the labour force with tertiary level reached 20 percent (EPU, 9MP 2006).

The consistently high growth in the late 1980s and early 1990s created a strong demand for the manpower. The Sixth Malaysian Plan (1991-1995) was a turning point in Malaysian economy when for the first time the country experienced a

shortage of labour. With the small labour supply the rapid economic growth translated into a relative skill shortage. At the same time, the education system could not respond adequately to meet the requirement of labour in sectors, especially for skilled workers. The unemployment rate fell to the lowest rate ever recorded, which was 2.8 percent. As a result, the government took the decision to liberalize the policy of foreign labour. In 1995, a total of 852,700 work permits were issued to foreign workers as an initial solution to meet the rapid demand of labour force, as shown by Table 3.4 (EPU, 7MP 1996). By the year 2000, the number of foreign workers with permits increased to approximately 1 million. Of the total in 2000, 31.3 percent were in manufacturing, 29 percent in agriculture, 8.7 percent in construction, 7.4 percent in the services sector and the rest (20.3 percent) worked as maids.

During the period of 6MP, 1991-1996, employment expanded at the rate of 3.4 percent per year. The rapid growth of the economy contributed to the high demand on the labour force. Nevertheless, the supply of labour grew only 2.9 percent within the period. On the absolute number, the total of jobs created was approximately 1.2 millions more than projected (1.1 millions). As a result, a labour shortage occurred in all sectors the economy. The economic crisis of the late 1990s had a severe effect on several sectors of economy, especially construction, banking, manufacturing and agriculture. Consequently, the demand for labour in these sectors declined. The average growth of employment was a negative between 1998 and 1999.

In the 7MP, 1996-2000, the population of working age grew at an average of 2.8 percent. The labour force participant (LFPR) rate at 64.9 percent, was lower than 1995 due to the economic crisis. At the end of year 2000, the labour participant rate was 65.7 percent. Male LFPR only increased by 0.1 percent, from 85.3 in the Sixth

Malaysian Plan to 85.4 in the Seventh Malaysian Plan, while female LPFR increased 43.5 to 44.5 percent. During the 7MP period, approximately 1.3 million persons entered the labour market, or 254,000 persons per year.

The demand for foreign workers remains important for the low skilled workers to fulfil the demand in certain sectors of economy. Thus, the number of foreign workers increased from 0.7492 millions in 2000 to 1.0 millions in 2005. Of this total, 31.0 percent were in the manufacturing sector. While the number of skilled workers and expatriates were 35,480, of whom 52.9 percent were in the services sectors. In the mid-term review of Eighth Malaysian Plan, 2001-2003, the numbers of job seekers with tertiary education increased from 11.2 percent in 2000 to 14.5 percent in 2003 due to increasing of graduates entering the job markets. On the other hand, the number of new jobs created which required tertiary education was low. As a result, two-thirds of the unemployment was from the age group of 15 to 24 years old. However, the job seekers from these groups were unemployed for less than 6 months, on average (EPU, Mid-term Review of 8MP 2003).

## 3.10 Demand and Labour Supply by Sectors

In the late 1980s, the manufacturing sector registered the most rapid output growth. It accounted for about one quarter of the total employment in Malaysia. In addition, this sector also generated more than 50 percent of the net employment in 1990. The demand for labour grew at 9.0 percent per annum in the Sixth Malaysian Plan, 1991-1995. During this period, there was witness of industrial restructuring towards higher high value-added products and activities. Consequently, the labour shortages occurred not only at the production level but also at the skilled and semi-skilled levels. For

example, the supply of skilled and semi-skilled workers in 1995 was only 15,844 persons, as shown in Table 3.4. By year 2005, it had increased to 75,168 persons.

Between 1996 and 2000 (during the 7MP period), the manufacturing sector expanded at a rate of 4.8 percent per annum and contributed to the major share of net employment creation of 0.53 million jobs. The manufacturing share of total employment was increased from 25.3 percent in 1995 to 27.6 percent in year 2000. On the other hand, the output of diploma and certificate level was only at 39, 870 and 29,780 persons during the same period, as shown by Table 3.2 (page 68).

**Table 3.4: The Supply of Skilled and Semi-skilled Manpower by Course, 1995-2005 (persons)**

| Course | Output | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1995 (%) | 2000 (%) | 2003 (%) | 2005 (%) | Average Annual Growth Rate 1995-2005 (%) | 7MP (1996-2000) (%) | 8MP (2001-2005) (%) |
| Engineering | 18,254 | 26,984 | 39,271 | 50,272 | 17.54 | 122,593 | 197,441 |
| Mechanical | 8,483 | 11,700 | 17,875 | 23,514 | 17.72 | 56,971 | 91,758 |
| Electrical | 9,477 | 14,742 | 20,643 | 25,876 | 17.30 | 63,643 | 102,496 |
| Civil | 294 | 542 | 753 | 882 | 20.00 | 1,979 | 3,187 |
| Building Trades | 1,997 | 2,513 | 3,188 | 3,800 | 9.03 | 13,415 | 21,601 |
| Information & Communications Technology | 4,214 | 8,304 | 9,991 | 11,541 | 17.39 | 28,296 | 45,566 |
| Others | 2,882 | 3,792 | 3,966 | 4,904 | 7.02 | 19,354 | 31,161 |
| Skill Upgrading | 563 | 2,893 | 3,778 | 4,651 | 72.61 | 3,781 | 6,089 |
| **Total** | **15,844** | **44,846** | **60,193** | **75,168** | **37.44** | **187,439** | **301,859** |

*Source: 7MP, 1996-2000 (1996), 8MP, 2001-2006 (2001), Mid-Term Review of 8MP 2001-2005 (2003).*

The increasing world demand for electrical and electronic products contributed to the rapid growth in this sector; hence the demand for labour was increased significantly. Within the review period of the 8MP, this sector supplied more than 270,700 new jobs which was nearly half of the total new jobs created by the manufacturing sector. It was a result of the recovery plan of the economic crisis in

the late 1990s. The manufacturing sector expanded at an average rate of 3.4 percent per annum during 2001 and 2003. The total employment by sector of the economy was shown by Table 3.5. While the number of trainees as skilled or semi-skilled human resources in year 2003 was only 60,193 persons (Table 3.4). The supply of skilled and semi-skilled manpower increased to 75,186 persons in 2005. During the 7MP period, the supply of skilled and semi-skilled workers were 187,439 and increased to 301,859 persons at the end of 8MP period. However, these were not sufficient to provide what the country needed during this period. The supply of skilled and semi-skilled manpower from 1995 to 2005 is shown in Table 3.4.

Wholesale & retail trade, hotel & restaurants contributed around 17 and 18 percent respectively of the total employment during 1990 and 2005. The number in employment was increased from 1.2 million in 1990 to 1.8 million in year 2005. The total net jobs created by this sector during 6MP was approximately 0.1 million, increasing to 0.23 million in the 8MP.

The finance, insurance, real estate & business services sector contributed between 9 and 10 percent of the net job creation during 1990 to 2005. Total employment in this sector was increased from 0.258 million in 1990 to 0.680 million in 2005. However, within the services sector, the other services sub-sectors generated the second highest number of jobs during the last two decades. The share of the total net jobs creation by this sector was 17.5 percent during the Seventh and Eighth Malaysian Plans, accounting for 0.222 and 0.274 million new jobs, respectively.

In the 9MP, 2006-2010, the manufacturing and services sector is expected to create approximately 462,600 and 693,400 jobs, respectively. In the manufacturing sector, it will depend on the global demand for electrical and electronic goods. While

in the services sector, the wholesale and retail trade, hotels and restaurants will be expected to be the largest contributor.

**Table 3.5: Employment by Sector, 1990-2005 ('000 persons)**

| Industry | 1990 (%) | 1995 (%) | 2000 (%) | 2005 (%) | Net Job Creation 6MP | 7MP | 8MP |
|---|---|---|---|---|---|---|---|
| Agriculture, Forestry, | 1,738.0 | 1,492.7 | 1,407.5 | 1,403.0 | -245.3 | -85.2 | -4.50 |
| Livestock & Fishing | (26.0) | (18.5) | (15.2) | (12.9) | (-18.7) | (-6.7) | (-0.3) |
| Mining & Quarrying | 37.0 | 40.5 | 41.2 | 43.5 | 3.5 | 0.7 | 2.30 |
| | (0.6) | (0.5) | (0.4) | (0.4) | (0.3) | (0.1) | (0.1) |
| Manufacturing | 1,333.0 | 2,027.5 | 2,558.3 | 3,177.1 | 694.5 | 530.8 | 618.80 |
| | (19.9) | (25.3) | (27.6) | (29.5) | (52.9) | (41.7) | (39.4) |
| Construction | 424.0 | 717.1 | 755.0 | 823.0 | 293.1 | 37.9 | 68.0 |
| | (6.3) | (9.0) | (8.1) | (7.6) | (22.3) | (3.0) | (4.3) |
| Electricity, Gas & Water | 47.0 | 67.4 | 75.0 | 99.5 | 20.4 | 7.6 | 24.5 |
| | (0.7) | (0.8) | (0.8) | (0.9) | (1.6) | (0.6) | (1.6) |
| Transport, Storage & | 302.0 | 395.2 | 461.6 | 579.0 | 93.2 | 66.4 | 117.4 |
| Communications | (4.5) | (4.9) | (5.0) | (5.1) | (7.1) | (5.2) | (7.5) |
| Wholesale & Retail Trade, | 1,218.0 | 1323.5 | 1,584.2 | 1,814.6 | 105.5 | 260.7 | 230.4 |
| Hotel & Restaurants | (18.2) | (16.5) | (17.1) | (16.7) | (8.0) | (20.5) | (14.7) |
| Finance, Insurance, Real Estate | 258.0 | 372.8 | 508.7 | 680.0 | 114.8 | 135.9 | 171.3 |
| & Business Services | (3.9) | (4.7) | (5.5) | (6.3) | (8.7) | (10.7) | (10.9) |
| Governments Services | 850.0 | 885.8 | 981.0 | 1,048.7 | 35.8 | 95.2 | 67.70 |
| | (12.7) | (11.1) | (10.6) | (9.7) | (2.7) | (7.5) | (4.3) |
| Other Services | 479.0 | 676.7 | 898.7 | 1,173.5 | 197.7 | 222.0 | 274.8 |
| | (7.2) | (8.5) | (9.7) | (10.8) | (15.1) | (17.5) | (17.5) |
| **Total** | **6,686.0** | **7,999.2** | **9,2712** | **10,842.0** | **1,313.2** | **1,272.0** | **1,570.7** |
| **(%)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** | **(100)** |
| Labour Force | 7,040.0 | 8,254.0 | 9,572.5 | 11,208.3 | | | |
| Local | 6,752.0 | 7,401.3 | 8,823.3 | 10,208.3 | | | |
| Foreign | 290.0 | 852.7 | 749.2 | 1,000.0 | | | |
| Unemployment | 256.0 | 254.8 | 301.3 | 366.3 | | | |
| Unemployment Rate (%) | 5.1 | 3.1 | 3.1 | 3.3 | | | |

*Sources: EPU 6MP, 1991-1996 (1996), EPU 7MP, 1996-2000 (1996), EPU 8MP, 2001-2006 (2006).*

Employment in the construction sector grew at an average rate of 9.2 percent per annum during the period of 6MP. It accounted for about 22.3 percent of the job creation due to the massive infrastructure projects[24]. The share of total employment increased from 6.3 percent in 1990 to 9.0 percent in 1995. However, this sector was severely affected by the economic crisis in the 7MP. Employment recorded an average growth of 1.7 percent contributing 3.0 percent of employment creation or

[24] Including the Kuala Lumpur International Airport, Kuala Lumpur City Centre, Kuala Lumpur Tower, electrified double tracking of the national railway and the expansion of the major ports in Malaysia.

37,900 new jobs. However, this sector did not catch the attention of local job seekers. Thus, it had to rely on foreign workers and consequently, the number of foreign workers in this sector increased from 65,851 in 2000 to 224,350 in 2003, accounting for 28.3 percent of the total employed (EPU, Midterm Review of 8MP 2003).

In line with the slow growth and increasing mechanization in the agriculture sector since 1980s, the number in employment declined by approximately 245,300 jobs during the 6MP. Agriculture share of total employment fell from 26.0 percent in 1990 to 18.0 percent in 1995. On the labour supply side, the labour shortage occurred due to the movement of local and young to other sectors. Compared to agriculture, the other sectors are more attractive in terms of better wages, prospects, and fringe benefits. As a result, the agriculture sector was gradually forced to absorb foreign workers, especially on the rubber and palm oil plantations. During the 7MP, this sector continued to decline with the annual growth rate at an average of 1.2 percent per annum. In spite of the declining demand for labour, this sector still faces the problem of attracting local labour. Consequently, the number of foreign workers involved in this sector increased from 175,000 in 2000 to 327,490 persons in 2003. According to the report in the Eighth Malaysian Plan (2006), the impact of better farm management and the increase in labour-saving technologies, resulted in the total number in employment in this sector declining by 17,300 in the year 2005.

## 3.11 Demand and Labour Supply by Occupation

Over the last two decades, the demand for workers in the professional, technical, administrative and managerial categories increased rapidly. This is consistent with the high growth in the manufacturing and services sectors during this period. According

to the report in 7MP (EPU, 2001), the average annual rate of growth of jobs within these occupations was about 6 percent during the 6MP. This indicates a strong demand for tertiary and technical education. For example, the demands for engineers and engineering assistants were about 36,350 and 48,000, respectively. However, the capacity of education and training to supply engineers was only 13,000, while the supply of engineering assistants was less than half the required amount. Thus, the shortage of engineering assistants was about 26,600. Shortages were also reported in all fields of health professionals, such as physicians and surgeons. The supply of allied health professionals, for example nurses and medical assistants did not the meet the demand during the period of 6MP.

Employment in all major occupational groups expanded during the 7MP. Demand for professional and technical, administrative and managerial categories registered the highest growth during this period. The professional and technical category grew at 5.2 percent per annum. The share of the total employment was 17.9 percent or 227,900 new jobs were created. Therefore, their share of total employment increased from 9.9 percent in 1995 to 11 percent in 2000. In the meantime, the demand for engineers and engineering assistants were increased significantly to 61,030 and 143,200 respectively at the end of year 2000. The demand for medical and health professionals was 29,600 and, for allied health professionals were 45,860. The supply of workers in these categories by public and private institutions was approximately 8,590 and 27,170, respectively. In the professional category, only the supply of teachers has met the demand during the 7MP. The number of teachers was increased to 306,950 in 2000 in secondary and primary education. Nevertheless, there were critical shortages of teachers in specific subjects such as Mathematics, Science and English language.

During the review period of Eighth Malaysian Plan, 2001-2003, the demand for most occupational groups registered a positive growth. The highest growth was recorded in the craft and related trade workers category. The legislators, senior officials and managers category grew at an average rate of 6.4 percent per annum. While the demand for professionals[25] grew at an average annual rate of 1.2 percent, or 19,500 of total jobs created. Meanwhile, the technicians and associates professional category registered an average growth of 4.8 percent per annum, or 165, 200 jobs created during the period. Table 3.6 shows the total employment by major occupation groups in Malaysia from year 2000 to 2010.

During this period, all major occupational groups registered a positive growth, except for agricultural and elementary occupations. During the 8MP, 2001-2006, the craft and trade workers category recorded the highest average annual growth. The figure was at 8.4 percent per annum, as shown in Table 3.6. It was followed by the senior officials and managers at 6.4 percent per annum. In raw numbers, the total for craft and related trade workers was increased from 0.844 million in 2000 to 1.264 million in 2005. Approximately 0.22 million jobs were created during this period. The senior officials and managers occupations increased from 0.639 million in 2000 to 0.872 in 2005. The total is expected to exceed 1 million in the next five years.

[25] After year 1998, the occupational job categories used a new classification. It was based on Malaysian Standard Classification of Occupations 1998. Professional category was included the graduates teaching professionals, accountants and auditors and engineers.

**Table 3.6: Employment by Major Occupational Group[1], 2000-2010 ('000 persons)**

| Occupational Group | '000 persons | | | % of total | | | Average Annual Growth Rate (%) | |
|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | 8MP | 9MP |
| Senior Officials and Managers[2] | 639.9 | 871.6 | 1,018.0 | 6.9 | 8.0 | 8.5 | 6.4 | 3.2 |
| Professionals[3] | 537.9 | 680.9 | 778.4 | 5.8 | 6.2 | 6.5 | 4.8 | 2.7 |
| Technicians & Associates Professionals[4] | 112.9 | 1,430.5 | 1,580.8 | 12.0 | 13.1 | 13.2 | 5.1 | 2.0 |
| Clerical Workers[5] | 890.4 | 991.4 | 1,018.0 | 9.6 | 9.1 | 8.5 | 2.2 | 0.5 |
| Service Workers & Shop & Market Sales Workers[6] | 1,205.6 | 1,558.0 | 1,892.2 | 13.0 | 14.3 | 15.8 | 5.3 | 4.0 |
| Skilled Agricultural & Fishing Workers[7] | 1,391.2 | 1,376.0 | 1,344.9 | 15.0 | 12.6 | 11.2 | -0.2 | -0.5 |
| Craft & Related Trade Workers[8] | 844.0 | 1,263.8 | 1,604.8 | 9.1 | 11.6 | 13.4 | 8.4 | 4.9 |
| Plant & Machine Operators & Assemblers[9] | 1,493.2 | 1,568.9 | 1,628.7 | 16.1 | 14.5 | 13.6 | 1.0 | 0.8 |
| Elementary Occupation [10] | 1,159.5 | 1,153.7 | 1,110.2 | 12.5 | 10.6 | 9.3 | -0.1 | -0.8 |
| **Total** | **9,274.6** | **10,894.8** | **11,976.0** | **100.0** | **100.0** | **100.0** | **3.3** | **1.9** |

*Source: EPU 9MP, 2006-2010 (2006).*

Notes:
[1] This classification based on Malaysian Standard of Occupation 1998. The data prior to 2000 is not provided in this table due to the different occupation classification group.
[2] Includes general managers, department managers and senior government officials.
[3] Includes graduate teaching professions, accountants, and computer system designers and analysts.
[4] Includes non-graduates teachers, supervisors and engineering and computer support technicians.
[5] Includes administrative clerks, accounting and finance clerks and telephone operators.
[6] Includes cooks, travel guides and waiters.
[7] Includes farm workers, plantation workers and forestry workers.
[8] Includes mechanics and fitters, carpenters and tailors.
[9] Includes equipment assemblers, drivers and machine operators.
[10] Includes street vendors, domestic helpers and cleaners and construction labourers.

Professionals, Technicians and Associate Professionals, Service workers, and Shop and Market Sales Workers, grew about 5 percent per annum during the 8MP. On the other hand, Skilled Agricultural and Fishery Workers and Elementary Occupations categories recorded a negative annual growth, on average. Clerical Workers, and Plant and Machinery Operators and Assemblers, grew at only at 1 and 2 percent per annum, respectively.

During the past two decades, improving the quality of human capital development in Malaysia was the key thrust in the five year plans. Employment expanded in line with economic growth, which was mainly driven by the

manufacturing and services sectors. The allocation and expenditure in education increased significantly. It contributed to the expansion of the capacity of educational institutions. As a result, the quality of the labour force improved with the increasing supply of educated and skilled workers. However, greater focus should be given to reduce the skills mismatch and enhance employability of labour. In addition, the shortage of labour supply in crucial occupations such as engineering and associate engineers, medical and health professionals and associates remains an enormous challenge. Therefore, the holistic approach in human capital development encompassing knowledge and skills, progressive attitudes and strong moral values was undertaken as a priority in the Ninth Malaysian Plan. The education system continues to improve and to enhance the quality of human capital, especially, in reaching the ratio of 60:40 of students in Science and Arts and Humanity to meet the demands of workers in particular job categories. Smart partnership and collaboration with the private sector, among the stake holders should be intensified.

## 3.12 Educational Development, Reforms and Issues

Current reforms in Malaysian education are an ongoing effort which began four decades ago, but recently concentrates more on school quality. The reforms of the late 1990s were started with the introduction of the Education Act 1996. The act updated the specific outline policies of the Education Act 1961, with the strengthening of all levels of education ranging from pre-school to post secondary school which were not covered in the previous act. The thrust of Malaysian education programmes was to increase the students' accessibility, strengthen the delivery systems and improve the quality of teaching and learning. Efforts were made to expand the existing facilities

and at the same time provide new facilities to create a conducive environment for teaching and learning. Besides focusing on facilities and the learning environment, the main agenda was to inculcate good values and positive attitudes among the students across curricular and co-curricular fields.

### 3.12.1 Accessibility, Delivery and Quality

One of the most challenging factors in an education system is better access to education. Accessibility to education normally depends on the financial contribution from the government and the economic status of the student. Even in developed countries with relatively high rates of participation in education, access remains one of the supreme challenges. Malaysia has to develop a variety of paths to enable greater access, starting from the pre-school level. Even though the enrolments increased Malaysia still needs a holistic effort to improve accessibility and quality to strengthen delivery, especially in rural areas. This effort will contribute to reducing the education gap between the rural and urban populations. Finally, the earnings gap between these groups will reduce.

The Education Act 1996 (Amended 2001) provided the formulation of a National Pre-school Curriculum with new standards for curriculum, facilities, training and re-training of the teachers, both in public and private pre-school centres. In the current system, where the delivery of pre-school services involves several ministries and organizations at the different levels as mentioned above, the delivery from various organisations was rarely integrated, thus reducing effectiveness and coverage (Haddard 2002; Kammaerman 2002). Meanwhile, imposing fees at public pre-schools or increasing the role of the private sector means that the poorest may left out. These

groups are the biggest benefiting group from pre-primary education (Myers 1992).

Next to all this effort, priority should be given to increasing the awareness of primary education among the *Orang Asli*[26], the disadvantaged group, of low income families and children with special needs. These efforts must be complemented by increasing educational support such as text books, scholarships, stationary, as well as basic needs, especially among the *Orang Asli* and low income families. At the same time, an effort should be made to reduce class sizes; overcrowded classes and high teacher student ratios occur in certain areas. Even though the data show that the teacher student ratio had improved from 1:20.4 in 1990 to 1:18.1 in 2002 (EPU, Malaysia 2004a) and it is the second lowest ratio in Southeast Asia (ADB 2003), most ordinary classrooms in Malaysian government schools still have more than 35 students. Efforts to supply experienced and trained teachers in rural areas and to ensure that adequate teaching and learning materials are available in these rural schools must continue. At the same time, the curriculum for the training of teachers should be reviewed continuously; new electives and teaching innovations with the student-centred learning approach would help to improve the quality of education, strengthen the delivery and increase creativity and innovation.

### 3.12.2 Emerging Technologies

Rapid changes and development in technology and information had a broad impact on the Malaysian educational system recently. The process of teaching and learning would become outdated without the use of technology, when preparing the new generation with skills and knowledge. School curriculum reforms should take into account that any change would give important information and technology in the

[26] *Orang Asli* refers to indigenous group who live in the interior part of Malaysia.

classroom so that students would have the opportunity to learn at early stage. Integration of the new knowledge will require a much more significant investment from the policy maker through the Ministry of Education. The impact of changes in the 1990s also witnessed the implementation of computers and information technologies in the educational system (Rahmah 1999). The early step in introducing information technology was the implementation of "Smart School" in 1996 and should be expanded to regular schools.

### 3.12.3 Public Examination

Students at government schools who complete the primary up to post secondary education in 13 years are entitled to sit four the public examinations. These public examinations are the Primary School Achievement Test at Year Six in primary education, Lower Secondary Assessment (LCE/PMR) at Form 3 Secondary School followed by the Malaysian Certificate of Education (MCE/SPM) at upper secondary level, and finally the Malaysian Higher School Certificate (HSE/STPM) at post secondary school. At the same time students have to sit the school assessment twice a year at every level. This process shows that the Malaysian education system is more exam-oriented compared to other developed countries. The tough curriculum, heavy school bags, many examinations and higher expectation from parents, put much pressure on the younger generation. All this should be looked into as a priority to increase students interest in school, in which the teaching process could nurture their thinking skills and enhance new knowledge.

### 3.12.4 Higher Learning Reforms

Rapid changes and new challenges clearly put the Malaysian higher education system under considerable strain. At present, student enrolment demands cannot be met, public financial investment is starting to decline and the infrastructure is frequently inadequate. On the other hand, universities have the marvellous ability to turn out a wide range of skilled workers from different fields who innovate and help determine society, and their own future. Continuous changes in current economy and society provide Malaysian higher education with an array of major challenges. In order to achieve the Ministry of Education hopes 'to develop a world class quality education system which will realize the full potential and fulfil the aspiration of the Malaysian nation' (Zakaria 2000, p.114), adjustments should be made within institutions, especially in access and admissions policies, course delivery, student learning strategies and curriculum content. Major challenges also include finding enough resources and finance to facilitate development and improving quality.

Overall, education in Malaysia is highly subsidized by the government whereby primary education is almost free, and public higher learning institutions are almost 90 percent funded by public finance. However, financial support by government will decline to 60 percent in 2010 (Hassan 2003). To reduce the government's financial burden, universities should establish smart-partnership with the private sector, creating companies or corporation that would allow universities to generate their own income. In addition, more multinational or state-owned companies could take part to operate the universities. At the moment of writing, there are three universities that are fully run by large companies. They are the University of Multimedia, run by a large company, the University of Petronas run by a

petrochemical company and the University of Tenaga Nasional that is run by a major electrical company.

In the last five years, private higher learning institutions have expanded enormously, particularly after the implementation of The Private Higher Education Act 1996 and the National Accreditation Board (NAB) 1996. This is a turning point for private education to play a crucial role and for the government to oversee the quality of academic programs as well as to monitor the way they manage their institutions. Generally, private institutions must meet the standards set by NAB before being allowed to conduct an academic program (Mohd Ridzuan 2001). This is very important to ensure quality, proper infrastructure and qualified staff aiming at international standard and recognition. The difference of quality between private universities and public universities will possibly affect the wages in the labour market. The returns to university education might be different and may bias the estimation, because to control for private and public universities in our estimation is not possible due to lack of appropriate data.

### 3.12.5 Returns to Investment in Education

One important issue left behind in the educational development, planning and reforms in Malaysia is the causal effect of the schooling on earnings. In the five year plans, "growth with equity" is a key thrust in economic, political and social development planning. It is undeniable that the economic achievements in past three decades were fabulous. But, earnings inequality also shows an increasing trend. A large amount of allocation and expenditure in education and human capital development has provided a greater access to education, and more educated and skilled workers. As a result, the

schooling attainment was increased and led to higher earnings. In human capital theory, the impact of schooling on earnings is always related to returns to education. The private rate of return to education is referred to the impact of schooling on individuals' earnings, while the impact on society is reflected as social return. In developed countries, the return to education is very important as a part of the policy implications review.

In many studies, it was proven that the returns to education differs among individuals or groups. Those obtaining higher levels of education will earn more than those having less education. Furthermore, individuals with higher ability or higher income family background have an opportunity to obtain a higher education compared to the low family incomes. Therefore, it is important to consider the returns to education as a part of the policy reforms. The returns gap between the dropped-out, or staying at a minimum schooling leaving age compared to those staying-on after compulsory schooling might provide important information. It could be used as an indicator in the implementation of schooling compulsory age or other policy. In order to acquire more information about the impact of education on earnings or economic growth, a "centre of economic of educations" or "fiscal studies" should be established.

## 3.13 Conclusion

The National Education Philosophy clearly addresses what the country wants to achieve and to be for the future. Due to national and global changes, the Malaysian education curriculum gradually follows the needs of economic-based but still preserves the country's beliefs, traditions and identity. The need to keep a high level

of coverage, enrolment and completion rates in primary and secondary schools, and to ensure that everybody obtains these levels of education remains as a challenge. Another challenge is to improve education quality and equality not only at primary and secondary levels but more obviously at tertiary education. The changes of labour market, kinds of skills and knowledge that are required in today's global workplace need to be addressed. The increasing privatisation of education, beginning with the dramatic increase of private institutions of higher education but often expanding downward to lower levels of the system should be seen as the next agendas where proper and continuous assessment and monitoring are needed. Next, standardisation of educational content, methods, and assessment through curriculum integration, and the development of standard system of quality assurance, evaluation, and accountability are very important and should be carried out in favour of our national system and global knowledge simultaneously. Finally, the increase of usage and domination of new information and communication technologies in education and governance should be involved across the nation in order to reduce the information gap between the rich and low-income families and urban and rural areas.

To sum up, education programmes were expanded and further improved in the successive five year plans. An increasing capability of education and training delivery system provided a right track to meet the dynamism of the labour market. Human capital development strategy created a mass of trained, skilled and semi-skilled workers, and a knowledgeable workforce to sustain economic growth. The supply of quality human capital improved with a higher proportion having tertiary education. The higher learning institutions expanded rapidly and the output at degree and diploma courses increased significantly. But how far education has benefited the individual or society is not known unless a continuous study is undertaken by

individuals or interested groups. I attempt to estimate the benefits to the people mainly focusing on the private rate of return to schooling.

The next chapter will review the human capital theory and related concepts in referring to education. It is important to explain the relationship between the education and earnings.

# CHAPTER 4 - ECONOMIC THEORY OF EDUCATION

## 4.1 Introduction

This chapter will explain the important concepts in human capital theory with a focus on the economics of education. The concept of education as an investment is described in the first section. In the next section, I discuss the costs and benefits of education. The costs of education include both direct costs and indirect costs. Indirect costs include the opportunity cost or earnings forgone. The direct costs, whether to the individual or to government, are easy to measure compared to earnings forgone.

The impact of education on individuals and on society at large, has been considerable both in pecuniary terms and in terms of fringe benefits. The returns from education differs between individuals for many reasons. However, the pattern throughout the world is that those with higher levels of education tend to receive higher wages. This is explained by the relationship between schooling and earnings. In the basic theory of the economics of education, the schooling coefficient is interpreted as an average return from education, or the private rate of return to schooling. The derivation of the schooling coefficient from the basic earnings function is the main focus of this chapter and it is described in detail in the third section. The next two sections considers two related issues in the economics of education theory; the concept of educational attainment as a screening device and the determinants of demand and supply of education. Finally, I discuss briefly the correlation between education and economic growth.

## 4.2 Education: Investment or Consumption

In many countries, schooling is compulsory up to a certain age; i.e. primary education is obligatory for every child of 5 or above, either in government or private schools. Regardless of whether education is provided privately or whether it is free (i.e. provided by government), education still involves out of pocket expenses for parents or the family. Even though the infrastructures such as buildings and facilities are often provided by the government, supplementary needs remain the responsibility of the parent or family. Some parents have decided to meet additional payments for their children's education, for example, by sending their children to private schools or tuition classes after normal school hours. The purpose is to get the best result in the national examination that is required by the stiff competition for entrance to higher learning. Those who incur this expenditure do so in the belief and expectation that such education expenditure will produce higher future earnings. But the key question here is, can this expenditure be considered as an investment or consumption?

Basically, goods and services can be divided into two categories, namely consumption and investment. Consumption is something that is consumed and benefited from immediately whereas investment is something that is produced or from which benefit is derived in the future (Woodhall 1987, p. 21). Investment is measured over a period of time and refers to an increase in capital. Expenditure on goods or services can be classified as investment or consumption whenever it is not clear into which category the expenditure falls. Education expenses could perhaps be classified an investment, or consumption or both.

In Keynesian theory, formal education is classified simply as consumption in the national income determination because households and government spend their

money on these particular items. But, expenditure on job-training is obviously an investment because its purpose is to increase income in the long-run[27]. In the classical view, spending on education is more commonly regarded as an investment because of the future benefits. In addition, education provides increasing skills and knowledge that makes the learner more productive when he or she enters the labour force (Blaug 1973).

In the perspective of the capital and investment theory, investment refers to expenditure on physical capital, such as buildings, factories and machines or assets to generate income in the future. Education performs the same function. Education creates assets in the form of knowledge and skills. Labour uses this increased knowledge and skill to become more productive, just like machines in a production line. However, machines and other assets will depreciate over time, but knowledge and skills do not as long as somebody uses and practices them frequently and as long as they remain relevant. Today, in modern economics, education is regarded as being similar to public goods: it should be provided by the government, particularly in primary education. At the same time, a majority recognizes the fact that an investment in education will generate a stream of benefits in the future (Bowman 1968), so education is better seen as an investment. Economist started to develop theories related to human capital development in order to understand the role of education in the stream of future earnings and economic growth.

From this point, education or schooling will be treated as an investment rather than as consumption for the following reasons. Firstly, as discussed earlier, more schooling will provide accrued benefits in the future. Secondly, individuals would take a loan to support their schooling when the internal rate of return is higher than

[27] See Mark Blaug 1973, p. 19.

the market rate of interest, suggesting that investment in education is worthwhile. Thirdly, with a good qualification or education, the probability of getting a better job or being employed with higher earnings is higher compared to people with less education. Fourthly, direct education costs lower the net benefits of schooling (Harmon, Oosterbeek & Walker 2003). More schooling may give better opportunities to have a job that is related to training, if schooling and training are complementary (Blundell et al. 1996) and finally, people with higher education may acquire more non-pecuniary benefits that tend to be related to a highly skilled job, such us social status and respect (Chevalier & Lydon 2001). It also enhances the productive abilities of the workers, who, in turn, earn higher wages (Ginther 2000). However, to some extent education might be categorized as consumption where the pursuit of education aims only to gain knowledge rather than to generate a future income.

## 4.3 Education and Cost

The next stage in understanding the basic concept of human capital is the total resources cost of education. These costs are measured not only in terms of financial expenses but also in terms of opportunity costs. The costs to the individual are the private costs of education and the opportunity cost of the student's time is measured by earnings forgone. The costs to society are the social cost of education, which include all expenditure on teachers' salaries, other current expenses, the value of building and equipment, and the opportunity cost of the student's time. The student's time, is once again measured by earnings forgone as a proxy for production forgone by society when students continue their schooling rather than join the labour market (Woodhall 1972).

### 4.3.1 Direct Costs

An important category of costs in education is direct costs. Economists have some alternatives in defining and measuring costs, so at this point, it is worth differentiating between various concepts of costs. As in cost analysis in the production function, this involves the cost of inputs that can be measured in terms of real resources or in financial terms. Inputs in the educational process consist of several items, for example teachers and staff time, buildings, materials, books and other equipment. The expenses related to these inputs include teachers and staff salaries, the costs of books and other related equipment and materials as well as buildings costs. These costs are directly incurred by the public authorities or by the students. Hence, any expenditure that is directly spent by the public or government or by students (or their families) is referred to as a direct cost. This category of cost has received most attention from economists because the information is easily available and often involves a level of taxation (Atkinson 1983). A study in the United States by Haveman & Wolfe (1995) found that the direct costs associated with housing, feeding, clothing, health care and transport for children aged from 0-18 accounted for two-thirds of all expenditure on children, or approximately 10 percent of GDP (including the indirect costs represented by the forgone earnings of mothers). One of the methods used to measure the costs of educational intervention is the 'ingredient method' proposed by Levin & McEvan (2001, pp. 49-57). This method identified inputs in education by five specifications known as personnel, facilities, equipment and materials, other program inputs and, finally, required client inputs[28] .

[28] This method is significant in measuring costs in education intervention and commonly used in cost-effectiveness analysis. For details, see Cost-Effectiveness Analysis: Method and Applications, 2nd edition, 2001.

### 4.3.2 Indirect Costs

If the inputs used for educational purposes were not so used, there would be other alternative uses of these inputs in economic production. For example, school buildings might be used for health care, or educational expenditure might be used for developments in agriculture. In economic analysis, the value of a resource is measured in terms of its alternative use. This is commonly known in economic term as the 'opportunity cost'. The opportunity cost of a new building for a university is the alternative development that has been forgone; perhaps some new primary schools or teachers' college. In addition, when resources are used to develop either a new university or a couple of primary schools, it means that the alternative opportunity has been sacrificed or forgone.

The concept of opportunity cost (earnings forgone) is wider than the concept of direct cost or financial cost. Opportunity cost refers to real resources but its measurement is represented by the expenditure of money (Woodhall 1987). Real resources consist of the resources that can be purchased and, hence, they are measured by money expenditure. On the other hand, real resource also includes the sources that cannot be bought or sold. For example, the time that teachers spend on teaching in school is represented by their salaries and is measured in pecuniary terms. But the time students or volunteers spend in study or helping teachers and school administration is unpaid. This has an economic value and an opportunity cost as well. If the students could be in paid employment, to enrol in school means earnings forgone to them. The sum of all the direct expenditure, plus students earnings forgone and the value of volunteers, represents the output forgone by society as a whole. The costs to society are called social costs, and the costs to individuals are known as private costs. Private costs differ considerably from those of the society because most

of the costs, for instance the direct costs, are subsidized from public funds and the effect of the earnings forgone may be less because it is supported by students' funds. In addition, the individuals will be concerned with income after tax. Therefore the private costs of education are much lower than the social costs.

The concept of earnings forgone is very important in human capital theory, especially in estimating the private rate of return to education. When all the direct costs of education for individuals are difficult to estimate, the earnings forgone is assumed as a direct cost of certain levels of education.

### 4.3.3 Recurrent and Capital Costs

Other important concepts in education costs are capital costs and recurrent costs. Capital costs refer to the costs of the durable assets such us buildings, equipment and other things that can be used for a long period. The benefits of using this asset will also last for a longer period. The expenditure on the capital goods can perhaps be regarded as an investment. Because of alternative usages, the expenditure on capital assets, for example the costs of buildings, are both direct and indirect, as mentioned above. However, it is helpful to classify it as a capital cost in order to differentiate it from recurrent costs. Recurrent, or current cost is the expenditure that includes all outlays on consumable goods and services, that bring instant benefits. In education, this includes textbooks, school uniform, stationery and other expenses that must be renewed regularly. Teachers and supporting staff salaries, including fringe benefits, are also calculated as recurrent costs because they are inherently repeated.

### 4.3.4 Total, Average and Marginal Costs

The total cost of education consists of direct and indirect costs (i.e. earnings forgone) incurred at all educational levels. However, it is not easy to measure educational costs and it is always crucial to education planners and policy makers to distinguish different concepts in order to analyze educational costs. It is more difficult when one takes into account the earnings forgone (i.e. opportunity cost) in calculating the overall costs. Hence, in empirical studies total cost may sometimes measure the cost of all the resources used at any particular scale of operation and may refer to total current costs, while in other studies, capital costs may be included in the measurement of the total cost (Verry 1987). When focusing on the cost of education it is very useful to measure the cost of educating one pupil or student. The cost per student, or the unit cost, is the total expenditure, or costs, divided by number of students enrolled in a school or at a certain level of education. This is also referred to as an average cost. Incremental cost, or marginal cost, is the increase in total costs that results from increasing enrolments by one unit or student. The total cost will increase if the number of enrolments in schools or institutions increases, but average or marginal costs will increase, decrease, or remain constant depending on the components of fixed and variable costs incurred in providing the education under consideration and on the time (short or long-run) over which the matter is considered.

One of the important components in total costs is the earnings forgone at any level of schooling. Even though not all studies in educational costing present this cost, many discussions regarding investment in education take into consideration earnings forgone as a fundamental cost because earnings forgone may have an impact on behavioural decision making. In addition, a decision to educate (or not) can take both costs of education and earnings forgone into account, and varied among education

levels. The ratio of earnings forgone to total educational investment also differs between developed and less developed countries. For the developed countries, the proportion of earnings forgone is approximately two-thirds of the total investment in secondary education and about one half in higher education. But it is much lower in the less developed countries, of Asia and Africa whereby the forgone earnings proportion is only about half of the total investment in secondary education and one-third for the higher education level[29]. Thus, direct costs represent a much higher proportion of the total costs in poor countries than in rich countries.

In addition, perhaps it can be considered as a critical point that the direct costs of providing one year of education at university level in lower income countries are 77 times those of providing in one year of education at primary school, and the total costs of providing one year of education at university level are 88 times greater than at primary level. Even in the middle-income countries the costs for one year in higher education are 22 times greater than the costs of providing one year in primary school (Psacharopoulos 1973, pp. 126-128). This cost differential is something that policy makers should take into account when considering the expansion of the higher education level.

The distribution of educational expenditure budget roughly indicates the policy priorities of a country. In Zimbabwe and Philippines, the majority of resources are focused on primary education where the majority of students in the system are found (UNESCO, 2003a). Generally, the ratio of spending to population throughout the world is fairly similar at the primary and secondary levels. However, the difference in costs per student by level of education could influence overall proportions of spending. For example, a study by Haveman & Wolfe (1995) found

[29] See Table 8.1 and 8.2 in Psacharopoulos (1973) for the detail of figures and countries.

that the annual expenditure on children aged 0-18 years accounted for almost 15 percent of the GDP in the United States in 1992. The relative difference in costs is highest in China, Brazil and Indonesia where the cost of a tertiary education is more than 12 to 16 times the cost of primary education.

In Malaysia, the difference in costs by level of education is explained by the effort to expand secondary and tertiary education. The recurrent costs per student in primary and secondary schools in 1987 were MYR589.00 and MYR811.00 respectively (EPU, 6MP 1991). In 2004, the recurrent costs per student at primary and secondary schools were MYR1,895.30 to MYR2,804.10 respectively (DOS 2006). Meanwhile the recurrent cost per student in tertiary education was MYR20,212.93[30]. Costs are twice as high for a secondary student as for a primary pupil and ten times as high for tertiary education.

## 4.4 The Benefits of Education

The idea that education is beneficial to people is universally accepted. More education generally means higher earnings. Evidence shows that some people earn more money with less education, particularly those involved in business and entrepreneurial enterprises, but it is undeniable that, on average, people with more education earn more than people with less education. To prove this requires longitudinal studies, taking many years to follow the career paths of selected samples. In addition, when the time comes for decisions and findings, the conclusion is not relevant or significant because the number changes that have occurred within the period. These include changes in job markets, experience, economic transition, and other factors. According

[30] Calculated by the author, refer to Table 7.8, Chapter 7 for details.

to Atkinson (1983), an alternative approach to prove the differences in earnings between less and more educated people is to use cross-sectional data on the schooling and earnings of a particular year. Nevertheless, many difficulties remain; for example getting the correct figures for incomes. There is much evidence that shows that there is a positive correlation between earnings and education using the cross sectional approach. Blaug (1973) commented that as follows:

*' we begin by emphasizing a remarkable fact of life between two groups of individuals of the same age and sex, the group with more education of whatever kind will have higher average earnings from employment than the groups with less, even if the two groups are employed in the same industry.... The universality of this positive association between education and earnings is one of the most striking findings of modern science'* (p. 27)'.

Two basic characteristics must be recognised. Firstly, those with more education usually earned more than those with less education. Secondly, the question of whether this difference is caused by education is brought out by a third group of factors such us family wealth, motivation, innate ability or others (Solmon 1987). Any discussion of educational benefits shows clear differentiation between different levels of schooling.

Today, most countries in the world provide 'almost free' education at least at primary level. In some countries, secondary education is compulsory but others it is not. And at the higher level only a small percentage of the total population undertake and complete their course. Obviously, levels of schooling will differ and the benefits that accrue from education also differ for those who completed different levels of education. Substantially, the returns are heterogeneous. But one of the benefits of completing primary and secondary schooling is the opportunity to continue to the next level and achieve higher credentials. Moreover, the benefits of education are not only seen in terms of income but also in terms of fringe benefits.

### 4.4.1 Private and Social Benefits

Returns to education commonly depend on educational attainment or 'credentialism'. Moreover, there are a number of possible benefits from the educational process. Firstly, the direct benefits to the students whereby they can seek employment after completing their schooling. This benefit is easy to conceptualize; a simple example is that a student who is able to read will be better off compared to those who are unable to do so. In economic terms this is known as a "private benefit of education". Economists differentiate between private benefits and social benefits, which means that education benefits the people who receive it by paying tax. If he or she graduates from university and becomes a teacher, the private benefit could be the higher income and status. However, the social benefit refers to the benefit received by those who benefit indirectly from the teacher's services. So, it is clearly true that benefits accrue not only to the student but to society at large; and, in the end, to the country when more educated manpower is provided by the education system. However, calculating the benefits of education or rates of return on human capital investment to society as a whole is not easy despite the fact that some costs and returns can be identified. The difficulty occurs because collective benefits are hard to measure and the benefits received by individuals within a society cannot readily be attributed to the specific investments over the life cycle.

In general, it is widely accepted that education enhances the new knowledge, skills and competency which not only generates economic activities but also breeds 'good' attitudes which contribute to social benefits. Moreover, schooling is shown to be linked to social benefits in numerous ways. Firstly, there is a positive correlation between education and health (see Cooper et al. 2006); an educated person will handle health information better than a less educated person and produce more significant

improvements in health outcomes. Secondly, more schooling will reduce early school drop-outs and failures, which will contribute to less crime and negative social behaviour among young people. Finally, more educated people will tend to contribute to an improved environment. These kinds of social benefits indirectly provide a path to economic growth.

The private benefit from education is easy to measure compared to societal benefits. For example, evidence from OECD (OECD 1998) countries shows that for a cohort of age 30-44 in 1995 those who completed schooling at less than upper secondary level tended to earn between 10 and 40 percent less than those who completed upper secondary school[31]. On the other hand, the gap between tertiary and upper secondary graduates is greater than the gap between those with and without upper secondary education. In Malaysia, for example, civil servants with primary education earned approximately one-third of those who completed at upper secondary levels. In human capital theory, the private benefits of education can be measured by estimating the rate of return to education. The concepts and methods of estimating the private benefits from schooling are discussed in the next section.

### 4.4.2 Rate of Return

Rate of return is defined as the rate of interest at which discounted net benefit of an investment equates to zero. It is a summary of statistics that describe the relationship between the costs and benefits of the particular project. The rate of return is denoted as $r$ of the particular project and can be calculated using the simple equation below;

[31] Detail figures of education and earning in OECD countries for cohort of age 30-44 in 1995 were described on pages 53-59 (OECD 1998).

$$\sum_{t=1}^{n} \frac{B_t}{(1+r)^t} = 0 \qquad (4.1)$$

Similarly, the rate of return to a given educational level can be measured by comparing the costs and benefits connected with it. For example, a project of "higher education" will take four years to complete and will incur direct and indirect costs. Assuming direct costs as $C_h$ and indirect costs (forgone earnings) as $W_S$, the benefits of higher education are the difference between wages earned by university graduates, denoted as $W_h$ and those earned by secondary school graduates, as $W_S$. If the study period takes four years to complete and the higher education graduates will have a working life of 40 years[32], the rate of return to investment in higher education can be measured by the equation 4.2.

$$\sum_{t=-4}^{0} (C_h + W_S)_t (1+r)^{-t} = \sum_{t=1}^{40} (W_h - W_S)_t (1+r)^{-t} \qquad (4.2)$$

The general costs and benefits equation explicitly places costs on the left hand side and benefits on the right side. All costs are calculated forward to year zero and the benefits are discounted back to the same point in time.

### 4.4.3 Private and Social Returns

The rate of return to education can be divided into two types namely, the private rate of return and the social rate of return. The private rate of return refers to the benefits that apply to the person who invests at a certain level of education. The equation (4.2) will correctly describe $r$ as the private rate of return only if $W_s$ and $W_h$ refer to earnings after tax and $C_h$ includes the out-of-pocket expenditure incurred by the individual.

[32] This number refers to the Malaysian setting, where the students completed higher learning education at the age of 24 and have a working life of 40 years until retiring the age of 64.

To calculate the social rate of return taxes need to be added to the net earnings. It is defined as

$$W_s^{'} = W_s + T_s \quad \text{and} \quad W_h^{'} = W_h + T_h \ , \tag{4.3}$$

where $T_s$ and $T_h$ are the income tax paid by school and university graduates. Society's expenditure per student in higher education is incorporated in direct costs by expression $C_h^{'} = C_h + S_h$, where $S_h$ is the amount that society spends per student in higher education. Substituting the values of $W_s^{'}$, $W_h^{'}$ and $C_h^{'}$ in the equation 4.3, gives:

$$\sum_{t=-4}^{0}\left(C^{'}{}_h + W^{'}s\right)_t\left(1+r^{'}\right)^{-t} = \sum_{t=1}^{40}\left(W^{'}{}_h - W^{'}s\right)_t\left(1+r^{'}\right)^{-t} \tag{4.4}$$

The outcome of equation 4.4 is the social rate of return (r′) to higher education. When education is highly subsidized by the federal or local authorities, students pay less than the full cost of their education. In this case $C_h^{'}$ will be greater than $C_h$ and the people with higher earnings will pay more taxes than people with lower earnings (in this example $T_h > T_s$). Therefore, the social rate of return tends to be lower than the private return as in the equation below:

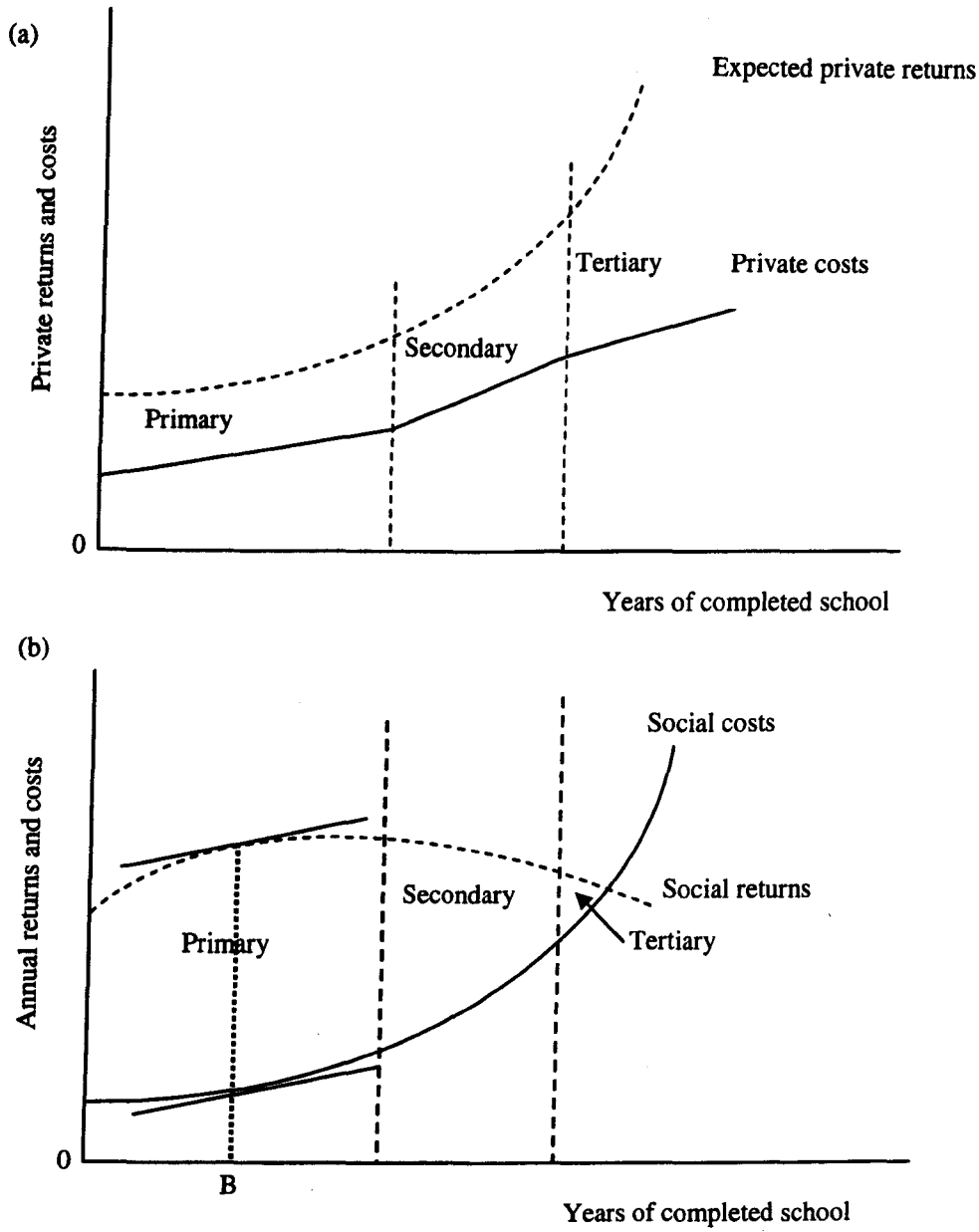
$$C_h^{'} - C_h > T_h - T_s \tag{4.5}$$

However, it is not impossible in some cases that the private rate of return to education is lower than the social rate of return. This could occur if the subsidy is low and the taxes are high, so the equation 4.5 will be the other way around. The difference between the private and the social rates of return create a divergence in educations benefits.

Todaro (1989) used the curve show that this divergence leads to misallocation of resources. Figure 4.1(a) shows the expected private returns and the expected private costs plotted against years of schooling. Students with more school attainment will expect a higher rate of return to education after completing their education. Hence, the expected private returns curve increases gradually in the earlier years of schooling. It then rises dramatically with more schooling compared to the private costs. So, in order to maximize the difference between private returns and private costs, the optimal strategy is to take advantage of as much schooling as possible.

The social benefits and returns against years of schooling can be plotted as shown in Figure 4.1(b). The social costs curve increases gradually in the earlier years of schooling and it rise slightly faster in the post-secondary school and tertiary education. Marginal costs of education at the higher level increase due to capital and recurrent costs which are expensive at this level of education and are also often highly subsidized by governments, particularly in the developing countries. On the other hand, the social returns curve increases gradually and reaches the peak point at a certain level of education (secondary level in this stylised figure) and decreases according to the length of years of schooling as a result of the diminishing marginal social rate of return. Therefore, the optimal choice of educational investment is probably at the point B where the marginal social cost equals the marginal social benefit.

**Figure 4.1: Costs and Returns to Education Comparison**




*Source: Todaro 1989*

At any point beyond OB years of schooling, the marginal social cost exceeds the marginal social benefit which indicates that additional investment in education at post-secondary or higher levels will obtain negative social rates of return.

Figures 4.1(a) and 4.1(b) implicitly signify the divergence between the individual and the socially optimal strategy in educational investment. For an individual, the optimal strategy is to pursue educational attainment to as high a level as possible in order to secure a stream of enhanced future earnings. But, more investment in higher education is not the optimal strategy from a social viewpoint. In his early studies, Psacharopoulos (1973) summarized a study across 33 countries in the world using before-tax earnings to compute the social returns and after tax-earnings for all private returns[33]. Although it varies across countries, the private rate of return in primary school is higher than at any other educational level. This is not unfeasible because, at this level, education is almost free and the earnings forgone is nearly zero.

Table 4.1 summarizes the social and private rates of return to education for different levels of schooling. It shows that both the social an the private rates of return declined more between primary and secondary school than between the secondary and tertiary levels.

**Table 4.1: Private and Social Rates of Return to Education**

| Educational Level | | Rates of return (%) | Standard deviation | Number of observations (Countries) |
|---|---|---|---|---|
| Social | | | | |
| | Primary | 25.1 (19.4) | 19.1 (8.3) | 19 (17) |
| | Secondary | 13.5 | 13.5 | 26 |
| | Higher | 11.3 | 6.8 | 28 |
| Private | | | | |
| | Primary | 23.7 | 9.4 | 8 |
| | Secondary | 16.3 | 8.4 | 21 |
| | Higher | 17.5 | 9.7 | 25 |

*Source: Psacharopoulos (1973), Table 4.2 p. 65.*

[33] In some cases, he used before-tax and foregone earnings to calculate private rate of returns due to the limitation of the data. For detail explanation, see Psacharopoulos (1973).

In order to determine the rate of return hierarchy according to the level of schooling, his study chose 18 countries to be investigated. It was found that 14 out of 18 countries indicate that the rate of return at primary education ranks first, whilst 10 countries show that higher education is lower than the other two levels of education. The divergence between social and private rates of return which is illustrated by Table 4.1 arises because individuals pay only a part of the overall schooling expenses, the rest being funded by the state or government. Furthermore, total after-tax earnings and forgone earnings differential will affect the rate of return in many ways.

## 4.5 Earnings Function

Economists use a variety of methods to measure the return to education. For example, the basic production function, earnings function and cost-benefit analysis are methods that can be applied in order to calculate the gain from educational attainment. However, the earnings function was the commonest method used in many studies. According to Psacharopoulos (1987), the earnings function is used to answer a number of questions regarding the factors that differentiate earnings between people. The factors or variables influencing earnings include years of education, ability, age and experience. Simple earnings function can be written as:

$$Y_i = f(X_{1i}, X_{2i}, X_{3i} .....) \qquad (4.6)$$

where $Y_i$ denotes the earnings for individual $i$ and $X$ denotes the factors such as schooling, ability, occupation, cost of training and other factors. Any residual factor rising from the actual specification, such as luck or political influences, will fit into the equation as an unobserved factor. However, this function does not reflect the earnings differentials theorem which is based on supply and demand equilibrium for

different kinds of labour. But the simple earnings function denoted by equation (4.6) is useful to analyze the association between different characteristics of the individual and his or her earnings.

Firstly, the earnings function can be used to isolate the effect of one factor on earnings by controlling a set of other characteristics. Secondly, equation (4.6) has been used in the rate of return analysis. For example in cost-benefit analysis, education benefits are measured through the differences between income levels for various school attainments. Let us say that $s$ is graduate school level, then the graduate of the lower school level will be $s-1$. Therefore, the whole differential due to education attainment at graduate school level could be written as $(Y_S - Y_{S-1})$. Moreover, one should not assume that the whole difference in earnings can be attributed to education because many factors were also correlated with higher earnings, such as ability, parent's education and wealth. Nevertheless, it remains partly true. Blaug (1968) applied cost-benefits in education with the correction of the earnings function by applying the alpha (α) adjustment coefficient. The function of earnings is denoted by equation (4.7);

$$B = \alpha(Y_S - Y_{S-1}) \qquad (4.7)$$

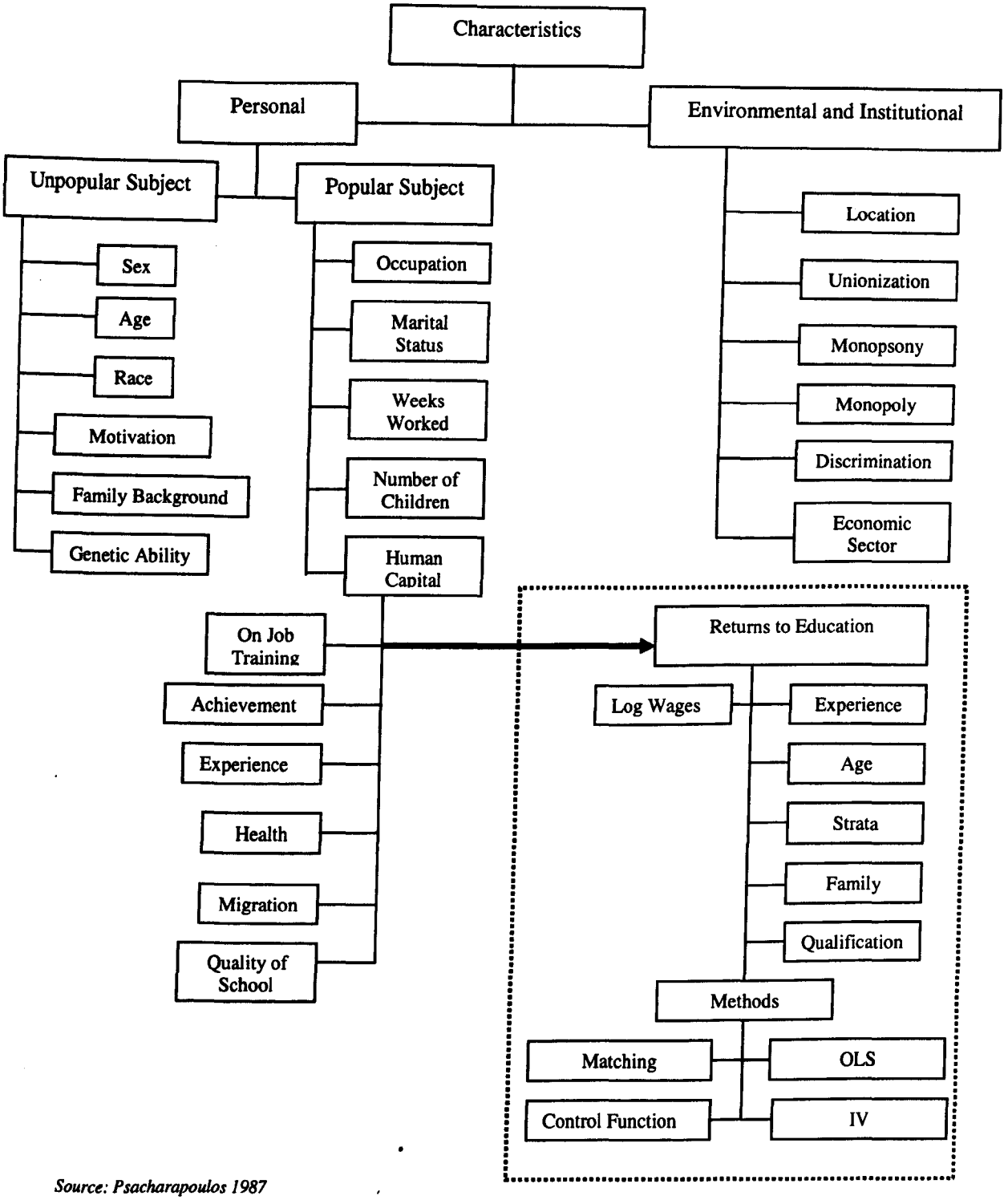
The alpha (α) in equation (4.7) is applied to all factors that are determined by earnings. This equation gives the alternative way to derive the value of alpha coefficient. Different values of the alpha coefficient are specific to different levels of schooling or economic growth. In addition, the earnings function can also be used to measure income growth and income distribution. To estimate the sources of past economic growth one must construct a measurement of aggregate labour services; this is "educational level" which is a useful instrument in classifying a set of earnings. In

the case of measuring income inequality, the earnings function will be transformed to a semi-log form and the variances on both sides will be addressed by equation (4.8);

$$Var(\log Y_i) = Var.f[(X_{1i}, X_{2i}, X_{3i}.....)] \qquad (4.8)$$

The left side of equation (4.8) shows a direct measurement of income inequality and could be correlated to the variability of the various characteristics on the right side. The earnings function is regarded as a useful equation to segregate many variables such as the effects of education, ability, social background and other factors. By using appropriate data, one can analyze the factors that determine earnings. For example social background or education attainment can be used. Most studies of the earnings function use income as the dependent variable, but difficulties in obtaining data on earnings has forced researchers to look at total income or hours worked. On the other hand, the independent variables may vary from socio-economic to environmental and institutional variables. Figure 4.2 depicts the most common variables found in studies in human capital theory. But, for the purpose of this study, I discuss the theory that is related to the private rate of return to education. Therefore, this study limits itself to those factors within the dotted rectangle.

**Figure 4.2: The Variables and Methods in Earning Functions Studies**




*Source: Psacharapoulos 1987*

## 4.6 The Private Rate of Return to Schooling

The relationship between education and earnings has become a popular topic for economists who are interested either in human capital or the economics of education.

Most studies use a number of techniques and models to explore an investment in education, the effect on future earnings and, finally, the rates of return based on available data. The econometric models that have been applied use earnings or production functions in human capital. Mincer (1974) developed an earnings specification to analyze the effects in schooling. To understand this specification, we have to begin with some basic assumptions. The first is that there is no further investment after completion of school. The second is that the flow of the individual's earnings is constant during his or her working life. Thirdly, the depreciation in the school years and the net investment in working life are assumed to be zero, so the changes in earnings are based on human capital stock. The length of a working life depends on the number years of schooling. Earnings life is assumed to reduce by one for each year per each additional year of schooling[34]. So, the deferral of earnings due to length of schooling is similar to a reduction of the earning period by the following equation when the discounting process is discrete.

$$V_S = Y_S \sum_{t=s+1}^{n} \left(\frac{1}{1+r}\right)^t, \tag{4.9}$$

where

$n$ = length of working life plus length of schooling or length of working life for person without schooling

$Y_s$ = annual earnings of an individual with $s$ years of schooling

$V_s$ = the present value of his life earnings at start of schooling

$r$ = the discount rate

[34] See Björklund & Kjellström (2002) for discussion of the assumption.

$t$ = 0, 1, 2, ....., n time in years

When the process is continuous, the equation (4.9) becomes ;

$$V_S = Y_S \int_s^n e^{-rt} dt = Y_s \frac{e^{-rs} - e^{-rn}}{(r)} \tag{4.10}$$

And the present value of life earnings of the individual if he or she engages in $(s-d)$ years of schooling is[35];

$$V_{s-d} = \frac{Y_{s-d}}{r}(e^{-r(s-d)} - e^{-rn}) \tag{4.11}$$

By equating $V_s = V_{s-d}$, we will get the ratio of annual earnings after $s$ years of schooling to earnings after completing $(s-d)$ years of schooling. The ratio is denoted by $k_{s,s-d}$,

$$k_{s,s-d} = \frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)} - e^{-rn}}{e^{-rs} - e^{-rn}} = \frac{e^{r(n+d)} - 1}{e^{r(n-s)} - 1} \quad . \tag{4.12}$$

From the above equation it is revealed that the ratio of $k_{s,s-d}$ is; (a) larger than unity which describes the effect that people with more schooling will get higher annual pay; (b) a positive function of $r$, which represents the difference between earnings of individuals due to the different in investment of $d$ years of schooling is larger the higher the rate of return to schooling; and (c) a negative function of $n$. This explains that the difference is larger when the general working life span is shorter, since the costs of schooling must be recouped over a relatively shorter period.

Since $k_{s,s-d}$ is a positive function of $s$, where $d$ is fixed, the person with more schooling will receive a higher income than the less educated person. However, $k_{s,s-d}$ changes with a change in $s$, and $n$ is insignificant when $n$ is larger, so for all practical

[35] Where $s$ is years of schooling, $d$ is the different in the amount of schooling, and $e$ is base of natural logarithm.

purposes $k$, is treated as a constant. Similarly, when one assumes that earnings life span is fixed regardless of schooling, $k$ remains constant. Redefining $n$ as the fixed span of earnings life, then;

$$V_s = Y_s \int_s^{n+s} e^{-rt} dt = \frac{Y_s}{r} e^{-rs}(1 - e^{-rn}) \tag{4.13}$$

$$V_{s-d} = Y_{s-d} \int_{s-d}^{n+s-d} e^{-rt} dt = \frac{Y_s}{r}.(1 - e^{-rn}) e^{-r(s-d)} \tag{4.14}$$

and solving for $k_{s,s-d}$ from the equalization of present value above, we get;

$$k_{s,s-d} = \frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)}}{e^{-rs}} = e^{rd} \tag{4.15}$$

Now, in contrast to equation (4.12), the earnings ratio $k$ of income, differing by $d$ years of schooling, does not at all depend on the level of schooling $s$ or on the length of earning life $n$, when that is finite, even if short. Now, define $k_{s,0} = \frac{Y_s}{Y_0} = k_s$. By (4.15), $k_s = e^{rs}$, in logarithms the formula becomes;

$$\ln Y_s = \ln Y_0 + rs \tag{4.16}$$

Equation (4.16) describes the basic conclusion that the percentage increase in earnings is strictly proportional to the absolute difference in the time spent at school, with the rate of return as the coefficient of proportionality. In other words, this equation demonstrates the logarithm of earnings to be a strict linear function of time spent at school. However, the above equations are based on the prior assumption that the person does not invest in human capital after $s$ years of schooling. In reality, individuals tend to develop and continue to upgrade their skills, and knowledge after completion of school at a certain age and this will have an impact upon earnings in the long run.

Next, we relax this assumption, so that the workers utilise resources, whether in the form of expenses or opportunity cost, in order to enhance skills and knowledge. Let $C_j$ represent resources utilised in year *j* after entering the labour force, therefore his or her net earning in $Y_j$ in "year *j*" is reduced by $C_j$. On the other hand, earnings still equate with gross earnings if the person does not invest in himself. Assuming that the direct cost of schooling is zero, then the total cost of schooling in an investment for period j is $C_1 = Y_0 + 0C_1$, where $Y_0$ is the opportunity costs in terms of earnings forgone in period 0. Therefore, the income generating function will be;

$$Y_1 = Y_0 + r_1 Y_0 \tag{4.17}$$

Then, if investment in schooling continues for *s* years;

$$Y_2 = Y_1 + r_2 Y_1, \ldots\ldots, \ldots\ldots, Y_S = Y_{S-1} + r_S Y_{S-1}$$

Add the second assumption, which is $r_1 = r_2 \ldots = r$, thus, earnings of individuals from *s* years of schooling becomes;

$$Y_S = Y_0(1+r)^S \tag{4.18}$$

or, in log-linear form;

$$\ln Y_S = \log Y_0 + \bar{r}S \tag{4.18a}$$

Finally, one can analyze the earnings data according to the number of years of schooling by;

$$\ln Y_S = Cons + bS \text{ , or}$$

$$\ln Y_S = \alpha + bS \tag{4.18b}$$

The $b$ coefficient estimates the average private rate of return to schooling. It remains only an estimation because we are still using the assumption of direct costs equal to part-time student earnings and constant age-earning profiles (Psacharopoulos 1987).

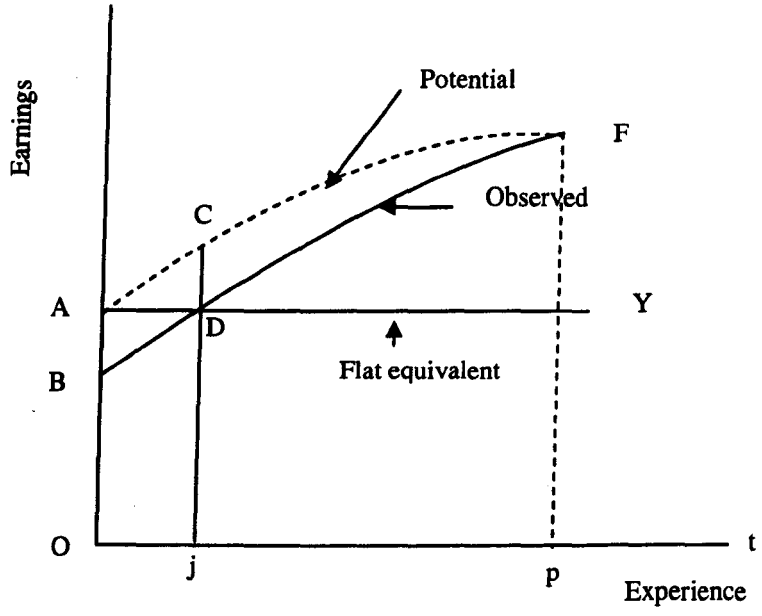
## 4.7 Age and Experience

According to human capital theory, investment made after leaving school will produce extra earnings later. Based on observations over the years, age and experience will influence the earning profiles after investment, as a result of returns during the working life. Figure 4.3 explains an illustration of the return in investment for all years of work experience (Mincer 1974; Psacharopoulos 1987).

Figure 4.3 is considered as earnings-experience profiles for those who have completed a certain level of schooling. If the completed level of schooling is university level, so the figure shows three earnings profiles which are addressed by AF, BF and AY. BF refers to the observed earnings over the individual's working life $(Y_t)$ which is the net result of investments through their working life. Whilst, the flat line AY is the earnings-experience profile for the individuals who are not involved in job training, or in other words, there is no further investment after starting the job. If individuals take the decision to invest on in the job training, so the present value of BF should be at least equal to AY. CD measures the amount of earnings forgone as a result of investment in "on job training" and the return to "on job training" in the $j^{th}$ year for the "Op" years of experience. In the early years of experience earnings for investors are smaller than the earnings without further investment, which are shown by the different of OB and OA respectively. But for the investors, their earnings will

keep growing and then overtake the individuals who do not invest during the years of work experience "Oj".

**Figure 4.3: Earnings-experience Profile**




According to Mincer (1974, pp.3-12), the impact of post-school investment will create an earnings gap and in fact, this will increase with years of experience in each schooling year; for example in two or three decades the annual earnings will nearly double for each group of schooling. If so, years of experience should be entered in the earning function; however, experience is not linear but concave as shown in Figure 4.3 and then the equation (4.18) becomes;

$$\ln E_t = \ln E_S + \beta_1 t - \beta_2 t^2 \qquad (4.19)$$

The equation (4.19) is the parabolic earnings function in the experience term, where $t$ is years of experience, and $E_s$ is earnings capacity after completion of schooling. Thus,

$$\ln E_S = \ln E_0 + rS \text{, or } \ln Y_S = \ln Y_0 + rS \tag{4.20}$$

Then, substitute in equation (4.19) and;

$$\ln E_t = \ln E_0 + rS + \beta_1 t + \beta_2 t^2 \tag{4.21}$$

If work experience is continuous and starts immediately after completion of schooling, work experience is current age minus age at completion of schooling; thus $t = A - S - b$, where $A$ is current age, $S$ is years of schooling and $b$ is age at the beginning of schooling; then the earnings function could transform to;

$$\ln E_t = \ln E_0 + rS + \beta_1 (A - S - b) + \beta_2 (A - S - b)^2 \tag{4.22}$$

Returning to the Mincerian earning function shown by equation 4.21,

$$\ln E_t = \ln E_0 + rS + \beta_1 t + \beta_2 t^2 \tag{4.23}$$

where $E_t$ represents log earnings, $S$ is years of schooling, and $\beta_1$ is years of work experience. Equation 4.23 can be estimated using standard regression techniques and cross section data, defined across individuals at a single point in time. Other things being equal, an increase of one year in an individual's years of schooling would be expected to increase $\ln E_t$ by $r$. Since $\Delta \ln E_t$ more or less equals the proportional change in $E$, it follows that $(1+r)$ approximates to the ratio of earnings after an extra year of schooling. If forgone earnings represent the sole cost of extra year of schooling, then $(1+r)$ is the ratio of a year's earnings after the an extra education to the cost of education. Hence, one can define $r$ as a private rate of return to schooling.

The last parameter in the above equation, $\beta_2$ measures the potential rate of return through a life time of working experience.

Estimating private rates of return by education levels can be separately done by amending the equation (4.23) according to the years of schooling; basically primary, secondary and tertiary education. So, equation (4.23) becomes,

$$\ln E = \ln E_1 + aS_1 + bS_2 + cS_3 + \beta_1 t + \beta_2 t^2 \qquad (4.24)$$

where $S_1$, $S_2$, and $S_3$ are dummy variables for each schooling level. For example, an individual who has only secondary education has not invested at upper levels and would have $S_1 = 1$, $S_2 = 0$, and $S_3 = 0$. Thus, the private rate of return to education can be calculated by $r_t = \frac{r}{N_t}$, where $N_t$ denotes years of schooling completed at the $t^{th}$ level of education, $t = 1,2.....n$. If primary education starts at age 7 and is completed at age 12, this means that the number of years of schooling for primary education is equal to 6 years. If secondary lasts from 12 to 19 years of age and higher education will take 4 years to complete then, $N_1 = 6$, $N_2 = 7$ and $N_3 = 4$ respectively. The private rate of return to education for different levels of schooling will be $r_1 = \frac{a}{N_1}$, $r_2 = \frac{b}{N_2}$, and $r_3 = \frac{c}{N_3}$.

In the literature, the earnings function that was discussed above is commonly known as the Mincerian earnings equation. It is widely used in estimating the private rates of return to schooling. In the next chapter, I will discuss further this equation and the problems that relate to its practical application.

In early studies of the returns to schooling, many scholars argued about this function. The main argument concerned the assumptions in the Mincer equation (for example Blinder 1976; Rosenzweig 1976). Björklund & Kjellström (2002)

investigated the assumptions numbered 4 to 6 in the original work of Mincer (1974) by using Swedish data. They found that the internal rate of return to schooling is quite sensitive to the assumption made about the length of life or retirement age for persons with different lengths of schooling. They also suggested that there are more advantages to completing schooling at a younger age. However, their final conclusion was that as "an analysis of the impact of schooling and work experience on wages, it is definitely hard to beat the Mincer equation" (p. 209) and "the functional form is not ad hoc, and " it is based on the optimizing behaviour of individuals, and represents the outcome of a labour market process" (Chiswick 2003, p.220).

What we concerned with so far is the benefit of education at the micro level. More education may contribute to economic growth by increasing the quality of the labour force. The next topic will discuss the correlation between education and economic growth.

## 4.8 Education and Economic Growth

Economic growth is usually measured by the rate of increase in national income. National income is the total amount of all earned and unearned income in the economy in a particular year. If the extension of education leads to an increase in income to those who benefit from it, and a rise in income would accelerate the spending and investment in education, this will lead to a rise in the national income. It looks very simple, but it is not easy to measure the correlation or cause and effect between education and economic growth. However, one cannot argue that the role of formal education is not limited to imparting the knowledge and skills that enable individuals to function, as agents of economic change in their societies. In most poor

countries, education performs a traditional role in reducing poverty (Jung & Thorbecke 2003). Formal education also imparts values, ideas, attitudes and aspirations, which may or may not be in the nation's best development interest (Todaro 1989, p. 331).

Since the 1960s, many studies have attempted to relate the contribution of education to economic growth by emphasizing human capital, such as Schultz and Denison (Psacharopoulos & Woodhall 1985) who used the aggregate production function. Denison (1966, p. 215) noted that more education may contribute to growth in two ways. Firstly, more education may raise the quality of the labour force, and secondly, improved productivity due to advanced knowledge will provide more or better information which relates to production, which accelerates economic growth indirectly. Both studies by Schultz (1963) and Denison (1966) measure the contribution of education to economic growth in developed countries as shown in the wide range of contribution, from 2 to 25 percent in terms of the rate of return in human capital to economic growth (in Psacharopoulos & Woodhall 1985). Using the same method, both economists looked at the developing countries in Asia, Latin America and Africa. Even though there are some critics among economists of education, the overall finding is clear, that increased education of the labour force appears to explain a substantial part of the growth output in both developed and developing countries.

Further analysis by Hicks (1980) confirmed that the relationship between economic growth and human development showed three variables which contributed nearly 60 percent of the variation in per capita growth rates in developing countries between 1960 and 1977. The variables are; the rate of investment, the growth rates of

import and the level of human resources development. Although it seems difficult to prove quantitatively the contribution of expansion of education at all levels to economic growth, it is strongly believed that education has contributed through creating more productive, educated and skilled manpower and creating widespread employment and earning opportunities for teachers, school and construction workers and small businesses. In addition, small and medium entrepreneurship that relates to education will create educated leaders to fill the vacancies in government and private sectors. It also provides a wide range of training and education that can lead in promoting literacy, basic skills, attitude and values in national development (Todaro 1989).

Gupta & Verhoven (2001) support the idea that the size and efficiency of public education expenditure are important in improving socio-economic performance. Furthermore, the role of primary and secondary education is important and highly significant in the early years of independence among the African and Asian countries in order to fulfil the needs of their nations. Indeed, investment in education is the main explanation for the rapid growth of the new economic tigers in Asia, particularly in primary and secondary industrializations (World Bank 1993) while at the same time promoting equity (Barro 1991; Tanzi & Chu 1998).

The work of Birdsall & Sabot (1995) found that primary and secondary school enrolment had great spill over effects on economic growth for High Performance Asian Economics (HPAEs) in the early 1980s. This finding was supported by Campos & Root (1996) with their argument that basic education increases the supply of skilled workers and will reduce the bottleneck in the labour market and also decreases income inequality in South Korea. This occurs during labour intensive under export-

oriented manufacturing strategies whereby a good supply of semi-skilled workers stimulates the economic expansion. According to Kakwani, Prakash & Son (1999), the rapid growth in South Korea is due largely to the high level of education of their workers. An increase in human capital, by improvement in educational attainment and combined with factor accumulations in the physical and labour force has driven this fast growth. The proportion of the Korean workforce with a secondary education has tripled between the mid-1960s and the mid-1990s.

The high level of education has enabled the labour force to absorb rapid changes in technology (Young 1995; Nelson & Park 1999). OECD (2000) also found a stronger link between human capital and economic growth for those countries with high levels of upper secondary and tertiary attainment: for example Argentina, Chile, Jamaica, Malaysia, Peru, the Philippines and Uruguay. In fact, estimation by Freire-Serén (2002) using the dynamic system of simultaneous equations confirmed that an increase in human capital has a positive and significant effect on the growth of income. Addition (2003) found that most developed nations are able to generate productivity gains at 1.3 percent per annum higher than the developing countries due to the higher educational attainment. He suggested that any policies to increase educational attainment will have the greatest impact of economic growth. According to La Fuente & Ciccone (2002, p. 4), the literature suggested that, holding other things equal, an additional year of school average attainment increases the level of aggregate productivity by around 6 percent on immediate impact and by a further 5 percent in the long run.

## 4.9 Screening Hypotheses

As discussed earlier, education is normally divided into three levels; primary, secondary and tertiary. Education automatically operates as a mechanism which arranges individuals by their abilities, skills and knowledge and finally classifies them according to their credentials. Those with capabilities, opportunities and higher achievement will move forward to the highest level. Some will drop-out at a certain level of education and only acquire a certificate or education credential according to their achievement, before they enter the job market. Here, education seems to be acting as a filter or screening device in many ways starting from the bottom level. For example, it is normal practice at any level of education, for students to be given a grade through several assessments made either by the school or by national public examination.

In some developing countries, public examinations at primary or secondary schools are seen as important stages at which to screen students' abilities, and to identify those with potential to be a skilled workers. The screening hypothesis is more obvious at secondary level because this is the right time to filter students by public examination in order to select qualified persons to enter university, college or a training centre. At the same time, students will choose their education according to their interests and intended career path. Starting from this point, the students become a catalyst for education as a screening device when they sort themselves according to their interest and comparative advantage or ability. Furthermore, by this time they have more information about the job market and know that more education means higher future earnings. The screening gives the student a clear picture that earnings will increase with the additional education.

Screening hypotheses also exist in the job market. Employers will look for and hire suitable candidates based on numerous criteria. At the first level, education credentials would become the basic criterion because they have not found a quicker and cheaper method. Through time, employers usually observe their workers and pay them according to their abilities and performance (Psacharopoulos 1987). Education has actually provided the initial screening for the employer at the earlier stages.

According to Blaug (1987), the screening hypothesis can be divided into two stages, namely strong and weak screening. Strong screening needs special tools and procedures to select appropriate candidates, and of course, involves heavy expenditure. Normally it occurs in certain 'crucial' jobs, such as managers and younger executives. For most other jobs, employers use 'educational credentials'; that is called weak screening because the educational process has involved a continuous process of screening, and acted as a filter device for the employer in hiring workers.

Many studies have found some evidence to support the strong screening hypothesis. However, there is also some evidence to support the weak screening hypothesis; for instance studies by Brown & Sessions (1998 & 2006), Cohn, Kiker & Mendes (1987) and Fredland & Little (1981). Whether strong or weak screening exists, education enhances lifetime earnings and is a worthwhile investment for individuals (Psacharopoulos 1994; Brown & Sessions 2006). Today, the screening device is likely to be an approved and accepted approach and regarded by most people as being fair. In Malaysia, for example, a screening device is present in the public sector. All types of occupations, job categories, grades and payments are based on qualification. These are stated in the Malaysian Numeration Scheme (MNS) which is managed by the Public Service Department (PSD).

Screening explains why highly educated people on average earn more than less educated people even though sometimes they may not be as productive. To sum up, the screening hypothesis explains why individuals tend to acquire or demand more education, and why individuals with more education tend to earn higher incomes. Therefore, according to the screening hypothesis schooling is a sign of future productivity and productivity is measured by schooling credentials. However, screening that relies on educational attainment is perhaps an inefficient method. Many firms pick up the initial signal from education and follow this with their own assessment or other screening test. They used supplementary tests, such as personality, aptitude or performance competency during the hiring process.

## 4.10 Demand and Supply of Education

The amount of schooling received by individuals is influenced by many non-market factors, but in economic discussion it is very important to say that the amount of schooling is largely determined by the demand and supply, as with any other goods or services. However, the determinant of the supply side is less important than the demand side because of to the role of the government as an education provider or subsidizer particularly in developing countries. The supply of education refers to the number of school places from primary, secondary and higher education that is largely determined by the political process rather than by economic decision.

Developing countries' yearly budgets show that the relative amounts spent on schools, colleges or universities, depends on government education expenses. The bigger the portion of the budget allocation to the education sector means the greater the number of schools. In the end, it confirms that the education supply really depends

on the government education expenditure which is strongly associated with the level of private aggregate demand for education.

Why does the demand for education keep increasing? Two important factors were indicated by Todaro (1987, p. 337), the first factor was the prospect of the future earnings for an educated person or individual being greater than for the less educated person, through 'private benefit' in the modern sector of employment. It is proven that in today's economy, wage or income differences are due to education credentials. Even though some countries, such as Malaysia and India, depict increasing levels of graduate unemployment, individuals have a firm belief that those who hold a higher level certificate can get a 'good job' sooner or later. This is because the 'screening hypothesis' is actually practised in some developing countries, particularly in public services. Although, in recent years it happens that some people have earned more money with less education, particularly those who are involved in the entrepreneurship or business sectors, nevertheless, in the long run most people strongly believe that more education will lead to a higher earnings (Atkinson 1978, p. 27). At this stage, it is revealing that there is a positive relationship between the demand for education and wage differences.

The second factor is the educational cost. Both direct and indirect costs determine the demand for education. It is expected that the demand for education will have a negative correlation to the direct cost. The higher the school expenses, the lower the demand for education would be even in the primary school where education is almost free. But what is 'free' education? Families spend much on so many things that are associated with education. For example, the expenses of books, transportation, materials and stationery. Thus the direct cost or out-pocket cost is

really related to the level of income, although it is a small portion of education expenditure; but in developing countries where the members of the low income families is larger, it is still a huge barrier even in the primary school. At the secondary level, direct costs are higher due to the variety of fees and other expenses.

At the same time, secondary education involves higher indirect costs or earning forgone and it is better for some families to keep their children at home to generate additional income to support the family. Furthermore, children of primary school age tend to stay at home to look after their younger siblings so the parents can spend longer at the workplace. This opportunity cost shows an inverse relationship to the demand for education. The greater the opportunity cost, the lower the demand for education.

Earlier studies in developing Asian countries show that the demand for education is a positive function of income (Meerman 1974 & 1979). These studies give more evidence of the earnings forgone and become one of the factors why parents tend to keep their children in the house or field rather than at school. For the poor families it is more obvious because their children start generating income for the family at a lower age. In some countries, the number of school enrolments for girls is lower than for boys due to the need to provide home care, and to appear to be productive earlier than boys. For example in Pakistan, a study by Burney & Irfan, (1991); Blood (1995) shows that females receive less education than males. Indeed, the opportunity cost of sending girls to school is greater than for boys, as females are responsible for the care of the house, tending to live stock and other agricultural activities (Holmes 2003, p.250).

Besides the discussion of the demand of education from the public point of view or consumers, another crucial issue that should be considered is the demand for educated manpower. No doubt for developing countries, there is commonly a shortage of educated manpower. From the economic aspect, the lack of educated manpower is represented as one of the constraints to economic development. Indeed, the actuality that education provides skilled and productive workers is becoming more important in planning and forecasting demand and other crucial problems for policy makers. One of the methods used to forecast the progress of the development of educated workers is the "manpower requirement approach" (Parnes 1962). However, some economists have challenged this approach, with the arguments that the relationship between the level of education qualification of workers and the level of output is fixed and stable. Furthermore, there are arguments relating to the relationship between educational qualification and the structure of occupation and also the relationship to the long-term forecasting of future level of outputs. For example Woodhall (1987, p.6) noted that there was always the choice to use either the manpower requirement approach, cost-benefit or rate of return analysis in the economics of education.

## 4.11 Over-education and Under-education

In recent times, the remarkable growth in educational development has changed the educational credentials in the young age group level. They had more education attainment. For example, in 1992, 65 percent of the population aged 25 to 34 years had at least an upper secondary school education (OECD 1995). The increase of education level among the population will cause the growth of a more highly educated labour force. Despite this increase, it can be argued that the demand for a more highly

educated labour force has been raised at the same pace, to absorb the surplus of skilled workers, if any. If the growth of more highly educated workers outpaces the increasing demand for such workers, over-education will result (Groot & Brink 2000). Over-education is defined as actual schooling greater than required, with under-education similarly defined as the inverse (Hartog 2000, p. 133).

In the literature, the definition of required, over and under-education can be classified into "objective" and "subjective" definitions. The subjective definitions are based on the self-report by individual workers whether they are over-educated or under-educated. The objective method is defined by comparing years of education attained with the average education level within the occupation of the workers (Groot & Brink 2000; Rub 2003; van der Meer 2006).

One of the early empirical definitions of the term is suggested by Verdugo & Verdugo (1989), by using the mean of education level across a range of occupations. Workers with educational attainment greater than one standard deviation above the mean for their specific occupation are defined as over-educated. Over-education will lead to misallocation of resources. When the output of the educational system is greater than what can be absorbed by the economy, the workers will seek jobs with lower educational requirements. Some of them may turn to the traditional sector to avoid unemployment, and this is not a productive result of spending time in school. Even though the private rate of return to over-education is positive, it is smaller than the returns to actual education or required education. In contrast, the rates of return for under-education are negative and always smaller than the returns to required education (Hartog 2000). This part will be further discussed in Chapter 6.

## 4.12 Conclusion

The previous work by economists in general human capital theory provides the stepping stone for those interested in the economics of education and in further examination and research in educational investment and return. It is unquestionable that education is a vehicle for generating economic growth. At the same time investment in education will contribute to the future benefit, not only of the whole nation but also of individuals. At the first stage, education is more likely to be treated as a consumption or public good where free education for all is provided, especially in primary education. Nevertheless, higher levels of education are more expensive. However, people with more education are likely to achieve higher earnings than those with less education. Then, education no longer becomes a public good but tends to be an investment. Indeed, in the progress of globalisation and liberalisation, associated with competitiveness and openness in the labour market, what is required is not only skills and knowledge but also educational credentials.

The functional form of human capital earnings function serves to estimate the returns to investment in education. Moreover, it also could be used as a basis for the analysis of earnings inequality across time and across space. Based on the Mincer (1974) earnings equation, this thesis will estimate the returns to education in Malaysia from 1995 to 2004. A further discussion of the extended model is set out in Chapter 6. Meanwhile the next chapter will review the literature relating to returns to education which is mainly based on the earnings equation.

# CHAPTER 5 - LITERATURE REVIEW

## 5.1 Introduction

This chapter will summarise the related literature according to its relevance, interest and importance to this study. The first section describes briefly the development of the empirical studies in estimating the private rate of return to education. Two principal methods have been used in the literature to estimate the private rate of return to education. In the past three decades, the standard earnings function has dominated the literature where the OLS has been the tool of estimation. In recent literature, the alternative approach uses the Instrumental Variable (IV) approach to estimate returns to schooling. The next section summarizes the private rate of return to education. I highlight the world average returns, followed by the returns to education in the most developed countries in Europe. I also discuss the returns in other parts of the world, such as Asia, finally focussing on the previous estimation of the returns in Malaysia. In this section, the review of literature emphasizes the homogenous return to education in which the estimation uses OLS.

The third section in this chapter concentrates on the previous studies using the instrumental variable, which also emphasizes the limited literature relating to less developed countries. The empirical results of the private rate of returns estimates using both OLS and IV, will be discussed in this part. It will provide evidence from across the world to prove the theoretical prediction that OLS was biased in its estimates of returns. The fourth section explains the impact of schooling on earnings differentials. There are many studies of the wages gap, but this section is limited to the literature that has used the earnings equation to examine the impact of schooling on earnings. Therefore, it focuses on the earnings differential between groups, for

example between different genders, between rural and urban areas, and between the self-employed and employees. The last section is the conclusion.

## 5.2 Methods of Estimation

The rate of return to education has been explored mainly in developed countries in both theoretical and empirical studies. Economists such as Becker, Schultz, and Mincer have primarily explored human capital theories and models to estimate the returns to education. They were followed by Psacharopoulos, who has provided insights and evidence to those who are interested in this branch of economics. By estimating and comparing returns across the world, many researchers have improved both models and specifications, improving the measurement and reducing the econometrics problem.

Basically, three different approaches have been used in the literature to estimate the returns to education. The first approach is the internal rate of return to investment in education using the full or elaborate method. An elaborate method is a specific algebraic definition of rate of returns that equates a stream of benefits to a stream of costs at a given point of time (Psacharopoulos 1980, p. 76). The second approach is the standard human capital earnings function. Most recent studies use this method, due to the difficulties in obtaining appropriate micro data, especially data consisting of detailed age-earnings profiles.

The second approach which is known as the Mincerian human capital earnings function, Mincer (1974), is more convenient. The dependent variable in this model is the log of earnings or wages, while the explanatory variables are years of schooling, experience or potential experience and their squares, as mentioned in Chapter 4. This

function has been extended to deal with different questions, such as returns to different level of schooling, discrimination, school quality and returns to language skills (Harmon et al. 2003). Using the simple Ordinary Least Squares (OLS) on this function, one can interpret the schooling coefficient as a rate of return to investment in education (as mention in Chapter 4). Further details of this estimation are explained in the next chapter.

Recently, empirical studies have relied on a third approach, which is more advanced, to improve the understanding of endogeneity and heterogeneity issues in returns to education. Heterogeneity refers to differences in the returns to schooling across individuals due to factors unobservable to the econometrician, but known to the individuals at the time of their decision (Harmon et al. 2003, p. 206). These issues could be solved by using alternative approaches, such as Instrumental Variables (see, Card 1999 & 2001), Matching (Blundel et al. 2001 & 2004) or Control Function. IV has been used extensively either using supply-side institutional features of the education system as instruments, or demand-side factors that relate to family background or innate ability. But, once again empirical studies tend to use data from developed countries. In the developing economies, datasets with appropriate instruments are very difficult to obtain. It is the main problem in measuring returns to schooling, where the schooling choice is a difficult decision (Aakwick, Salvanes & Vaage, 2003). However, from the theoretical perspective, IV is just as appropriate in developing as in developed countries.

In particular, this approach in useful if the policy maker focuses on the effect of education reforms to sub-populations rather than to average individuals; for example, the effects of educational initiatives such as compulsory schooling, school

reforms, financial support, and accessibility to schools for the sub-group in the population. Matching and control require more information than schooling and earnings, such as parents education or income, occupation, siblings, ability tests, etc. Again, such data are typically provided by rich and continuous datasets. In the matching approach, schooling is referred to as a "treatment". The effects of the treatment from compulsory schooling, drop-out or staying-on beyond the schooling leaving age on earnings may be estimated. The treatment effect on treated, average treatment effect, average treatment effect of non-treated and local average treatment effect could be explained from the results of the study from rich a data set. In the review of literature, I initially give details about the homogenous return to schooling where the method of estimation uses OLS.

## 5.3 Returns to Education Across the Region

Psacharopoulos (1981, 1985, 1993 & 1994) has undertaken comprehensive research on returns to education in developed and less developed countries since the 1970s. From his work, one can identify several patterns of rates of return to education throughout the world. First, returns to education in the private sector are higher than in the public sector. It is strongly believed that wages in the private sector are based largely on enhanced productivity. On the other hand, screenings and credentials are more likely to be used in public sector. Secondly, a pattern over time has shown varying rates of return; returns to primary education are higher than returns secondary education and returns to secondary education are higher than returns to tertiary education. Thirdly, rates of return in less developed countries are higher than in

developed countries. Finally, the rate of return to education for females is higher than for males because of their lower forgone earnings, as reflected by their lower wages.

The latest worldwide studies as updated by Psacharopoulos & Patrinos (2002 & 2004) show that the average rate of return to education is about 10 percent for the entire world; about 12 percent in Latin American/Caribbean and Sub-Saharan Africa, and around 7 percent for Europe, the Middle East and North Africa and the OECD countries. Rates of return to education in low and middle-income countries remain higher than in high-income countries with the average rates at around 11 percent and 7 percent respectively. Results for gender also show the same pattern with returns of 9.8 percent for females and 8.7 percent for males. Table 5.1 shows differences in returns to investment across the world.

**Table 5.1: Returns to Investment in Education (%), Full Method, Regional Average**

| Region | Social | | | Private | | |
|---|---|---|---|---|---|---|
| | Primary | Secondary | Higher | Primary | Secondary | Higher |
| Asia* | 16.2 (19.9) | 11.1 (13.30) | 11.0 (11.7) | 20.0 (39.0) | 15.8 (18.9) | 18.2 (19.9) |
| Europe / Middle East / North Africa* | 15.6 (15.5) | 9.7 (11.2) | 9.9 (10.6) | 13.8 (17.4) | 13.6 (15.9) | 18.8 (21.7) |
| Latin America / Caribbean | 17.4 (17.9) | 12.9 (12.8) | 12.3 (12.3) | 26.6 (26.2) | 17.0 (16.8) | 19.5 (19.7) |
| OECD | 8.5 (14.4) | 9.4 (10.2) | 8.5 (8.7) | 13.4 (21.7) | 11.3 (12.4) | 11.6 (12.3) |
| Sub-Saharan Africa | 25.4 (24.3) | 18.4 (18.2) | 11.3 (11.2) | 37.6 (41.3) | 24.6 (26.6) | 27.8 (27.8) |
| World | 18.9 (18.4) | 13.1 (13.1) | 10.8 (10.9) | 26.6 (29.1) | 17.0 (18.1) | 19.0 (20.3) |

Sources: Psacharopoulos (1994), Table 1, p. 7, Psacharopoulos and Patrinos (2002), Table 1, p.13.
Notes: * non-OECD
Numbers in parentheses are the world rate of returns to education which was updated in 1994.

The social and private rate of returns to education at any level of schooling have slightly decreased over the past few years, as shown in Table 5.1. In detail, private returns at primary level declined sharply compared to secondary education. By

contrast, the returns at higher levels have remained stable for the past 12 years. Private returns are higher than social returns where the latter is based on the definition of private benefits and external benefits (total costs). This is because education is highly subsidized and the fact that the typical social rate of returns estimate does not include social benefits. Public subsidy increases with level of education (as discussed in Chapter 4). Thus, the positive relationship between public subsidy and the level of education increases the income distribution gap.

Returns to another year of schooling show a small decline in a decade (from 1990 to 2000), but at the same time, average years of schooling levels have increased (Table 5.2).

**Table 5.2: The Coefficient on Years of Schooling: Mincerian Rate of Return (Regional Average)**

| Country | Years of Schooling | Coefficient (%) |
|---|---|---|
| Asia* | 8.4 (8.4) | 9.9 (9.6) |
| Europe/Middle East/North Africa* | 8.8 (8.5) | 7.1 (8.2) |
| Latin America/Caribbean | 8.2 (7.9) | 12.0 (12.4) |
| OECD | 9.0 (10.9) | 7.5 (6.8) |
| Sub-Saharan Africa | 7.3 (5.9) | 11.7 (13.4) |
| World | 8.3 (8.4) | 9.7 (10.1) |

*Sources: Psacharopoulos (1994), Table 4, p. 14, Psacharopoulos and Patrinos (2002), Table 4, p.14.*
Notes: * non-OECD
Numbers in parentheses are the world rate of returns to education which was updated in 1994.

The negative relationship between the average years of schooling and returns to education reflects demand and supply; an increase in the supply of education has led to a decrease in returns of schooling, *ceteris paribus*. For example, countries such as France and Germany, which have a steady growth in the supply of educated workers, showed a decreasing returns to schooling (Katz, Loveman & Blanchflower, 1993) and the same pattern is found in Norway (Haegeland et al., 1999). However, new evidence

provided by Ammemüllerand & Weber (2005) shows returns to schooling in East Germany ranged from 7 to 8 percent, and 8 to 10 percent in West Germany between 1975 and 2002.

Thus, it is not correct to conclude that the returns to education decrease over time across the world. It has been shown by new evidence in the literature relating to various countries that the trends of the returns to education are not similar. For example, Trostel, Walker & Woolley (2002) used International Social Survey data to investigate the returns to education in 28 countries showing no evidence of a rising rate of return from 1985 to 1995. Estimation by PURE project in Europe (Harmon, Walker & Westergaard-Nielsen 2001) found no clear pattern for the total of 15 countries[36]. Nevertheless, 7 out of 15 countries emerged with distinguishable trends (Table 5.3). Denmark, Portugal, Finland and Italy exhibit increasing returns to education.

According to Haegeland et al. (1999), the US, UK and Japan and other developed countries with a declining rate of growth of highly educated workers, experienced increasing returns to schooling. On the other hand, Austria[37], Switzerland and Sweden have shown a decrease in returns for both men and women. In the meantime, the rest of the countries do not show any clear change in trends but the difference between men and women remains. In the case of the Netherlands, prior to 1985, the data showed that private rates of returns to education fell from 11 percent to

[36] PURE refers to Public Finding and Privates Return to Education. This project started in 1998 and ended in year 2000. It involved 15 Europeans countries, i.e. Austria, Denmark, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK.

[37] Fersterer & Winter-Abmer 2003 also found the falling of the returns to education in Austria from 1981 to 1997. Returns to education for men had declined about 3 percentage point (9.4 to 6.6), while for women had decreased from 11.3 percent to 6.6 percent, which was almost 5 percentage point.

5 percent between 1962 and 1985 (Plug & Levin 1999) and remained constant around 5 to 6 percent in the 1990s (Kalwij 2000).

**Table 5.3: Rates of Return to Education in Europe**

| Country | Year | OLS | Year | OLS | Trend |
|---|---|---|---|---|---|
| Austria | 1981 | 10.5 | 1993 | 9.7 | - |
| Denmark | 1980 | 4.6 | 1995 | 6.6 | + |
| Finland | 1987 | 9.5 | 1993 | 8.9 | - |
| France | 1977 | 7.5 | 1993 | 7.6 | = |
| Germany[1] | 1984 | 9.4 | 1995 | 8.5 | - |
| Greece | 1974 | 5.8 | 1994 | 6.5 | + |
| Italy | 1980 | 4.3 | 1995 | 6.4 | + |
| Ireland | 1987 | 10.2 | 1994 | 8.9 | - |
| Netherlands | 1979 | 8.6 | 1996 | 7.0 | - |
| Norway | 1983 | 5.7 | 1995 | 6.0 | + |
| Portugal | 1982 | 11.0 | 1995 | 12.6 | + |
| Spain | 1990 | 7.2 | 1995 | 8.6 | + |
| Sweden | 1981 | 4.7 | 1991 | 4.1 | - |
| Switzerland | 1992 | 9.6 | 1998 | 9.0 | - |
| UK | 1980 | 6.7 | 1995 | 8.6 | + |

*Source: Harmon, Walker & Westergaard-Nielsen, 2001. Table 1.5, p. 15.*
Note: [1] Figures for Germany is estimated for first quantile.
+ Increase
- Decrease
= No obvious trend

For Sub-Saharan Africa, Siphambe (2000) investigated returns to education in Botswana and found that the returns for females were about 18 percent compared to 12 percent for males. This is higher than the average rate of returns to education for Sub-Saharan Africa or globally. One interesting piece of evidence from Botswana is that the private rate of returns to secondary education is higher than primary education, compared with other countries in previous studies. Using the General Household Survey for Nigeria, Aromolaran (2002) found the returns to education for both men and women were small in primary education, at about 2 and 3 percent, compared to post-secondary education which were substantially higher at around 10 to 15 percent. Kazianga (2004) reported that the rate of return to primary education in the public sector was very small for men and almost zero for women in Burkina Faso.

However, high returns to secondary and tertiary education provided enough incentives for parents to enrol their children at the higher levels.

Schultz (2003), assembled empirical evidence from household surveys collected from 1985 to 1999 in six African countries - Ghana, Côte d'Ivoire, Kenya and South Africa, Nigeria and Burkina Faso. He found the private rates of return to higher education were relatively favourable by world standards at 10–15 percent, suggesting that private families and individuals in Africa currently have a strong financial incentive to acquire more higher education. However, comparable returns for those completing primary level appear to be modest at between 3 and 10 percent.

This, however, contradicted previous findings as reported in Table 5.1. Obviously, the average returns to education for all regions experienced a substantial decline over time, particularly for primary education. For example, the updates have shown that returns to primary education decreased dramatically in the Asian region, followed by OECD countries. This estimation was made by Psacharopoulos (1994) and Psacharopoulos & Patrinos (2002) using the full method. The coefficient estimated by the same authors using standard earnings function showed the same trend with a slight decline except for Asia and OECD countries. Hence, it is not unusual that returns to secondary or post-secondary education are higher than returns for those completing at primary schooling.

Previous studies in Latin America/Caribbean have noted that the returns to education are high for primary education and become lower further up the educational ladder. However, new studies from various countries have shown contrasting evidence as well. For example, in Argentina, high returns were noticeable in primary education but these were overtaken by those who completed the university level

(Goigvagnoli, Fiszbein & Patrinos 2005). The overall rate of return to an additional year of schooling increased from 8.6 percent in 1992 to 11.4 percent in 2002. This represents a 32 percent increase in 10 years; a large increase compared to most countries. Much of increase is due to the increasing returns to tertiary education. It is also higher in the private sector (Savanti & Patrinos 2005). Sakellariou & Patrinos (2004) found the same pattern in Venezuela, where the returns to education in the 1990s have decreased, while the average years of schooling increased. On the other hand, in the new century, the returns for secondary and tertiary education have experienced a noticeable increase over time, and finally, overall private rates of return have increased as well. This result was also paralleled in other middle-income countries in Latin-American such as Mexico and Brazil[38].

Evidence from Eastern Europe has shown that the returns to education have been high, especially after the economic reforms. Filer, Jurajda & Planosky (1999) estimated the benefits of education in 1995-1997 for Slovak and Czech men. The data suggested that the additional benefit of education increased by 12% (1.0 percentage point) in the Czech Republic and 32% (1.9 percentage points) in Slovakia. In 1997, each additional year of schooling increased wages by 9.4% in the Czech Republic and 8.4% in Slovakia. These returns compare favourably with OECD countries.

## 5.4 Returns in Asia

In Asia, returns to education have increased recently. For example, the country with the lowest returns, China, has shown a slight increase over time. Byron and Manaloto

[38] In addition, the same pattern was found in Spain and Portugal, see Garcia-Meinar & Mentueaga-Gomes 2005.

(1990) reported the rates of return were less than 4 percent[39]. Using a wide range of samples, the rewards from investment in education in the late 1980s were shown to be low compared to the Asian average (about 9 percent). Johnson & Chow (1997) and Liu (1998) found that the returns were only 3.29 percent and within the range 2.8 to 3.6 percent respectively. Both studies used the 1988 Chinese Household Income Project (CHIP-88) data. Byron and Manaloto (1990) estimated a low return of 1.4 percent for each additional year of schooling; Meng and Kidd (1997), Maurer-Fazio (1999), Johnson and Chow (1997) and also Liu (1998) indicated that the returns for an additional year of schooling in China were between 2.8 and 5.0 percent. All these studies utilized the first wave of data from the Chinese Household Income Project (CHIP) 1988. In addition, Fleisher and Wang (2005) concluded that China's rapid economic growth, associated with returns to schooling that were below the Asian average could make China an exception.

However, another estimation derived from a second wave of household income surveys (CHIP-95) carried out by Li (2003) found a slight increase in returns of more than one percentage point. This estimation shows the overall returns for an additional year of schooling at about 5.4 percent. Although it is still low in comparison, nonetheless it is in line with the pattern of increasing rate of returns to education by one percent for a decade. Bishop and Chiou (2004) estimated the returns in Taiwan (1978-1995) and China (1988-95). They found the male coefficient of schooling was remarkably stable over time in Taiwan, ranging between 0.063 and 0.067. Meanwhile, the schooling coefficient in urban China and Guangdong increased from 0.029 to 0.047 and 0.029 to 0.056 respectively. These two provinces are

[39] However, this study used a small sample, i.e. 800 adults in 1986.

considered to be the most developed parts of China. However, these figures are low compared to returns in other parts of Asia.

Estimates using the second wave of CHIP 1998 data show that the return was higher than in previous studies. For instance, Gustafsson and Li (2000), Knight and Song (2003) found the returns to college education increased by between 5 to 15.5 percent from 1988 to 1998. Furthermore, Zhang et al. (2005) proved that the returns to schooling in China after economic transition had increased. There was evidence that returns to schooling in urban China over an extended period of economic reform increased dramatically, from 4.0 percent in 1988 to 10.2 in 2002. Most of the increased return that occurred after 1992 was reflected in the increasing wage premium for higher education, institutional reforms and high demand for skilled workers.

Deolalikar & Berhman (1991) estimated the returns in Indonesia using the data from the 1986 Labour Force Survey (SAKERNAS), which consisted of 25,555 individuals who reported their wages from the national sample comprising of 225,000 individuals aged at least 10 years. The test of the different coefficients for females and males did not differ significantly for sub-primary, primary and junior secondary school. However, it was significant for both vocational and general secondary education. The private rates of return for sub-primary up to university levels ranged between 5 and 11.7 percent[40]. The same authors estimated the data again in 1995 and then reported the private rates of return to education in Indonesia. However, these

[40] These results were for males, whilst the returns for females were ranged between 5.3 and 9.5 percent. For details, see Table 1, page 469.

results were slightly lower than those reported in the previous estimation. Average returns for the pool sample had a range between 3.8 and 8.5 percent[41].

The latest study in Indonesia, carried out by Leeuwen (2005), estimated the returns between 1986 and 2002 by using data from SAKERNAS and SUSENAS (Indonesian Household Survey). It found that the returns for secondary and higher education were increased from 11.0 percent to 21.8 percent and from 11.1 percent to 20.1 percent respectively. However, the rates of return for primary education fluctuated more over time. The returns were reported to be approximately 4.0 percent in 1986, declining to 3.4 percent in 1996 and reaching a peak in 1998 (9.6 percent) before declining drastically to 4.5 percent in 2002[42].

The country with the most successful economy in South-East Asia, and with the highest per capita income, is Singapore. This country also noted the highest returns among other countries in this region. The past estimations by Clark and Fong (1970) using 1966 data as well as Liu and Wong (1981) using 1974 data indicated the returns to an additional year of schooling at about 13 percent. Similarly, recent studies by Sakellariou (2003) using the mid-1988 Labour Force Survey (15,000 observations) arrived approximately at the same average estimation. At the same time, the mean of years of schooling for Singaporean workers was 9.5 years[43]. The pattern of private rates of return by levels of education in Singapore indicated the U-shaped distribution; higher returns were obtained in primary education at 23.3 percent (versus no formal education) and secondary education at 13.5 percent. Returns for an additional year of

[41] The returns for males and females were 3.4 to 8.2 percent and 4.4 to 11.7 respectively.
[42] The author believed that the returns have increased drastically in 1998 and 2000 due to the effect of the Asian financial crisis. People with primary education are the most unemployed and the average of returns to primary education rises more strongly than those who have obtained secondary and tertiary education.
[43] The average years of schooling in Singapore is higher than the mean of non-OECD countries (9-9.2 years) and below than OECD countries (10.5-11 years) in late 1980s.

schooling for post-secondary, polytechnic and university were 12.6, 14.3 and 21.5 respectively. Higher returns for university education reflect the strong demand for limited places in higher education. Hence, the entry at university level is highly selective[44].

The average level of education for Thailand has also shown an increase in the last decade (Hawley 2004). Means for men and women increased from 8.49 years to 9.66 and 9.15 to 10.45 respectively between 1985 and 1998. Women also have higher levels of education compared to men. Meanwhile, completing an additional year of schooling for both men and women in Thailand provides an additional 11 to 12 percent of monthly log earnings. This is shown in the models which control not only the basic parameters, but also include the area of residential, regional, and public/private sector employment. This study also indicates that returns to vocational education are higher than returns to general education (Hawley 2004). It is also confirmed by the earlier results of Moenjak & Worswick (2003) which showed that upper secondary vocational education gave higher returns, at 23.8 percent for men and 20.7 percent for women.

## 5.5 Returns to Education in Malaysia

The studies of returns to education in Malaysia can be divided into two categories: those which used a variety of data collected by official bodies or field surveys by researchers, and those which utilized official data from the government such as the Malaysian Family Life Survey 1 and 2 (MFLS1 and MFLS2) and the Household Income Survey.

[44] Singapore only had three universities in 2001.

In the first category, Hoerr (1973) conducted the first cost-benefit analysis of education in Malaysia, using the "Malaysian Socio-Economic Sample Survey of Households, 1967-68". The survey, which covered 30,000 households, was the first available, with reliable information on incomes, education levels, and related indicators of occupation and family background. However, his study covered only a relatively small sample, of between 166 and 800 respondents from the whole survey. Nevertheless, that study remains very important as a benchmark in the investigation of the returns to education in Malaysia. Using the two basic variables, i.e. age and education, the author explored the returns to education, by using OLS as a tool of analysis.

The findings of this study showed that the cumulative private rate of return to education was higher for upper secondary education at 17.6 percent compared to primary or higher education, which were 12.9 and 16.0 percent respectively. If one considers teacher's training as schooling's coefficient, it is very interesting that the returns show the highest rate, at 23.6 percent[45]. This phenomenon indicated a higher demand for teachers due to the privileges of the job, especially among the Malays, during the time of the survey. Furthermore, this study also indicated that the social rate of return to education was 8.2 percent for primary education, increasing to 11.9 percent for lower secondary levels and 13.0 percent for upper secondary. However, it declined to 11.4 percent for higher education. In terms of marginal returns, the private return was highest at the primary level, followed by secondary level then, declining

[45] In human capital theory, teacher's training has been categorized under the 'job training'.

according to the increase in educational attainment. A similar pattern was also found for the marginal social rate of return[46].

Mazumdar (1981) used two data sets in her study; the first was known as the 1970 Post Enumeration Survey (PES). This survey covered information for 8,095 male wage-earners and self-employed individuals, including background variables and type of employer. The second was the 1975 World Bank Migration and Employment Survey (MES) which had information relating to 1,889 male employees in three urban areas in Malaysia; namely Kuala Lumpur, Kota Bharu and Kuantan. The regression covers all male workers in urban areas, including employees and self-employed people[47]. She found evidence of a particularly high return to schooling for completed educational phases after primary school. In fact, completed primary education gives an earning premium of 68 percent above those with no schooling. After that, completed LCE, completed MCE, and completed HSC bring earnings of 27 percent, 59 percent, and 86 percent respectively over the earnings completed stage "no education to primary education", "primary to LCE", "LCE to MCE", and so on.

The evidence from the PES data showed that the highest returns to education were for those who had completed higher rather than primary education. Interestingly, her study also analysed the earnings for those who dropped out at certain levels of education. The results showed only a small difference in earnings between those who dropped out at one level of completion compared to those who dropped out at the next level. According to the author, this evidence proved that the educational credentials are being used as a screening device in the labour market, meaning that employers

[46] Marginal social return from primary to secondary level was 15.6 percent; lower secondary to upper secondary was 15.3 percent and declined to 12.8 percent for post secondary (pre-university). However, it has decreased to 5.8 percent at university levels. For details, see Table 4, p. 29, Hoerr (1973).

[47] The explanatory variables were age, educational level, race and language used in school, type of town, region and the name of the metropolitan.

considered that schooling certificates are more important than years of schooling. With more comprehensive data (MES), Mazumdar has also investigated the simple human capital model for the public and private sectors. She found the proportion of variance within the public sector is higher than that of the private sector, at 0.67 and 0.31 respectively. This emphasises that wage determination in the public sector is determined by age (seniority) and formal education. Furthermore, her study also showed that education plays a major role in explaining the earnings model. However, the observations only covered the ages between 19 and 22 years old, and does not represent the human capital model as a whole in Malaysia. The dependant variable was the log median earnings of the group selected, and therefore did not represent individual earnings.

Further estimation of the rates of return to education in Malaysia was carried out by Lee in 1980. He used non-random samples of 1,179 people from the private sector and 792 samples from public sector employees in the Klang Valley. This study extended the model by including racial group within its parameters. Two important findings appear in his study. First, it supported the previous study which concluded that the earnings variation in human capital theory is largely explained by education. In the public sector, earnings differentials were explained by differing levels of education. The second finding, which is perhaps more important for the educational policies directed at reducing inter-racial inequalities, related to the private sector. Half of the earnings differentials between racial groups were explained by racial discrimination. Chapman and Harding (1985) used data from a tracer study carried out by the MARA Institute of Technology (ITM) and the Economic Planning Unit (EPU) in 1979. It consisted of 605 observations of both males and females. The average returns to schooling for the overall sample was 9.37 percent, while the returns

for males and females were 5.28 and 8.15 percent respectively. Unfortunately, these figures, did not represent the Malaysian population as a whole but might be true of the returns of diploma holders.

Other studies estimated the returns to education using MFLS 1 and 2. This survey was conducted for the purpose of gathering data on economic and biological aspects of fertility rates and other related variables. It was conducted by the government during 1976-79 (MFLS1) in Peninsular Malaysia. The sample consisted of 1,262 households in which at least one married women was aged less than 50 years old at the time of survey. It also included the earnings and occupational histories of the women, and also the data for the husbands (Butz and Vanzo 1978). Blau (1986), Gallup (1997) and Chung (2003) estimated the rate of return to education. Blau (1986) found the schooling coefficient for urban males who completed primary education was 0.15, and the coefficient for urban women was 0.45, while the coefficients for rural men and women were 0.26 and 0.25 respectively. Returns for completed secondary education were 0.77 percentage points for urban men and 1.1 for women. Those in rural areas received returns of 1.1 percentage points for men and 2.0 for women. The coefficient for those who completed at the higher level of education in urban areas was 1.67 percentage points for men and 2.39 for women. Meanwhile, the men and women in rural areas received returns at 2.39 and 2.1 percentage points respectively.

Gallup (1997) utilized the Second Malaysian Life Family Survey (MFLS2) to explore the returns and earnings by ethnicity in Malaysia. The average rate of return to education was 7.6 percent. This figure is lower than other estimations in Malaysia, for example Mazumdar (1981). Indeed, it is far behind the Asian average. However,

the more important thing highlighted by the author was the earnings gap between ethnicities. The Malays from the MFLS2 sample earned on average 66 percent of the earnings of Chinese (the omitted dummy in his regression), while Indians managed to earn 76 percent of the earnings of Chinese over the sample period. Even when experience, tenure, and education were added, the Malays and Indians only obtained 76 and 83 percent respectively of the earnings of Chinese. All groups received their highest earnings at 18-19 years of experience, but the Chinese earnings-profile was steeper and more concave than that of the Malays and the Indians. The rates of return to education between levels of education is different from the world findings. The returns were lowest at primary education for each race, and highest for tertiary education. This was probably due to higher access to primary school and difficulties in gaining access to higher education. On the other hand, perhaps it could be explained by the shift in demand from unskilled workers to higher skilled workers which is faster than the increasing education levels of the population. The returns to education in Malaysia which were estimated by the authors are shown by Table 5.4.

Using the same data as Gallup, Chung (2004) found that a similar pattern derived higher in returns for each level of education. Chung exploits the opportunity by following the sample in MFLS1 and MFLS2. The first estimation utilized data from two Malaysian Family Life Surveys (MLFS). The result indicated that the marginal returns to education were 12 percent for lower secondary, 17 percent for upper secondary, and 26 percent and 17 percent for pre-university and higher education respectively. However, the survey does not adequately represent the Malaysian labour market. Nevertheless, the rich information in MLSF has given the author the opportunity to estimate the returns in human capital investment. Results

from the New Sample[48] (MFLS2) were inconsistent with the first regression from the MLFS1. The rates of return for lower secondary (versus primary) and pre-university (versus upper secondary) were approximately 4 percentage points lower than the first estimation, which was about 8 percent. On the other hand, the returns were higher for upper secondary (versus lower secondary) and higher education.

**Table 5.4: Returns to Education in Malaysia**

| Author | Data | Sample | Method | Pooled | Male | Female | Primary | Secondary | Higher |
|---|---|---|---|---|---|---|---|---|---|
| Hoerr (1973) | MSSH 1967-68 | 800 | OLS | - | | | 0.129 | 0.17 | 0.16 |
| Chapman & Harding (1985) | ITM & EPU Tracer Study (1979) | 605 | OLS | 9.37 | 0.53 | 0.82 | | | |
| | | | | | | | 0.15 (UM) | 0.77 (UM) | 1.67 UM) |
| | | | | | | | 0.26 (RM) | 1.10 (RM) | 1.85 RM) |
| Blau | MFLS2 | | | | | | 0.45 (UF) | 2.01 (UF) | 2.39 (UF) |
| (1986) | 1987-88 | 1,262 | OLS | | | | 0.25 (RF) | 2.00 (RF) | 2.10 (RF) |
| | PES1970 | 8,095 | OLS | 0.14 | | | 0.18 | 0.33 | 0.44 |
| Mazumdar | HIS 1984 | 1,889* | OLS | 0.14 | | | 0.13 | 0.30 | 0.76 |
| (1981) | HIS 1987 | | OLS | 0.16 | | | 0.18 | 0.25 | 0.58 |
| | MFLS2 | | | | | | 0.056 (M) | 0.061 (M) | 0.096 (M) |
| Gallup | 1987-88 | | | | | | 0.030 (C) | 0.044 (C) | 0.080 (C) |
| (1997) | | 1,262 | | 7.6 | | | 0.036 (I) | 0.035 (I) | 0.075 (I) |
| Schafgans | MFLS2 | | | | | | 0.052 (M) | 0.19 (M) | |
| (1998) | 1987-88 | 1,262 | P & SM | | | | 0.021 (C) | 0.16 (C) | - |
| | MFLS 1 | | | | | | | | |
| | 1976-77 | 534 | OLS | | | | | 0.66 | 1.76 |
| Chung | MFLS2 | | | | | | | | |
| (2004) | 1987-88 | 804 | OLS | | | | | 0.63 | 1.53 |
| | | | | | 3.9%[1] | 4.8%[1] | | | |
| | | | | | 6.0%[2] | 8.7%[2] | | | |
| | | | | | 8.6%[3] | 12.3%[3] | | 8.7%[2] | 14.6%[4] |
| Chung | HIS | | | | 11.8%[4] | 16.0%[4] | 6.1%[1] | 11.4%[3] | 21.9%[5] |
| (2003) | 1997 | 59,091 | OLS | | 19.2%[5] | 22.5%[5] | | | |
| Rahmah & Rogayah | Field Survey | | | | | | 0.028 | | 0.018 |
| (2003) | 1999 | 2,065 | OLS | | | | (S) | 0.032 (SK) | (US) |

*Source: Compiled by author; Chung, T. P. 2003, Table 1-3, p. 838-839.*

Notes: * Urban males only; UM-urban males, RM-rural males, UF-urban females, RF-rural females, M-Malay, C-Chinese, I-Indian, S-skilled, SK-semi-skilled, US-unskilled.
[1] No certificate
[2] Lower secondary
[3] Upper secondary
[4] Pre-university
[5] Higher education

Chung (2003) has estimated the rates of return to education in Malaysia using a massive data set; the 1997 Malaysian Household Income Survey. She found that the

[48] For explanations of the new sample, see Chung (2003), pp. 9-12.

marginal gross return was higher at the upper secondary level to pre-university level where an individual has an annual gross return of 22.9 percent. This result is consistent with the result from her previous study but contrasts with the study by Hoerr. However, due to the many differences, a comparison between the earlier and later studies is hard to carry out. For example, the study conducted by Chung was more comprehensive when using the Malaysian Household Income Survey 1997 which was more representative in constructing earnings profiles. In addition, the data sets also added more explanatory variables including wage earners, self-employed, and marital status as well as gender.

Studies of the rates of return with different data sets in Malaysia have shown inconsistent results. However, in general the highest returns are obtained from upper secondary education. This contrasts with the average returns world wide, which are highest at the primary level. Meanwhile, it is unchanged for pre-university versus upper-secondary for both of the estimations. The more important result that the author's findings have shown is that the rates of return are higher, and there is a positive and significant impact of training for women who participated in the survey.

Rahmah & Rogayah (2003) estimate the returns to skill among the employees in the major industries of the manufacturing sector. The data for their study was collected from a field survey in the most developed areas in Malaysia; viz; the Klang Valley and Penang. The sample size was 2065. The small sample size is due to the limited financial resources. In this study, three categories of workers were identified - skilled, semi-skilled and unskilled[49]. Their results revealed that the means of

[49] They used the definition of workers of the Ministry of Human Resources. Skilled workers are referred to those who attended more than 6 months of training; semi-skilled are the workers with training of 3 to 6 months. While the unskilled workers are referred to those who have attended less than 3 months on training.

schooling for skilled, semi-skilled and unskilled workers were 14.25, 11.18 and 10.45 years respectively. The striking results from their study are that the years of schooling have a significant relationship with earnings in the majority of the sub-industries, except in the textile and wood-based industries. The importance of educational attainment is clear in the transport and food industries, in which one additional year of schooling would increase earnings by 5.2 and 4.6 percent respectively. Meanwhile, returns to schooling for workers in the electrical and electronics, and the chemical industries only average 2.4 percent for an additional year of schooling.

Private returns to education in Malaysia are higher and positively correlate with educational attainment. As compared to previous estimates, Table 5.4 also indicates that returns to education at secondary and higher level are lower than the estimations by Psacharopoulos (1985 & 1993) and Psacharopoulos & Patrinos (2002), which were 32.6 and 34.5 respectively. Other studies also reveal a mix of results, especially relating to the returns to levels of schooling.

Most of the studies were inconsistent and report different findings. The estimates of returns to education were inconsistent for two main reasons. Firstly, the data sets in the studies are different. Secondly, the method or model specification was not the same despite most of the studies having used OLS as a tool of analysis. The limited data and resources, and to some extent the choice of schooling and earnings variables, also give a different impact on returns to education. Moreover, some of the studies, Gallup (1997) and Mazumdar (1981) for example, emphasize income inequality rather than returns to education. The explanatory variables in the earnings equation are also inconsistent. Blau (1986), for example, included the dummy for occupation in the regression which has an impact on schooling coefficients.

Nevertheless, this is common when the researchers have different sets of potential regressors in a data set. The dissimilarity of methodological aspects and data availability, economics and educational change will affect the outcomes. On top of that, the results may be biased due to measurement error, omitted variables or the absence of information about how ability affects the schooling choice. Nevertheless, these studies that estimate the returns to education have made a great contributions to the literature related to Malaysia.

In this study, the objective is to estimate the private rate of return to education in Malaysia using the latest data set; in particular to estimate the average return for an additional year of schooling. Furthermore, it will provide new evidence of the returns to education by using the latest available data sets. Previous data and analysis on returns to education were based on small numbers of observations and various types of data. This thesis estimates the returns based on heterogeneous as well as homogenous returns assumptions. The former uses Instrumental Variable (IV) techniques that have never been applied to Malaysian data to our knowledge. This innovation reduces potential bias in parameter estimates and also shows the impact of school reform on the returns. Use of IV techniques in studying the returns to education in emerging economies is rare. Our results add new evidence from the emerging economies to the economics of education literature.

In the next section, I will discuss details of the homogenous and heterogeneous returns to education and the different results that comes from the OLS and the alternative, i.e. IV approaches.

## 5.6 OLS and IV Estimation

Despite the usefulness of the standard earnings function in the last four decades across the world, the rate of return to education using OLS in the Mincerian earnings function is subject to bias in estimation[50]. There is a growing debate in the literature regarding how robust and precise the estimation is when using this method. OLS estimates of returns to education tend to be upward biased because of endogenous schooling. Any measurement error of schooling, on the other hand, would lead to downward bias in estimation. Moreover, the absence of ability or some other factors that are correlated to schooling decisions but omitted from the equation also lead to upward bias in estimating the returns. Recently, researchers have exploited various types of data from different countries to investigate the returns to education more complex estimation techniques. One of the methods is IV which is widely used to reduce the potential bias in estimation.

Early exploration was lead by US economists where the most sophisticated data and well developed statistical packages were available. For example, Angrist and Krueger (1991) estimated the rate of return to education by using the variation of the schooling law and year of birth across the US as the instruments. Estimation by IV has shown a slight increase in rates of return at 0.081 as compared to the OLS value of 0.063. However, Bound et al. (1995) argued that the quarter of birth as an instrument might have an effect on earnings through schooling. According to Harmon, Oosterbeek & Walker (2003), in most social science studies, parents with a low income background do not choose a particular time to have children compared to high income earners who could plan to have children during a particular period or season. Results from another study by Angrist & Krueger (1992) using the date of

[50] Discussion regarding bias in estimation using OLS will be described in the next chapter.

birth data from the US Draft Lottery number revealed the same pattern where IV estimates were higher than OLS which at 0.066 compared to 0.059. However the test for significant difference in this study was rejected (insignificant).

**Table 5.5: Estimates Rate of Returns by OLS and IV**

| Study | Sample | OLS | IV | Instruments |
|---|---|---|---|---|
| Angrist & Krueger (1991) | US 1970/80 Census: (Men born 920-29, 1930-39, 1940-49) | 0.063 (0.000) | 0.081 (0.033) | Year * Quarter of Birth State* Quarter of Birth |
| Angrist & Krueger (1992) | US 1979-85 CPS: Men born 1944-53 (potential Vietnam War Draftees) | 0.059 (0.001) | 0.066 (0.015) | Year of birth (Draft Number Lottery) |
| Card (1995) | US NLS: men age 14-24 in 1966 samples as employed in 1976 | 0.073 (0.001) | 0.132 (0.049) | Nearby college to place of residence in 1966 |
| Butcher & Case (1994) | US PSID 1985: White women age 24+ | 0.091 (0.007) | 0.185 (0.113) | Presence of Siblings (sisters) |
| Harmon & Walker (1995) | UK FES 78-86. Males 16-64 | 0.061 (0.001) | 0.152 (0.015) | School living ages changes |
| Dearden (1998) | UK NCDS: women born in 1958 | 0.048 (0.048) | 0.055 (0.005) | Family variables, parent education |
| Uusitalo (1999) | Finnish Defence Forces Basic Ability Test Data matched to Finnish income tax registers | 0.089 (0.006) | 0.129 (0.018) | Parental income and education, location of residence |
| Harmon & Walker (1999) | UK GHS 1985-1992: Males 16-64 | 0.049 (0.000) | 0.140 (0.005) | School leaving age changes and educational reforms |
| Meghir and Palmer (1999) | Sweden-Males | 0.028 (0.007) | 0.036 (0.021) | School building project |
| Duflo (1999) | Indonesian | 0.077 (0.001) | 0.091 (0.023) | Indonesian school project |
| Harmon & Walker (2000) | UK NCDS: Men | 0.050 (0.005) | 0.099 (0.019) | Family background |
| Denny & Harmon (2000) | Irish ESRI 1987: Males | 0.08 (n.a) | 0.098 (n.a) | Abolition of fees for secondary school |
| Pons & Gonzalo (2001) | Spain: Males 16-64 | 0.064 (0.004) | 0.107 (0.010) | Education policy interventions, family background, season of birth |

*Sources: Harmon, Oosterbeek & Walker (2001), Table 1.8, p.22; Harmon, Oosterbeek & Walker (2003), Table 11, p. 141-142.*
Notes: Standard error in parentheses
n.a – not available

Table 5.5 reveals the result of returns to education by both methods, which indicated that IV is greater than OLS by 5 to 6 percent per year of schooling. Card (1995) used the distance to college as an instrument for schooling for males who grew up near the college. The result from OLS indicated that the rate of return was about 7 percent

lower than IV's estimate of 13.2 percent. A series of studies by Harmon & Walker (1995, 1999, & 2000) which either used change in schooling law or family background, as instruments have also shown that IV estimates were greater than OLS by about 6 to 9 percent. Ashenfelter et al. (1999) in a study for "publication bias" carried out a meta-analysis regression for 27 studies in nine countries. They discovered that the mean for OLS was 0.066 and 0.093 for IV (0.093 for twins studies)[51].

Another point from the above table also revealed an interesting finding where the estimation based on family indicator or background as the instruments were not much different from the estimates derived by OLS. Studies of meta-analysis for 15 European countries in PURE projects also revealed the same pattern. Results from the analysis using IV studies on family background were close to OLS on average. However, overall average returns to schooling as estimated by OLS were 6.5 percent per year, i.e. almost 9 percent lower than IV estimates of about 13 to 14 percent (Harmon, Walker & Westergaard-Nielsen 2001).

One of the example studies using IV in Asia was carried out by Fleisher and Wang (2005) in China. They used year of birth and the location of schools as the instruments during the Cultural Revolution in China. Their results showed that IV estimates were about 40 percent higher than the OLS estimate for the incomes of 1978. However, for the years 1984, 1987 and 1990, the IV estimates were approximately 3 times higher than the OLS estimates – from between 1.4 percent in 1978 and approximately 6 percent in 1990. They were larger than the estimates derived from cross sectional studies of returns to education in 9 transition economies

[51] Refer Table 1 and 2 in this report for further explanation and meta-analysis sources.

(including China, Russia, Central and Eastern Europe) which were between 4 and 5 percent higher, on average, than OLS estimates (Fleisher et al., 2005).

## 5.7 Heterogeneous Returns to Education

Estimating the returns to education using OLS on equation 4.23 in Chapter 4 (or equation 6.3 in the next chapter) explains the average returns, signifying a constant return across all individuals. In some developed countries, notably the UK and the US, the availability of panel observations has enabled economists to derive conclusions about the degree of heterogeneity in schooling choice. In the absence of such readily available panel data it is more difficult to observe directly the extent of such heterogeneity. The methods used to observe heterogeneity indirectly include IV, Control Function (CF) and Matching (MM) methods allow estimating of different returns across individuals. A further discussion in the next chapter.

A study from UK's panel data has made a great contribution to the literature on corresponding heterogeneous returns. Dearden (1999), using NCDS (the British National Child Development Survey) data had reported evidence of the persistence of heterogeneity. She found that the returns to an additional year of schooling for UK men is about 5.5 to 6 percent. A heterogeneity in returns to full time education correlated with the level of innate ability, parental interest or family financial circumstances. The father's education has a negative relationship with returns to education, but a positive impact on the overall level of wages received by individuals. Individuals whose father's had received 10 years of education received marginal returns of 4.5 percent compared to estimated returns of 6.2 percent for individuals whose father's received only 7 years of education. Individuals with lower levels of

education show significantly higher marginal returns to education than the population as whole. She also suggested that IV procedures which rely on intervention may overestimate the marginal return obtained by previous studies in the UK (for example Dearden 1999a; Harmon and Walker 1995).

Blundell et al. (2004) used the MM to examine the impact of the degree qualification obtained by individuals on their earnings. They compared the outcomes of the group with degree qualifications with those individuals who had the opportunity of undertaking higher education but decided not to do so. They used the same panel data (i.e. UK-NCDS). This data is rich in information about the educational history of all individuals born between 3 and 9 March 1958, including the school exams, higher education, and family background. In addition, NCDS also provides information on the ability test which tests maths and reading abilities, when the pupils were aged 7, 11 and 16. The earnings were measured by hourly wages at the age 33. The higher education regression suggested that those with a good performance in the maths test (at 7 years old) had a better chance of completing a first degree. Meanwhile those with low performance in the maths test had a poorer chance of completing a non-degree higher education course.

With a limited sample of individuals with at least one A level, they used matching methods to model the impact of higher education on hourly wages and assumed that the decision to participate in higher education was based on the observable variable of NCDS data. Their results show average returns to undergraduate degree level of around 21 percent for men and 39 percent for women. After controlling for ability at age 7, region, school type, family background, demographic characteristics and type of occupation, the return decreased to around 17

percent for men and 37 percent for women. It also shows that the returns to higher degree and non-degree courses at higher education were lower than those obtaining degree qualification, but remained significant.

Blundell et al. (2001 & 2004) provided a comprehensive review of alternative models and methods for estimating the effect of schooling on earnings. The alternative methods rely on different identifying assumptions; the methods were instrumental variable (IV), control function (CF) and the matching methods (MM)[52]. They highlighted the results from the high quality data set (i.e. NCDS 1958 cohort study) in the UK which emphasized the importance of the model's specification. The model is distinguished from single treatment and multiple treatment models and emphasises the importance of allowing for the variation of returns across individuals for the same educational qualification. In the variation of returns (heterogeneous returns), there are four possible parameters of interest; the Treatment on the Treated (TT), the Local Average Treatment Effect (LATE), the Average Treatment Effect (ATE) and the Average Effect of Treatment on the Non-Treated (ATNT)[53].

The result of the single treatment models (qualifications versus no qualifications) derived using OLS estimation is 37.0 percent. This reduces to 25.25 percent after adding ability, school type and family background variables. The IV estimate of the returns is 78.6 percent, but this reduces to 47.4 percent after using more credible instruments[54]. The results from IV are higher than from OLS estimations and provide evidence of heterogeneous returns to schooling. This is also confirmed by the CF model where the returns for those who obtained a qualification is

[52] Further details of the method are discussed in the next chapter in particular the instrumental variable methods which is one of the main model used in this thesis.
[53] See also Imbens and Angrist (1994) and Angrist and Krueger (1991) for the LATE.
[54] The instruments are number of older siblings, financial difficulties in 1969 or 1974 and parental interest in the child's education at the age of seven.

37.7 percent; this is lower than the IV estimation. The results from matching method estimation revealed that those who obtained qualifications (ATT) achieved returns of around 31 to 35 percent, whereas the estimate for those who did not obtain qualifications (ATNT) was 23 to 24 percent. Results from the MM show the returns of ATT ranged between 31.3 and 34.6 percent, while the effect of treatment on the non-treated (ATNT) gave a result between 23.1 and 23.6 percent.

Dearden et al. (2004) focussed on returns from staying on post-compulsory schooling, and the returns from completing higher education, compared to having stopped with qualifications of at least level 2 for the marginal entrants to higher education. They used the 1970 British Cohort Study (BCS70) which contains detailed information about ability, family background, education and employment. Their aim was to investigate the returns to the marginal learner - those who have achieved the level of education as the Average Effect of Treatment on the Treated (ATT) and - those who could have but did not achieve that level of education as the Average Effect of Treatment on the Non-Treated (ATNT). They used OLS and MM to estimate the returns. The first result refers to the "staying on past compulsory schooling" and shows the overall result for men; OLS and MM show that individuals who stayed on at school earned 11-12 percent more than if they had dropped out. The ATT and ATNT are similar, indicating that the returns of those staying on and those dropping out are same. The result for women was around 18 percent for both ATT (staying on) and ANTT (dropped out). The returns for men and women in higher social classes were higher than for those in lower social classes. The matching estimates show some heterogeneity in returns, both by income segregation and between treated and non-treated. However, the results did not show any substantial heterogeneity in returns when the sample was divided by ability.

The second estimate compared higher education completed (ATT) with levels 2 and 3 (ATNT). For men, the OLS estimated returns are 16 percent, the ATT 14 percent and ATNT 16 percent. But returns for females staying on at higher education were 22 percent, and 1 percent higher for females with non-graduate qualifications. When the sample was broken down by social class, males from higher social classes had higher (20 percent) returns than those from lower social classes (9-11 percent). When they compared ATT and ATNT, they found that among low income men, the return of ATT was 5 percentage points higher than the returns of ATNT. Therefore, they suggested that there are substantial return variations (especially for males), among for those staying on to higher education for all sub-groups of the population.

Aakvick et al. (2003) examined the nature of school reforms in Norway to investigate the heterogeneity of returns. The major Norwegian schooling reform was the extension of the mandatory years of schooling from seven to nine years. This was started in 1960 and lasted until 1972[55]. The results of their study showed that the return using OLS estimation was 7.5 percent, and increased to 10.2 percent using school reform as the identifying instrument. It provided further evidence of heterogeneity in returns to schooling. The chosen instrument in the study identified the returns achieved by those who were affected by the schooling reforms. They also found that the returns to schooling were strongly non-linear and they suggest that the Roy model (see Heckman & Honoré 1990) is better than the traditional IV when schooling is treated as a continuous variable. Furthermore, the results from the Roy model estimation indicate that the returns to upper secondary school and one and two years education at regional colleges, together with master's program, have a high

[55] They used The National Censuses Population and Housing data for 1960 and 1970, where the net sample was comprised of 160,000 individuals who were borne from 1948 to 1957. These data is rich with the information regarding parents' education, seniority, type of education, municipal, annual income and employment relationship.

return when measured by wages. Also they found that the average treatment effect is high for medium-length education and they conclude that the comprehensive school reform has the potential to give a high return in terms of wages.

Maier et al. (2004) evaluated human capital investment by assuming heterogeneous returns in Germany. Based on a sample of West German full-time employed males from the "BIBB/IAB Strukturerheburg 1998/99", they provided evidence of heterogeneous returns to schooling from different approaches. Firstly, using the two-stage least square estimate in which the instruments are the unemployment rate at graduation and its interaction with age (and its square), and secondly, they apply the conditional mean independence (CMI) to identify the ATE of schooling. The result from the first estimation (IV or 2SLS) was 8.3 percent which is higher than the result derived using standard OLS (4.2 percent). Meanwhile, the CMI approach revealed an average of treatment effect (ATE) of 8.7 percent. The later estimates are not much different from the 2SLS, which could be considered as a LATE but the returns are in line with the evidence of the persistence of heterogeneity across individuals.

So far, what we are concerned with in the discussion, are three major issues of the impact of schooling on earnings which have been raised in the literature. Firstly, on average, returns to education across the world show a slight decline after one decade. Although, some countries show a pattern of increase over time, the cross country analysis shows a declining return. Secondly, schooling as the individual's decision parameter is an endogenous variable in the standard earnings function estimates using the OLS. This results in an average return for all that could be regarded as a homogenous return. Thus, the standard least square estimate is only a

matter of exploration and the impact, or the usefulness, with respect to the policy implication of school reforms or other exogenous variables seems very limited, especially in the emerging economies. Finally, recent literature shows the returns vary across individuals. A choice of schooling level as a parameter is determined by the individual's observed and unobserved marginal benefits of the schooling choice. Thus, the return for an additional year of schooling varies across individuals. Furthermore, the countries with rich data sets allow the researcher to estimate the impact of the policy reforms; for example LATE or, the impact of changes in the school leaving age (compulsory schooling), which are ATT or ATNT.

## 5.8 Schooling, Returns and Wages Differential

Earnings differentials is partly explained by educational attainment. In the studies across the world it has been proved that those with higher levels of education are more likely to receive higher earnings than those with less education. Therefore, investment in human capital is a top priority and most countries spend a huge proportion of their annual budget on it. Earnings gap, either among ethnic groups, between rural and urban areas or between genders, remain an interesting area of investigation. The changes in wage structure have been attributed to the growth of the more educated (skilled) workers, amount of schooling among different groups of people, the quality of schools, and educational structure and its reforms.

Study of education and earning differentials have been carried out in many countries, e.g. Carnoy (1996); Link et al. (1980); Darity et al. (2000); Finis (1973); Chiswick (1988); and Sweetman & Dicks (1999). Studies across countries have also been carried out; such as Teulings & van Rend (2002), Acemoglu (2002),

Mavromaras & Theodossiou (2005), Budría & Pereira (2005) and others. It is impossible to list all the studies in this thesis, therefore, I have categorized by region, ethnicity, gender, and economics activity but limited myself to the literature that focuses on schooling and earnings.

### 5.8.1 Region

Psacharopoulos and Patrinos (2002) indicated that the higher returns are recorded for low and middle-income countries, especially in Latin America, Caribbean and Sub-Saharan Africa. On the other hand, the high income countries of OECD reported the lowest returns, while the Asian return is approximately the world average. The lowest rate of returns to schooling is lowest for the non-OECD European, Middle East and North African Group. The evidence across the world has shown that the rate of return to education is likely to be higher for the economically developing countries. The developed economies showed lower and declining returns. For example, Rati (1996) investigated the relationship between the level of development and rates of return using multi-country data[56]. The results support a negative relationship between the level of development and the rate of return to education.[57] The hypothesis of diminishing returns to schooling perhaps be can be explained by the mean of schooling in LDCs which is lower than in DCs[58]. Another possibility is that schooling is more valuable in the process of development in LDCs.

[56] His study covered 107 countries comprises of 23 developed countries and 84 less-developed countries. Samples were also divided by income levels, which were low-income countries (LICs -22 countries) and middle-income countries (MICs - 62).

[57] See also Psacharopoulos & Ariagadda (1986), and Nehru, Swanson & Dubey (1993) for the previous evidence.

[58] Demetrides & Psacharopoulos (1987) also found that the increasing mean of schooling by a year over one decade has been decreasing the rate of returns to education by one percentage point in Cyprus.

The returns differentiation exists not only at the macro level. More specific wage gaps among groups remain. It has become an enormous challenge, especially in attempts at reducing the wages gap. The trend towards the earnings gap is not only limited to the developed economies. Obviously, in the developing economies too, it has shown a widening gap between genders, ethnicity, rural and urban areas, and low and high-skilled workers. The literature offers many explanations of this phenomenon.

### 5.8.2 Gender

The private rate of return to education differs between males and females. The returns are between 1 and 3 percentage points greater for females than males. However, these returns may vary for different countries. Dougherty (2003) using meta-analysis of 24 studies from US data found evidence that most of the studies have shown the schooling coefficients for females to be higher than for males[59]. The final report of the PURE project for 15 countries in Europe indicated that only 4 out of 15 countries had schooling coefficients for females that were lower than those for males[60]. These countries were Austria, the Netherlands, Denmark and Sweden, where the gap is less than 2 percentage points. However, there is no gender pay gap in Austria and Sweden. On the other hand, the countries with the highest returns to education were Ireland (14 percent) and the UK (12 percent) which show the biggest gap between genders of around 5 and 3 percentage points respectively.

[59] See Table 1, page 22 in Dougherty (2003).
[60] However, this project was estimated using data range from 1991 to 1996, which can be considered out of date. For example, estimation for Sweden was carried out using data in 1991, Finland (1996), Ireland (1994) and 1994-1996 for UK.

However, Trostel, Walker & Woolley (2002) using International Social Survey data across 28 countries showed a lower return, of only 0.8 percent. Although the OLS estimates were 4.9 percent for men and 5.7 percent for women, the trend is consistent with the previous study. The smaller gap between the returns might be due to the heterogeneity across countries. Some countries have noted much higher returns compared to others; for example returns in the Philippines are ten times higher than the lowest return in the Netherlands. On the other hand, this study also confirmed the latest world figures as updated by Psacharopoulos & Patrinos (2002) where the rate of return is higher for females than males by 1 percentage point (returns for males and females are 8.7 and 9.8 percent respectively). Ammermüllerald & Weber (2005) also reported that returns for women were above those for men for most years in Germany, and the same pattern was also found in the transition economies (Campos & Jolliffe 2002).

The returns differ between males and females because of earnings gap. There are several possible reasons for the gender wage gap. Firstly, females may receive lower wages due to fact that, to some extent, they do not possess the desired skills compared to males (Lauer 2005). So, females may have lower wages as a result of the lower educational attainment, and different levels of education, compared to males (Psacharopoulos 1973, 1980 & 1981; Deolalikar 1993). The relationship between family wealth and educational attainment is positive and may have contributed to the wage gap between males and females. Low-incomes families may give a priority for boys to enrol at school compared to girls. However, high-income families will observe more equality among their children. Schultz (1988) has found positive income elasticity and negative price elasticity in school enrolments. Furthermore, this elasticity is larger in absolute values for female enrolment rates than for male

enrolment rates. He has also observed greater responsiveness of female enrolment rates to changes in incomes and prices over time within countries. Given that male enrolment exceeded female in low incomes families, these patterns are consistent with Schultz's conjecture that as income increases, parents put greater weight on equalizing investments in male and female children.

Schultz (1993, p. 695) raises the possibility that, independent of the magnitude of the private returns to investments in human capital, "... as parents become wealthier, they may attach greater value to equalizing their investments in their daughters and sons". This argument was supported by Parish and Willis (1993, p.885) who noted that "once families have the prospect of more income...sons and daughters begin to get equal education". If this were indeed the case, there would be distinctly larger gender differentials in school enrolment and educational attainment among children from poverty households than among children from financially well-off households. The family's investment decisions might be credit-constrained, and it was also noted that gender differentials would be smaller as the parents' income becomes higher and the number of children smaller. On the basis of their empirical work on Taiwan, Parish & Willis (1993) concluded that "...children's educational outcomes were highly dependent on economic security. Families with low incomes tend to chose more carefully on who inside the house will get education. Among the most secure families, things were radically different. In this group, siblings essentially had no effect on educational opportunity", (pp. 885–886). This conclusion suggests the presence of a relationship between a family's economic well-being and household composition, with the latter influencing who will get proper education in low-income households but not in high income households.

On the other hand, the wage differential between men and women may result from the fact that even identical skills, or same level of education are not rewarded in the same way by employers. Both aspects can be attributed to different factors, such as differing abilities and preferences, or discrimination. According to the human capital theory, fewer working hours and fewer years in labour market also lead to less investment in education. Alternatively, they may have a preference for qualifications which are not well rewarded in the labour market (e.g. they may choose a subject of study that is not well rewarded). They also invest less than men do in their human capital because they anticipate lower wages or employment, or because they have other life priorities (time for children etc.).

Blundell et al. (2004), the returns for women are more difficult to interpret because women's educational choice and workforce participation decisions are more complicated than men's. And when we come across developing countries, the workforce participation choice is more multifaceted with social factors such as family relationship, religion and custom influencing the working life in many ways. However, in most developed economies the wage gap between the different genders has decreased during the last decade. This is due to several possibilities such as the closer mean of years of schooling between genders, length of working life and experience as well as an increasing rate of participation of women in labour forces (Fuente & Ciconne 2002) especially among younger cohorts.

As indicated in Chapter 4, the OLS estimation on the standard earnings function is based on the earnings forgone. When the earnings forgone for females is lower than for males, the estimation of the private rate of return to education will appear higher for females than males. It is also due to the calculation which did not

take into account the increased probability of more educated women participating in the labour force (Psacharopoulos, 1985, 1993; Psacharopoulos & Azad Alam 1991; Psacharopoulos & Patrinos 2002; Sakellariou 2003).

### 5.8.3 Ethnicity

The levels of education always have a strong economic interrelation with the social background, community, geography and ethnicity or race. The nature of society in which children grow up will impact upon both the nature and quantity of the human capital investment. Some of their backgrounds, of course, will influence an investment in education which finally affects the outcome in returns. Becker (1967, reprinted 1993) highlights the importance of an individual's background in influencing accumulated human capital investment and its returns. Chiswick (1998) adds family background to ethnic group[61]. Cameron & Heckman (1999) examine the college entry among minorities (Hispanic and Blacks) and whites. The important factor, which correlates to college attendance, is family background (measured by parental education) rather than access to short-term credit. Family income is important for explaining the earlier grade transitions, but, not for college enrolments. They also examined racial-ethnic differences in schooling. They found that, once the family background, has been controlled for, minorities are more likely than the Whites to graduate in high school and attend college. Again, it is long-term factors that mostly account for this relationship, rather than short-term cash constraints. A principal

[61] An early study on ethnicity and earnings has been carried out by Weiss (1970) in the US. Results showed a significant relationship between earnings and ethnicity. Educational achievement explained more of the variance in earnings than the number of years in school. In contrast, the effect of education on earnings was less for blacks than for whites. It was suggested that increasing and improving the education for blacks would not necessarily increase their income. Furthermore, improving quality may give a smaller impact for blacks and greater impact for whites. Thus would increase inequality (p. 159).

conclusion from their work is that to raise college attendance and success in college, policy makers should focus on ensuring that more students graduate from high school as well as obtaining the skills and motivation required to perform successfully during college. Their evidence suggests that most of the problems of disparity in schooling attainment among racial, ethnic and income groups arise at earlier points of an investment in education for children from poor families.

Barrow & Rouse (2005) estimate the returns to schooling among racial groups using the U.S Decennial and the National Longitudinal Surveys 1979. The results showed an overall cross-sectional return to schooling of about 9 percent. The estimation was highest among African Americans (10.4 percent) and lowest among Hispanics (7.6 percent). The estimated return for Hispanics was the only one that was statistically different from that of the other two groups. Overall, based on the cross-sectional estimates, they found little difference in the return to schooling by race/ethnicity. In addition, they continued to produce a higher point estimate for African Americans than for Hispanics and non-minorities; they found that the differences across race/ethnicity were not statistically significant, even after taking into account attempts to control the ability and measurement error biases.

On the other hand, when they found point estimates that were relatively similar across racial and ethnic groups, no evidence was then found that returns to schooling were lower for African Americans or Hispanics than for other non-minorities. However, some evidence has shown that measurement error and selection bias may differ by race and ethnicity. More importantly, they suggested that any policies to increase education among low-skilled workers would create an opportunity to reduce inequality and increase economic well-being. However, data from Canada

showed different findings. For example, Sweetman & Dicks (1999) found that levels and cross-sectional returns to education showed large differences among ethnic groups. They used the data from Canadian Census in 1986 and 1991[62]. Results had shown a large gap among groups either in the average of hourly wages or in average annual earnings. The highest group obtained the average of 67 percent and 45 percent more per hour for men and women respectively. Furthermore, the highest-earnings group for men is twice the size of the lowest groups. However, the gap between the highest and lowest is not significant for the women's group. In terms of returns to education, the F-test result clearly establishes that the cross-sectional relationship between earnings and education differ significantly in terms of ethnicity. As noted elsewhere, returns for women are higher than returns for men, and Sweetman & Dicks (1999) estimations also reveal the same pattern, except for the Chinese group. For men alone, the highest coefficient appeared as 285 percent larger than the lowest. In spite of that, the highest return for females is 222 percent relative to the group with the lowest return. Fascinatingly, a group of Black Caribbean men with higher average years of education showed the highest returns to education. Their wages and earnings were actually extremely low.

The finding however contradicted other studies using US data which exhibited a lower return for this group as compared to non-minorities (for example, Chiswick 1988). Another interesting finding is the returns for the male Jewish group which is approximately equal to the average of all groups despite their higher earnings. In conclusion, this study discovered heterogeneity in educational outcomes, years of

[62] They merged both censuses in their analyses in order to investigate intergenerational effects. On the other hand, census data from 1971 was used to estimate characteristics of the preceding generation. 15 ethnics groups were identified with the minimum sample size of 200.

schooling and returns to education across 15 ethnic groups in Canada for both men and women.

The link between returns to education and earnings differential in Europe varies across countries. By using quantile regression, Pereira and Martins (2000) found three different situations. The first is the positive and increasing relationship between the education and earnings gap within a group (see, also Papps (2004) for New Zealand), but this finding only related to Portugal. Budría & Pereira (2005) found to be true of Greece, Norway and Italy but not for Portugal.

The second, as stated by former studies indicates the relationship is positive and stable between education and earnings gap in Austria, Finland, France, Ireland, Netherlands, Norway, Sweden, Spain, Switzerland and the UK. Finally, the returns-quantile profile is negative which means education reduces the earnings gap in Germany and Greece. However, the findings for Germany, the UK, France and Finland from the latter studies contrasted with the findings from the former. These ambiguous results show that education has a strong impact on the earnings gap among and within groups. The positive or negative impacts, it would partially depend on the heterogeneity in labour markets, and policy making, as well as the demand for and supply of labour. Hence, investing in education should be planned carefully if equality and distribution are among the main policy objectives.

Differentials in returns gap among groups (and also within groups) is more noticeable in the developing economies. For example, Arias, Yamada & Tejerina (2002) have established some evidence of contributory factors to the increasing earnings gap in Brazil. They have investigated earnings gap between whites and the African descendent population (*pretos* and *pardos*) using a survey and annual state

data that covers the period from 1940 to the 1990s. The results from quantile Mincer earning equations indicated that differences in human capital accumulation (parents' education, education quality and own investment) and its returns explained most of the earnings gap between the whites and African descendent population. The higher return of the whites is partly due to a more advantages socio-economic background. Therefore, they tend to be in a relatively higher quality of school. Parental education not only increases children's educational attainment but also grants substantial wage returns for them in their adult life. The racial pattern of wage gains from parental education could reflect returns to indicate the unobserved family human capital, specifically for non-whites (especially for *pretos*). Furthermore, it also reflects the returns to unmeasured components of school quality and/or family labour market connections for whites.

Schafgans (1998) has noted from the MFLS2 that a wage gap does exist among race groups in Malaysia. The average earnings for both men and women in the wage sector are higher for Chinese than for Malay. Participation rates in the wage sector are similar between Chinese and Malay men (between 46-47 percent). However, among the women, Chinese participation is more active (28.6 percent) compared to the Malay counterparts (21.8 percent). The average age of female workers is lower than the men at 31 years and 34 years respectively. In terms of education, men show that they are more educated with 7.8 years of schooling compared to women with 6.5 years. However, it is lower in the wage sector where the average is 8.2 and 7.8 years for men and women respectively. Furthermore, there a diminishing gap has appeared between men and women, and among ethnicities for the younger age group.

Schafgans (1998) also found an increasing return to higher education for both ethnic groups (Chinese and Malay). Malay men indicate returns to education of 6 percent and 18 percent for primary school and secondary school and above respectively. Meanwhile the returns to primary education for Chinese men are insignificant (with a point estimate equal to 2 percent). The returns to education for Chinese women are 10 percent and 8 percent for primary education and secondary education and above respectively, whereas the estimates for Malay women are 4 percent and 5 percent for the same levels of education. However, the estimates for the latter are insignificant. Therefore, (according to the author) ethnic difference in returns to education appeared at both levels for women. Nevertheless, among men, ethnic differences in returns to education are most noticeable in primary education. For secondary education and higher, there is not much difference between Malay and Chinese men. This result implied that improved educational attainments up to primary education would benefit Malay men. For Chinese women, wages would be increased significantly with the increasing of educational attainment .

Gallup (1997) who used the same data supports this conclusion. The Chinese have the lowest education coefficients, followed by Indian and Malay[63]. These are explained by the fact that that Malays experienced lower earnings forgone in returns to education estimations. On the other hand, the Chinese yield higher income at any levels of education, except for tertiary education, where the Indians have the lowest coefficient.

[63] See Gallup (1997), Table 3.2, page 17, for details about these coefficients. Result showed that primary education's coefficient for Chinese was not significant.

### 5.8.4 Wage earners and self-employed

Schooling and earning differentials also exist between wage earners and self-employed workers, or between private and public sectors. I highlight some literature regarding the returns and wages gap from the latest studies. Giovagnoli et al. (2005) found that mean earnings in Argentina for employed workers are approximately 8.14 pesos per hour, while self-employed workers received earnings less than half of an employed workers earnings, which is 3.10 pesos per hour. But, the lowest earnings per hour were received by the employees at only about 2.94 pesos per hour. The evidence from the Netherlands, however, indicates that the rate of return for self-employed (entrepreneurs) is higher than for employees (14 percent and 10 percent, respectively), and previous estimates suggested similar returns. The tests also show the result is robust (Sluis et al. 2004). In Argentina, the returns to schooling are higher in the private sector by 1 percentage point for both years 1998 and 2002, compared to the public sector. Overall, the increase in the returns to schooling is mainly due to the increase of returns to tertiary education. The returns to "completed at university" level are also higher in the private sector (Savanti & Patrinos 2005). Kazianga (2004), also shows that the private sector enjoyed a higher return compared to the public sector in Burkina Faso. Those who completed at primary and secondary education, however, will receive higher returns to schooling if they work in the public sector. In Hungary (Campos & Jolliffe (2002)) returns to schooling are higher in private sector only in the later period of the economic transition.

## 5.9 Conclusion

Rates of return to investments in education vary across the world. For the less developed countries, one additional year of education yields higher returns of about 10 to 12 percent compared to 6 to 7 percent in developed countries. Rates of return to education are higher for developing countries compared to developed countries. From the literature in developed countries, especially the US, it has been proven that the rate of return to education is likely to be a U-shaped pattern. In 1970s, the rates of return are higher but these decreased in the 1980s and then increased again in the 1990s. This pattern also applied to European countries as a whole[64]. These changes in returns are close to the shift in the supply and demand of human capital. If the supply of levels of high human capital exceeds the demand, it will reduce the schooling wage-premium. On the other hand, the increase in demand for high levels of human capital will raise the rate of return to education. In the last three decades, studies also indicate that rates of return have decreased over time, although recent studies did not support this finding. For example, the PURE project has revealed that there is neither a clear pattern of declining nor one of increasing rates of returns.

Using the Mincerian earnings function, estimates of returns to education are higher for females than for males due to the lower earnings forgone. This wages gap is partly explained by the difference in mean years of schooling between the male and female full-time workers. To some extent, labour force participation rates and experience as well as accumulated "on the job training," is lower for females than for males, which also contribute to the lower returns. However, recent policy changes, along with development progress, industrialisation and modernisation should reduce the gender returns gap.

[64] Noted that U-shaped pattern exist for European countries as whole. However, if one considered a country individually, the rate of returns is varied across time.

Returns to education are higher at the early stage of development suggesting a reverse relationship between returns and levels of growth. Even though there is no strong evidence, the rates of return to education is decreasing over time. When the per capita income increases, the returns will decrease. Both of these assumptions were based on two or three data points of certain countries within a 10 to 15 years timescale. The findings are in line with the economic theory. Economists speculate about whether an increase in human capital stock might reduce returns to education or whether an increase in the ratio of more educated to less educated workers would reduce relative wage differentials between these groups.

The schooling decision, whether to invest more or less in education is a complex choice. Whether it is worth or not to spend more time and expenses in education is crucial when the schooling becomes endogenous.

In Malaysia, only a few studies have been carried out in this branch of economics. Therefore, it is very difficult to conclude with confidence that the private rate of return to education has increased after the significant economic achievement of the past three decades. Moreover, the economic imbalance and income disparity between groups make it more difficult to predict the trend of returns. Hence, it is interesting to the researchers (and important to policy makers) to explore and estimate the rates of returns to education over a longer timescale in Malaysia. In addition, it will provide new evidence from an alternative approach with the latest data sets.

# CHAPTER 6 - EMPRICAL MODELS AND DATA DESCRIPTION

## 6.1 Introduction

The traditional earnings function, in particular referring to the Mincer equation remains important in estimating the private rate of return to schooling. In developing countries, this model was used extensively to examine the effect of schooling on earnings. And to some extent, it contributed to policy implications, especially policies related to public funding in education. However, the precision of estimation using simple regression on the traditional function is under debate due to several reasons. Essentially, related to the econometrics' issue and measurement error, which I will in discuss detail in this chapter.

This chapter contains three sections. The first section begins with the introduction of the standard model. From this model I, then, extend to the homogeneous return model to estimate the average private rate of return to schooling, which returns to schooling is constant across individuals. In this model, years of schooling represents a schooling variable. It also has been known as the one-factor human capital model. It can also be used to estimate the marginal effect of different levels of schooling on earnings, by adding either the qualifications or additional years of schooling completed, as a schooling variable. In these circumstances, it remains under the homogenous returns model but the treatment is relaxing the one factor assumption and allows different schooling levels to have an impact on earnings. The second model specification is the heterogeneous returns models allowing a return which differs across individuals. In the literature, it can be used to estimate the returns

to schooling by using Instrumental Variable, Control Function or Matching Methods. But, in this study I intend to use the most preferable method which is Instrumental Variable (IV).

The next section will discuss the incidence of under- and over-schooling. It is very is useful to examine the emergence of under- and over-schooling in the Malaysian labour market. The Verdugo & Verdugo (VV) model applies in this study. Even though this model was argued in the literature, the data did not lead to a better experiment. In the third section, I explain the nature of the household income survey in Malaysia. Then, it will be followed by a detail of descriptive statistics. The results from the estimation will be revealed in the next chapter.

## 6.2 Mincerian Earnings Function

The empirical analysis of this study uses the human capital earnings function to estimate the rate of returns to schooling in Malaysia. In prior discussion, it was mentioned that the earnings function is widely used to estimate the returns for the last thirty years after the breakthrough by Jacob Mincer (1974). According to Card (2001), this path-breaking work was extensively used by economists as an econometric approach to estimate the rate of return to investment in education. The empirical model used in this study starts from the Mincerian earning function (equation 4.23 in Chapter 4) that is already known in the literature as a benchmark and will be used to estimate the average private rate of return to education in Malaysia. The basic specification is;

$$\ln W_i = \alpha + \beta_1 S_i + \lambda_1 Exp_i + \lambda_2 Exp_i^2 + \varepsilon_i \qquad (6.1)$$

where $\ln W_i$ is log earnings, $S_i$ is years of schooling, $Exp_i$ is the potential experience of individual i, and $\varepsilon_i$ is well-behaved error term. The last term of equation, $Exp_i^2$ represents the experience squared to capture a concavity of the observed earnings profile. The estimation of the parameters $\lambda_1$ and $\lambda_2$ will become positive and negative respectively. Due to the absence of the completed data on experience, Mincer (1974) proposed the "potential experience", i.e. the number of years individual A could have worked after completing schooling and then, assuming that he/she starts schooling at 7 years old and begins working immediately after $S_i$ of schooling, hence $Exp_i$ is equal to A – S – 7 (Age – Years of Schooling – 7).

Applying simple OLS to the above equation, one can estimate the coefficient $\beta_1$ as the average of private rate of return to schooling (Weiss, 1995). Card (1999, p.1082) and it was concluded that, "the average (or average marginal) is not much below the estimates that emerges from a standard human capital earnings function fit by OLS". Furthermore, Chiswick (1997, p.2) affirmed that "human capital earnings function is frequently used for estimating the rate of return to schooling.....but is it important to say that in many circumstances the coefficient is not the interpretation". Therefore, one should be conscious in an interpretation of the schooling coefficient[65].

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[65] According to Chiswick (1997, p.2), the simple way to derive the coefficient of schooling variable should begin with the assumption that no investment in further training or on job training. Then, to get the school coefficient let $E_o$ be the earnings without schooling, $E_t$ be the earnings after completion certain years of schooling, $C_t$ be the total investment in the year t of schooling, and finally $r_t$, be the rate of returns on investment in year t of schooling. Therefore, $k_t = C_t / E_{t-1}$ is investment in t level of schooling relative to a full year of potential earning if investment are not made in this level of schooling. Then, after completing one period of investment, one could get earning by $E_1 = E_0 + rC_1 = E_0 + r_1k_1E_0 = E_0 (1 + r_1k_1)$. For two periods of investment, use $E_2 = E_1 + rC_2 = E_1 + r_2k_2E_1 = E_1 (1 + r_2K_2)$. Now, using mathematical induction,

$E_s = E_0 \prod_{t=1}^{s} (1+ r_tk_t)$ where S in the number of years S of school completed, then taking natural logarithms, its become $LnE_s = LnE_0 + \sum_{t=1}^{S} (1 + r_tk_t)$. If $r_tk_t$ nearly zero then, $Ln(1 + \varepsilon) \approx \varepsilon$ for small

Mincer (1974) claimed the weekly earnings were preferred as a dependent variable in the model. His argument was that individuals with more education tended to work more and will receive higher earnings compared to those with less education. However, in the literature on the human capital earnings function a variety of earning measurements have been used to estimate the rate of return. For example, the alternatives annual or monthly earnings have been used as the dependant variable, depending on the data availability. Consistently, the earnings variable in equation 6.1 makes use of the logarithmic form because the distribution of log earnings is very close to a normal distribution, especially log hourly wages (Card 1999). In addition, it is preferable to use the log transformation based on the success of the standard (semi-logarithm) human capital earnings function (Willies 1986). The method used here is preferable having regard to the data available and the log transformation is convenient for interpretation in this study[66]. For the purpose of this study, dependent variable will use monthly or annual earnings depending on what is reported by the survey.

The standard earnings function can be used to estimate the average rate of returns to different levels of schooling by converting the continuous years of schooling $(S_i)$ to dummy variables which represent the different levels of schooling. After fitting schooling dummies, the extended earning function will be;

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values of $\varepsilon^2$. So $LnE_s = LnE_0 + \sum_{t=1}^{S} (r_t k_t)$. By separating of the $r_t k_t$ we can estimate each level of schooling through the equation $LnE_s = LnE_0 + (r_t k_t)S$ after adding a residual, $LnE_s = LnE_0 + (r_t k_t)S + \mu$. Hence, the coefficient of schooling is an estimation of the percent increase in earnings after additional year of schooling. The parameter k will be equal to 1 if the investment of schooling equals to full year. So, $r = b/k = b/1 = b$. Then, $k = 1$ if $C_t = E_{t-1}$ when there is no out of pocket expenditure ($D_d = 0$), or, the opportunity cost ($C_f = E_{t-1}$) is the full year of earnings. However, k does not need to be equalled to 1.

[66] The choice of time frame in estimating depends on the data availability. For the developed countries like the USA, UK and Europe, it is appropriate to use hourly wages recognising that the educated person may work more hours. This is consistent with Mincer's suggestion. However, wages payment methods in developing countries make it more appropriate to use a monthly basis and most of the household income surveys are reported either on an annual or monthly basis.

$$\ln W_i = \alpha_0 + \beta_1 PRIM_i + \beta_2 SEC_i + \beta_3 HIGH_i + \lambda_1 Exp_i + \lambda_2 Exp^2 + \varepsilon_i \quad (6.2)$$

Using the above equation, we can estimate the returns for each level of schooling. The parameters are derived from the following formulae;

$$r_{(PRIM)} = \frac{\beta_1}{S_{PRIM}}, \quad (6.2a)$$

$$r_{(SEC)} = \frac{\beta_2 - \beta_1}{S_{SEC} - S_{PRIM}}, \quad (6.2b)$$

$$r_{(HIGH)} = \frac{\beta_3 - \beta_2}{S_{HIGH} - S_{SEC}}, \quad (6.2c)$$

$\beta_1$, $\beta_2$ and $\beta_3$ are the parameters estimates, while $S_{PRIM}$, $S_{SEC}$ and $S_{HIGH}$ are indications of the total number of years of schooling for each successive level of education: Namely six years for primary education, and seven and four years for secondary and university level respectively[67]. Obviously, it is not true to assume that primary school graduates have foregone earnings for every year of their primary schooling (six years). In the literature, one could find a range of one to four years of forgone earnings for primary school. For example, Psacharopoulos (1994) assumed only one year of forgone earnings for the primary school. However, this study has assumed forgone earnings for primary education is equal to three and half years (see, also Patrinos & Sakellariou, 2004). Then, $S_{PRIM}$ is equal to three and half years ($S_{PRIM}$ = 3.5)[68]. This is similar to the previous studies by Mazumdar (1981) and Chung (2003 & 2004).

[67] This is referring to normal academic years of schooling in Malaysia.

[68] Three years earning forgone is more realistic for developing countries. In rural area, student intends to work at early years of age compared to urban because they have to support their family and many involves in traditional sectors, especially in 1970s and early 1980s. In this study, the earning forgone is 3.5. It is followed Mazumdar (1981) and Chung (2003 & 2004) make a result is comparable with the previous findings.

The traditional Mincer equation has been revised and experimented with in order to derive a robust and precise estimation. Basically, scholars agree that OLS regression on the Mincer equation will under-estimate the private rate of returns to schooling. Most literature and research in developing countries have a tendency to use the one-human capital factor model, i.e. using years of schooling to estimate the private rate of returns. This estimation was restricted to the overall return to schooling. But the true returns, of course were different for the different levels of education, therefore, the multiple treatment model can be used as an alternative. It can separate the impact of schooling on earnings for different levels of education. However, both of the single and multiple models remained under the homogenous returns model. In this study, the term "treatment" (referring to schooling) will also be used to refer to the impact of schooling on the specific levels of education on individuals. In our model so far, the returns are constant across individuals. If we allow for different returns across individuals, the private rate of return to education refers to heterogeneous returns. For example, Blundell, Dearden & Sianesi (2001 & 2004), using the NCDS Birth Cohort data for UK examines the relationship between education and earnings. They highlight two important issues in their paper. The first concerns the measurement of education and second the issues of the homogenous and heterogeneous returns to education.

## 6.3 Homogenous Return Framework

In the one factor human capital model, schooling is treated as a single measurement, let say $(S_i)$. Rewriting equation (6.1), the model become,

$$\ln Y_i = \alpha_i + \beta S_i + \varepsilon_i \qquad (6.3)$$

where $\alpha_i$, represents the differing levels of earnings across individuals for any given level of schooling. $\beta$ is the marginal return to schooling level of $S_i$. While, $\varepsilon_i$ is the error term (to capture error in earnings). $S_i$ is expected to be correlated with $\alpha_i$ positively, and will induce an upward bias in OLS estimation. On the other hand, measurement error of schooling ($S_i$) will offset the upward bias (correlation between $\alpha_i$ and $S_i$) in estimation. Hence, this trade off was the result of bias in estimations in measuring the private rate of returns to schooling. Equation (6.3) is the homogenous return to education (the same $\beta$ for all individuals $i$) in one factor human capital model when using the single measurement for $S_i$, i.e. years of schooling as a continuous variable, $S_i \in \{1,2,.....J\}$.

Now, we might consider the rates of return to each level of schooling in this estimation, then, it will refer to "multiple treatment". The equation (6.2) needs to rearranged, thus;

$$\ln Y_i = m_0(X_1) + \beta_i S_i + \alpha_i + \varepsilon_i \qquad (6.2d)$$

Using this equation we can treat the various levels of schooling or qualifications (in which $S_i = \sum_{j=1}^{J} jS_{ji}$ with $S_{ji} \equiv 1_{(S_i=j)}$), by assuming the linear relationship $\beta_{ji} = \beta_j = j\beta$ and could get the homogenous return to one additional year of schooling. In other words, this is $\beta_{j+1,i} - \beta_{ji} = \beta$ for all $j = 0,1,2,....., j$. It refers to each additional year of schooling with the same marginal return. This explanation is equivalent to the traditional equation in most literature, i.e. equation (6.2a) to (6.2c).

The multiple treatment model uses the natural sequence of binary variables for each level of schooling, where $S_{1i} = 1$ for individuals if he or she completed the first stage or level of schooling (or passed the first of examination and obtained a certain certificate). If they completed the next level or one additional year of schooling, then,

$S_{2i} = 1$. On the other hand, the reference level refers to those who did not complete (no treatment) a certain level of schooling; in which case $S_{0i} = 1$. In our case, those not receiving any treatment (non-treated) are individuals with no formal education. Assuming that $J$ represents levels of schooling or treatments (or qualification obtained), the equation (6.2d) can be simplified as;

$$\ln Y_i = \alpha_i + \beta_1 S_{1i} + \beta_2 S_{2i} + \beta_3 S_{3i} + .....\beta_J S_{Ji} + \varepsilon_i \qquad (6.4)$$

where $S_{1i}, S_{2i}, .....S_{Ji}$ are the levels of treatments. Meanwhile $\beta_1, \beta_2, ....\beta_J$ is the marginal impact of higher levels or additional years of schooling. However, equation (6.4) remains a homogenous returns model but is expanded to the multiple treatment models. But in this case, we relax the one factor human capital model and allow the different level of schooling of impact on earnings.

These models will be used to estimate the private rate of return to schooling in Malaysia. As is commonly used in literature, the method of estimation uses the OLS. Both single treatment and multiple treatments models will apply to the Malaysian data. The result, then, will refer to the homogeneous return to schooling for Malaysia. It also our objective to examine the heterogeneous returns model for Malaysia. The model specification is discussed in the next section.

## 6.4 The Heterogeneous Return Model

The homogenous return model appeared in the early estimation of the private rate of return to education. Recently, there has been interest in estimating heterogeneous returns, for example Imbens & Angrist (1994), Dearden (1999), Card (2001) and others. According to Blundell et al. (2001 and 2004), once returns are allowed across

individuals the effect of schooling is not constant for all individuals. The average return to schooling in the heterogeneous returns model can be estimated in the parameters of various interests. The model can be used to estimate (a) the Average Treatment Effect (ATE) where the $\beta_0$ is the average of population to achieve a certain level of education ($S_{1i}$) or not, (b) the Average Effect of Treatment on Treated (ATT), $\beta_T$ refers to the average for those who were observed ($S_{1i}=1$) and (c) a Local Average Treatment Effect (LATE) – measures the impact of education ($S_{1i}=1$) on those who were affected by the policy changes[69].

The general relationship of levels of education and earnings in the heterogeneous returns model can be expressed by the equation (6.5),

$$\ln Y_i = \alpha_i + \beta_i S_{1i} + \varepsilon_i \qquad (6.5)$$

Equation (6.5) is a single discrete treatment heterogeneous returns model, where $\alpha_i$ and $\beta_i$ represent the heterogeneous relationship between educational qualifications $S_{1i}$ and earnings. $\beta_i$, can be interpreted as heterogeneous returns to schooling level $S_{ji}$ for individual $i$ since it measures the marginal proportional impact of this level of schooling on earnings for individual $i$. In the previous model (equation 6.3 and 6.4) the beta, $\beta$ or $\beta_1$ are constants across individuals[70], but in the single discrete heterogeneous returns model, $\beta_i$ differs over time. In the homogenous return model, the dependence of the schooling level $S_i$ on the unobserved ability component $\alpha_i$ it is difficult to understand the bias from the direct comparison group with or without schooling ($S_i$) in OLS estimation. But, in the heterogeneous model, we allow for "observable heterogeneity" in both $\alpha_i$ and $\beta_i$. If we have some of the observed

[69] For details see Imbens and Angrist (1994), Blundell at el. (2001 & 2004).

[70] However, $\alpha_i$ is allowed to vary across individuals to capture the differential abilities and general level of earnings, across individuals with the same educational levels.

covariates $X_i$ (ability score, demographic variable, etc), the parameters alpha and beta can be made to depend on $X_i$ and then, the levels of $X_i$ and interactions of $X_i$ with schooling variable $S_{1i}$ will place in the regression model. However, it could be done if the data set provided relevant information. Moreover, the heterogeneous model is also important in determining whether or not the schooling choice $S_{1i}$ depends on the unobservable determinants of the individual's marginal returns from schooling of $\beta_i$. If $\beta_i$ is known in the schooling choices, the returns to earnings are reflected in their choice. If $\beta_i$ did not represent all their choices, but, at least part of them.

The multiple treatments model in the heterogeneous returns model can be derived by expanding the multiple treatment model (from the homogenous model) of equation (6.4). The set of *J* treatment are $S_{1i}$, $S_{2i}$, ..... $S_{ji}$. Hence, the model is

$$\ln Y_i = \alpha_i + \beta_{1i} S_i + \beta_{2i} S_i + \beta_{3i} S_i + .....\beta_{ji} S_{ji} + \varepsilon_i \qquad (6.6)$$

## 6.5 Ordinary Least Square and Econometric Problems

Despite the popularity of using OLS on the standard earnings function, its use raises a number of issues regarding the robustness of estimation. Referring to the basic model, equation (6.5),

$$\ln Y_i = \alpha_i + \beta_i S_i + \varepsilon_i \qquad (6.5)$$

and rewriting model (6.5),

$$\ln Y_i = \alpha_0 + \beta_0 S_{1i} + (\alpha_1 - \alpha_0) + (\beta_1 - \beta_0) S_{1i} + \varepsilon_i \qquad (6.7)$$

where $\alpha_0$ and $\beta_0$ are the population means of $\alpha_1$ and $\beta_1$. The main point here is the parameter $\beta_0$ which is a measure of the average return to achieve educational level $S_{1i}$ in the population. For example, $S_{1i} = 1$ refers to a certain level of education (let's say primary education), or those who pursue a high level of education. Combine with unobservable and, we can get:

$$\ln Y_i = \alpha_0 + \beta_0 S_i + \mu_i \tag{6.8}$$

where

$$\mu_i = (\alpha_1 - \alpha_0) + (\beta_1 - \beta_0) S_{1i} + \varepsilon_i \tag{6.8a}$$

OLS regression of log earnings on schooling will produce bias in estimation on $\beta_0$ because of the correlation between $S_{1i}$ and $\mu_i$. The primary sources of bias could have emerged from three sources:

(a) Returns bias – this bias occurs because of the correlation between marginal returns with the schooling choice of $S_{1i}$. It is not very clear, but depends on the average return among sub-population of those with $S_{1i}$.

(b) Ability bias – this occurs due to the correlation between $S_{1i}$ and the $(\alpha_1 - \alpha_0)$ term. A possible correlation will produce an upward bias.

(c) Measurement error bias – this refers to measurement error in schooling variable ($S_{1i}$). This bias tends to over-estimate the rate of returns to schooling.

The secondary bias is absent in the homogenous returns model, especially in the one factor model. The bias in OLS could be reduced if the data set is rich in other control variables. By adding other controls variables it may be possible to capture the ability bias and the omitted factors. However, as suggested in the literature, the

alternative methods are Instrumental Variable, Control Function, and Matching Method.

As mentioned before, in reference to the bias (a) schooling may be endogenous as a result of the individual's optimal schooling choice. As a result, OLS estimates will be biased upward[71]. Secondly, the bias referred at (b) above, the presence of ability bias due to the unobservable factor that is correlated with both schooling and wages, also leads to estimation bias. In the basic specification (6.1), it is assumed that the independent variables are not correlated with the unobserved disturbance in the equation; however, this assumption sometimes could not be satisfied. Hence, estimation based on equation (6.1) or (6.8) by OLS will be biased if the variables such as motivation or ability effects earnings but are omitted from the equation (6.1). Moreover, if ability is believed to be associated with both wages and schooling (Ashenfelter et a, 1999), estimates of the returns to education tend to be biased upward (Grilliches 1977, Card, 1999)[72]. However, most of the cases of omitted ability are biased by not more than 5-15 percent (Shultz 1988).

Many studies agreed that factors such as ability, motivation, parental background (or social status) and health (for example Schultz, 2003a, Cooper et al., 2006 ) will affect earnings but are omitted from the model specification. Furthermore, perhaps it is a more imprecise in estimation when the coefficient is correlated not only on wages but also with schooling. Card (1997) summarized a mass of literature which

[71] For details, see Willis & Rosen (1979).

[72] Griliches (1977, p.4) suggested that the equation which supposed to be estimated is $y = \alpha + \beta S + \gamma A + \mu$, where A is the ability measurement that always being ignored in the estimation. Following the basic econometric procedure, $Eb_{yS} = \beta + \gamma b_{AS} = \beta + \gamma \text{ cov } (AS)/\text{var } S$, which leads to the conclusion that simple least square coefficient of ln $Y$ on $S$ is biased upward (relative to $\beta$). This is based on assumption that, firstly, ($\gamma > 0$) meaning the ability has independent positive effects on earning. Secondly, the relationship between the omitted ability and observed schooling variable is positive ($b_{AS} > 0$). Then, finally, it is also assumed that ability is the only variable that has been dropped and that all other usual least square assumptions hold.

found that the trend in estimation using OLS is inconsistent due to explanatory variables or the error term, which included the unobserved factors that correlated with schooling coefficient. Consequently, the schooling coefficient will be biased in estimation. The major problem in dealing with these omitted variables in determining earnings is the difficulty in getting the appropriate data sets that hold the information on ability, family background or social status together with an individual's education attainment and earnings (Willis, 1986). Moreover, these issues prompt the economist to explore more, and recently tests on IQ have been used as a direct attempt to measure ability. Indeed, some researchers used various types of samples to investigate the effect of ability in schooling, such as twins and siblings.

Finally, a third source of potential bias, i.e. the bias referred to at (c) above, is associated with the measurement error. This bias, associated with schooling measurement, age and experience is misreported in the data. According to Angrist & Krueger (1995), the data of the United States shows that nearly 90 percent of data on schooling is precise. However, it is very difficult to conclude how precise the schooling measure is in the developing countries.

The simple way to deal with this problem is to include the omitted variable in the equation. This means that the ability becomes an explanatory variable in the equation[73]. Nevertheless, it must be taken into consideration that ability itself is also influenced by schooling; hence, using the proxy, this variable will be biased downward (Ashenfelter et al. 1999). But, recently most of the researchers used IV estimation in order to solve the bias, although there is still no consensus about the best approach. Therefore, it is our intention to provide evidence from the Malaysian data

[73] Some researchers attempted by using IQ test as a proxy to measure ability. For example Grilliches and Mason (1972), Grilliches (1977).

that OLS under-estimates the private rate of return to schooling. We will estimate the homogenous returns using OLS and, try to prove that the heterogeneous returns model of IV's is higher than the former.

## 6.6 IV Estimation

IV operates by constructing another variable, which is not correlated with earnings but is correlated with educational attainment. This should lead to a consistent estimate of rate of return. The general endogenous schooling model consists of the two equations below;

$$\ln W_i = X_i'\delta + \beta_1 S_i + u_i \qquad (6.9)$$

where

$$S_i = Z_i'\alpha + v_i \,. \qquad (6.10)$$

In equation (6.9), $\ln W_i$ is determined by a vector of exogenous variables $X_i$ and years of schooling $S_i$. Meanwhile, the $\beta_1$'s coefficient are interpreted as estimates of the private rate of return to education. Estimation of the equation (6.9) by OLS will yield consistent estimates of $\beta_1$ if the $S_i$ is exogenous, so that is there is no correlation between the two error terms. If this condition is not satisfied alternative estimation methods (i.e. IV approach) must be employed since OLS will be biased. The model is a reduced form which provides a variable in vector $Z_i$ that is not contained in $X_i$ (Pons & Gonzalo 2001). That is a vector of exogenous variables which influence schooling that can legitimately be omitted from the earnings equation. Then, replace the schooling in equation (6.9) with the predicted or fitted value for schooling.

The basic idea of IV operates using two steps. First, estimate the effect of the IV variable on schooling and, then estimate the effect of the instrumental variable on earnings. This is based on the assumption that the instrument is correlated with earnings only because it influences schooling, so the ratio of the effect of the instrument on earnings to its effects on schooling will provide an estimate of the causal effect of schooling on earnings (Ashenfelter et al. 1999, p. 455). Many researchers apply IV estimation with different types of policy reforms to estimate returns to education and compare the results with those derived using OLS. For example, Harmon & Walker (1995) used the change in the school leaving-age (SLA) in UK, which first occurred in 1946 from 14 to 15, and then from 15 to 16 in 1973.

The main problem in the IV approach is to identify the instruments. One has to be careful with the validity and quality of the instruments. In order to identify the effect of schooling on earnings, it must focus on providing variables in vector $Z_i$ that are not contained in $X_i$. This requires the identification of some kinds of variables to determine the schooling which can legitimately be omitted from the earnings equation. The variable is provided by the natural experiment (Heckman 1990; Harmon, Oosterback & Walker, 1999 & 2001). The quality of instrument in IV's method can be certified only if it ensures a strong correlation between schooling and the instruments. By contrast, if the relationship between instruments and earnings is weak then the IV estimation will be more biased than that obtained by OLS. Bound et al. (1995) proposed that the F-test on the excluded variables can be performed in order to test the correlation between instruments and the years of schooling. Meanwhile, the chosen instrument is valid when it is orthogonal to the error term of

the wage equation $(E[Z_i, \mu_i] = 0)$. For the validity, the Sagan miss-specification test will be used to identify this matter[74].

As in the economics of education discussion, it is proposed that schooling tends to be endogenous, and it is more precise if one can handle the test of this endogeneity. If schooling were exactly exogenous, OLS estimation would be more precise than the result yield by IV. So, one could implement the Durwin-Wu-Hausman test for endogeneity of schooling which is allowed to reject or accept the null hypothesis that the OLS is consistent (Hausman 1978; Davidson & McKinnon 1993).

Many researchers apply IV estimation with different types of instruments to estimate returns to schooling and compare the results with those derived using OLS. The instruments range from variables associated with individuals, for example ability and parental background, to the non-human factors such as changes in law, location and schooling quality. Pons & Gonzalo (2001) classified determinants of variables in IV estimation by three criteria. First, the family background is used as instrument. Second, the exogenous impact on schooling, which includes the changes in education law, is used. Finally, the other variables correlated with schooling such as season of birth or college proximity are used.

Previous studies using family background as an instrumental variable for schooling were done by Blackburn & Neumark (1993 & 1995) for USA, Uusitalo (1999) for Finland, Levin & Plug (1999) for the Netherlands, Callan & Harmon

[74] Under the null hypothesis of valid instrument, the Sargan test (N times the $R^2$ from the regression of the residuals of the IV estimates of the wage equation on the instruments) is asymptotically distributed as a Chi-squared with degrees of freedom equal to the number of over-identifying restriction (Pons & Gonzalo, 2001).

(1999) for Ireland, Brunello & Maniacci for Italy in 1999, and Pons & Gonzalo (2001) for Spain, and all have shown the promising results.

The second criteria uses the exogenous impact on the education system, and this is the instrument chosen in this study. Then, the results are compared with the standard method. One of the important exogenous impacts on the Malaysian education system is the changing of the medium of instruction from English to the Malaysian language. Hence, this natural experiment, i.e. the school reform has created an opportunity for instrumental choice in IV estimation.

The exogenous impact on the Malaysian education system was the introduction of the Malaysian language as the official medium of instruction. It was started in 1957 as a compulsory subject in primary and secondary schools. Since 1970, it has been compulsory to teach all students in Malaysian language as a medium in Standard 1 in government schools. By the end of 1982, Malaysian language was completely used as the medium of instruction at all levels in school. Under these circumstances, those students born after 1963 automatically used the national language in the learning process. I will exploit this exogenous impact in this study as a dummy variable to explain the rate of return to education. D70, is thus a dummy variable which is equal to 1 for individuals starting schooling in 1970 and thereafter, and otherwise is equal to 0. Given the year of the reform, affected individuals ($D_i = 1$) are taken to be those who were born in 1963 and later. This exogenous variable affected the decision and opportunity to pursue education at higher levels. In this context, IV estimates of the return to schooling using a medium of instruction reform as the instrument, would be interpreted as the average return to education for those who were affected by the policy reform. Borrowing the terminology from the

literature on "treatment effects", $D_i$ (exposure to different education system reform) is independent of individual ability and the reduced form schooling residual, with the assumptions that there is heterogeneity in the returns to schooling and that the IV estimate is the "Local Average Treatment Effect (LATE)" (Imbens & Angrist 1994; Blundell et al. 2001 & 2004).

In the past, studies in developed countries have shown that changes in education law have given a good indicator in estimation, for example Harmon & Walker (1995) in the UK, Viera (1999) in Portugal, Meghir & Palme (1999) in Sweden and Baceinas et al. (2000) in Spain.

### 6.6.1 The Property of IV

The IV is the natural method to turn to in estimating returns. All biases in OLS appeared from the correlation of observable schooling measures with the unobservable schooling in the earnings regression. The IV will estimate consistently if the instrument is correlated with schooling but not correlated with unobservable ability, heterogeneity and measurement error term.

Let's say that our IV's instrument (D70) is $D_i$, and it does satisfy the condition of orthogonallity, which are:

$$IV: A1: E[(\alpha_1 - \alpha_0)|D_i] = 0$$

$$IV: A2: E[(\beta_1 - \beta_0)|D_i] = 0$$

$IV: A3: E[(\varepsilon_i)|D_i] = 0$ and $IV$ correlate to $S_{1i}$ by

$$IV: A4: E[(S_{1i})|D_i] = D_i'\pi$$

where $\pi$ is a finite vector of the unknown reduced form coefficients. Consider the IV estimator in the heterogeneous returns model with the assumptions IV: A1-A4,

$$E[\ln Y_i|D_i]=\alpha_0+\beta_0 D'\pi_i+E[(\beta_i-\beta_0)S_{1i}|D_i] \tag{6.11}$$

The first stage regression, there is nothing in assumptions IV: A1-A4 can be made the first term of (6.11) to disappear. Therefore, it is necessary to add another assumption. However, IV estimation is a consistent estimator of $\beta_i$ in homogenous "one factor model" because $\beta_i$ is constant across $i$ and the final term of (6.11) is zero, by definition.

Basically, the IV estimator was interpreted as Two Stage Least Square (2SLS). The transformed regression model is:

$$D_i \ln Y_i = D_i\alpha_i + \beta_i D_i S_{1i} + D_i\varepsilon_i \tag{6.12}$$

with the weights depending on the sample covariance matrix of $D_i\varepsilon_i$. In case of single instrument the IV estimator reduces to

$$\hat{\beta}_{IV}=\frac{\text{cov}(\ln Y_i, D_i)}{\text{cov}(S_i, D_i)} \tag{6.13}$$

Given all assumptions of IV, the transformation of $D_i$ will eliminate $\alpha_i$ but not the $\beta_i S_{1i}$. Then, estimate the average of $\beta_i$ among those individuals for whom $S_{1i}=1$. This is known as the treatment on the treated parameter $\hat{\beta}_{IV}=\hat{\beta}_T$. A common usage of IV can be found in literature. Firstly, with reference to the "difference in differences" estimator, it will compare the group of individuals with $S_{1i}=1$ to the group with $S_{1i}=0$ before and after the treatments. Secondly, in literature it will be found by using a choice of twin samples[75]. Finally, it shows by examination the rate

[75] See Ashenfelter & Krueger (1994); Altonji & Dunn (1996); Berhman et. al. (1996) and Bonjour et al. (2000).

of returns using exogenous reform. For example school reforms and changes in schooling law. The comparison, normally refers to the outcomes among two groups due to the changes in exogenous factors[76].

### 6.6.2 IV in Heterogeneous "One Factor" Model

Now, consider model (6.5) and assumption IV: A4 which in this case indicates:

$$S_i = D_i'\pi + v_i, \text{ where } E(v_i|D_i) = 0 \tag{6.14}$$

and the estimation of $\pi$ is consistent using OLS on the reduced form of:

$$IV: A5: v_i = \rho_{v\beta}(\beta_i - \beta_0) + \mu_i, \text{ with } E[(\beta_i - \beta_0)^2] = \sigma^2{}_\beta$$

This assumption implies,

$$E[(\beta_i - \beta_0)S_i|D_i] = \rho_{v\beta}\sigma^2{}_\beta,$$

so that equation (6.11);

$$E[\ln Y_i|D_i] = \alpha_0 + \beta_0 D'\pi_i + E[(\beta_i - \beta_0)S_{1i}|D_i] \tag{6.11}$$

becomes,

$$E[\ln Y_i|D_i] = \alpha_0 + \beta_0 D'\pi_i + \rho_{v\beta}\sigma^2{}_\beta$$

$$E[\ln Y_i|D_i] = \alpha_0 + \beta_0 D'\pi_i \tag{6.15}$$

In this case (6.15), IV estimates the average of $\beta_0$ consistently, but not the intercept.

[76] See for example, Angrist and Krueger (1991 & 1992).

### 6.6.3 IV in Heterogeneous Single Treatment Model: Estimating the LATE

This model is our motivation to estimate the private rate of return to education in the heterogeneous returns models. The interpretation of IV in this model was precisely the motivation of the Local Average Treatment Effect (LATE) of Imbens and Angrist in 1994. It was simplified by Blundell, Dearden and Sianesi (2001 & 2004). Let us begin with a single binary instrument $D70_i = \{1,0\}$, which is the school reform (changing medium of instruction in Malaysian education system) and is correlated with schooling level $S_i$ in the population. This event can be defined as:

$$D70_{1i} = \{S_{1i} | D_i = 1\}$$

$$D70_{0i} = \{S_{1i} | D_i = 0\}$$

and assume LATE: A1 for all either $[D_{1i} \geq D_{0i}]$ or $[D_{0i} \leq D_{1i}]$. Then, the instrument has the same directional effect on all whose behaviour it changes. For instance, if $[D_{1i} \geq D_{0i}]$ so that the IV estimator has the very simple form.

$$\hat{\beta}_{IV} = \frac{\text{cov}(\ln Y_i, D_i)}{\text{cov}(S_i, D_i)} \tag{6.16}$$

$$= \frac{E[\ln Y_i \mid D_i = 1] - E(\ln Y_i \mid D_i = 0]}{E[S_i \mid D_i = 1] - E[S_i \mid D_i = 0]} \tag{6.17}$$

if $\alpha_i$, $\beta_i$, and $\varepsilon_i$, independence from $D_i$, the equation (6.17) reduces to

$$\beta_{IV} = \frac{E[\beta_i S_i | D_i = 1] - E[\beta_i S_i | D_i = 0]}{\Pr[D_{1i} > D_{0i}]} \tag{6.18}$$

$$\beta_{IV} = \frac{E[\beta_i \mid D_i] - E(\beta_i D_i]}{\Pr[D_{1i} > D_{0i}]}$$

$$\beta_{IV} = E[\beta_i \mid D_{1i} > D_{0i}] \tag{6.19}$$

Therefore, IV will estimate the average of returns to education among those induced to changes in behaviour under the schooling reforms. We called this effect the LATE of the changing of medium of instruction (D70) in the Malaysian education system. This model is used in my study.

Another purpose of this study is to investigate the incidence of over and under-education. In the next section, I discuss the model of estimation, but we must bear in mind the important criticism of the homogenous return model.

## 6.7 Over-education and Under-education: Estimation Model

One of the purposes of this thesis is to examine over- and under-schooling in the Malaysian labour market. It is a very important issue after 3 decades of the implementation of the various 5 year plans. When education becomes a major tool in successive five years plans with a huge public funding every year, especially for higher education, it will affect supply and demand in the labour market. Demand for skilled and educated workers was increased over time. While the higher education institutions and training centres developed and progressed well in a past few decades, the emerging important issue of the impact of the policies is the mismatch between demand and supply in the labour market. High education unemployment increased over the last 5 years. In 2006, the cumulative unemployment among university graduates was approximately 60,000. It will be expected to reduce by half after the Malaysian Public Service Department (PSD) offered approximately 20,000 jobs. At the same time, the Ministry of Human Resource reported job vacancies in the Malaysian labour market in 2006 at more than 180,000 for all categories.

Unemployment of highly educated individuals are not critical in crucial sectors, for example medicine, law, engineering etc. On the other hand, most of the university leavers who obtained degrees in humanity and social science have competed in the labour market. However, lack of self–confidence, critical thinking and communication skills among graduates become a barrier to entering the globalisation and liberalization in economics. Consequently, these circumstances forced them to compete in the local labour market. In addition, they are prepare to work in a job that needs lower education requirement rather than be unemployed[77]. While education is indicative of the amount of training that might be necessary by the employer, greater education means less training required. Thus, employers tend to hire a person with higher education than required by them (Verdugo & Verdugo 1989, p.630). Thus, workers under utilize their education. In addition, in the Malaysian multicultural society, it also appears that a particular group is more inclined to hire persons in same group (Lee 1980). It is also a trend to hire a person with less than the required education but with similar interest. Under- and over-schooling is not obvious in Public Service Department (PSD) in Malaysia. Under the civil servant scheme, any kind of job have their own specification, educational requirement, and wages. But, a person in the same job specification will receive the same reward except those who were promoted or had more work experience[78]. It is because the required qualification is the main factor in recruiting civil servants.

[77] In Malaysia, there is no social welfare or any subsidies for school and university leavers. No job meanings no money. Therefore, they remain depending on their parents to support themselves until they could find a job. This situation put more pressure for unemployed persons, especially for those from rural areas or poor family background. The best solution is to get a job regardless of how low the payment is, therefore they tend to migrate to urban areas in order to get more opportunities.

[78] Public servant will receive an increment every year. It will depend on the grade and scale of job category. Recently, the scheme is known as *Sistem Saraan Malaysia* (SSM-being in Malay acronym).

An investigation of over-schooling (OS) and under-schooling (US) using HIS data utilizes the equation by Verdugo & Verdugo (1989) with some modification. This model was extensively used, for example by Groot (1993), Cohn & Khan (1995), and Bauer et al. (2002). The full model is

$$LnY_{it} = X_{it}\beta + \alpha E_{it} + \psi(OS)_{it} + \lambda(US)_{it} + \varepsilon_{it} \qquad (6.20)$$

where $LnY_{it}$ is the natural log of monthly earnings of individual $i$ at point of time $t$, and $X$ is a row of vector of independent variables[79]. Following Cohn and Khan (1995) & Sicherman (1991), the coefficients of $\psi$ and $\lambda$ in above functions will explain, "on the average, the wage of workers who report higher (or lower) levels of schooling than required by their job is lower or higher than that of similar worker with the same levels of schooling, who work in the jobs that require the level of schooling they actual have" (1991, p.117). There will be expected, a negative coefficient for $\psi$ and a positive for $\lambda$. Note that it is not a negative or positive rate of return, but the negative coefficients suggest that they received less or more returns than required schooling (RS) in matching jobs.

The definition of over- and under-schooling are by VV is $S^r$ (required schooling) equal to mean $S$ of the worker's education if the worker's schooling ($S$) is within ± one standard deviation of mean $S$ for his/her three digits census occupation code[80] ; Thus,

(a) $OS = 1$ if the worker's education is above of mean $S$ plus one standard deviation of the average for his/her three digits census occupation code, or $OS = 0$, otherwise;

[79] Note that the explanatory variables in this estimation will use the same Mincer's earnings function as in the previous estimation.
[80] Both HIS 2002 and HIS 2004 use the same codes, but HIS 1995 used the 1980 occupation codes.

(b) $US = 1$ if the worker's education is lower of mean $S$ plus one standard deviation of the average for his/her three digits census occupation code, or $OS = 0$, otherwise;

The VV's model was criticised by some researchers, especially the definition of over and under-education. Summaries from the Hartog (2000), Bauer et al. (2002), Sicherman (1991), Cohn & Khan (1995) regarding the issue, to identify and examine the incidence and labour market effects of educational mismatch can be used by four methods. First, the schooling requirement is measured using exogenous definition based on the information or judgement from the evaluation of occupational professional job analysis (JA). This method is known as job analysis. Second, several studies have used the self-assessment by workers to determine the education required by the job (WA). The third method uses the realized matching (RM), or average education (AE). Finally, a modal education or mode value (MD) estimates the level of required education by computing the amount of education that most commonly occurs within an occupational category (Rubb 2003)[81].

In this study, we are going to use the definition used by VV and Rubb (2003) for several reasons. JA is not appropriate due to the absence of job analysis by the professionals. There is no judgement about the required education within occupations in the Malaysian labour market. The closest assessment might be a job specification under Public Service Department, which covers all kinds of occupation, qualification, wages, grade, scheme but is only being used by civil servants. Nevertheless, these is no clear evidence to say that the private sector follows the same scheme. Moreover, HIS data does not provide information for this group. Meanwhile the second

[81] This method is not much different with VV model. Instead of using mean of schooling, this method uses the mode of schooling required within the occupations to define the adequately educated for the same job.

definition, of course, is beyond our control. Thus, the better choice is to use VV's and add the mode values definition by Rubb (2003) as well.

The estimation of returns to education in homogenous and heterogeneous return models, and over and under-education uses the data from households income surveys in Malaysia. The details of this data is explained in the next section and in Appendix 2.

## 6.8 Source of Data

This study uses cross sectional data from the national income survey in Malaysia. In general, the comprehensive household income survey data in this country was prepared and conducted by the Malaysian Government through federal agencies, such as the Department of Statistics, the Economic Planning Unit (EPU) and other ministries including the Ministry of Human Resource. For the purpose of this study, the household income data, known as the Malaysian Household Income Survey (HIS) will be used. The Department of Statistics (DOS) Malaysia was responsible for designing, conducting and processing the HIS every two or three years, since 1974. The main objective of the HIS is to provide data on income for the purpose of policy formulation, mainly to give information on income distribution, poverty and basic amenities. Furthermore, it is also important for the government to monitor the patterns, changes and magnitude of income distribution continuously, after the implementation of several policies, to reduce the incidence of poverty and economic imbalances. Simultaneously, the data will provide information to evaluate and assess certain programs and policies in the past and to prepare for the future. Hence, it

parallels with the concept "growth with equity" as the key thrust of the Malaysian's development policy.

The detail of the information of HIS is explained in the Appendix 2-Household Income Survey (HIS). These are including the method of survey that was conducted by the government and the variables in Household Income Survey. Additionally, this appendix also mentions the process of data application and the limitation of the data usage.

## 6.9 Household Income Survey 1995 (HIS1995)

HIS1995 contains income and socioeconomic information of 37,355 heads of households. 21.49 percent of the observations were dropped from the population. It includes those not in the labour force with ages below 14 and above 64. The pensioners, students, house makers and unpaid workers are also not included. From 29,325 observations, 50.2 percent household heads are the single earner. Meaning that only one person received any income at the time of survey. 32.2 percent of observations were households with two earners; 11.07 percents were households with three earners in every household. Meanwhile, 4.12 and 1.51 percent of households have 4 and 5 earners respectively. The number of households with income recipients between 6 and 16 is less than 1 percent. These observations are the main focus of study based on the circumstances of the data provided by EPU. The number of income recipients was used as the key factor to get the individual incomes and the rest of the socio economics variables which are valid for the human capital model. Thus, our sample from HIS1995 is 14,726 observations or approximately 39.21 percent of the HIS1995 household heads.

## 6.10 Household Income Survey 2002(HIS2002)

HIS2002 covered about 37,763 households in Malaysia. 11.42 percent or 4313 observations from this survey were dropped from the estimation as those not in the labour force. It also includes persons with unearned any income at the time of survey. The sample with extraordinary earnings, i.e. more than MYR50,000 per month is also excluded. For HIS2002, only 5 observations earned equal or more. Students, pensioners, house-wives and unpaid workers were also dropped. This group consists of 3,760 observations from the whole population. Those households with single earner in HIS2002 are 13,326 (46.53 percent) from the figure of 28,637. From this figure, 36.34 percent are two earners in each household. 11.24 and 4.18 percent are the three and four earners respectively. Consequently, only 13,326 or approximately 35.29 percent from the total head of house holds are valid for our models.

## 6.11 Household Income Survey 2004 (HIS2004)

HIS2004 covered information from 36, 481 household heads. Initially, 22.19 percent from the all observation was dropped from the population. It includes those not in the labour force, and then excluded the pensioners, students, house makers and unpaid workers. From the 28,385 observations, 47.53 percent household heads are the single earner. 35.2 percent of observations were households with two earners; 11.24 percent were households with three earners. Meanwhile, 4.03 and 1.31 percent of households have 4 and 5 earners respectively. The number of households with income recipients between 6 and 11 is less than 1 percent. The observations are valid with the human capital model based on the circumstances of the data provided by EPU is 13,492 for

HIS2004. This refer refers to those households with a single earner. From all household heads, our observation is limited to approximately 36.98 percent.

## 6.12 Descriptive Statistics

### 6.12.1 Earnings

The basic of descriptive statistics is provided by Table 6.1 and 6.2. It was an estimate of the sample means of earnings (in current price), education, age, and experience for HIS1995, 2002 and 2004 for the whole sample, by stratum and activities as well. Earnings were then, transformed to log monthly income to fit with the function. This table shows that monthly earnings increased during 1995 from MYR1,471.08 to MYR2,063.76 in 2004. As compared between strata, monthly income for those who had settled in the rural area only increased by 30.85 percent (from MYR1,093.53 to MYR1,474.61) during 1995 to 2004. Meanwhile, the monthly income for urban areas is greater than before by 45.85 percent (MYR1,749.38 to MYR2,551.39) during the same period. This figure shows that the income gap between strata has widened in a decade. Earnings for those employed were 16.67 percent higher than self-employed or employers in 1995. The earnings gap between these two groups, however reduced in 2004. The persons as employees received only 11.18 percent more in 2004. In absolute figures, they earned MYR1,915.20 and MYR2,129.34 (in current price) respectively. Inequality between employees and self-employed decreased during 1995 and 2004. However, the earnings gap between rural and urban areas was more obvious in this observation. Monthly income earnings was transformed to natural log and the figures come out between 7 to 7.58 for all samples from 1995 to 2004, except for the rural and employer observations in 1995 with only 6.76 and 6.82 respectively.

### 6.12.2 Controls Variables

Table 6.1 also provides information of control variables. Basically, mean of schooling, certificate obtained, age and experience were increased during 1995 to 2004. In a decade, mean years of schooling has improved. For a pooled sample, average years of schooling increased by one year. A mean of certificate obtained raised from 1.94 to 2.19 in 2002 and 2.24 in 2004. Age and experience have been increased by two years during this period. On the other hand, comparisons between groups reveal a huge difference in the level of education. The persons in urban areas more likely to be better educated. For example, in 1995, the mean of schooling for urban was 9.16 years but for the rural only 6.91 years. Mean of certificate obtained was different between these two groups by almost 2 points. Furthermore, rural residential obtained no more than lower secondary (mean of certificate is 1.32 in 1995) but the urban residential obtained lower secondary, with at least a mean certificate of 2.24. In fact, the average of certificate obtained by urban head of households in 1995 (2.24) was equal to the pooled or all samples in 2004. Indeed, the mean of schooling for the urban samples in 1995 (9.16) was more than rural samples in 2004 (7.4) or overall sample in 2004 (9.04). The gap of the mean of educational attainment between rural and urban samples is very noticeable. The mean of schooling in 2004 (7.84) for rural samples doesn't reach the mean figure of urban for year 1995 (9.16).

The next column reveals the mean of schooling and certificate obtained for those who participated as employer and employee. In 1995, years of schooling for self-employed and employer was 6.16 years and 9.15 years respectively. It differed by 2.99 years. The figures were increased to 7.30 years for self-employed and 9.81 years

for paid workers respectively in 2004. The mean difference between these two groups in 2004 decreased to almost half a year. The mean of certificated also shows the same trend during this period of time. The educated workers are likely to work as employees and received a salary rather than be self-employed.

Age and experience for the overall sample have been increased by one year in a decade. The mean of age for the pooled sample in 1995 was 38.53, which increased to 40.27 and 40.93 in 2002 and 2004 accordingly. The mean of experience also increased by one year, from 23.33 years in 1995 to 24.89 years in 2004. The mean of age for the urban sample is 37.20 years, and 40.17 years for the rural. In 2004, the mean of age sample for the urban was 43.46 (increased by 3 years) and 40.17 for the rural sample (increased almost 2 years). However, the mean of experience for both samples was raised about 2 years. For the urban sample, the mean of experience was 21.12 years in 1995, and increased to 22.20 and 22.44 years in 2002 and 2004 respectively. In the meantime, the mean of experience of the rural sample was about 27 years. Obviously, the samples indicated that the rural area was older than the urban by about 2 years. However, the age difference within groups was obvious for self-employed and employees. For HIS1995, the mean of age for employees was 7 years less than self-employed (43.46 years for self-employed and 36.21 for employee). The same trend was found for HIS2002 and HIS2004. In terms of experience, the mean for self-employed in 1995 was 30.30 years but only 20.06 years for employees. These figures were raised to 31.24 and 22.09 in 2004 for self-employed and employee, respectively. Interestingly, the samples have shown an enormous difference between the means of age and experience between self-employed and employee, where employees were younger than self-employed. Moreover, the mean of experience for

self-employed was10 years greater than for employees not only for HIS1995, but it also for in HIS2002 and HIS2004.

### 6.12.3 Gender

The distribution of males and females in the sample are unequal as shown in the data. Data released by EPU are restricted to the head of household only. Therefore, married women do not fall into these categories because the husband would be listed as the head of household. In HIS1995, females as head of household covered only 8.89 percent of the overall observations. Samples for females in HIS2002 and HIS2004 covered about 11.00 and 11.44 percent respectively. The rest of the heads of household are males at around 90 percent of the samples. Female heads of household in urban areas were greater than in rural areas for all HIS, by about 2 percent. However, female heads of household as paid workers were between 1 to 2 percent higher than those who appeared as self-employed for all surveys.

## Table 6.1: Descriptive Statistics, HIS 1995-2004

| | Pooled | | | Urban | | | Rural | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | 1995 | 2002 | 2004 | 1995 | 2002 | 2004 | 1995 | 2002 | 2004 |
| ***Earnings (mean)*** | | | | | | | | | |
| Monthly earnings | 1471.08 | 1974.34 | 2063.76 | 1749.38 | 2290.73 | 2551.39 | 1093.53 | 1486.88 | 1474.61 |
| Log monthly earnings | 7.01 | 7.32 | 7.36 | 7.19 | 7.48 | 7.58 | 6.76 | 7.08 | 7.10 |
| ***Control measures (mean)*** | | | | | | | | | |
| Schooling | 8.20 | 9.03 | 9.04 | 9.16 | 9.85 | 10.03 | 6.91 | 7.78 | 7.84 |
| Certificate | 1.94 | 2.19 | 2.24 | 2.24 | 2.45 | 2.56 | 1.32 | 1.78 | 1.85 |
| Age | 38.53 | 40.27 | 40.93 | 37.20 | 39.05 | 39.48 | 40.17 | 42.14 | 42.68 |
| Experience | 23.33 | 24.23 | 24.89 | 21.12 | 22.20 | 22.44 | 26.26 | 27.36 | 27.84 |
| ***Gender (%)*** | | | | | | | | | |
| Male | 91.11 | 89 | 88.56 | 90.18 | 87.75 | 87.6 | 92.35 | 90.92 | 89.71 |
| Female | 8.89 | 11 | 11.44 | 9.82 | 12.25 | 12.4 | 7.65 | 9.08 | 10.29 |
| ***Region (%)*** | | | | | | | | | |
| Peninsular | 79.44 | 82.34 | 78.22 | 81.28 | 83.8 | 79.14 | 77.01 | 80.1 | 77.1 |
| Sabah & Labuan | 10.08 | 8.97 | 13.06 | 8.26 | 7.9 | 11 | 12.50 | 10.62 | 15.37 |
| Sarawak | 10.47 | 8.69 | 8.72 | 10.45 | 8.3 | 9.71 | 10.49 | 9.29 | 7.53 |
| ***Zone (%)*** | | | | | | | | | |
| South | 17.86 | 18.73 | 16.78 | 18.05 | 18.04 | 18.82 | 17.60 | 19.79 | 14.32 |
| Central (Klang Valley) | 18.12 | 19.86 | 17.6 | 23.15 | 23.3 | 23.18 | 11.44 | 14.55 | 10.87 |
| East | 18.25 | 18.57 | 19.86 | 17.42 | 19 | 14.94 | 19.34 | 18.49 | 25.79 |
| North | 25.22 | 25.18 | 23.98 | 22.66 | 23.83 | 22.2 | 28.62 | 27.26 | 26.12 |
| Sabah & Sarawak | 20.56 | 17.66 | 21.78 | 18.72 | 16 | 20.86 | 22.99 | 19.9 | 22.9 |
| ***Stratum (%)*** | | | | | | | | | |
| Urban | 57.03 | 60.64 | 54.71 | - | - | - | - | - | - |
| Rural | 42.97 | 39.36 | 45.29 | - | - | - | - | - | - |
| ***Activity (%)*** | | | | | | | | | |
| Self-employed /Employer | 31.96 | 29.73 | 30.63 | 22.15 | 22.27 | 20.82 | 44.97 | 41.22 | 42.47 |
| Employees | 68.04 | 70.27 | 69.37 | 77.85 | 77.73 | 79.18 | 55.03 | 58.78 | 57.53 |
| ***Marital status (%)*** | | | | | | | | | |
| Single | 8.89 | 13.54 | 13.16 | 9.82 | 17.75 | 18.38 | 7.65 | 7.05 | 6.84 |
| Married | 91.11 | 80.51 | 79.85 | 90.18 | 76.89 | 76 | 92.35 | 86.08 | 84.52 |
| Widow | - | 3.65 | 4.71 | 0.00 | 2.83 | 3.31 | 0.00 | 4.9 | 6.42 |
| Divorced | - | 2.3 | 2.28 | 0.00 | 2.52 | 2.32 | 0.00 | 1.96 | 2.23 |
| ***Education attainment (%)*** | | | | | | | | | |
| No education | 7.23 | 3.97 | 5.27 | 3.60 | 1.98 | 2.32 | 12.04 | 7.04 | 8.84 |
| Primary One | 0.69 | 0.48 | 0.32 | 0.54 | 0.3 | 0.19 | 0.88 | 0.76 | 0.47 |
| Primary Two, Three | 4.37 | 3.13 | 3.25 | 2.67 | 2.07 | 1.96 | 6.64 | 4.77 | 4.8 |
| Primary Four, Five | 4.9 | 3.52 | 3.06 | 3.14 | 2.43 | 2.06 | 7.24 | 5.2 | 4.27 |
| Primary Six | 22.1 | 19.07 | 17.75 | 18.29 | 14.22 | 12.42 | 27.16 | 26.54 | 24.19 |
| Form One, Two | 4.19 | 3.93 | 3.78 | 4.47 | 4.15 | 3.56 | 3.82 | 3.6 | 4.04 |
| Form Three | 18.76 | 19.73 | 18.95 | 19.55 | 19.74 | 19.47 | 17.70 | 19.71 | 18.33 |
| Form Four | 1.02 | 1.19 | 1.03 | 1.10 | 1.37 | 1.12 | 0.92 | 0.92 | 0.92 |
| Form Five | 26.14 | 31.75 | 32.6 | 32.88 | 36.37 | 37.98 | 17.21 | 24.63 | 26.1 |
| Lower Six | 0.18 | 0.17 | 0.16 | 0.21 | 0.25 | 0.14 | 0.13 | 0.04 | 0.18 |
| Upper Six | 3.36 | 2.87 | 2.76 | 4.32 | 3.42 | 3.43 | 2.09 | 2.02 | 1.96 |
| College | 3.57 | 5.15 | 6.16 | 4.27 | 6.45 | 7.88 | 2.62 | 3.15 | 4.08 |
| University | 3.5 | 5.04 | 4.91 | 4.97 | 7.26 | 7.46 | 1.55 | 1.62 | 1.82 |
| ***Certificate obtained (%)*** | | | | | | | | | |
| No formal education | 7.23 | 3.97 | 5.27 | 3.6 | 1.98 | 2.32 | 12.04 | 7.04 | 8.84 |
| No certificate | 42.98 | 35.15 | 30 | 35.58 | 27.84 | 21.99 | 52.8 | 46.41 | 39.98 |
| Lower secondary | 15.71 | 17.03 | 19 | 17.06 | 17.47 | 19.15 | 13.92 | 16.36 | 17.84 |
| Upper Secondary | 23.87 | 30.85 | 32 | 30.47 | 35.63 | 37.63 | 15.11 | 23.49 | 25.34 |
| Pre University | 3.15 | 7.95 | 9 | 4.05 | 9.81 | 11.45 | 1.96 | 5.09 | 6.19 |
| Higher Education | 7.06 | 5.04 | 4.91 | 9.24 | 7.26 | 7.46 | 4.17 | 1.62 | 1.82 |
| ***Sample size*** | ***14,726*** | ***13,326*** | ***13,492*** | ***8,398*** | ***8,080*** | ***7,382*** | ***6,328*** | ***5,245*** | ***6,110*** |

*Source: Calculated by author from HIS1995 to HIS2004.*

## Table 6.2: Descriptive Statistics, HIS 1995-2004 (..continued)

| | Pooled | | | Self-employed/Employer | | | Employees | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | 1995 | 2002 | 2004 | 1995 | 2002 | 2004 | 1995 | 2002 | 2004 |
| ***Earnings (mean)*** | | | | | | | | | |
| Monthly earnings | 1471.08 | 1974.34 | 2063.76 | 1318.04 | 1750.00 | 1915.20 | 1537.76 | 2069.26 | 2129.34 |
| Log monthly earnings | 7.01 | 7.32 | 7.36 | 6.82 | 7.13 | 7.20 | 7.10 | 7.40 | 7.44 |
| *Control measures (mean)* | | | | | | | | | |
| Schooling | 8.20 | 9.03 | 9.04 | 6.16 | 7.29 | 7.30 | 9.15 | 9.78 | 9.81 |
| Certificate | 1.94 | 2.19 | 2.24 | 1.32 | 1.62 | 1.68 | 2.23 | 2.43 | 2.49 |
| Age | 38.53 | 40.27 | 40.93 | 43.46 | 45.42 | 45.54 | 36.21 | 38.09 | 38.89 |
| Experience | 23.33 | 24.23 | 24.89 | 30.30 | 31.13 | 31.24 | 20.06 | 21.31 | 22.09 |
| *Gender (%)* | | | | | | | | | |
| Male | 91.11 | 89 | 88.56 | 91.18 | 90.38 | 89.5 | 91.08 | 88.41 | 88.14 |
| Female | 8.89 | 11 | 11.44 | 8.82 | 9.62 | 10.5 | 9 | 11.59 | 11.86 |
| *Region* | | | | | | | | | |
| (%)Peninsular | 79.44 | 82.34 | 78.22 | 77.00 | 81.2 | 75.8 | 80.37 | 82.83 | 79.28 |
| Sabah & Labuan | 10.08 | 8.97 | 13.06 | 11.58 | 9.84 | 14.79 | 9.38 | 8.6 | 12.3 |
| Sarawak | 10.47 | 8.69 | 8.72 | 10.94 | 9 | 9.41 | 10 | 8.58 | 8.42 |
| *Zone (%)* | | | | | | | | | |
| South | 17.86 | 18.73 | 16.78 | 17.81 | 17 | 12 | 17.88 | 20 | 18.73 |
| Central (Klang Valley) | 18.12 | 19.86 | 17.6 | 10.18 | 14.59 | 12.66 | 21.85 | 22.08 | 19.79 |
| East | 18.25 | 18.57 | 19.86 | 23.01 | 21.86 | 25 | 16.01 | 17 | 17.63 |
| North | 25.22 | 25.18 | 23.98 | 26.48 | 28 | 25.87 | 24.63 | 24 | 23.14 |
| Sabah & Sarawak | 20.56 | 17.66 | 21.78 | 22.52 | 18.8 | 24.2 | 19.63 | 17.17 | 20.72 |
| *Stratum (%)* | | | | | | | | | |
| Urban | 57.03 | 60.64 | 54.71 | 39.52 | 45.43 | 37.2 | 65.25 | 67.08 | 62.45 |
| Rural | 42.97 | 39.36 | 45.29 | 60.48 | 54.57 | 62.8 | 34.75 | 32.92 | 37.55 |
| *Activity (%)* | | | | | | | | | |
| Self-employed /Employer | 31.96 | 29.73 | 30.63 | - | - | - | - | - | - |
| Employees | 68.04 | 70.27 | 69.37 | - | - | - | - | - | - |
| *Marital status (%)* | | | | | | | | | |
| Single | 8.89 | 13.54 | 13.16 | 91.18 | 4.24 | 4.55 | 91.08 | 17.47 | 16.96 |
| Married | 91.11 | 80.51 | 79.85 | 8.82 | 88.11 | 85.84 | 8.92 | 77.29 | 77.21 |
| Widow | - | 3.65 | 4.71 | na | 5.5 | 7.33 | na | 2.86 | 3.56 |
| Divorced | - | 2.3 | 2.28 | na | 2.15 | 2.27 | na | 2.37 | 2.28 |
| *Education attainment (%)* | | | | | | | | | |
| No education | 7.23 | 3.97 | 5.27 | 15.17 | 8.13 | 10.7 | 3.49 | 2.21 | 2.87 |
| Primary One | 0.69 | 0.48 | 0.32 | 1.17 | 0.86 | 0.51 | 0 | 0.32 | 0.24 |
| Primary Two, Three | 4.37 | 3.13 | 3.25 | 8.03 | 5.43 | 5.88 | 3 | 2.16 | 2.08 |
| Primary Four, Five | 4.9 | 3.52 | 3.06 | 8.58 | 6.81 | 5.11 | 3 | 2.13 | 2.16 |
| Primary Six | 22.1 | 19.07 | 17.75 | 29.47 | 28.45 | 25.82 | 18.64 | 15.1 | 14.19 |
| Form One, Two | 4.19 | 3.93 | 3.78 | 5 | 5.05 | 4.45 | 4 | 3.46 | 3.48 |
| Form Three | 18.76 | 19.73 | 18.95 | 15.11 | 18.98 | 19.29 | 20 | 20.05 | 18.8 |
| Form Four | 1.02 | 1.19 | 1.03 | 1.13 | 1.09 | 0.92 | 0.97 | 1.24 | 1.08 |
| Form Five | 26.14 | 31.75 | 32.6 | 13 | 20.32 | 21.59 | 32 | 36.59 | 37.47 |
| Lower Six | 0.18 | 0.17 | 0.16 | 0.15 | 0.1 | 0.27 | 0.19 | 0.19 | 0.11 |
| Upper Six | 3.36 | 2.87 | 2.76 | 1.47 | 1.84 | 1.86 | 4.25 | 3.3 | 3.16 |
| College | 3.57 | 5.15 | 6.16 | 0.83 | 1.67 | 1.72 | 5 | 6.62 | 8.12 |
| University | 3.5 | 5.04 | 4.91 | 1 | 1.29 | 1.89 | 4.49 | 6.63 | 6.24 |
| *Certificate obtained (%)* | | | | | | | | | |
| No formal education | 7.23 | 3.97 | 5.27 | 15.17 | 8.13 | 10.7 | 3.49 | 2.21 | 3 |
| No certificate | 42.98 | 35.15 | 30 | 58.41 | 52.32 | 44.31 | 35.73 | 27.88 | 23.88 |
| Lower secondary | 15.71 | 17.03 | 19 | 11.52 | 15.42 | 18.32 | 17.68 | 17.72 | 19 |
| Upper Secondary | 23.87 | 30.85 | 32 | 11.35 | 19.38 | 21 | 29.75 | 35.7 | 36.91 |
| Pre University | 3.15 | 7.95 | 9 | 1.34 | 3.46 | 3.7 | 4 | 9.86 | 11 |
| Higher Education | 7.06 | 5.04 | 4.91 | 2.21 | 1.29 | 1.89 | 9.34 | 6.63 | 6.24 |
| ***Sample size*** | ***14,726*** | ***13,326*** | ***13,492*** | ***4,706*** | ***3,962*** | ***4,132*** | ***10,020*** | ***9,364*** | ***9,360*** |

*Source: Calculated by author from HIS95 to HIS2004.*

### 6.12.4 Region and Zone

Region in HIS consists of Peninsular Malaysia, Sabah and Labuan, and Sarawak. The distribution of regions in the HIS is dissimilar because of the Peninsular Malaysia consists of 11 states. Therefore, in this thesis, we generated new variables by Zone and State. The samples for Peninsular Malaysia in HIS1995 to HIS2004 are between 78 to 82 percent. On the other hand, the regions of Sabah and Sarawak were 10 and 9 percent respectively for HIS1995 and HIS2002. But, in HIS2004, the sample for Sabah was 13.06 percent as compared to Sarawak which was only 8.72 percent. Table 6.6 also reveals the percentage distribution according to stratum, employers and employees. In order to make the data more comparable, the observations were also applied to Zone and State. The data distribution between Zones is more equal, for instance, HIS1995 shows samples for South, Klang Valley and East are about 18 percent. Meanwhile, the percentage of samples from Sabah & Sarawak was 20.56 percent and more for North (25.22). For the HIS2002 and 2004, the percentage of sample by Zone is not much different, between 18 and 24 percent.

## 6.13 Conclusion

In this chapter, I discussed Mincerian earnings function to estimate the private rate of returns to schooling. This function will estimate the homogenous return. I apply OLS on equation 6.1 for the overall returns. And then, the extended equation 6.2 to 6.4 will be used to estimate the discrete return to schooling for each level of schooling and qualification obtained. However, I believed that our estimation also might be subjected to several biases either due to endogeneity in schooling, omitted variable or measurement error. Therefore, I will further examine the returns by using the IV

estimation when allowing the return varies across individuals. In our model, the LATE is most preferable with the exogenous impact of schooling reforms in the Malaysian education system. In particular, equation 6.9 to 6.13 is our approach to estimate the heterogeneous returns to schooling. The third section explained the method used to investigate emerging of over- and under-schooling, which is the equation 6.20. I will estimate the return to over- and under schooling by using standard OLS. It was followed by the descriptive statistics. The main result of this study, then, will be described and discussed in the next chapter.

The feature of the HIS, including how it has been designed, collected and analysed are discussed detail in the Appendix 2. This appendix also explains the earnings and schooling variables that will be used in our study. The limitation of the study was also highlighted. The next chapter will discuss the results of this study.

# CHAPTER 7 - EMPIRICAL RESULTS

## 7.1 Introduction

This chapter will explain the empirical results from this study. The first section is an estimate of the private rate of return to education by using standard earnings function on national survey data at three points of time spanning almost one decade. The results of OLS for HIS1995, HIS2002 and HIS2004 were obtained by controlling gender, stratum, activity and region as reported in this section. Then, it is followed by the presentation of a schooling and earnings differential among groups. In this section, it also describes the marginal gross returns by levels of education. The second section will give details of the result of the rates of return to education using IV. The third section discusses the incidence of over- and under-education. The fourth section presents the cost of education. And finally will come the conclusion of this chapter.

## 7.2 The Homogenous Return Model

In this section, I will start with the explanation of the average return to schooling. In this case, the results were derived from the estimation using equation 6.1 in Chapter 6. It estimated the return when using the years of schooling as a continuous variable. It is followed by wage differentials between groups and then, the results of estimation for the returns of difference levels of schooling, where schooling variable was treated as the dummies of qualifications and years of schooling accordingly. It used OLS approach on equations 6.2 to 6.2(c) in the previous chapter. The omitted dummy or reference variable was "no formal education" for both dummies of schooling. Additionally, the explanatory variables were the same for all estimations. Since it was

the homogenous return framework, the returns to schooling in the homogenous return model are constant across individuals.

### 7.2.1 The Homogenous Return Model: An average Return

The first empirical results were derived from the estimation using equation 6.1 in Chapter 6. It estimated the Mincerian earnings equations where the natural log of monthly earnings received by an individual is a function of potential experience and its square and education of individuals (years of schooling). While the control variables use dummies for gender, marital status, household heads' activities and location (settlement type and zone of residence). Since that is the homogenous return model, the method of estimation used is the OLS. In comparison with other estimates is based OLS on homogenous return model.

However, it might worth highlighting two important issues in this homogenous returns result that may lead to bias in estimation in addition to what was discussed in Chapter 6. Firstly, our dependant variable is log monthly earnings which contain the "other earned income" in the original earnings of the HIS survey (see Appendix 2). This may induce a bias in estimation, possibility upward. Apparently, there is no further information that can be used to isolate the effect of the "other earned income" and also, there is no hours work variable to use as the dependant variable. Secondly, the data sets are consisting of the heads of household information. Therefore, some who were in paid employment, especially women, are under represented in the sample because they are not in the sample as they are not heads of households.

Table 7.1 provides evidence that the average private rate of return from another year of schooling in Malaysia is relatively stable over time. The average private rate of

return to schooling for an additional year of schooling was 10.59 percent in year 1995, 10.51 in 2002 and 10.04 percent in 2004.

**Table 7.1: Private Rate of Return to Education, Age 15-64 (1995-2004)**

| Variables | Year | | |
|---|---|---|---|
| | 1995 | 2002 | 2004 |
| Schooling | .1059*** | .1051*** | .1004*** |
| | (.0018) | (.0018) | (.0018) |
| Exp | .0484*** | .0381*** | .0292*** |
| | (.0015) | (.0016) | (.0016) |
| Exp2 | -.0006*** | -.0004*** | -.0002*** |
| | (.0000) | (.0000) | (.0000) |
| Female | -.2181*** | -.1037*** | -.0859*** |
| | (.0171) | (.0178) | (.0180) |
| Single | - | .1140*** | .1513*** |
| | | (.0165) | (.0172) |
| Widow | - | -.0794** | -.0074 |
| | | (.0311) | (.0291) |
| Divorced | - | -.0825** | -.0400 |
| | | (.0357) | (.0369) |
| Employee | .0134 | .0753*** | .0179 |
| | (.0121) | (.0126) | (.0125) |
| Rural | -.2475*** | -.2392*** | -.2994*** |
| | (.0097) | (.0099) | (.0101) |
| Klang Valley | .1206*** | .1305*** | .0939*** |
| | (.0157) | (.0149) | (.0157) |
| East | -.3356*** | -.3027*** | -.2563*** |
| | (.0151) | (.0148) | (.0152) |
| North | -.2163*** | -.2018*** | -.1886*** |
| | (.0134) | (.0139) | (.0143) |
| Sabah & Sarawak | -.0417*** | -.0896*** | -.1552*** |
| | (.0144) | (.0154) | (.0152) |
| Constant | 5.6496*** | 5.8372*** | 6.0672*** |
| | (.0318) | (.0319) | (.0329) |
| R-squared | 0.3936 | 0.3937 | 0.3893 |
| F | 804.39 | 618.39 | 570.26 |
| Observations | 14,726 | 13,324 | 13,492 |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.

As discussed in Chapter 6, the OLS estimation of returns to education may be subject to bias from the omitted variables, measurement error or returns of the sub-population. Alternatively, the IV approach is used and the results will be described in the next section.

The average returns to education slightly declined from year 1995 to 2004. In order to examine the declining trend of returns, the three surveys were merged.

Applying the regression by including the interaction of year and schooling, the result reveals that the declining returns are significant between year 1995 and 2004. This results is shown in Table 3A in Appendix 3.

One additional year of experience increased earnings by 5 percent in 1995, 4 percent in 2002 and 3 percent in 2004. With the exception of the dummy for "Employee", all parameters are significant at 0.05 levels or better in all years. Most of the coefficients are significant at 0.001. On the other hand, parameters for widows and divorced did not appear in Table 7.1 for year 1995 because they were treated as single persons in this survey. The coefficient for a single person was automatically dropped from the estimation (for year 1995) due to the multicolinearity of the female sample[82].

The results show the Malaysian HIS data are consistent with the basic human capital model. The result of OLS on earnings function by controlling gender, marital status, activity and area of residence is in line with the basic theory. Schooling and experience are positively correlated with earnings but experience squared is negatively correlated.

The average return to schooling based on a homogenous return model for Malaysia is consistent with the average return for middle-income countries, which is 10.7 percent (Psacharopoulos & Patrinos 2002)[83] and slightly higher than the Asian average. The private rate of returns for Asia as a whole in 2004 was 9.9 percent (Psacharopoulos & Patrinos 2004). Nevertheless, it is low compared to the Asian Tigers. For example, Singapore with an average return of 13.4 percent in year 1974 (Psacharopoulos, 1994) and 13.1 percent in 1998 (Sakellariou, 2003); the Republic of

[82] In the HIS1995, data given by EPU was restricted to household heads. Consequently, the separate data for married women did not appeared because they are not considered as household heads. Therefore, in gender cases, all females' observations are single.
[83] Table 3, page 14, Psacharopoulos & Patrinos (2002).

Korea from 12 to 13.5 percent between 1974 and 1986 (Ryoo et al. 1993). But, in Thailand which is similar in terms of economic development the private return almost equals that of the other two countries. For example, an average return in Thailand (Hawley 2004) was estimated at between 10.3 and 10.7 percent from 1985 to 1998[84]. Both Malaysia and Thailand enjoyed considerably higher returns compared to the rest of Southeast Asia and other developing countries. In Vietnam, for example, average returns from education for an additional year of schooling was 4.8 percent for the overall sample, 3.4 and 6.8 percent for males and females, respectively (Moock, Patrinos & Venkatamaran 2003). Whereas, Indonesian young people benefited slightly more than Vietnamese from an additional year at 7.0 percent in 1995 (Duflo 2001).

Previous estimates for Malaysia in 1979 (as reported by Psacharopoulos 1994) was 9.4 percent. Meanwhile, average returns for secondary education and higher education were 32.6 and 34.5 percent, respectively[85]. This result is suspect because of such a large swing over a short period of time. He reported the mean year of schooling as 15.8[86]. Then, Psacharopoulos and Patrinos (2002 & 2004) reported again with different figures, in which the returns in 1979 were 5.3 and 8.2 percent for men and women, respectively. These figures were inconsistent, especially for average years of schooling. In fact, the richest and most developed states in Malaysia (Selangor and FT Kuala Lumpur) only had an average of 13 years of schooling in 2004. When I examined the original study I found that it was not representative. The nature of the sample only covered from the tracer study conducted by The Mara Institute of

[84] Hawley (2004) used national Labour Force Survey in Thailand. He estimated males and females separately. The return for men was 10.3 for both 1995 and 1998. While the private rates of return to women were 10.3 and 10.7 for the same year.

[85] The results for average returns to secondary schooling and higher education are derived by using the full method estimation.

[86] See Appendix, Table A2, page 20 for year 2002 and Table A3 for the latest report by Psacharopoulos & Patrinos (2004).

Technology (ITM) and Economic Planning Unit, which consists of 605 observations of their ex-students. The average age is only 27 years old, and then, the mean years of schooling was true as reported above because the samples were graduated from higher institution. This estimation, actually, was conducted by Chapman & Harding (1985).

Furthermore, other related studies in Malaysia reported the returns for each level of schooling rather than the average returns for an additional year of schooling. For example, Hoerr (1976), Lee (1980), Mazumdar (1981), Gallup (1999), and Chung (2003 & 2004) reported with regard to the level of education. They did not present the overall rate of returns, thus, it is very difficult to look at the trend of previous returns. Rupert (1998) using the household data set found that the rate of return to schooling education was only 2 percent. However, her studies do not use individual earnings but total labour income as a dependent variable. As well as basic human capital, she put types of occupation in the models. Most of the coefficients were statistically significant, but the rate of return was very low for a developing country, probably due to the multicolinearity[87]. Occupation is slightly related to education.

There has been a slight decline in observation from 1995 to 2004. This was maybe a statistical artefact but it might also reflect a change in the supply of skilled workers in Malaysia. The negative relationship between the supply of human capital (as mentioned in Chapter 5 and 6) and its returns was found in other countries. Teulings et al. (2002) and Martins & Pereira (2004), for example, provided empirical evidence in support of this relationship. In Malaysia, the progress and development in human capital after three decades of New Economic Policy have produced a great impact on the supply of educated and skilled workers in the labour market. Enrolment for

[87] Her main objective is to analyse the policies used to manage the foreign labour in Malaysia and Singapore, not the private of returns to education.

certificates and diplomas increased from 10,150 persons in 1990 to 88,848 in 2005. Meanwhile, enrolment at degree levels increased significantly from 52,810 in 1990 to approximately 244,527 persons in 2005. During the 8MP, output at degree level was about 292,378 persons, as shown by Table 3.2, 3.3 and 3.4 in Chapter 3. Although the demand for educated skilled workers remains high in the Malaysian labour market, the mismatch between demand and supply contributed to the emergence of higher educated unemployed, recently.

Psacharopoulos & Patrinos (2002) have proposed the evidence that world average returns decreased by 1 percent in a decade. Then, they suggested new evidence after adding six new observations and updates for 23 countries; which suggested the average rate of return to another year of schooling (for 98 countries) is 10 percent. However, the average returns to schooling declined by 0.6 percentage point after 12 years (Psacharopoulos & Patrinos 2004). It is consistent with our finding that the decline in the private rate of return to schooling was 0.55 percent. Trostel, Walker & Woolley (2002) estimates using comparable data in 28 countries. They found no evidence of rising rates of return to education from 1985 through 1995. In fact, the trend was down slightly, over this period. This pattern was also found by Fersterer and Winter-Ebmer (2004) in Austria for the period 1981-1997. Using cross-section data they found the falling returns to education consistent with a rise in the supply of educated workers in the Austrian labour market.

On the other hand, Harmon, Walker & Westergaad-Nelson (2001) examined the pattern of rate of returns to schooling across Europe from 1980 to 1998 and found mixed results. From 15 countries, they found that only France had experienced a steady return over time. Denmark, Greece, Italy, Norway, Portugal, Spain and UK recorded

increasing returns from 0.2 to 2.0 percentage points. Meanwhile, countries like Austria, Finland, Germany, Ireland, Netherlands, Sweden and Switzerland showed a declining return between of 0.6 and 1.6 percentage points.

To summarize, most countries across the world have shown a downward trend in the returns to education over time. Exceptionally, for a few countries, with slightly increased returns (especially in Europe) one could suggest that returns might be increased in line with increasing years of schooling and earnings. In Malaysia, the private rate of return to schooling, our evidence suggested decreasing returns. It was partly explained by an increase in educated and skilled workers. In fact, in ten years the mean of schooling was increased by almost one year in this observations.

### 7.2.2 Schooling and Earnings Differential

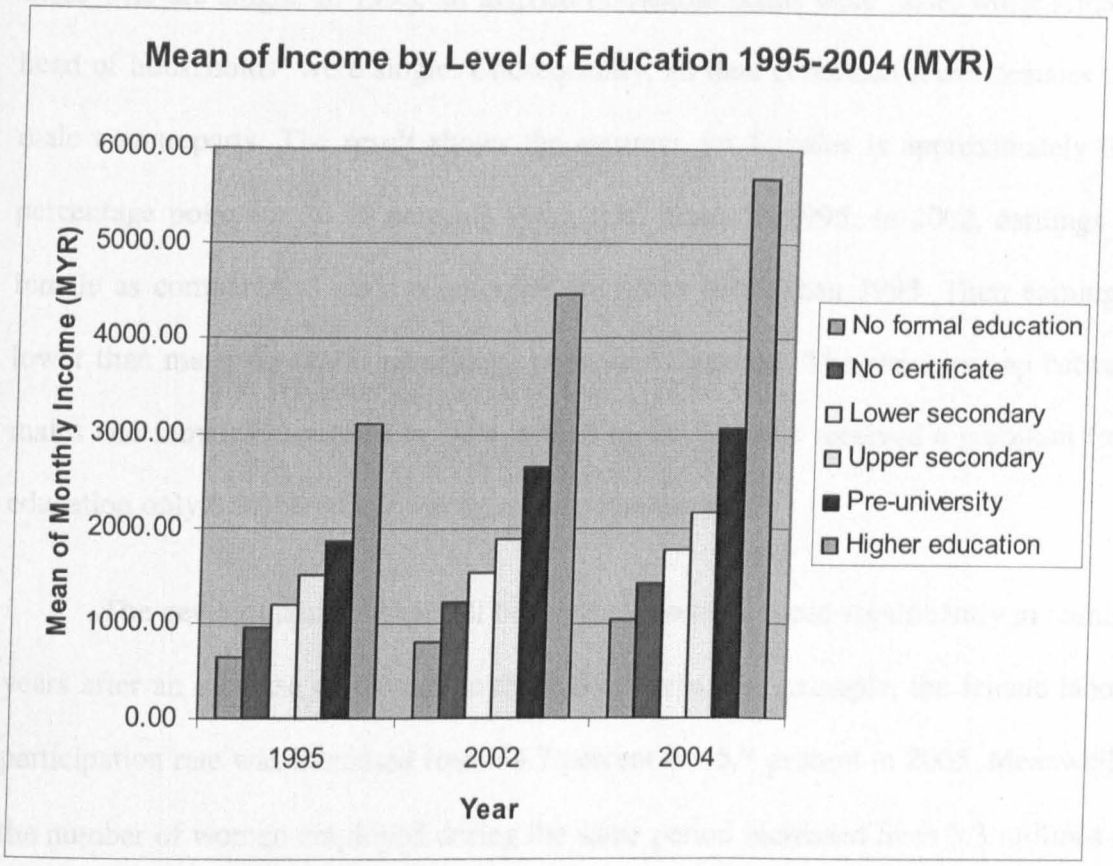
In this study, schooling accounts for around of 40 percent of variation in labour market income, as shown in Table 7.1. This is shown by $R^2$ in our estimation with other explanatory variables but excludes unobserved factors, such as ability. Our data shows that schooling attainment (referred to certificate obtained) has determined the level of individual earnings in Malaysia. The similar findings also noted by Nikolaou & Theodossiou (2006) in the UK[88].

For all samples (in Figure 7.1), the average income increased significantly from 1995 to 2004. The mean of monthly income for those who obtained higher education was increased approximately by 84.32 percent between 1995 and 2004. Meanwhile, the

[88] They used the British Workplace Employee Relations Survey (WERS) 1998 to estimate the returns to qualifications for males and females. Their results showed that educational qualifications are the major factors explained the earnings variation.

mean of monthly income for those with no formal education and pre-university education was increased by 62.99 and 64.56 percent respectively.

**Figure 7.1: Mean of Monthly Income by Levels of Education**




The mean of monthly income for those who had no certificate, obtained lower and upper secondary education increased between 44.13 and 50.00 percent during the same period. Even though the average income of all the sample increased, the earnings gap is very obvious. Figure 7.1 shows that higher educated yields five times more than those with no formal education. Individuals with pre-university education received only approximately half of the higher education's income, on average. The earnings gap for lower secondary to pre-university levels is between 20 to 40 percent for all years. Details of the figures are shown in Table 4A, Appendix 4.

### 7.2.2.1 Gender

As discussed in the previous chapter, the observation for both males and females is not equal. This is because the data provided by EPU only consists of heads of households. Therefore, in the observations the heads of households are dominated by men except those who are single. In 1995, all married household heads were male; while female's head of households' were single. Consequently, all data contained fewer females than male counterparts. The result shows the earnings for females is approximately 0.22 percentage point (or 20.38 percent) lower than males in 1995. In 2002, earnings for female as compared to male counterpart are much better than 1995. Their earning is lower than males by 0.104 percentage point or 11 percent. The earnings gap between males and females narrowed in 2004, which means females received a premium from education only 8.96 percent lower than male counterparts.

The gender earnings gap will be expected to be reduced significantly in coming years after an increase of women in the labour force. For example, the female labour participation rate was increased from 44.7 percent to 45.7 percent in 2005. Meanwhile, the number of women employed during the same period increased from 3.3 millions to 3.5 millions and their share was 36.7 percent of total employment. Moreover, the improvement in educational attainment for women enables them to be employed in high-paying occupations. Their proportion in the senior officials and managers category increased from 4.8 percent in 2000 to 5.4 percent in 2005. In fact, in the professional category (doctors, dentists, lawyers and architects) the proportion of women is higher than men; 7.5 percent for women and 5.5 percent for men in 2005. In higher education, the enrolment is also dominated by females. Their enrolment at public universities increased significantly from 61 percent in 2000 to 63.4 percent in 2005[89] (EPU 2006,

[89] However, at the post-graduate level, female students for the masters and doctorate level were accounted for only 48.8 percent and 35.7 percent , respectively (EPU, 8MP 2006).

9MP, pp. 283-284). The pattern of female participation in the Malaysian labour market will close the gender wage gap in coming years.

The result for all years reported demonstrates that the females of this sample earn considerably less than the males. The finding is consistent with the view that a major part of the earnings differential was attributed to the employment of women in low-paying occupations. To some extent, however, it appears to be the result of both lower skills and the practice of wage discrimination by employers. In the latter case, it is very difficult to document to what extent there was discrimination by employers. More than that, custom, tradition and family relationship also force women to accept low-paying jobs. Occupational differences is attributed variously to the supply-side differences in human capital and family responsibilities (Joy 2006) and demand-side constraint in the labour market referring to employees preference, costs and discrimination (Blau et al. 1999).

#### *7.2.2.2 Marital*

The earnings are higher for single rather than married household heads. Results in Table 7.1 reveal that earnings for single and married households are statistically different. The coefficients for all years reveal that single household heads received 12.08 to 16.30 percent higher earnings than married household heads in 2002 and 2004, respectively. As well as single and married persons, samples for 2002 and 2004 also included the divorced and widowed. They obtained earnings of 8 and 7 percent lower respectively than married household heads in year 2002. However, in 2004, the gap for these categories was insignificantly different from the baseline reference.

### *7.2.2.3 Self-employment and Employee*

The model also contains two groups of workers, self-employed/employer and employees/paid workers. The results for employees or paid workers, coefficient shows that, other things being equal, employees received higher earnings than self-employed over a period of time. For instance, data for 1995 to 2004 show that employees had higher earnings than employer by 1.35 to 1.81 percent. However, the difference between these groups was insignificant except in 2002 when the difference between these two groups was about 7.82 percent. Furthermore, it was statistically significant at the 1 percent level for the year 2002 only. This finding, however, did not provide enough evidence to support an assumption that the self-employed as a group can be assumed to be part of a low status, or low-returns. In addition, beyond these findings, only a little appears to be known about the characteristics of self-employed and employees. But, our findings support the results for the males sample in Kuala Lumpur by Mazumdar (1981) that the self-employed were older on average than employees. Our sample shows the mean of age for employees was around 7 years younger than the self-employed (refer to 6.12.2 and Table 6.1 in Chapter 6). Blau (1986) has provided evidence from MFLS 1976-77 (1262 households) that self-employed men have earnings substantially above those of employees with similar characteristics in urban areas. This finding obviously contrasts with our findings. Albeit we have not enough characteristics for these groups, but in all years of HIS with more observations it has been shown that the self-employed have less schooling, obtained lower certificate and are older than employees.

### *7.2.2.4 Urban and Rural*

The impact of schooling for an additional year for urban residents is greater than for rural residents. Indeed, the difference between urban and rural residents increases with time. In 1995, rural earnings were about 28.08 percent lower than urban. Furthermore, the gap between these two groups increased more after one decade. The earnings for rural workers were approximately 35 percent lower than urban in 2004. As expected the returns for urban are higher than rural due to both higher mean earnings and schooling. Returns to education for urban were steady during the period of time of the estimation. All coefficients and magnitudes were found to be significantly different at 1 percent level between urban and rural.

The mean of schooling for rural areas was 6.91 years in 1995 and increased to 7.84 in 2004. By contrast, the mean of schooling for urban areas was much higher than for rural areas. Indeed, an average year of schooling for urban areas for 10 years ago (9.16 years in 1995) was higher than rural for 2004. In 1995, and in 2004 the mean of schooling for urban was 10.03. As a result, income disparity between rural-urban is very obvious. In 2004, the official figures from government indicate that the rural-urban income ratio was 1:2.11 (9MP, 2006). However, income ratios from this observation are much lower, in 1995 and 2004, at 1:1.60 and 1:1.70 respectively[90]. Although this observation shows lower than the official figures the widening trend is ultimately obvious. Thus, it will be an enormous challenge for the policy makers to narrow the rural-urban income ratio from 1:2.11 in 2004 to 1:2.0 in 2010 (EPU, 9MP 2006).

[90] The analysis in this thesis is based on an individual's income and reported as the mean of individuals. Therefore, mean of incomes are reported as an individuals from observations on household heads. On the other hand, official figures from government are calculated as mean of households.

One explanation for the returns gap being 30 percent higher for urban is due to the opportunity to get a better job in the labour market. Those who completed higher education are likely to move and settle down in an urban area. The lack of opportunity and low demand for skilled workers in rural areas could be the best explanation for low returns to investment in education in rural areas. Migration from rural to urban areas contributes to the widening earnings gap in recent years. Consequently, the share of population living in the rural areas declined from 38.0 percent of total population in 2000 to 37.0 percent in 2005; attributed to urbanisation and out-migration of the younger population looking for better economic opportunities in the urban areas.

In 1980, FT Kuala Lumpur was the most popular region for seeking economic opportunity. Nearly 300,000 people from other states in Malaysia migrated to this area. During 5MP (1985-1990) period, Selangor became a popular destination when more than 125,000 people from rural areas moved and settled down there. These two states are significant because they are the centre of federal government administration, business and manufacturing (Chamsuri, Surtahman & Norshamliza 2005).

Schooling and earnings differentials between rural and urban areas have been found in most developing countries. Data from other countries, such us Thailand also show regional inequality. According to Hawley (2004), this differential increased over time. This is due to the rural residents having on average lower educational attainment than the urban. Morley (1982) also found the same pattern in Brazil. Dutta (2006) exploits three national employment surveys in India to support the evidence that rural workers earned less than urban. Asadullah (2006) also reported the return for urban workers (8.1 percent) is higher than rural counterparts (5.7 percent) for Bangladesh. In China, Tao (2005) reported that the wage gap between 1988 and 2000 was considerable. This is contributed by the presence of foreign companies, joint venture

firms and increasing information in the labour market. Indeed, educational attainment is seen to be an important factor of institutional differential groups of workers in China's urban market (Maurer-Fazio & Ngan Dinh 2004).

Under the extensive economic growth in developing countries, the manufacturing and services taking place as an engine of economic growth will be most affected in the urban areas. On the other hand, the proportion of working population involved in the agriculture sector is greater in rural areas. With a lower educational attainment and a smaller increase in productivity and production, they therefore earn less in comparison. It is contributing to the internal and external migration not only in developing countries, but also in developed countries.

Krugman (1991) argued that many economists believed that most manufacturing is geographically concentrated. Therefore, the skilled workers tend to move to these areas. Borjas et al. (1992) also explained that internal migration occurred in the developed countries. Highly skilled workers tend to migrate to areas where skills are in demand. This phenomenon was supportive of increasing returns in urban areas (Acemoglu 1996). Duranton & Monastiriotis (2002) point out that data on average regional earnings indicated a worsening of UK inequalities. Returns to education increased nationwide, which favoured the most educated zone, i.e. London.

#### *7.2.2.5 Region*

The augmented Mincerian earnings model comprises a region or zone of residence. Basically, the comparison by region is unsubstantiated in terms of economic development. The economic progress in Sabah and Sarawak was slow compared to Peninsular Malaysia. Therefore, it was converted to five zones and it is more

comparable[91]. The bottom of Table 7.1 shows the returns for each zone as compared to the baseline, which is zone south. Thus, the coefficients of zone variables represent the impact of residence in specific zone controlling for rural and urban areas. Zone of residence-viz East, North, Sabah and Sarawak (where the South was an excluded variable) are negatively related to monthly earnings in all years. In contrast, Klang Valley, which is the most developed zone in Malaysia, enjoyed higher earnings over time. The rest, earn less than residents from South but this differential decreased between 1995 and 2004, except for Sabah and Sarawak which showed an opposite trend.

As mentioned before, Klang Valley, the centre of economic growth in Malaysia has enjoyed the highest returns to education. The return obtained by Klang Valley was between 12.81 percent in 1995 and 9.85 percent higher than the baseline (as compared the South zone). On the other hand, the Eastern zone experienced the lowest returns to investment in education, but the gap was decreased, recently. In 1995, the East zone recorded 39.88 percent lower earnings than the South. But in 2002, it reduced from 35.35 to 29.22 percent. Overall, the regional wages gap has been declining from 1995 to 2004. Nevertheless, returns for Sabah and Sarawak are not following this trend. The earnings gap between Sabah and Sarawak, and Peninsular Malaysia widened in 2005. Returns for Sabah and Sarawak were 4.25 percent lower than the South, and the returns gap much wider in 2004; 9.37 percent in 2002 and 16.78 in 2004. As compared to the Eastern zone, essentially they enjoyed higher returns.

[91] This five zone is commonly used in Malaysia, especially in education sector. Each zone comprises of different numbers of states not only because of the different location, but also due to the population. For example, Central Zone (known as Klang Valley) consists of two states; FT Kuala Lumpur and Selangor which are highly populated. On the hand, Sabah & Sarawak only comprise of two states and one federal territory is located at Borneo Island.

**Table 7.2: Schooling and Development Composite Index**

| Region/States | DCI[1] | Incidence[2] of poverty (%) | Annual Growth Rate-8MP[3] | Mean of Income | Mean of Schooling | Rate of Return |
|---|---|---|---|---|---|---|
| ***Southern*** | | | | | | |
| Johor | 100.6 (6) | 2.0 | 5.1 | 2,286.89 | 9.22 | 8.09 |
| Melaka | 104.2 (3) | 1.8 | 4.2 | 1,942.05 | 9.30 | 8.18 |
| N. Sembilan | 102.3 (5) | 1.4 | 3.8 | 2,194.25 | 9.12 | 8.91 |
| ***Klang Valley*** | | | | | | |
| Selangor | 103.2 (4) | 1.0 | 5.2 | 2,840.20 | 9.82 | 11.41 |
| FT K. Lumpur | 109.6 (1) | 1.5 | 3.8 | 2,966.04 | 11.29 | 11.97 |
| ***Northern*** | | | | | | |
| Kedah | 97.8 (9) | 7.0 | 4.1 | 1,839.66 | 8.73 | 9.78 |
| Perak | 100.4 (7) | 4.9 | 4.1 | 1,581.28 | 8.62 | 9.51 |
| Perlis | 99.9 (8) | 6.3 | 3.4 | 1,636.47 | 8.91 | 11.10 |
| Penang | 105.7 (2) | 0.3 | 5.0 | 2,475.41 | 10.06 | 10.29 |
| ***Eastern*** | | | | | | |
| Kelantan | 93.1 (13) | 10.6 | 3.5 | 1,427.45 | 8.08 | 9.81 |
| Pahang | 97.6 (10) | 4.6 | 3.3 | 2,049.66 | 9.27 | 9.84 |
| Terengganu | 96.2 (12) | 15.4 | 3.9 | 1,461.37 | 8.80 | 11.27 |
| ***Sabah & Sarawak*** | | | | | | |
| Sabah | 90.0 (14) | 23.0 | 4.3 | 1,609.51 | 7.93 | 12.38 |
| Sarawak | 96.6 (11) | 7.5 | 4.6 | 2,167.17 | 8.18 | 11.87 |

*Sources: Malaysia (2006), 9MP; Column 5-7 calculated by author.*

Notes: [1] Development Composite based on Economic and Social Development Index which are based of 16 indicators.

[2] Incident of poverty based on figure in 2004

[3] 8MP (Eight Malaysian Plan, 2001-2005) based on 1987 price

Number in parenthesis is the ranking of DCI

According to the Ninth Malaysian Plan (9MP, 2006), based on the Development Composite Index (DCI), FT Kuala Lumpur, Penang, Melaka, Selangor were the most developed regions in 2005 (Table 7.2). Sabah and the states in the Eastern zone were the least developed regions. Besides DCI, the development gaps between regions and states were identified in terms of the gross domestic product (GDP), its growth, household income and incidence of poverty, as well as attractiveness to new investment in manufacturing.

In fact, in this HIS data, the highest mean years of schooling was recorded by FT Kuala Lumpur at 11.29 years in 2004. It was followed by Penang with an average 10.07 years and then, Selangor with 9.82 years. These states recorded a higher mean of

income and private rate of return. Furthermore, the percentage of poverty was lower than other states. With the exception of Sabah and Sarawak, in general, the states with more educational attainment received higher returns to education.

This evidence suggests that years of schooling, or educational attainment, correlated highly with earnings in Malaysia. The distribution of educational attainment and earnings is different between regions (states), which implies that the returns would be part due to state differential. If workers with a certain level of education live in developed regions, for example, Klang Valley, and workers with their own education live in Eastern, the return to schooling may reflect the regional difference in schooling and earnings. Inter-regional differences in educational attainment could to some extent be explained by differences in family background and accessibility of quality education.

### 7.2.3 The Homogenous Return Model: Qualifications

The homogenous return model estimates a single return across individuals. The private rate of returns estimated by equation 6.1 was referred to as an average for "one factor model" human capital model. It aggregates schooling into a single measure, i.e. years of schooling. Therefore, $\beta$ measured the marginal return to schooling $S_i$ in the particular definition of earnings. In the Malaysian education system the students could have or could not have obtained the certificate after completing certain years of schooling. Therefore the private rate of return to schooling will differ. Although, they completed the same years of schooling, the qualification obtained might differ. Meanwhile, the HIS reported both qualifications obtained and years of schooling completed by the household heads. Therefore, it allowed us to examine the

homogeneous returns across individuals by both different schooling levels and by qualifications. This disaggregated analysis focuses on the sequential nature of qualifications in Malaysia. It identifies the qualification of those who stopped schooling after completing a certain level of education. The coefficients of any qualification variable will represent the percentage difference in log monthly income between persons who completed the particular education dummy and those who stopped at the lower level[92]. This analysis uses a set of education dummies as discussed in Chapter 6. Table 7.3 shows the information of regression on equation 6.2 to 6.2c.

The results shows nearly all education coefficients are statistically significant at the point of estimation of 0.01 levels, indicating that the particular education credentials' variables are different from the estimates for the omitted variables. In fact, the results are reasonable, except that for "Employee" the coefficients are not significant in 1995 and 2004. This is consistent with the previous estimation. All the coefficients are shown by Table 7.3. The coefficients for those who obtained primary, lower and upper secondary were 0.3439, 0.5607 and 0.7933 points respectively for year 1995. Meanwhile, the coefficient for pre-university was 1.06 and 1.57 for those who completed higher education. In 2002, the coefficients for each level of qualification from lower to higher level education attainment was 0.2504, 0.4307, 0.6532, 1.0858 and 1.6134. The coefficients for year 2004 were 0.1634, 0.3365, 0.6208, 1.0328, and 1.5614. Overall, returns to individuals' qualifications showed a decreasing trend over time for the lower level qualifications, but remained stable for higher levels. For example, returns of those who had completed primary education (as compared to those who had no formal education) decreased from 0.34 points in 1995 to 0.16 in 2004.

[92] The regression model is based on an assumption that the cost of schooling was limited to earnings forgone.

**Table 7.3: Homogeneous Return: Qualifications[a]**

| Variables | Year | | |
|---|---|---|---|
| | 1995 | 2002 | 2004 |
| Constant | 6.0204*** | 6.2589*** | 6.4599*** |
| | (.0339) | (.0353) | (.0356) |
| Primary education | .3439*** | .2504*** | .1634*** |
| | (.0223) | (.0248) | (.0242) |
| Lower secondary | .5607*** | .4307*** | .3665*** |
| | (.0254) | (.0281) | (.0273) |
| Upper secondary | .7933*** | .6532*** | .6208*** |
| | (.0253) | (.0278) | (.0273) |
| Pre-university | 1.0557*** | 1.0858*** | 1.0328*** |
| | (.0351) | (.0315) | (.0303) |
| Higher education | 1.5659*** | 1.6134*** | 1.5614*** |
| | (.0315) | (.0353) | (.0345) |
| Exp | .0528*** | .0477*** | .0416*** |
| | (.0015) | (.0016) | (.0016) |
| Exp2 | -.0008*** | -.0007*** | -.0006*** |
| | (.0000) | (.0000) | (.0000) |
| Female | -.2678*** | -.1344*** | -.1250*** |
| | (.0172) | (.0177) | (.0176) |
| Single | (dropped) | .1148*** | .1399*** |
| | | (.0163) | (.0169) |
| Widow | No obs. | -.0947*** | -.0469* |
| | | (.0308) | (.0284) |
| Divorced | No obs. | -.0978*** | -.0616 |
| | | (.0349) | (.0362) |
| Employee | .0152 | .0677**** | .0102 |
| | (.0121) | (.0127) | (.0123) |
| Rural | -.2715*** | -.2512*** | -.3026*** |
| | (.0098) | (.0099) | (.0099) |
| Klang Valley | .0903*** | .0914*** | .0549*** |
| | (.0156) | (.0147) | (.0155) |
| East | -.3691*** | -.3188*** | -.2764*** |
| | (.0150) | (.0147) | (.0149) |
| North | -.2266*** | -.2029*** | -.1959*** |
| | (.0133) | (.0139) | (.0141) |
| Sabah & Sarawak | -.0794*** | -.1177*** | -.1951*** |
| | (.0146) | (.0153) | (.0151) |
| F | 579.56 | 510.40 | 518.54 |
| R-squared | 0.3966 | 0.4065 | 0.4162 |
| Sample | 14,726 | 13,324 | 13,492 |

[a] The omitted variables are no formal education, male, married persons, self-employed, urban and zone of South.
Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

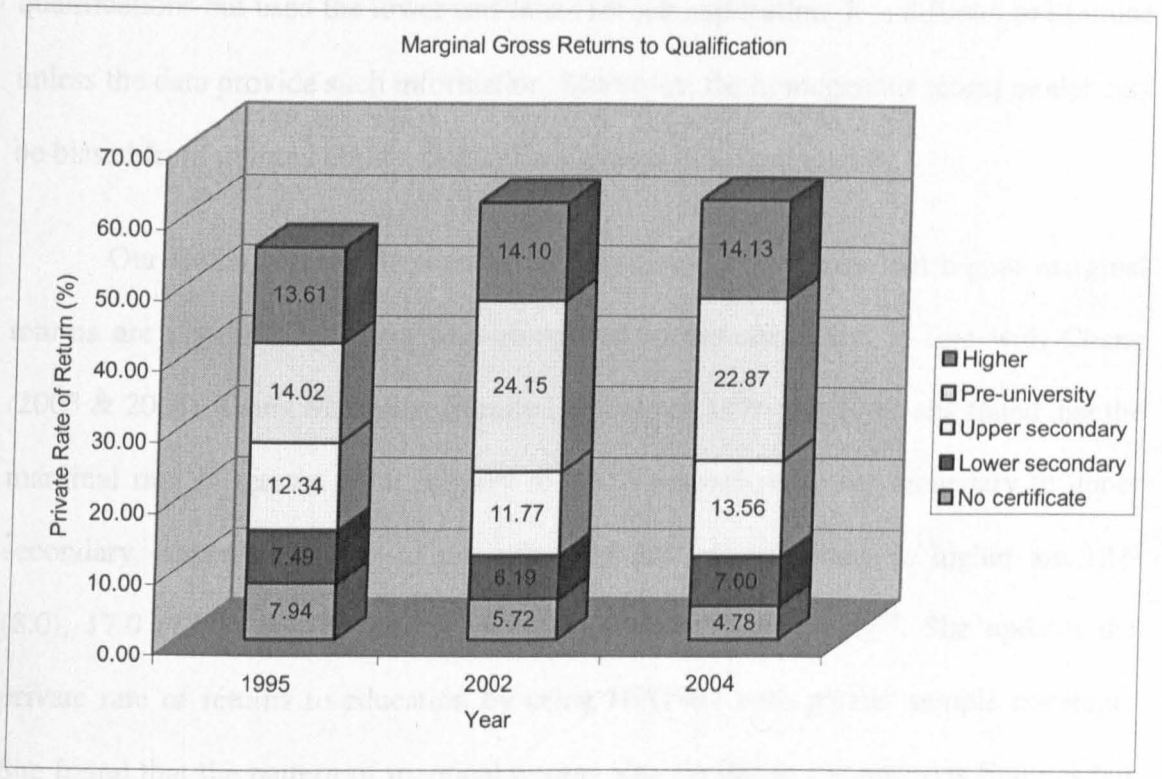
The coefficients for lower and upper secondary were 0.607 and 0.7933 in year 1995. They declined to 0.3665 and 0.6208, respectively in year 2004. The t-test reveals that the declining trend was statistically significant, as shown in Table 3B in Appendix 3. However, at the higher level, returns for higher education were stable during a decade which made the earnings premium around 1.6 point as compared to the omitted educational dummy. The t-test using interaction dummy of qualifications and years

explained that there are no significant differences between those years (Table 3B, Appendix 3). The trend of returns to qualification follows a gradually downward declining trend of average return from 1995 to 2004. It appears the decline is concentrated away from those with little or no post education qualifications.

The credentials coefficients from Table 7.3 were transformed to the percentage returns for those undertaking different levels of education, which are shown in Figure 7.2. It is easier to explain the marginal gross returns to education for each level of qualifications. However, the interpretation of the coefficients of dummy variables in semi-logarithmic regression should be transformed carefully. Basically, the regression coefficients multiplied by 100 is equal to the percentage effect of that variable being explained. It is correct for the continuous variables (as schooling coefficient in Table 7.1), but it is not for dummy variables. The correct approach to transform the dummy coefficient is equal to 100 multiplied by {exp ($\beta$)-1)}, where $\beta$ is the coefficient for dummy (Halvorsen & Palmquist 1980). Figure 7.2 shows the marginal gross return by qualifications.

Individuals with primary education had decreasing marginal returns over time compared to those who had no formal education. The marginal gross returns to qualification for individuals completed at this level were 7.94, 5.72 and 4.78 percent for 1995, 2002 and 2004 respectively. The marginal gross returns for primary education to lower secondary education is quite stable between 1995 and 2004, at 7.49 percent for 1995, 6.19 and 7.00 percent for 2002 and 2004, respectively. For those who completed upper secondary, additional returns of between 12 and 13.5 percent compared to lower secondary, were received. For all levels of education, the highest returns were obtained by those at pre-university level.

**Figure 7.2: Private Rate of Returns by Level of Qualification (%), 1995-2005**




The additional returns for those who completed at pre-university compared to those who completed at upper secondary are 14.02, 24.15 and 22.87 percent for years 1995, 2002 and 2004 respectively. However, the return in 1995 is lower than other years but remains higher compared to other levels of education. While, those who obtained the higher level of certificates secured (compared to pre-university) around 14 percent for all three years.

The results indicate that there are high and positive private returns to education in Malaysia, especially at higher levels of education. The marginal gross returns for each successive level are stable for all three HIS samples, except for primary education and pre-university (in 1995). The highest marginal return is for those who completed pre-university level, which is about 23 to 24 percent (except that 1995 was lower than

2002 and 2004). However, these findings were subject to the bias in estimation. It might be from the measurement error when some people do hold the higher qualifications but used the lower certificate for job application. It is difficult to examine unless the data provide such information. Moreover, the homogenous return model may be biased from omitted ability, family background or school quality.

Our findings from all years of samples provide evidence that higher marginal returns are obtained by those who completed at pre-university, in line with Chung (2003 & 2004). Using Malaysian Family Life Survey 1976 and 1988, she found that the marginal rate of returns from primary to lower secondary, lower secondary to upper secondary, upper secondary to pre-university and pre-university to higher are 12.0 (8.0), 17.0 (17.0), 26 (23) and 17.0 (13.0) percent, respectively[93]. She updates the private rate of returns to education by using HIS1997 with greater sample coverage. She found that the pattern of marginal returns was similar to her previous findings but the overall figure is slightly lower[94]. Furthermore, our results showed that marginal gross returns to education at secondary education are low. They are consistent with the findings by Lee (1980), Lee & Sivanthiran (1980) and Chung (2003 & 2004).

The same trend is also found in Brazil. Returns to middle and lower levels of schooling declined considerably from 1976 to 2001. Intermediate schooling declined steadily from 81 percent to 43 percent, while returns to primary and secondary schooling remained fairly constant in the 1980s, but began to fall during the1990s.

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[93] Figures in parentheses are marginal rate of returns for 1988. Although MFLS contains a very rich information about earnings and socioeconomics background, but the respondents only covered married women. MFLS 1988 was considered a panel data when 70 percent samples (respondents) from MFLS1were re-interviewed (889 out of 1262 women).

[94] Marginal gross returns to education for no formal education to no certificate was 7.8 percent, while no certificate to lower secondary, lower secondary to upper secondary, upper secondary to pre-university, and pre-university were 4.5, 14.1, 22.9 and 17.1 percent, respectively. She used age and age-squared as proxies of experience. On the other hand, our study used the original Mincer's equation, i.e. potential and its squared.

Returns to college education moved from 116 percent in 1996 to 146 percent in 2001 (Satomoyo 2001). In Mexico, Ulrich (1998) found that the returns to primary and secondary schooling declined between 1984 and 1994, but increased at preparatory level from 13 to 16.3 percent. At university level, the return was increased almost double (9.1 percent to 17.6 percent) during this period. Giovagnoli et al. (2005) reported that the highest return in Argentina was for primary schooling in 1992. However, after a decade, the highest return was for those who completed at university levels.

### 7.2.4 The Homogenous Return Model: Years of Schooling

As mentioned earlier, HIS also recorded the number of years of schooling completed. The augmented Mincerian earnings function fitted well when using years of schooling dummies and other controlling variables. Table 7.4 shows the marginal gross returns to years of schooling. The reference variable was "no formal education". The difference between Table 7.3 and Table 7.4 were the schooling dummies. The results in Table 7.3 showed the coefficients dummies of certificates obtained by the respondents. Those who completed at primary education were referred to as "no certificate". Those who obtained Lower Certificate of Education (LCE) were categorized as lower secondary. Meanwhile, the upper secondary for those who obtained the Malaysian Certificate of Education (MCE) and pre-university for those who have a diploma or Higher School Certificate (HSC). On the other hand, Table 7.4 showed the results of the coefficients dummies for those who completed at certain years of schooling. Meaning that, some people have completed at certain years of schooling and obtained a certificate and some of them do not hold one. However, both estimations used the same reference variable; it was "no formal education".

## Table 7.4: Marginal Gross Returns to Schooling

| Variables | Year | | |
|---|---|---|---|
| | 1995 | 2002 | 2004 |
| Constant | 5.8554*** | 6.1344*** | 6.3885*** |
| | (.0341) | (.0355) | (.0358) |
| Year 1 | .1077* | .0307 | .1273 |
| | (.0612) | (.0629) | (.0809) |
| Year 2 & 3 | .1987*** | .1122*** | .0649** |
| | (.0303) | (.0338) | (.0324) |
| Year 4 & 5 | .2723*** | .1510*** | .0818** |
| | (.0286) | (.0340) | (.0328) |
| Year 6 | .3889*** | .2697*** | .1786*** |
| | (.0235) | (.0256) | (.0253) |
| Year 7 & 8 | .6191*** | .4928*** | .3909*** |
| | (.0254) | (.0356) | (.0357) |
| Year 9 | .6094*** | .4991*** | .4044*** |
| | (.0254) | (.0279) | (.0275) |
| Year 10 | .6202*** | .6807*** | .4162*** |
| | (.0476) | (.0511) | (.0490) |
| Year 11 | .8821*** | .7398*** | .6669*** |
| | (.0257) | (.0280) | (.0277) |
| Year 12 | .7395*** | .8149*** | .4983*** |
| | (.1449) | (.1180) | (.0975) |
| Year 13 | 1.1487*** | .9548*** | .8935*** |
| | (.0345) | (.0406) | (.0389) |
| Year 14 | 1.3849*** | 1.2961*** | 1.1839*** |
| | (.0347) | (.0325) | (.0317) |
| Year 17 | 1.9708*** | 1.7157*** | 1.6176*** |
| | (.0366) | (.0355) | (.0349) |
| Exp | .0547*** | .0479*** | .0413*** |
| | (.0015) | (.0016) | (.0016) |
| Exp2 | -.0008*** | -.0008*** | -.0005*** |
| | (.0000) | (.0000) | (.0000) |
| Female | -.2453*** | -.1283*** | -.1149*** |
| | (.0169) | (.0174) | (.0176) |
| Single | (dropped) | .1111*** | .1445*** |
| | | (.0160) | (.0168) |
| Widow | No obs. | -.0970*** | -.0425 |
| | | (.0301) | (.0283) |
| Divorced | No obs. | -.0923*** | -.0661* |
| | | (.0345) | (.0358) |
| Employee | .0191* | .0699*** | .0104 |
| | (.0119) | (.0125) | (.0123) |
| Rural | -.2535*** | -.2399*** | -.3004*** |
| | (.0096) | (.0098) | (.0099) |
| Central (Klang Valley) | .1029*** | .0998*** | .0562*** |
| | (.0153) | (.0145) | (.0153) |
| East | -.3455*** | -.3098*** | -.2712*** |
| | (.0148) | (.0146) | (.0149) |
| North | -.2136*** | -.2030*** | -.1923*** |
| | (.0131) | (.0136) | (.0141) |
| Sabah & Sarawak | -.0707*** | -.1172*** | -.1969*** |
| | (.0143) | (.0152) | (.0151) |
| F | 438.73 | 397.35 | 382.05 |
| R-squared | 0.4199 | 0.4212 | 0.4231 |
| Sample | 14,726 | 13,324 | 13,492 |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level .
* Significant at 10 % level.

In Table 7.4, all dummies for schooling are statistically significantly different except for "Year 1" in both years of 2002 and 2004. With the exception of "Employee" and "Widow" in 2004, all coefficients and signs of controlling variables are statistically significant at a 5 percent level or better. In general, results from the estimating returns shown by levels of schooling coefficients declined over one decade. For example, the coefficient for Year 2 & 3 (over Year 1) in 1995 was 0.1987 and decreased to 0.0649 point in year 2004. The same trend also appeared at the higher level.

The coefficients for university (Year 17) completers in 1995 was 1.97, then declined to 1.18 in 2004. The declining trend of marginal gross returns to an additional year of schooling using dummies year of schooling was consistent with the decline of the average return (Table 7.1). On the other hand, the coefficients for explanatory variables showed mixed results. The wage gap between female and male counterparts has narrowed over time, while the earnings differences between single and married persons increased during this period. The model also included stratum and region (zone) of residence as explanatory variables. Earnings differentials between these groups are shown by the parameters in Table 7.4. The coefficients provide evidence that the wages gap between these groups increased over time. In 1995, for example, the "Rural" coefficient was 0.25 and this rises to 0.30 in 2004. Using the South as a baseline, results show that the earnings gap was narrowed over time for three zones (Klang Valley, East and North), but in relation to Sabah and Sarawak the earnings gap for these three states widened.

The marginal gross returns to schooling became more explainable when we transformed to the percentage as described by Table 7.5. The marginal gross returns for Year 1 at primary school were 11.40, 3.12 and 13.58 in 1995, 2002 and in 2004 respectively. However, only year 1995 was statistically significant at the 10 percent

level. It suggested that those who completed one year at primary school were not significantly different to those without formal education during these years. While, those who completed at Year 2 and 3 obtained marginal gross return to schooling about 6 percent in 1995 and 2002. However, in 2004, the marginal gross return was negative 4 percent. Those who completed at Year 4 and 5 (as compared to Year 2 and 3) yielded 2 and 3.75 percent higher, but decreased to only 1 percent in 2004. Those who completed at primary education received approximately 7 and 8 percent marginal return compared to those who stopped schooling at Year 4 and 5.

**Table 7.5: Marginal Gross Returns to Schooling (%)**

| Year of schooling completed | 1995 | 2002 | 2004 |
|---|---|---|---|
| Year 1 vs no formal education | 11.40[a] | 3.12[b] | 13.58[a] |
| Year 2 & 3 vs Year 1 | 6.26 | 5.58 | -4.07 |
| Year 4 & 5 vs Year 2 & 3 | 3.75 | 1.96 | 0.84 |
| Year 6 vs Year 4 & 5 | 8.09 | 8.23 | 6.67 |
| Year 7 & 8 vs Year 6 | 16.6 | 16.04 | 15.20 |
| Year 9 vs Year 7 & 8 | -0.69 | 0.42 | 0.91 |
| Year 9 vs Year 10 | 1.12 | 19.91 | 1.19 |
| Year 11 vs Year 10 | 29.9 | 6.09 | 28.49 |
| Year 12 vs Year 11 | -13.3 | 7.80 | -15.51 |
| Year 13 vs Year 12 | 50.6 | 15.01 | 48.47 |
| Year 14 vs Year 11 | 18.25 | 20.37 | 18.81 |
| Year 17 vs Year 13 | 22.81 | 20.95 | 19.84 |

Note: [a] The coefficients for Year 1 versus no formal education in 1995 and 2002 are insignificant.
[b] Significant at 10 percent.

Those who completed up to Year 7 and 8 enjoyed higher returns compared to Year 6 (Primary 6); in fact the figures are around 17 and 15 percent higher respectively. But, the marginal gross return for Year 9 is relatively less value for investment in education. In fact, it showed negative return in 1995. On top of that, individuals who completed education at Year 11 (Form 5) and Year 13 (Upper 6) most probably obtaining Upper Secondary Certificate and Higher Certificate of Education received a higher return. On the other hand, negative return was the reward for those who achieved only half way pre-university education (completed at Lower 6 -Year 12) for HIS1995 and HIS2004.

The completed table of marginal gross return for each level of schooling are depicted in Table 5.4A to 5.6B in Appendix 5.

The marginal returns for completed higher education (Year 17) were between 20 to 23 percent. Those who have not completed at pre-university (completed lower 6 only) might be the worst investment in education. But, when individuals complete at Upper Six and obtain Higher School Certificate, the marginal returns are higher even though they are unsuccessful in enrolling at higher education. Therefore, the best choice of investment in education is to continue learning until the finish of the Upper Sixth which exhibits high returns and increased up to 50 percent in 1995, 15.01 in 2002 and 48.47 in 2004, respectively. This finding also supports the evidence of estimation using level of qualifications that the higher return was shown also by the completers at upper levels.

The pattern of marginal gross private rate of returns to schooling is signalling the "sheepskin effect" in Malaysian labour market[95]. It reflects the labour market recognizing qualification as a requirement more than years of schooling. Moreover, certificates could be being used as a screening device for the employer in the competitive labour market. Therefore, if this hypothesis is true, the best choice for the individual in terms of investment in education is to obtain a certificate rather than merely to complete more years of schooling. For example, those who completed their education at Form 5 will obtain the Malaysian Certificate of Education. Then, their returns will reflect this qualification. However, an investment in an extra year of schooling (completed Lower 6) did not give any higher marginal return. In fact, the

[95] The sheepskin effect refers to the private rate of returns to education certificates rather than the accumulated years of schooling. The term is derived from the traditional way of presenting certificates or diplomas made from the skin of sheep. It was the practice during the second century in Asia; see Belman & Heywood (1997) for details.

finding reveals the return is negative. In order to get higher returns, he/she should add one more year of schooling and sit for the next examination (HSC). With higher qualification, i.e. HSC, the results showed that they may get more than double the returns compared to those from the earlier stages of education.

This hypothesis needs further investigation using more observations. This is due to the inconsistent results shown by Table 7.5. For example, the marginal gross returns for Year 12 (compared Year 11) in 2004 is positive, but both years 1995 and 2004 were negative. It might be due to the severe financial crisis of 1997, or insufficient data to support the consistent findings. Therefore, future research should concentrate on this issue.

## 7.3 Heterogeneous Returns Model: IV - Estimating the LATE

Now we consider the more general heterogeneous returns model. The homogeneous return model estimates a single return across individuals. In this section I examine how our estimates of the returns are affected if we allow for heterogeneous returns. There are three types of estimation; i.e. IV, MM and CF. In this case I opt for the IV approach. This approach is widely used to reduce potential bias in OLS estimation, as mentioned in Chapter 6. The key to this approach is to find suitable instruments for schooling. An exogenous factor that could legitimately be used as an instrument is the change of the medium of instruction in the schooling system from English to Malaysian language. Harmon and Walker (1995) used the change in the school leaving-age (SLA) in UK, which first occurred in 1946 from 14 to 15, and then from 15 to 16 in 1973. Although HIS contains rich information regarding education and its related factors, such as parents, sibling education and distance to school, the data released by the EPU

for this study is very limited. Our data do not contain parents' education, spouse's income and educational background or other related variables which were collected in the HIS survey. In general, one search for exogenous variables that is correlated with the other exogenous variables, but not to the residual. A commonly employed example is family background.

One of the potential instruments in the Malaysia education system is "schooling reform" which took place in 1970 when Malaysian language was introduced. It was started in Primary 1 in 1970, and continued thereafter. This was a significant change in the Malaysian education system. The use of the national language in school improved the opportunities for rural settlement and poor families in the enhancement of their level of schooling.

The dichotomous variable, I called D70, is a dummy variable which is equal to 1 for individuals starting schooling in 1970 and, otherwise equal to 0. It also added the same controlling variables as in previous OLS estimations. Given the year of the reform, affected individuals ($D_i = 1$) are taken to be those who were born in 1963 and later. The dummy D70 is therefore the instrument that I use. This exogenous variable affected the decision and opportunity to pursue education at higher levels. In this context, IV estimates of the return to schooling using a medium of instruction reform as the instrument, would be interpreted as the average return to schooling for an individual who required an additional year of education as a result of the reform. Borrowing the terminology from the literature on "treatment effects", $D_i$ (exposure to different education system reform) is independent of individual ability and the reduced form schooling residual (Heckman & Vytlacil, 1999) with the assumption that heterogeneity

in the return to schooling, and IV estimates are the "Local Average Treatment Effect (LATE)" (Imbens & Angrist, 1994; Heckman, 1997; Blundell et al., 2001 & 2004).

### 7.3.1 Diagnostic Testing

The first step of estimation is to examine the relevance and validity of the instrument. The strong correlation between dummy D70 with the endogenous variable (schooling) and orthogonality to the error process needs to be confirmed. Otherwise, the results will be biased and inconsistent. The degree of correlation to the endogenous variable is tested by examining the fit of the first stage equation with D70 included (Bound et al., 1995; Patrinos & Sakerillou, 2004). The results of tests using a dummy year of changing medium of instruction in schooling are statistically significant. The F-test is equal to 96440.60 and p-value is 0.000 for HIS2002 and 75534.30 ($p = 0.000$) for HIS2004. With regard to the quality of the D70's dummy, F-test on excluded variables and partial, is reported in the first row under Test Result in the bottom of the Table 7.6.

Furthermore, "robust regression" is used in order to counter the possible presence of heteroskedasticity errors. Both results from reduce-equation of schooling have a highly significant effect on length of schooling and no direct impact on earnings. In other words, all equations are exactly identified. These tests support the use of the D70 dummy as instrument for schooling. Apart from that, it also needs to check any potential endogeneity in schooling. Using a well-known Durbin (1954)-Wu (1973) - Hausman's (1978) test, the hypothesis that the OLS estimates differ is accepted at a level significant of 1 percent. All diagnostic tests of relevancy and validity are satisfied; therefore D70 was acceptable as the instrument for IV. All diagnostic test results are presented in the bottom rows (Test Result) in Table 7.6.

### 7.3.2 Results

Table 7.6 presents results obtained from both OLS and IV estimation. It includes the same explanatory variables of the previous estimation. Column 2 and 4, reported the OLS estimates for year 2002 and 2004, respectively.

**Table 7.6: OLS and IV Estimates**

| Variables | 2002 | | 2004 | |
|---|---|---|---|---|
| | OLS | IV | OLS | IV |
| Schooling | .1051*** | .1174*** | .1004*** | .1109*** |
| | (.0018) | (.0049) | (.0018) | (.0043) |
| Exp | .0381*** | .0394*** | .0292*** | .0298*** |
| | (.0016) | (.0017) | (.0016) | (.0016) |
| Exp2 | -.0005*** | -.0004*** | -.0003*** | -.0002*** |
| | (.0000) | (.0000) | (.0000) | (.0000) |
| Female | -.1037*** | -.1061*** | -.0859*** | -.0873*** |
| | (.0178) | (.0178) | (.0178) | (.0180) |
| Single | .1140** | .1069*** | .1513*** | .1453*** |
| | (.0165) | (.0165) | (.1646) | (.0173) |
| Widow | -.0794** | -.0757** | -.0074 | -.0033*** |
| | (.0311) | (.0312) | (.0311) | (.0292) |
| Divorced | -.0825*** | -.0776** | -.0400 | -.0389 |
| | (.0357) | (.0359) | (.0357) | (.0368) |
| Employee | .0753*** | .0697*** | .0179 | .0129*** |
| | (.0126) | (.0129) | (.0126) | (.0127) |
| Rural | -.2392*** | -.2270*** | -.2994*** | -.2885*** |
| | (.0099) | (.0109) | (.0099) | (.0108) |
| Central | .1306*** | .1212*** | .0939*** | .0871*** |
| | (.0149) | (.0153) | (.0149) | (.0159) |
| East | -.3027*** | -.3047*** | -.2563*** | -.2575*** |
| | (.0148) | (.0149) | (.0148) | (.0153) |
| North | -.2018*** | -.2055*** | -.1886*** | -.1915*** |
| | (.0139) | (.0324) | (.0139) | (.0144) |
| Sabah & Sarawak | -.0895*** | -.0801*** | -.1551*** | -.1465*** |
| | (.0154) | (.0359) | (.0154) | (.0157) |
| Constant | 5.8371*** | 5.6885*** | 6.0672*** | 5.9405*** |
| | (.0319) | (.0648) | (.0319) | (.0579) |
| R-squared | 0.3937 | 0.3913 | 0.3893 | 0.3875 |
| F | 618.39 | 409.47 | 570.26 | 407.77 |
| *Test Result* | | | | |
| Partial $R^2$ for excluded variable | | 0.9311 | | 0.9173 |
| instrument at first stage | | (0.000) | | (0.000) |
| F-test | | 96440.73 | | 75534.30 |
| [p-value] | | [0.000] | | [0.000] |
| *Endogeneity test-Wu Hausman* | | | | |
| F-test | | 7.5676 | | 7.339 |
| [p-value] | | [0.0059] | | [0.0068] |
| Chi-sq | | 7.5714 | | 7.3444 |
| | | (0.0059) | | (0.0067) |
| Observations | 13,324 | 13,324 | 13,492 | 13,492 |

*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.
Figures in parentheses are robust standard errors and under *Test Result* is a p-value.

By obtaining the original controlling variables, dummies for gender, marital status, activity and region (zone), results suggested that IV estimates were somewhat higher than OLS. Column 3 and 5 provide the rate of returns estimated using IV, at 11.74 and 11.09 percent for 2002 and 2004, respectively. The private rates of returns to education by IV estimation are approximately 11.70 and 10.46 percent higher than OLS. The result were higher because it is believe that OLS estimate underestimates the return. It is common that the standard error from IV estimation is higher than standard error in the OLS (for example, see Card 1993; Angrist & Krueger 1991). However, if the standard error is too big, it means a IV's instrument is a weak instrument.

Apart from that, the IV estimates also improved the augmented earning function results, especially for 2004. For example, the coefficient for dummy's stratum (rural) using OLS is not significant but it is statistically significant by using IV.

These findings are in line with Brunello & Miniaci (1999) for Italy. They used data of male house hold heads drawn from The Bank of Italy Survey (from 1993 to 1995). The important exogenous event in Italian education, which is Law 910 of December 1969 was used as the instrument. Their results suggested that the private rate of return increased from 4.8 percent (OLS) to 5.6 percent (IV). It was higher by 1 percentage point, as with our findings.

Meghir et al. (1999) examined the impact of the Swedish school reforms, i.e. extending compulsory schooling by one year was also close to our findings. Their result obtained using the exogenous variation induced by reform assignment led to a point estimate higher than OLS, even when they allowed for the heterogeneous returns to years of schooling. This is also consistent with the idea that reform changed the composition of those taking higher education towards lower average ability and poor

family background. Ashenfelter et al. (1999) analysed several studies in the US and seven non-US countries between 1974 and 1995, they found that IV and twin studies estimates exceed OLS estimates by 3.1 and 1.6 percentage points. With the exception of the studies that produced no interesting results and the insignificant difference between the IV and the least-squares estimates, the IV estimate is higher than OLS only by between 1.8 and 0.9 percentage point (la Fuente & Cicone 2002). Furthermore, Trostel, Walker and Woolley (2002, p.15) stated that, "OLS estimates are biased downward by about a percentage point, possibly more".

The example for less developed countries also confirmed this statement. Kazakhstan, Arabshebani & Musgrove (2006) used spouse education and smoking habits as instruments. Estimated by the valid instrument, i.e. spouse education, the result by IV is higher by about 3 percentage points for married men and 1 percentage point for married women. Duflo (2001) examined the effect of the school constructions program in Indonesia on education and earnings. She found returns to education ranging from 6.8 to 10.6 percent. Patrinos and Sakellariou (2003) estimates for Venezuela found the private rate of returns was 12 percent when using compulsory education. However, the return was lower (9.8 percent) while using parental background as IV but remained higher than OLS (6.0 percent) estimation. Uusitalo (1999) using family background as IV produced more extreme returns of approximately 60 percent higher than OLS. Filer, Jurajda & Plánovský (1999) used one digit occupational dummies as instrument and the result increased by 50-60 percent (4-5 percentage point) in Slovakia, but did not show increases in education's impact between 1995 and 1997 for Czech Republic. Pons & Gonzalo (2001) tested family background (educated parents, father with job characteristic with high responsibility, self-employed, permanent contract, and white collar job or work in the non-agriculture

sector) and found parent education as the best instrument. Secondly, they tested using changes in education sector "L/70" but the result was not as good as those for UK or other countries. The results of the estimation of wage equation with IV using valid instruments show a rate of return to schooling of around 10% which is higher than the OLS estimate (6.4%). A few studies in urban China also indicates that IV is higher than OLS between 4 and 5 percentage points such as Giles et al. (2004), Heckman & Li (2004) and Fleisher et al. (2005). They used family background, quality of elementary education and other instruments related to socio-economic indicators as instrument.

In contrast, some studies provide the opposite findings. For example, Callan & Harmon (1999) found that parental background (social class and educational attainment) and changes in the schooling system (free secondary schooling in mid-1960s and rising of the school leaving age in 1972) did not support the hypothesis that downward bias resulted from using OLS. Vieira (1999) used legal changes of compulsory education in Portugal on data drawn from Quadros de Pessoal for the years 1986 and 1992. The results show a high standard errors and OLS estimates are higher than IV.

Unfortunately, the comparison between OLS and IV estimations using Malaysian data with different IV instruments could not be made because there have been no previous studies of this kind relating to Malaysia. The main reason, probably, is due to the difficulty in getting the data. However, the various econometric tests used in this study indicate that the findings presented here are reliable.

Apart from that, one might be questioned regarding the D70 instruments which were applied to those aged below 41 and 39 years at the time of survey. Again, the test using OLS was done in order to prove that D70 is consistent. It was restricted to those

who were 39 (for HIS 2002) and 41 (HIS 2004) years old and below. The finding shows that the basic coefficients (experience squared) in the augmented earnings model are insignificant (the indication also wrong) for HIS 2004. Meanwhile, the schooling coefficient for HIS 2002 is much lower. The results are shown in Appendix 6, Table 6A and 6B. Once more, it is proved that the instrument is reliable.

Blundell et al. (2001 & 2004) noted the issues of interpreting IV estimates of return. In the heterogeneous return single treatment model, i.e. Local Average Treatment Effect-LATE, returns depended on the choice of instruments and the group of individuals who were impacted by the instrument. An invalid instrument will induce an upward bias. In this study, by using a valid D70's instrument, the IV estimate of LATE being higher than OLS by 10-11 percent is in line with other studies as mentioned above.

## 7.4 Over-education and Under-education: Results

The same samples were used to examine the existence of over-education and under-education. By using the mean of schooling within occupation, I found that the majority of samples are adequately educated. In 1995, about 27.81 percent are estimated to have been overeducated and 14.7 percent undereducated. The percentages for over and under education reduced to 19.0 and 11.53 percent respectively in 2002. For HIS2004, the percentage of overeducated persons decreased to 11.74 percent, but of those undereducated it increased to 12.13 percent. By using the mode value approach, as expected, those who fall under the category of over- and under-education is bigger. For example, those undereducated totalled 19.54, 35.76 and 40.79 percent in 1995, 2002

and 2004, respectively. Those overeducated totalled 53.93, 27.26 and 21.01 percent for each survey, respectively.

These figures indicate the heterogeneity in schooling. Using mean and one standard deviation within occupation values or mode values, the percentage of under- and over-education exceeds 10 percent. When using mode values approach, the percentage of under schooling is bigger and it increases over time. On the other hand, those in over-education were decreasing at the time of the survey. The market supply and demand adjustment might occur in 10 years time. Job mobility partly explained the over and undereducated adjustment in the labour market, where those having higher levels of education tend to work for lower wages in early working life before they finally find the appropriate job. Especially for Bumiputra, they are more likely to seek work as a public servant rather than work in the private sector[96].

Regression results from the equation 6.20 are presented in Table 7.7. These results are in line with the prediction that, on average, overeducated workers earn less compared to those who are just adequately educated; and undereducated workers earn more than those who are adequately educated. In 1995, earnings for overeducated persons were 14.45 (30.60) percent lower than for those adequately educated. Whilst, for under-educated persons, they earn about 44.00 (32.18) percent higher than adequately educated workers. In 2002, on average, the workers with higher levels of schooling (over-education) than required schooling (adequately educated) within their job received an earning about 11.18 (14.11) percent lower[97]. On the other hand, those who had lower schooling than required enjoyed 61.12 (20.26) percent higher rate of returns than those adequately schooled.

[96] The perception of the workers that work under Public Service Department is more secure than private sector in a long-term.
[97] Figures in parentheses are the results of mode values approach.

**Table 7.7: Estimated Earning Functions Using Verdugo and Verdugo Model[1]**

| | 1995 | | 2002 | | 2004 | |
|---|---|---|---|---|---|---|
| Coefficients | Mean[2] | Mode[3] | Mean | Mode | Mean | Mode |
| Schooling | .135*** | .139*** | .139*** | .126*** | .137*** | .123*** |
| | (.0023) | (.0023) | (.0020) | (.0020) | (.0019) | (.0021) |
| Over | -.134*** | -.267*** | -.106*** | -.132*** | -.303*** | -.118*** |
| | (0.1276) | (.0131) | (.0147) | (.0115) | (-0157) | (.0129) |
| Under | .371*** | .279*** | .478*** | .197*** | .531*** | .187*** |
| | (.0202) | (.0176) | (.0188) | (.0119) | (.0185) | (.0117) |
| Constants | 5.39*** | 5.467*** | 5.555*** | 5.643*** | 5.687*** | 5.827*** |
| | (0.0342) | (.0338) | (.0326) | (.0330) | (.0335) | (.0350) |
| R-squared | .4111 | .4164 | .4503 | .4177 | .4401 | .4070 |
| F | 733.70 | 737.55 | 699.65 | 598.37 | 630.40 | 526.68 |
| Observations | 14,726 | 14,726 | 13,324 | 13,324 | 13,492 | 13,492 |

*Source: Calculated by author.*
Robust standard errors in parentheses.
*** Significant at 1% level.
Notes: [1] All regressions includes potential experience and it's square. All dummies for gender, marital, activity, stratum and zones were added in the estimation.
[2] Mean-refers to the definition of under- and over-schooling using mean and one standard deviation.
[3] Mode-refers to the definition of under- over-schooling using mode values within occupation.

In 2004, earnings of overeducated workers was 35.39 (12.52) percent lower than those with required schooling. Undereducated persons received 70.00 (20.56) percent higher than those who have adequate education within their occupation.

Basically, the coefficients are somewhat bigger. The results are similar with Verdugo & Verdugo (1988), Cohn & Khan (1995) and Bauer (2002). The immediate indicators from this estimation of using one standard deviation and mode values are mixed. First, the percentage of overeducated workers was decreased both using mean (and one standard deviation) and mode value between 1995 and 2004. Second, the percentage of workers (by mean and one standard deviation) falling under the undereducated category was decreased slightly during the same period. However, the percentage of undereducated workers increased almost double by using mode values. Third, the overeducated workers as compared to adequately educated within any given occupation received a widening lower return. Furthermore, the earnings for undereducated within any given occupation decreased over time. On the other hand,

mode value's approach shows the wage gap narrower. Those overeducated remaining had lower earnings compared to the adequately educated, but decreased almost by half between 1995 and 2004. The returns for undereducated was higher than for adequately educated, but with decreasing returns.

By using mean and one standard deviation, results show the returns gap widening, but it shows an opposite finding when using mode value as the definition of over- and under-education, or schooling. The results were mixed, but by using mode values it looks like more acceptable and convenient with the labour market. However, the job analysis approach is needed for further investigations. Moreover, the results show that the rate of returns for overeducated increased almost 50 percent between 1995 and 2004. Interestingly, the returns for undereducated persons increased dramatically from 44.44 to 70 percent during the same period of time. Other findings were, with controlling required, that under- and over-education indicate that, on average, the rate of returns to education (schooling coefficients) is higher than previous estimations, which are 10 percent (OLS) and 11 percent (IV). This, in this case, shows rates of returns for an additional year of schooling are 13.5, 13.9, and 13.7 percent for each successive year.

This model was attacked by many scholars. For example Hartog (2000) raises two important issues. First, he argued the definition of over- and under-education, and second the model specification only considers a demand side but ignored the supply side. This argument was support by van der Meer (2006), which is that the incidence of over- and under-schooling depends on the education requirement measure. Our findings also shows the mixed results, after only using both mean and mode values within occupation. With no information of job analysis or self-valuation, it was very difficult

to define required education. However, in the Malaysian context, our results give a little information on the importance of measuring over- and under –schooling. The validity of the measurements, basically would be more influenced by the true measure of required education. On top of that, this model is the homogenous return model. Thus, the arguments of the potential bias is not much different from what was discussed before.

The next section discusses, briefly, financing education in Malaysia. In particular, cost per student at different levels of education.

## 7.5 Education and Funding

In 2007, MYR33.4 billions were allocated to the education sector, one-fifth of the overall amount of budget. This was mainly for operational and development expenditure, of which MYR6.7 billions were allocated for primary education and MYR6.2 billions for secondary education. On the other hand, in line with the development of human capital, tertiary education and training programs received MYR20.5 billions. Since the public sector dominates the provision of education in Malaysia, a huge amount of funding is very important to achieve a national vision. Increase in student enrolments, the development of new infrastructure and expansion of operational cost keep education costly each year. The cost of education, either for government to provide free education (social cost), or for individuals (private costs) increased over the period. Ignoring development and maintenance costs, the recurring costs took half of the overall expenditure.

Recurring costs per student, as shown by Table 7.8 are lower at lower levels of education. Costs increase significantly at higher level; for example, cost per student in

1990 was MYR1, 171.00 for secondary education. The costs of education, as shown by Table 7.8, are calculated based on the official government expenditure on education divided by the number of students for each level of education each year. Therefore, in certain years, the average cost per student might be lower, for example in the year 2000 the recurrent cost per student at higher education is lower than the previous years. It was due to the tight budget at this particular year. However, in higher education, the recurrent costs was ten times more than secondary education. These figures were calculated for regular education, i.e. they refer to regular school for secondary education and uncritical courses at university level. Meanwhile, cost per student at residential or technical school, almost doubled. For example, recurring costs per students in residential and technical schools were MYR7,179.90 and MYR8,130.50 respectively in 2003 (Ministry of Education 2005). Recurring costs per student in critical courses at university level, such as engineering, medical or equivalent at the public universities could reach MYR40,000 per year.

**Table 7.8: Recurrent Cost Per Students (MYR), 1970-2004**

| Year | Primary | Secondary | Higher |
|---|---|---|---|
| 1970 | 155.00 | 310.00 | n.a |
| 1975 | 258.86 | 359.47 | n.a |
| 1980 | 384.00 | 515.00 | 9,903.05 |
| 1985 | 565.00 | 820.00 | 13,180.96 |
| 1990 | 695.00 | 1,171.00 | 12,664.00 |
| 1995 | 1,032.90 | 1,676.00 | 13,119.37 |
| 2000 | 1,552.10 | 2,269.00 | 7,996.81 |
| 2004 | 1,895.30 | 2,804.10 | 20,212.93 |

*Source: Calculated by author from Educational Statistic of Malaysia, various years.*

Assuming that students completed schooling at higher education, one can calculate the total cost of education. In this example, it used those who were at the age of 42. This age represented the mean of the sample. They started primary one in 1970.

The social cost for primary education is MYR1,331.34 (6 years in primary school) and for 5 years in secondary education is MYR2,350.00. Finally, 6 years in tertiary education from 1994 to 2000 cost about MYR61,286.00. Total social cost per student for 17 years of education is MYR64,967.68.

Table 7.9 shows the total cost per student. The third column reveals the private cost per student for each successive level of education. These costs refer to earning forgone if they did not enrol at a previous level of education. It was obvious that private cost is higher than social cost.

**Table 7.9: Total Cost of Education Per Student 1970-1986 (MYR)**

| Level of Education | Social Cost[1] (%) | Private Cost[2] (%) | Total Cost[3] | Private Rate of Return[4] (%) |
|---|---|---|---|---|
| Primary | 1,331.34 (2.05) | 64,178.64 (23.99) | 65,509.98 (19.71) | 4.83 |
| Secondary | 2,350.00 (3.62) | 73,065.00 (27.31) | 75,415.00 (22.68) | 8.22 |
| Tertiary[5] | 61,286.34 (94.33) | 130,265.30 (48.70) | 191,551.62 (57.61) | 16.06 |
| Total | 64,967.68 (100.00) | 267,508.94 (100.00) | 332,476.60 (100.00) | |

*Source: Calculated by author.*

Notes: [1] Social costs refer to recurrent cost per student.
[2] Private costs calculate based on earning foregone.
[3] Total costs is Social + Private costs.
[4] Private rate of returns to schooling based on Mincer equation. Earning foregone for primary education is 3.5 years.
[5] Including pre-university.

This amount will be bigger if the pocket's cost, transportation, extra fees, and other cost are included. The total cost (column four) for primary education is MYR65,509.98, for secondary education is MYR73,065.00 and MYR130,265.30 for higher education. Then, the overall cost for those who completed at degree level is MYR332,476.60. The figures in Table 7.9 reveal that the private cost for four years at higher education exceed the private cost of 11 years at primary and secondary education. Furthermore, the cost for educational funding by the government at higher education is more crucial at higher level. The overall social cost for one student at

tertiary education is approximately equal to 17 students completed at secondary education.

## 7.6 Conclusion

Private rate of return to schooling in Malaysia is stated to be about 10 percent. It is almost equal to the world average and comparable to the Asian region. Compared to previous estimations, for example Chung (2003), the return for each level of schooling reveals the same trend, i.e. the higher return is obtained by pre-university students. Overall returns for all levels are almost double for the higher level of education. The pattern of returns from schooling shows that the returns are higher for those who obtain a certificate than those with only years of schooling, especially at higher level. One additional year of schooling will not yield a higher return if someone does not gain the certificate. Thus, the choice of investment in education may not be merely dependant on years of schooling but the quality of certificate. This circumstance apparently emerged due to the exam-oriented education. On the other hand, employers are able to use credentials as an initial screening device before they go further in recruitment, by taking into consideration the critical thinking, communication skill and personality, in hiring quality labour force. In the competitive labour market, an investment from the exam-oriented educational system will yield higher returns for those who obtain certificates. More years of schooling does not promise higher returns especially without any qualification. On the other hand, the employers have an opportunity to utilize a certificate as a screening device.

Essentially, individuals have different levels of schooling and therefore, the returns vary across individuals. Therefore, the results have clarified the difference in

the returns to different individuals. The IV provide a new estimate of the returns for those who were affected by the educational reforms. The exogenous impact in the Malaysian education system, reveals that the returns are heterogeneous. The result of IV was higher than the classical approach. This significant finding is in line with the evidence of other developed countries. It has added to the literature by showing that the exogenous impact in the Malaysian education system could be used to show that OLS underestimates the returns to education. On top of that, it could be considered as an important value-added research of returns to education in Malaysia.

The increasing educational funding should be followed by the higher social returns to education. Therefore, the first step is a tough challenge for government; i.e. to reduce the numbers of drop-out in the school system and that probably would be a good alternative for the government compared to the reshuffling the entire system. A second challenge is the choice of educational funding: how to allocate the funding between primary and higher education without sacrificing a higher return, or universal education?

# CHAPTER 8 - CONCLUSION AND POLICY RECOMMENDATIONS

## 8.1 Introduction

The impact of education on economic development has been established as an important factor in economic growth. There is emerging evidence which indicates that it is also associated with a wide range of non-economic benefits. Investment in human capital, and by implication in education, has thus moved from reducing poverty and economic inequality, to promoting fuller employment and social cohesion. That education, a part of human capital development, is key to successful economic achievement has been recognized throughout the world. The level of human capital quality segregates the world into developed and less developed countries. In fact, in 2002, the United Nations General Assembly adopted the resolution to implement a UN Decade of Education for Sustainable Development beginning from 2005 to 2014. Prior to that, the UN made an effort to accelerate world education development through the second objective of the UN Millennium Development Goals (MDG) – Universal Primary Education.

In Malaysia, the changes and reforms in the education system reflected the government's determination to reform education not only to provide a universal educational but also to satisfy a national need. Education in Malaysia, as a multiracial country, has been used as to unite and integrate the people by using a common language, system, and curriculum in education. Education, then, changed gradually as a mechanism to reduce and eliminate the incidence of poverty. Further, it became more significant in providing the high quality of human capital to meet the demands of the growing economy. These commitments have been demonstrated by the consistency of

expansion of educational functions in all five year plans since independence. Under the successive five-year plans, education expenditure rose sharply reflecting a higher investment in the secondary, tertiary primary levels. It shows that education is increasingly considered an investment in the collective future of society and the nation.

How valuable is this investment, in terms of returns, at the macro and micro economic levels? The measurement of monetary or non-monetary returns has attracted many scholars. Within this thesis, however, our focus is at the micro economic level and it is limited to the private rate of return to education. The results do not produce clear-cut policy messages. A number of points emerge which should inform policy thinking about human capital investment.

The remainder of this chapter is as follows. The next section of this chapter summarizes the results of the study. It is followed by an overview of the development over time of different methods used to estimate the private rate of return to education. The third section reviews briefly the trend of the returns to education in Malaysia. It reminds us of the results of the basic model and the alternative method of estimation. It is followed by the discussion of schooling and earnings differentials and educational funding. In the fifth section the important issues are put forward as the recommendations from this study. It is followed by a contribution of this thesis and finally, the suggestions for future research in this branch of economics.

## 8.2 Summary of the Empirical Findings

The empirical findings are as follows:

(a) The average private rate of return for an additional year of schooling in Malaysia was 10.6, 10.5 and 10.0 percent for HIS1995, HIS2002 and HIS2004, respectively. It declined by 0.6 percentage points after a decade.

(b) An additional year of experience has increased earnings by 3 to 5 percent for all years of the surveys.

(c) The human capital model, i.e. earnings function, fitted well with the Malaysian data. The models, coefficients and signs were in line with the theory.

(d) The schooling parameters show the private rates of return to education were similar to the world average and slightly higher than the average for Asia.

(e) The returns to qualification have shown a declining trend at the lower levels but remained stable for higher levels. Pre-university obtained the highest return.

(f) The higher level of schooling enjoyed a higher return and was stable over time compared to lower levels of schooling.

(g) The estimation of the private rate of return to schooling using the IV approach is higher than the estimation derived by OLS by approximately 10 to 11 percent.

(h) The earnings gap remains between groups. Female, self-employed and those in rural areas obtained a lower educational attainment and received lower earnings.

(i) The study also revealed the emergence of the incidence of over- and under-schooling.

## 8.3 The Methods of Estimation

The results above are based on OLS and IV estimations. The standard earnings function is used to estimate the private rate of return by applying the log of natural wages to schooling, potential experience and potential experience squared. The schooling coefficient was interpreted as average return to education. The merits of this standard approach were disputed by researchers because of the correlation between schooling and other factors. Then, more experiments using numerous pieces of data were carried out to prove that the OLS approach underestimates the rate of returns to schooling. These experiments made a little, though significant difference to the coefficient in the rate of return to schooling. In this thesis, the exogenous factors as instruments in IV approach, i.e. school reform indicates a higher result than OLS.

The choice of estimating the private rate of return either using OLS or IV depends on the availability of data. In general, a large data set derived from a national survey that provides representative data can be used in comparison with other studies. However, the nature of the national survey may not be detailed enough to satisfy the needs of research. For example, education and earning variables were not covered by the survey and needed to be constructed either based on proxy or assumption. Therefore, these variables will be subject to the bias of measurement error. On the other hand, some samples are based on survey carried out by firms, such samples may be rich in information on schooling and earnings but may be not representative. This was because the data based on firms or individuals surveys are focused on certain groups

only (for example, Lee 1980, in Malaysia). Consequently, the choice of methods was determined by the data available. Moreover, some researchers tended to place all variables (including dummy for occupation, see Psacharopoulos & Patrinos 2004) into the regression and then, claimed the schooling coefficient to be the Mincerian average rate of return to education.

One of the least popular methods used to estimate returns to education is the full method (see, Psacharopoulos 1984; Tan & Mingat 1992). This approach is very rare in the literature because it requires high quality data and huge sample coverage. The enormous sample is very important to develop "well-behaved earning profiles" in order to calculate the earnings forgone for each level of age. The scarcity of such data sets explains why the full method is not popular among the scholars.

The IV approach with natural experiments also has given interesting outcomes. The experimental method uses a twin sample to try to isolate the ability bias. In these experiments limited only to the US data (and a few studies in the UK and Australia) the average private rate of return to education is shown to be higher than results derived using OLS. The alternative model is also trying to solve a problem of endogeneity in schooling by isolating the ability bias. The studies on twins by Ashenfelter & Krueger (1994), Ashenfelter & Rouse (1998), Behrman & Rosenzweig (1999), Bonjour et al. (2003) and others (also Card 1995, 1999 & 2001) have encouraged the development of this approach. This approach has been given great attention by many researchers. Later, some studies used family background, schooling reforms, or other exogenous factors as instruments to reduce the bias in estimation, for example Imbens & Angrist (1994), Harmon & Walker (1995), Harmon & Callan (1999), and others.

Recently, the literature shows another alternative method to estimate the returns. Heckman et al. (1997 & 1998), Imbens (1999), and Dearden (1999), for example, proposed a matching method to estimate the returns to schooling. This method considered the matching of close neighbourhoods in order to reduce selection and other bias in estimation. Indeed, some of the terms used in the research are also being changed, for example "schooling" to "the treatment effects". Whether one calculates the average effect of treatment on treated (ATT) or non-treated (ATNT), the characteristic of estimation allows the researcher to estimate the heterogeneous returns to education.

Blundell et al. (2001 & 2004), compared the methods of OLS, IV, matching (see also, Abadi et al. 2001) and control function in order to investigate the heterogeneous returns by using NCD's data. They found that OLS underestimates the impact of education on earnings. The result of the matching method was between that of OLS and IV, while the result from the control functions approach is lower than from IV but higher than from OLS estimation. Their works have given a new idea at least (if not a new dimension) in providing an alternative method. These methods provided new evidence of heterogeneous returns to education in which returns vary across individuals. At this point, it is interesting to highlight the development of human capital in terms of changing methodologies.

The main issue is the rate of returns to education for the emerging economies (for policy implication) or the implication of the school reforms could be measured more precisely due to the progress of estimation approaches. As long as the data was representative, the method is valid for the available data and the results will be useful along with the other educational findings and, it will give some indicators for policy

recommendations. Thus, it would be interesting to apply a new approach (i.e. matching method) to Malaysian data in future research.

The findings from this study with three data sets of Household Income Surveys suggest that the human capital model fitted well with the Malaysian data. All coefficients, especially schooling, experience and its square were significant. Then, most of the controlling variables or dummies were statistically significant, and the signs consistently validated. I also provide new evidence of homogenous and heterogeneous returns to schooling in Malaysia, as discussed below.

## 8.4 RTE: Updates for Malaysia

The lack of high quality and rich information relating to individuals' earnings and schooling became a barrier to those interested in studying this branch of economics. However, some previous studies have given a basic idea and provide information on returns for each level of schooling. For example, the private rate of return was higher at pre-university, and is followed by university level (Chung 2003 & 2004). Whilst, lower and upper secondary were not showing a high rate of return to education. Our results supported Chung's finding and provided new evidence for Malaysia.

In summary, firstly, I found the average private rate of return in Malaysia almost consistent over a decade. The homogenous return was about 10 percent, equal to the world average and slightly higher than the Asian average. As a developing country, this figure may be regarded as reasonable. Over ten years (1995 to 2004), the private rates of return for Malaysia decreased by only 0.6 percentage points. This figure is also in line with the decreasing private rates of return to education world wide, which was 0.6 percent (Psacharopoulos & Patrinos 2004).

Secondly, the average returns to qualifications or years of schooling differed among individuals. The findings also support previous evidence that showed that staying up to pre-university level enjoyed the highest returns. Apart from that, this study found the emergence of credentialism in the Malaysian labour market. The average return for those who completed schooling half way through a particular level (for example, those who completed one year out of two years at upper secondary or pre-university levels) received the lowest returns. Having education mid-way through a particular level might be not a good decision on investment in education when qualifications are likely to be accepted as a screening device.

Thirdly, the relationship between years of schooling and its return is non-linear. Although there is no clear evidence to explain this relationship, different returns to different years of schooling have been revealed. Those who completed a certain level of schooling but without gaining a qualification did not show the same returns as those who completed at the same level but obtained a qualification (or certificate). For example, those who completed 11 years of schooling (upper secondary) but did not obtain the Malaysian Certificate of Education (MCE), were forced to accept a job with lower qualifications (LCE – with 9 years of schooling). I conclude that in the Malaysian labour market, workers with same years of schooling will receive different returns because credentials are being used as a screening device.

Finally, the important finding in this study reveals the heterogeneous nature of the returns to education in Malaysia. By using IV method, I managed to estimate the Local Average Treatment Effect (LATE) from schooling reforms – the changing of the medium of instruction in the Malaysian education system. It supports the evidence from the wide body of literature that OLS underestimates the returns to education. Using two

sets of data, HIS2002 and HIS2004, the private rates of return to education were increased by between 10 and 11 percent compared to standard OLS-based estimation. This is consistent with the findings from other countries. Furthermore, all diagnostics were tested, and the validity, quality and relevance of the instruments were statistically significant.

This finding could be considered as a valuable addition to the research into returns to education in Malaysia. The results also provided new evidence from the developing economies to the literature on the economics of education. These results, however, should be interpreted carefully. If the OLS estimation is unbiased and consistent, the higher return by IV estimation is due to the impact of policy reforms in education. On the other hand, if one argue that OLS underestimates the returns, the results may imply that the school reform of 1970 is a good instrument. In this case, it is impossible to separate the effects of the instrument on estimation properties and its effect in its own right. However, the LATE shows that returns to education in Malaysia are heterogeneous.

## 8.5 Schooling and Wages Gap

The success of the Malaysian economy in reducing poverty has been spectacular. The incidence of poverty has declined dramatically since the 1970s. With a strong commitment to the achievement of growth and redistribution, the New Economic Policy (NEP) regime has been able to direct development efforts to ensure the reduction of poverty. In 1970, the incidence of poverty was 52.4 percent, decreasing to 13.4 percent in 1993. This figure then declined to less than 10 percent in 2000. However, incomes gap trends were unclear. It seems to have been growing in the

1960s, declining in the 1970s and 1980s, and increasing since then (Jomo & Ishak 1986; Hashim 1997).

The results from this study offer some indications of schooling and earnings differentials. The earnings of females were lower than those of males. The incomes for urban areas were higher than those for rural, due to the fact that the average of years of schooling and earnings (and other characteristics) for urban areas were higher for all years of surveys. The earnings gap between these groups grew wider over a decade. Paid workers enjoyed greater earnings compared to the self-employed. The earnings gap is more obvious between less developed states and developed states. The comparison using zones of residence revealed that the Klang Valley received the highest return. This province also showed the highest earnings and the highest average educational attainment. The results suggest that earnings and schooling are highly correlated in Malaysia.

The Development Composite Index (DCI) which was based on economic and social indicators ranked the Klang Valley as the most developed region in Malaysia. Meanwhile, the Eastern zone, among the poorest of the Malaysian states, demonstrated the lowest ranking of DCI. These states show the lowest returns to schooling (especially for the Kelantan and the Terengganu) and actually obtained the lowest average years of schooling. These states also obtained a lower monthly income of household heads. In addition, the regional earnings gap widened over the period of time surveyed. Thus, one could conclude that the earnings gap is partly explained by the educational attainment of the samples.

## 8.6 Sheepskin Effect

In this study, the Mincerian earnings function was extended to investigate the incidence of over- and under-education. The results are interesting, for the first ever research using the Malaysian household income survey. Some researchers have argued about the definition or measurement of required education and the finding that over-education has a negative impact on earnings. All measurements and methods have advantages and disadvantages. Indeed, this study provides a basic idea as a pointer towards future research by utilizing the standard earnings function in examining the "sheepskin effect" in Malaysia.

The implicit assumption of the human capital theory is that firms and individuals adjust their investment and schooling requirements to the changes of demand and supply. The existence of over-schooling was a short-term phenomenon because of the lack of information and coordination in the labour market (Duncan & Hoffman 1981). However, in the case of under-education, the workers might have stayed in their jobs for a long time.

The findings from this study can be summarized as follows. Firstly, the percentage of over- and under-schooling workers using the definition of mean and one standard deviation was lower than the percentage of workers with the mode values definition. This finding is in line with the important arguments in the literature that the definition of under- and over-education will be affected by division of workers into each category. In Van de Meer (2006), the incidence of over- and under-education depends on the measurement of education requirement. In the case of Malaysia, our results show a number of workers being under-and over-educated depending on the definition of required education. By the first definition (mean and one standard

deviation) the workers adequately educated for an occupation was smaller than the second definition (modal values). However, our data did not give an opportunity to examine details using other definitions such as job analysis or self-evaluation. In addition, the important issue that I would like to address is the emergence of a "sheepskin effect" in the Malaysian labour market, particularly in the private sector. The credential is a sign of productivity in appointing and recruitment.

In the public sector, under-schooling (or over-schooling) are likely to be absent. This is due to recruitment procedures which are based on the qualifications, job specifications and schemes under the Malaysian Remuneration System (*Sistem Saraan Malaysia*). The recruitment process in this scheme is controlled and supervised by the Public Service Department (PSD) and the Public Service Commission (PSC)[98]. The screening process of appointment, recruitment and confirmation of service is conducted by PSD and PSC. Therefore, the incidence of under- and over-schooling is not an issue in PSD. In the isolated cases, some workers might be over-educated after they completed at degree or diploma level of education but remained holding the same post or job.

Secondly, workers in occupations that demand less schooling than they actually have (over-schooling) received lower earnings than those adequately educated. On the other hand, workers with under-schooling enjoyed a higher earnings than those who were adequately educated in the same occupations. These trends were the same for both definitions, but the returns were different.

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[98] The Public Service Commission of Malaysia's function under Article 144(1) of the Federal Constitution stipulated 6 main functions of the Commission, which are; appointment, confirmation of service, conferment into pension status, promotion, transfer, and exercise disciplinary control.

## 8.7 Education and Funding

There is a trade-off between universal education and the higher rates of return. Universal education provides a comprehensive education at a lower level (i.e. primary education). But the higher return was observed at higher levels of education, which is very costly. In Malaysia, the improvement in the literacy rate has been spectacular but more should be done to increase the quality of education. This could be achieved through improved efficiency in teaching and continuously improving the schooling environment. This kind of rectification needs huge funding. In addition, the issues of the lack of experienced teachers and poor infrastructures in rural areas requires the allocation of more funding.

The findings reveal that for the government to support four years at higher education per student costs more than the entire cost per student in 15 years of schooling at lower and upper secondary. This finding is especially important because public higher education is highly reliant on government funding. Since NEP was launched in 1971, almost half of the education spending in five-year plans went to higher education, the remainder going to primary and secondary levels. Increasing higher education fees to lessen the burden on public funding will affect the prospects of students from rural areas or poor families. In 1997, the government established the National Higher Education Fund Corporation (NHEFC) to provide wider opportunities in higher education funding[99]. The alternative is to reduce the financial burden for the government, especially in providing substantial allowances and scholarships for courses that are not considered to be critical to the government's objective. The

[99] The National Higher Education Fund Corporation (PTPTN) was established under the National Higher Education Fund Act 1997 (Act 566) and was effective from 1 July 1997. PTPTN becomes fully operational on 1 November 1997. It offers and gives education loans in the form of financial assistance to students. It also provides a wide range of supports such as administrative, supervisory and collection of loan settlement services.

NHEFC provides a loan for students who are eligible to pursue studies at higher learning institutions. This reflected the government's aspiration to ensure that no students were denied access to a higher level of education because of financial reasons.

In the case of primary and secondary education, the recurrent cost per student increased over time but remained lower than for higher education. These costs related to the increasing expenditure on management, upgrading information technology, facilities, and maintenances.

Malaysian education is very exam orientated. To some extent, the labour market has accepted this system. When a credential offers a signal of productivity and become a screening device in the labour market, it follows that the return to investment in schooling relies more on qualifications rather than years of schooling. Consequently, there is an incentive for students to get a quality of certificate in order to have the better chance in a labour market. In these circumstances, students from a lower family background with a poor learning environment will have less opportunity to obtain good results in national examinations and will always be left behind. On the other hand, rich families are likely to perform better in public examinations either at primary or secondary schools. They have a greater opportunity to enrol in a boarding school or at least in a quality school. Hence, they have advantages when they compete in the labour market.

The lesson (for both states and individuals) here is the that efficiency of the investment and the achievement of a higher private rate of return depends on the qualification and its quality. Therefore, a decision to stay in school should be made at least at a definite point of schooling (i.e. completing at Form 3, Form 5 and Upper 6 with appropriate certificates). Therefore, the challenge for the government is to increase

access to secondary education, particularly in rural areas. Since the costs to the nation are increasing as more is spent on education, an investment in education is more efficient if the number of drop-outs can be reduced and eventually eliminated.

## 8.8 The Policy Context

The UN Millennium Development Goals target is to ensure children will able to complete at primary education everywhere in 2015. But in Malaysia, this goal had already been achieved by 1990 when 99 percent of boys and girls were enrolled at primary education. In fact, 97 percent from above figures were completed at Primary 5. The education gap between young females and males had been completely eradicated by 2000. Literacy levels among individuals aged 10 and above reached 92 percent in 2000. Basic educational needs in the social context have been achieved. But, from the economic perspective, there is still much to achieve. The education gap and earnings differentials remain important agendas. Therefore, previous policies should be evaluated in order to get more information and inputs for future plans.

Again, I point out that this research alone does not offer a direct solution that can be used as a policy for the nation. However, I provide a number of points which could be considered in thinking of the human capital policies in the future.

I found that human capital investment accounts for a significant part of the total national income. A substantial proportion of the national income is devoted to investment in human capital. Public and private spending in education (and training) represents on average about 6 or 7 percent of GDP. The stakes are high and therefore, it is critical to ensure this volume of effort is well directed. On the whole, the evidence we have reviewed is consistent with the view of the literature that economic growth is

related to human capital stock. Therefore, increasing the quantity and quality of the stock of human capital should be an important part of any growth-promoting policy package.

The results from this study have indicated that there are significant economic returns to investment in education. Even though the focus of the study covered private returns, we strongly believe that the social returns are beneficial to society at large. The data and results illustrate how greater public and private expenditure can be rewarded by higher gains, at least in the case of the relative earnings of employed individuals with different levels of initial education. Immediate evidence has been demonstrated by the mean of incomes in Chapter 7. The average earnings for those who completed higher education was higher than those who obtained secondary education . It shows a simple proof of higher reward for higher investment. As a whole, the estimated returns to education compared with returns to other investments, implies that even in pure economic terms, investment in learning is worthwhile.

Our results are clearly demonstrated only for private returns. I know there is no single sector that has a monopoly on human capital investment. Therefore, better measurement of returns could inform some decisions about the most appropriate sharing of the costs, benefits, and responsibilities. Investments, however, have been made by individuals, families, private enterprise and public authorities. All contribute to the total stock of human capital. Investment by government is most appropriate where the public is likely to be more involved. But, in our case, the results suggested that those who completed at pre- and university levels obtained a high private return. Different learning experience and educational levels are mutually reinforcing, and bring

a combination of public and private gains. Calculations of social and private rates of return can help clarify whether a pattern of costs-sharing is appropriate.

In tertiary education where investment is primarily funded by government but accrues a high private return to individuals, it is legitimate to ask whether cost-sharing should be adjusted. It is possible to share the cost of education with the people who obtained higher education and earnings through tax adjustment. In doing so, however, it should take into account the aspects of existing private costs (such as forgone earnings) and public benefits that are not always reported. Thus, I would propose the measurement of the social returns to education, or at least giving more room to researchers who wish to use government data. The absence of rich data, especially on earnings after tax has made it impossible for researchers to measure the benefits from education for society. Better measurement will help governments to evaluate the case for sharing the costs of education between the public and private – i.e. the state and the individual - where markets alone fail to optimize investment.

In the IV estimates, an instrument that used was to pick up the returns to education for those who were affected by the school reforms. In this case, it was reasonable to presume that the compilers, who were being induced by the reforms, higher returns to schooling compared with those groups that not were affected. The LATE interpretation of returns to education, which is the interpretation of the IV estimate in the case of discrete instrumental variables (following Angrist et al. 1996; see also Aakvick et al. 2003) is our estimated parameter of returns to education. It refers to the returns to education for individuals obtaining extra years of schooling due to the impact of the educational reform. It also indicates that the standard IV interpretation of the pupils with the poor family background, in particular those with

non-English influences, are identified when using this school reform. Thus, our results partly explain the benefit of the school reform for the targeted group, which comprises those with the lower income background (especially in rural areas) when the policy was introduced. This kind of research has never been done before with respect to Malaysia. Therefore, further research should be carried out frequently in order to get more input and information to the policy makers. Furthermore, the educational reforms in Malaysia have to be more focused on the target group, in respect of which it is easy to implement, monitor and assess the impact of the policies.

I also provided strong evidence that educational differentials contributed to the incomes gap between states and regions. In fact, developed states such as Kuala Lumpur, Selangor and Penang had an average of schooling 4 to 5 years more than the less developed states. The states of Kelantan, for example, showed an average of schooling attainment of 7 years. This contributed to the lower earnings and returns to education, which were significantly the lowest among states. The returns to education in rural and less developed states are correlated with their lower educational attainment. This could be explained by the lower demand for skilled and educated workers. In rural areas, or less developed states, most educated workers are engaged as civil servants, such as teachers or administrators but less likely to be employed in the private sector. Meanwhile, less educated workers are concentrated in agriculture, are self-employed or work in non-productive sectors. Poor family background and being less educated are always associated with the lower quality of schooling environment and helps accentuate to the income disparity. Even though regional development has been targeted to reduce poverty, it has not been enough to attract more business into this area. Therefore, the more educated people continued to seek job opportunities in Klang Valley or in other developed states. In future planning, government should focus on

rural area or less developed states by providing an administrative centre, free trade zone or business centre. Or maybe it is more efficient to achieve the goals of regional development through the regional development strategy. This could create more jobs and reduce the number of educated people migrating to urban areas.

In the public service department's scheme, the civil servants who obtained a primary education get a basic salary as low as MYR500.00 per month (not including other allowances). These workers were categorized the *Support Group II (Grade 1 to 16)* category. Their monthly income, actually, was lower than the poverty line for Malaysia in 2004. The official figures of Poverty Line Income (PLI) were MYR691.00, MYR698.00 and MYR691.00 for overall, urban and rural respectively, in 2004 (EPU 9MP 2006). But, at the same time civil servants with lower education attainment have been paid lower than the PLI. This is in contradiction with the policy to reduce and eventually eradicate the incidence of poverty. Furthermore, there is no clear evidence that workers with the same educational attainment in the private sector receive wages in excess of the PLI.

Thus, it would be interesting to speculate what would happened if minimum wage was introduced in Malaysia. Evidence from other countries shows that minimum wage could help to reduce earnings gap. For example, the implementation of the National Minimum Wage (NMW) in the UK in 1999 raised the real and relative pay of low wage workers, narrowed the gender pay gap and now covers around 1-worker-in-10 (Metcalf 2007). Fitzner (2006) also confirms that "the minimum wage has not only significantly reduced the incidence of low pay; it has also helped contain wage inequality" (p.14). Similarly Lam et al. (2006), "the NMW does appear to be reducing inequality at the bottom of the wage distribution".

As suggested by the Congress of Unions of Employees in the Public and Civil Service (Cuepacs), the minimum wage for civil servants is RM1000.00. But, a further related policy implication is that minimum wage hikes might adversely affect public deficits in the longer term (via the public sector wage bill and the benefits and pensions bill), undermining the fight against poverty and inequality. In the short term, this policy might stimulate inflation. Given these policy implications, it is advocated here that more research is needed in this area before the minimum wage can be more convincingly justified to alleviate poverty or to reduce income disparity.

In the public services, the workers are paid on a monthly basis. But, the pattern in the private sector is more flexible, based on hours worked or paid on a monthly basis. The government has never fixed the amount for the lowest wage per hour. Therefore, some workers might be receiving earnings that are lower than their qualifications would suggest. If the government implemented more flexible hours work (or part-time work) in the public sector, and at the same time a minimum wage in the labour market, this would create more opportunities for workers to participate in the labour market, in particular those who obtained higher qualification but were not able, for various personal and family reasons, to work full time.

As mentioned previously, public funding in education is always crucial. Evidence from developed nations shows that private funding, especially in higher education, is the best way to reduce public spending in education. In lower education, especially pre-school and primary education there has been increasing participation by the private sector. But, in public higher education, more commitment and collaboration with the private sector is needed. Recently, the number of private universities increased dramatically, some of them collaborating with foreign higher education institutions

which are well funded through students' fees. It is possible to start by creating more opportunities for the private sector to be involved in research and development in higher education. Some of the research findings and products from higher education were outstanding and marketable. But it requires more funding to enhance the quality and to reduce the cost. Thus, vigorous participation from the private sector is vital to facilitate the expansion of higher education funding and lessen the government role. Indeed, the private sector will get the benefit from this collaboration. However, the quality of the public universities entirely depends on public funding; any decline in public funding might affect the quality of the universities. Therefore, the trade-off between high quality of higher education and lower public funding should be considered as a critical factor by the policy makers. At the same time, active collaboration between higher learning institutions could reduce the mismatch in the labour market. It could be done by working together to design and develop a curriculum based on the market requirement. This would ensure the employability of the graduates. In addition, more students at higher learning institutions will get early exposure to the workplace environment through apprenticeships or structural attachment programmes. Eventually, this will reduce unemployment among the graduates.

The Malaysian education system still adopts the "traditional" model. The students who complete at upper secondary and in many cases, passed upper six examination with the higher quality have a better chance to enter the public universities. The state finances most of the high-scoring students at matriculation centres in critical courses at public universities. The advantage of this model allows greater access for all students to the public universities. However, the highest income students still tend to get into the better universities because there are qualified and

universities are essentially free. In fact, the students from higher and middle income families could afford to enrol at private universities. Heavy subsidies to higher income families through free higher education are inequitable, especially in a society where they do not pay a higher proportion of income tax. It is also, to some extent, in contrast with the egalitarian approach that was proposed by the five years plan.

Finally, I would like to place emphasis on the monitoring, measuring and accounting of human capital accumulation in the country. Better accounting for human capital as an investment can provide better signals to individuals, government, and businesses. The information base on human capital in this country is inadequate not only from the point of view of the policy makers but also in relation to the needs of private individuals and enterprises. Markets need good information to work well. Individuals need better information for their niche and future opportunities before investing in appropriate areas. It is important to them to make sure an investment in education matched with their capability and interest. Government should not be in sole control of such information, but may be in a position to improve the availability of data. The collaboration with the enterprises is useful and encourages revising the accounting system. There is considerable scope for building human capital stocks, investments and returns. Indeed, in order to monitor, measure and account government needs to develop the related indicators. The tasks are complicated and require qualified persons from higher education, research bodies and policy makers to develop the indicators. It should cover the scope of issues; levels of human capital; the nature of, and scope of co-investment; optimizing public expenditure; ensuring more equitable outcomes; and measurement procedures and methods.

## 8.9 Contribution of the Study

The results of this study are significant at least, for those interested in human capital theory, especially with regard to the private rate of returns to education. This study provides also important information to the policy makers. It provides new evidence for the average private rate of return to education in Malaysia. This study corroborates previous findings, in which the return was positive and high at a higher level of education. For the economics of education theory, I have added new evidence from a emerging economy to the existing literature of returns to education. The evidence shows an average private rate of return for Malaysia that is similar to the return for Asia and middle- upper income countries.

The study has highlighted the result of estimation by the instrumental variables approach. This is the first study of returns to education using this approach in Malaysia. The schooling reforms in Malaysia, in particular with reference to the changes of the medium of instruction in 1970 (and thereafter) - could be marked as stepping stone for a future debate about the economics of education in Malaysia. This was the first evidence from this country and supports the findings in the literature that OLS underestimates the returns to education. In addition, our results also support the recent finding of heterogeneity in returns to schooling. The LATE revealed that the return varies across individuals. It supports the findings in the recent literature. Even though I cannot test the findings with other approaches (such as the matching method or the control function) I hope this will bee seen as a beginning that will attract the local economists into future discussion and research. Furthermore, the matching method in future research, the findings could be more fruitful and interesting.

The study describes the impact of schooling on earning differentials. The findings show the positive relationship between schooling and earnings. Those who completed at higher level education obtained a high return. Those in rural areas, which has lower education attainment have a lower income compared to those in urban areas, on average. In addition, an average of schooling was found to be lower in the less developed states. The people in these states received less earnings than those in the developed states. The earnings gap between regions, especially Sabah and Sarawak and Peninsular Malaysia should be regarded as a serious matter for the policy makers to consider.

There are limits to what this research can demonstrate. But, I hope it provides some information in a policy context and stimulates a better environment for a future research, either in terms of funding or access to government data. Along with other research, this research is useful for the policy makers. Furthermore, there is growing recognition of the key role of human capital in growth and social cohesion, and the role of government in guiding investment choices.

## 8.10 Future Research

The crucial issues in estimating the private rate of returns to education are always the quality and extent of the data that is appropriate for the model. Measurement errors regarding the calculation of years of schooling and experience led to bias in estimation. Other omitted variables such as family background, quality of school and ability as discussed in many literatures have influenced the results of estimation. One area of prospective research would be to explore these issues using Malaysian data relating to the record of services. For future research, it is our intention to work in this field.

The research will focus on private rate of returns to teachers' education and training. In Malaysia, there are several qualifications for teachers in the teaching profession. Firstly, for those who hold an education certificate after two and half years training in teachers college. Secondly, those who obtained a diploma in education also qualified as a teacher. The third category comprises the teachers that hold a degree with education or a degree with post diploma of education. In the late 1990s, the government started to upgrade the certificate and diploma holders to degree level by providing training and courses at several public universities. The teachers continue their study at degree level either as full or part time students. Those who registered as full time students earned half of their last basic salary. Meanwhile, the fees for their studies were paid by Ministry of Education. On the other hand, those who registered as part time students paid their fees by themselves but continued to receive the full salaries. By 2010, the Ministry of Education projected that all teachers in secondary schools and 25 percent in primary schools would be graduate teachers. Recently, to teach in secondary education teachers needed a higher education qualifications and teaching certificates (or degree with education). And those with certificates or a diploma of education were teaching in primary education.

Using the record of services, which include all particulars of earnings, schooling records, qualifications and family background, would give a great chance to overcome the problem of measurement error. Furthermore, this future research could also give details of the private cost for the teachers and the social cost for government in job training. Indeed, the results could explain the predicted rate of returns to education for the teachers after they completed their service. This program was crucial because it involved more than half of the teachers in Malaysian schools. The estimation of returns, including costs of training, would give alternative choices in teachers' training in terms

of cost-effectiveness as well. However, the rates of returns to education could be explained for this sample only. But if the data could be extended to the private sectors or government companies it would be more useful.

Furthermore, I would like to estimate the returns to education using the matching method. This estimation needs collaboration with other government agencies, such as the Economic Planning Unit and the Department of Statistics because it will involve a huge amount of HIS data.

# References

Aakvik, A., Salvanes, K. G. & Vaage, K., 2003, *Measuring Heterogeneity in the Returns to Education in Norway Using Educational Reforms,* IZA Discussion Paper No. 815, July 2003.

Abadie, A., Drukker, D., Herr, J. L. & Imbens, G. W., 2001, 'Implementing Matching Estimators for Average Treatments Effect in Stata', *The Stata Journal* (2001), 1, Number 1, pp. 1-8.

Acemoglu, D., 1996, 'A Microfoundation for Social Increasing Returns to Human Capital Accumulation', *The Quarterly Journal of Economics*, vol. 111, No. 3 (Aug., 1996), pp. 779-804.

Acemoglu, D., 2002, *Cross Country Inequality Trends*, Department of Economics Working Paper 02-14. Massachusetts Institute of Technology, MA, February 2002.

Addition, M. D., 2003, *Productivity Growth and Product Variety: Gains from imitation and education*, Policy Research Working Paper 3023, World Bank.

Altonji, J. G. & Dunn, T. A., 1996, 'Using Siblings to Estimate the Effect of School Quality on Wages', *The Review of Economics and Statistics*, Vol. 78, No. 4, pp. 665-671.

Ammermüllerald, A. & Weber, M., 2005, *'Educational Attainment and Returns to Education in Germany: An Analysis by Subject of Degree, Gender and Region'*, Centre for European Economic Research Discussion Paper No. 05-17 (ZEW).

Anand, S., 1983, *Inequality and Poverty in Malaysia: Measurement and Decomposition,* World Bank, Oxford University Press, Washington DC.

Anderson, K. H., King, E. M. & Yan Wang, 2003, 'Market Returns, Transfers and Demand for schooling in Malaysia, 1976-89', *The Journal of Development Studies*, Vol. 39, No. 3, pp. 1-28.

Anderson, L., 1980, 'Rates of Return to Human Capital: A Test using El-Selvador Data, *The American Economic Review*, Vol. 70, No. 2, pp. 138-141.

Angrist, J. D. & Krueger, A., 1991, 'Does Compulsory School Attendance Affect Schooling and Earnings', *Quarterly Journal of Economics*, 106, pp. 979-1014.

Angrist, J. D. & Krueger, A., 1992, 'The Effect of Age at School Entry on Educational Attainment: An Application of Instrumental Variables with Moments From two samples', *Journal of the American Statistical Association*, Vol. 87, pp. 328-336.

Arabsheibani, G. R. & Mussurov, A., 2006, *Returns to Schooling in Kazakhstan: OLS and Instrumental Variables Approach*, IZA Discussion Paper No. 2462, Institute for the Study of Labor, Bonn, Germany, November 2006.

Arias, O., Yamada, G. & Tejerina, L., 2002, *'Education, Family Background and Racial Earnings Inequality in Brazil'*, Inter-American Development Bank, September 2002.

Aromolaran, A. B., 2002, *'Private Rate of Returns to Schooling in Nigeria:1996-1999'*, Centre Discussion Paper No.849, Economic Growth Centre, Yale University.

Asadullah, M. N., 2005, 'Returns to Education in Bangladesh', *Education Economics*, Vol. 14, No. 4, pp. 453-468.

Ashenfelter, O. & Krueger, A., 1994, 'Estimates of the Economic Return to Schooling from a New Sample of Twins', *The American Economic Review*, Vol. 84, No. 5, (Dec., 1994), pp. 1157-1173.

Ashenfelter, O. & Rouse, C., 1998, 'Income, Schooling, and Ability: Evidence from a New Sample of Identical Twins ', *The Quarterly Journal of Economics*, Vol. 113, No. 1 (Feb., 1998), pp. 253-284.

Ashenfelter, O., Harmon, C. & Oosterbeek, H., 1999, 'A Review of Estimates of the Schooling/earnings Relationship, with Test for Publication Bias', *Labour Economics*, 6, (1999), pp. 453-470.

Asian Development Bank, 1999, *Country assistant Plan 2000-2002*, Manila, ADB.

Asian Development Bank, 2003, *Key Indicators 2003: Education for Global Participation*, ADB, Manila.

Atkinson, G. B. J., 1983, *The Economics of Education*, Hodder and Stoughton Ltd, Edinburgh.

Barceinas, F. O., Raymon, J. L. & Roig, J. L., 2000, 'Spain', in C. Harmon, I. Walker & N. Westergaard-Nielsen (eds.), *Education and Earnings in Europe: A Cross Country Analysis of Returns to Education*, Edward Elgar, Cheltenham, UK.

Barret, A., FitGerald, J. & Nolan, B., 2002, 'Earnings Inequality, Returns to Education and Immigration into Ireland', *Labour Economics*, 9, (2002), pp. 665-680.

Barro, R. J., 1991, 'Economic Growth in a Cross Section of Countries', *Quarterly Journal of Economics*, 106 (May), pp. 407-403.

Barrow, L. & Rouse, C. E., 2005, *'Do Differ by Schooling Differ by Race and Ethnicity?'*, Federal Reserve Bank of Chicago, Working Paper WP2005-02.

Bauer, T. K., Dross, P. J. & Haisken-DeNew, J. P., 2002, *Sheepskin Effects in Japan*, IZA Discussion Papers 593, Institute for the Study of Labor (IZA).

Becker, G. S., 1993, *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, 3rd edn, The Chicago University Press, Chicago.

Becker, G. S., 1960, 'Underinvestment in College Education?', *The American Economic Review*, Vol. 50. No. 2, pp. 346-354.

Behrman, J. R., Lori, K., Micheal, M. & Morton, O. S., 1995, *How Family Background Sequentially Affects College Choice: High School Achievement, College Enrolment & College Quality*, MIMEO, University of Pennsylvania.

Behrman, J. R. & Rosenzweig, M. R., 1999, 'The Returns to Schooling: New Evidence from Twins Data', *Economics of Education Review*, 18(2), pp. 159-67

*Berita Harian*. 14 September 2005. RM1.14b for rural education.

Birdsall, N. & Sabot, R., 1995, *'Virtuous Cycle: Human Capital Growth and Equity in East Asia'*, World Bank,Washington DC.

Bishop, J. A. & Chiou, Jong-Rong, 2004, 'Economic Transformation and Earnings Inequality in China and Taiwan', *Journal of Asian Economics*, 15 (2004) 549-562.

Björklund, A. & Kjellström, C., 2002, 'Estimating the Return to Investment in Education: How Useful is the Standard Mincer Equation?', *Economics of Education Review*, 21, pp. 195-210.

Blackburn, M. L. & Neumark, D., 1993, 'Omitted-Ability Bias and the Increase in the Return to Schooling', *Journal of Labor Economics*, 11 (3), pp. 521-44.

Blackburn, M. L. & Neumark, D., 1995, 'Are OLS Estimates of the Return to Schooling Biased Downward? Another Look', *The Review of Economics and Statistics*, 77 (2), pp. 217-30.

Blau, D. M., 1986, 'Self-employment, Earnings, and Mobility in Peninsular Malaysia', *World Development*, Vol. 14, No. 7, pp. 839-852.

Blau, F., Ferber, M. & Winkler, A., 1999, *The Economics of Women, Men, and Work*, 3rd edn., Prentice-Hall, Upple Saddle River, New Jersey.

Blaug, M., 1968, 'The Rates of Return on Investment in Education', in M. Blaug (ed.), *Economics of Education 1: Selected Reading*, Penguin Books Ltd, Middlesex.

Blaug, M., 1973, *Education and the Employment Problem in Developing Countries.* International Labour Office, Geneva.

Blaug, M., 1987, 'Where are We Now in the Economics of Education?', in M. Blaug (ed.), *The Economics of Education and the Education of an Economist*, Edward Edgar Publishing Limited, Hants.

Blom, A., Holm, N. & Verner, D., 2001, 'Education, Earnings and Inequality in Brazil, 1982 – 1998: Implications for Educational Policy', *World Bank Policy Research Working Paper* 2686, October 2001.

Blood, P. B., 1995, *Pakistan: A Country Study,* Federal Research Division, Library of Congress.

Blundell, R., Dearden, L. & Sianesi, B., 2004, *'Evaluating the Impact of Education on Earnings in the UK: Models, Methods and Results from the NCDS',*: University College London and Institute of Fiscal Studies, December 2004, London.

Blundell, R., Dearden, L., Goodman, A. & Reed, H., 2000, 'The Returns to Higher Education in Britain: Evidence From a British Cohort', *The Economic Journal,* 110 (February), pp. F82 – F99, © Royal Economic Society 2000.

Blundell, R., Dearden, L., Meghir, C., 1996, *The Determinants and Effect of Work related training in Britain.* Institute of Fiscal Studies, London.

Blundell, R., Dearden, L. and Sianesi, B., 2001, *Estimating the Returns to Education: Models, Methods and Results.* London: University College London and Institute of Fiscal Studies.

Bonjour, D., Cherkas, L. F., Haskel, J. E., Hawk D. D. & Spector T. D., 2003, Returns to Education: Education from UK Twins, *American Economic Review,* vol. 93, no. 5, pp. 1799-1802.

Bound, J., Jeagar, D. A. & Baker, R., 1995, 'Problem with Instrumental Variables Estimation when the Correlation between Instruments and Endogenous Explanatory Variables is Weak', *Journal of the American Statistical Association,* 90 (430), pp. 443-450.

Bowman, M. J., 1968, 'The Human Investment Revolution in Economic Thought', *Sociology of Education,* Vol. 39, No. 2, (Spring), pp. 111-37.

Bowman, M. J., 1968, Human capital: Concepts and Measures', in *Reading in the Economics of Education,* UNESCO, Paris, France.

Blinder, A. S, 1976, 'On dogmatism in Human Capital Theory', *Journal of Human Resources,* 11, (Winter 1976), pp. 8-22.

Brojas, G. J., Stephen G. B. & Trejo, S. J., 1992, *Self-selection and internal migration in the United States,* NBER Working Paper No. 4002.

Bronars, S. G. & Oetingger, G. S., 2006, 'Estimates of Return to Schooling and Ability: Evidence from Sibling Data', *Labour Economics,* 13, (2006), pp. 19-34.

Brown, S. & Sessions J. G., 2006, 'Evidence on the Relationship Between Firm-based Screening and the Returns to Education', *Economics of Education Review,* Volume 25, Issue 5, October 2006, pp. 498-509.

Brown, S. & Sessions, J. G., 1998, 'Education, Employment Status and Earning: A Comparative Test of the Strong Screening Hypothesis', *Scottish Journal of Political Economy,* 45(5), pp. 586-591.

Brunello, G. & Ariga, K., 1997, 'Earnings and Seniority in Japan: A Re-apparaisal of the Existing Evidence and a Comparison with the UK', *Labour Economics*, 4, pp. 47-69.

Brunello, G. & Miniaci, R., 1999, 'The Economics Returns to Schooling for Italian Men. An Evaluation Based in Instrumentals Variables', *Labour Economics*, 6, pp. 509-519.

Buchinsky, M., 1997, 'Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research', *The Journal of Human Resources*, XXX111, 1, pp. 88-126.

Buchinsky, M., 1994, 'Changes in the U.S. Wage Structure 1963-1987: Application of Quantile Regression', *Econometrica*, Vol. 62. No. 2 (Mar., 1994), pp. 405-458.

Budría, S. & Pereira, P. T., 2005, *'Educational qualifications and wage inequality: Evidence from Europe'*, Institute for Labour Study, IZA Discussion Paper No. 1763.

Burney, N. & Irfan, M., 1991, 'Parental Characteristics, Supply of Schools, and Child School Enrolment in Pakistan', *The Pakistan Development Review*, 30(1), pp. 21- 62.

Butz, W. P. and Vanzo, J. D. 1978, Malaysian Family Life Survey: Summary Report R-2351-AID, March 1978. RAND, Santa Monica, CA

Byron, R. P. & Manaloro E., 1990, 'Returns to Education in China', *Economic Development and Cultural Change*, 38 (4), pp. 738-796.

Callan, T. & Harmon, C., 1999, 'The Economic Return to Schooling in Ireland', *Labour Economics*, 6 (1999), pp. 543-550.

Cameron, S. V. & Heckmen, J. J., 1999, *'The Dynamics of the Educational Attainments for Blacks, Hispanics and Whites'*, National Bureau of Economics Research, Working Paper 7249.

Campos, J. E. & Root, H. J., 1996, *'The Key to the Asian Miracle: Making Share Growth Credible'*. Washington DC: Brookings Institution.

Campos, N. F. and Jolliffe, D., 2002, *'After, Before and During: Returns to Education in Hungarian Transition'*, William Davidson Working Paper Number 475, April 2002.

Cappelliari, L., 2002, 'Earnings Dynamics and Uncertainty in Italy: How Does Do They Differ between the Private and Public sector?', *Labour Economics*, 9, pp. 476-496.

Card, D., 1999, 'The Causal Effect on Education and Earning', in O. Aschenfelter & D. Card (eds.), *Handbooks of Labour Economics* 3, North-Holland.

Card, D., 2001, 'Estimating the Returns to Schooling: Progress on Some Persistent Econometrics Problem', *Econometrica*, 69 (5), pp. 1127-1160.

Card, D., 1995, 'Using Geographic Variation in College Proximity to Estimate the Return to Schooling', in Christofides, L. N., Grant, E. K., Suidinsky, R. (eds.), *Aspects of Labour Market Behaviour: Essays in Honour of John Vanderkamp*, University of Toronto Press, Toronto.

Carnoy, M., 1996, 'Race, Gender, and the Role of Education in Earnings Inequality: An Introduction', *Economics of Education Review*, Vol. 15, No. 3, pp. 207-212.

Chamsuri, S., Surtahman, K. K. & Norshamliza, C., 2005, *Ekonomi Malaysia (Malaysian Economy)*, 6th edn., Pearson, Petaling Jaya, Malaysia.

Chapman, B. J. & Harding, J. R., 1985, 'Sex Differing in Earnings: An Analysis of Malaysia Wage Data', *The Journal of Development Studies*, 21, No. 3 (April 1985), pp. 3672-73.

Chevalier, A. & Lyden, R., 2001, *'Estimates of the Effect of Education on Job Satisfaction'*, University of Warwick, Mimeo.

Chiswick, B. R., 1998, 'Interpreting the Coefficient of Schooling in the Human Capital Earnings Function', *Journal of Educational Planning and Administration*, 12(2), pp. 123-130.

Chiswick, B. R., 2003, *Jacob Mincer, Experience and the Distribution of Earnings*, IZA Discussion Paper No. 847, August 2003.

Chung, T. P., 2003, 'Returns to Education: Updates for Malaysia', *Applied Economics Letters*, 10, pp. 837-841.

Chung, T. P., 2004, 'The Returns to Education and Training: Evidence from the Malaysian Family Life Surveys', *Pacific Economic Review*, 9: 2 (2004), pp. 103-116.

Clark, D. H. & Fong, P. E., 1970, 'Returns to Schooling and Training in Singapore', *Malayan Economic Review*, No.2 (Oct. 1970), pp. 42 – 48.

Cohen, J. E. & Bloom, D. E., 2005, 'Cultivating Minds', *Finance and Development*, June 2005, IMF, New York.

Cohen, J. E., 1995, *How Many People Can Earth Support?*, W.W. Norton, New York.

Cohn, E. & Khan, S., 1995, 'The Wage Effects of Over-schooling Revisited', *Labour Economics*, Vol. 2, pp. 67-76.

Cohn, E., Kiker, B. & Mendes, D. O. M., 1997, 'Further Evidence on the Screening Hypothesis', *Economic Letters*, 25, pp. 289-294.

Cooper, D., McCausland, W. D. & Theodossio, I., 2006, The Health Hazards of Unemployment and Poor Education: The Socioeconomic Determinants of Health Duration in the European Union, *Economics and Human Biology*, 4 (2006), pp. 273-297.

Daiji, K., 2003, 'Human Capital Accumulation of Salaried and Self-employed Workers', *Labour Economics*, 10, (2003), pp. 55-77.

Darity, W. Jr. & Nembard, J. G., 2000, 'Racial and Ethnic Economic Inequality: The International Record', *The American Economic Review*, Vol.90, No.2, Papers and Proceedings of the One Hundredth Twelfth Annual Meeting of the American Economic Association (May, 2000), pp. 308-311.

Davidson, R. & McKinnon, J. G., 1993, *Estimation and Inference in Econometric*, Oxford University Press, New York.

Dearden, L., 1999a, 'The effects of families and ability on men's education and earnings in Britain', *Labour Economics*, 6, pp. 551–67.

Dearden, L., 1999b, *'Qualifications and Earnings in Britain: How Reliable are Conventional OLS Estimates of the Returns to Education?'*, Institute for Fiscal Studies, WP 99/7.

Dearden, L., McGranahan, L. & Sianesi, B., 2004, *'Returns to Education for the 'Marginal Learner': Evidence from the BCS70'*, Centre of the Economics of Education, London School of Economics, December 2004.

Demetris, L. & Psacharopolous, G., 1987, 'Educational Expansion and Returns to Education: Evidence from Cyprus', *International Labour Review*, Vol. 126, No. 5.

Denison, E. F., 1966, 'Measuring the Contribution of Education to Economic Growth', in E. A. Robinson & J. E. Vaizey (eds.), *The Economics of Education: Proceeding of a Conference* Held by the International Economic Association, St Martin's Press, New York.

Deolalikar, A. B., 1993, 'Gender Differences in the Returns to Schooling and in School Enrolment Rates in Indonesia', Journal of Human Resources, Vol. 28, 4, pp. 899-932.

Deolikar, A. B. & Behrman, J. R., 1991, 'School Repetition, Dropouts and the Rates of Returns to Schooling: The Case of Indonesia', *Oxford Bulletin of Economics and Statistics*, 53, 4, pp.467-480.

Department of Statistic, Malaysia, 1991, *Social Statistic Bulletin*, DOS, Kuala Lumpur, Malaysia.

Department of Statistic, Malaysia, 2005, *Social Statistic Bulletin 2004*, DOS, Kuala Lumpur, Malaysia.

Department of Statistic, Malaysia, 2006, *Social Statistics Bulletin*, DOS, Kuala Lumpur.

Department of Statistic, Malaysia, 1996, *Overview of the Household Income Survey in Malaysia* [Internet], Paper presented at Expert Group on Household Income Statistics, 2-4 December 1996, Available:

http://listproject.org/links/canberra/caberrareport/hasan.htm., [Accessed on 15 December 2005].

Dougherty, C., 2003, 'Numeracy, Literacy and Earnings: Evidence from the National Longitunal Survey of Youth', *Economics of Education Review*, 22, (2003), pp. 511-521.

Duflo, E., 2001, 'Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment', *American Economic Review* 91, No. 4, pp. 795–813.

Duncan, G. J. & Hoffman, S. D., 1981, 'The Incidence and Wage Effects of Overeducation', *Economics of Education Review*, 1, (1981), pp. 75-86.

Duranton, G. & Monastiriotis, V., 2002, 'Mind the Gaps: The evolution of Regional Earnings Inequalities in the UK, 1982-1997', *Journal of Regional Science*, Vol. 42, No. 2, 2002, pp. 219-256.

Dutta, P. V., 2006, 'Returns to Education: New Evidence for India, 1983-1999', *Education Economics*, Vol. 14, No. 4, pp. 431-451.

Economic Planning Unit, Malaysia, 1971, *First Outline Perspective Plan (OPP1) 1971-1990,* Government Printing, Kuala Lumpur.

Economic Planning Unit, Malaysia, 1986, *Five Malaysian Plan (5MP) 1986-1990,* National Printing Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia, 1990, *Second Outline Perspective Plan (OPP2) 1991-2000,* Government Printing, Kuala Lumpur.

Economic Planning Unit, Malaysia, 1991, *Sixth Malaysian Plan (6MP) 1991-1995,* National Printing Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia 1996, *Seven Malaysian Plan (7MP) 1996-2000,* National Printing Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia, 2001, *Eight Malaysian Plan (8MP) 2001-2006,* National Printing Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia, 2001, *Third Outline Perspective Plan (OPP3) 2001-2010,* National Printing of Malaysia, Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia ,2003, *Mid-Term Review of the Eight Malaysian Plan,* National Printing of Malaysia, Ltd, Kuala Lumpur.

Economic Planning Unit, Malaysia, 2004. *Malaysia: 30 Years of the Poverty Reduction, Growth and Racial Harmony.* EPU, Kuala Lumpur.

Economic Planning Unit, Malaysia, 2004a. *Quality of Life.* EPU, Kuala Lumpur.

Economic Planning Unit, Malaysia, 2006, *Ninth Malaysian Plan (9MP) 2006-2010,* National Printing Ltd, Kuala Lumpur.

Faaland, J., Parkinson, J. and Saliman, R., 1990, *Growth and Ethnic Inequality: Malaysia's New Economic Policy,* Hurst & Company, London.

Fersterer, J. and Winter-Ebmer, R., 2003a, 'Are Austrian Returns to Education Falling over Time?', *Labour Economics* 10(1): 73-89.

Fersterer, J. and Winter-Ebmer, R 2003b, 'Smoking, Discount Rates, and Return to Education', *Economics of Education Review*, 22, pp. 561-566.

Filer, R. K., Jurajda, S. and Planosky, J., 1999, 'Education and wages in the Czech and Slovak Republics during transition', *Labour Economics*, 6, pp. 581-593.

Finis, W., 1973, 'Black and Whites Differences in Returns to Schooling', *The American Economic Review*, Vol. 63, No. 5 (Dec., 1973), pp. 893-907.

Fitzner, G., 2006, *'How Have Employees Fared? Recent UK Trends'*, Employment Relations Research Series 56, DTI.

Fleisher, B. M. & Wang, X., 2005, 'Returns to Skills and Speed of Reforms: Evidence from Central and Eastern Europe, China, and Russia', *Journal of Comparative Economics 33* (2), pp. 351-366.

Fleisher, B. M., Sirianova, K. & Wang, X., 2005, 'Returns to Schooling in China Under Planning and Reform', *Journal of Comparative Economics,* 33, (2005), pp. 265-277.

Fredland, J. E. & Little, R. D., 1981, 'Self-employed Workers: Returns to Education and Training', *Economics of Education Review*, 1(3), pp. 315-337.

Freire-Serén, M. J., 2002, 'On Relationship Between Human Capital Accumulation and Economic Growth', *Applied Economics Letters*, 2002, 9, pp. 805-808.

Fuente, A. & Ciccone, A., 2002, *Human Capital in a Global and Knowledge-based economy,* OECD: Final Report, Paris.

Gallup, J. L., 1997, *Ethnicity and Earnings in Malaysia,* Harvard Institute for International Development, Development Discussion Paper No.592.

Garcia-Mainar, I. & Montuenga-Gomez, V. M., 2005, 'Education Returns of Wage Earners and Self-employed Workers: Portugal vs. Spain', *Economics of Education Review,* 24, (2005), pp. 161-170.

Giles, J., Park, A. & Zang, J., 2004, *The Proletarian Cultural Revolution, Disruptions To Education, and Returns to Schooling in Urban China,* Department of Economic, University of Michigan, An Arbor, MI.

Ginther, DK 2000, 'Alternative Estimates of the Effect of Schooling on Earnings', *The Review of Economics and Statistics*, Vol. 82, No. 1 (Feb., 2000), pp. 103-116.

Giovagnoli, P. I., Fiszbein, A. & Patrinos, H. A., 2005, *Estimating the Returns to Education in Argentina: 1992-2002*, World Bank Policy Research Working Paper 3715, September 2004.

Griliches, Z., 1977, 'Estimating the Returns to Schooling: Some Econometric Problems', *Econometrica*, Vol. 45, No. 1 (Jan., 1977), pp. 1-22.

Griliches, Z. & Mason, W., 'Education, Income, and Ability', *Journal of Political Economic*, 80, No. 3, Pt. 2 (May/June 1972), pp. 74-103.

Groot, W. & Brink, H., 2000, 'Overeducation in Labor Market: A Meta-analysis', *Economics of Education Review*, 19, pp. 149-158.

Gupta, S. & Verhoeven, M., 2001, 'The Efficiency of Government Expenditure: Experience from Africa', *Journal of Policy Modelling*, 23(4), pp. 433-467.

Gustafsson, B. & Li, S., 2000, 'Economic transformation and gender earnings gap in urban China', *Journal of Population Economics,* 13, pp. 305-329.

Haddad, L., 2002, *An Integrated Approach to Early Childhood Education and Care,* UNESCO, Paris.

Haegeland, T., Klette, T. K., & Salvanes, K. G., 1999, 'Decline Returns to Education in Norway? Comparing Estimates Across Cohorts, Sectors and Over Time', *Scandinavian Journal of Economics*, 101 (4), pp. 555-576.

Halvorsen, R. & Palmquist, R., 1980, 'The Interpretation of Dummy Variables in the Semilogarithmic Equations', *The American Economic Review*, Vol. 70, No. 3. (Jun., 1980, pp. 474-475.

Hansen, W. L., 1963, 'Total and Private Rates of Return to Investment in Schooling', *The Journal of Political Economy*, Vol. 71, No. 2 (Apr., 1963), pp. 128-140.

Hanushek, EA & Luque, JA 2003, 'Efficiency and equity in schools around the world', *Economics of Education Review*, 22, (2003), 481-502.

Hanushek, E. A., 2005, 'Why Quality Matters in Education', *Finance and Development*, June 2005, pp. 15-19, IMF, New York.

Harmon, C. & Walker, I., 1995, 'Estimates of the Economic Rreturn to Schooling for United Kingdom', *The American Economic Review*, Vol.85, No. 5 (Dec., 1995), pp. 1278-1286.

Harmon, C., Oosterbeek, H. & Walker, I., 2003, 'The Returns to Education: Microeconomics', *Journal of Economic Surveys*, Vol.17, No.2, pp. 0115-0141.

Harmon, C., Walker, I. & Westergaard-Nielsen N., 2001, 'Introduction', in C. Harmon, I. Walker & N. Westergaard-Nielsen (eds.), *Education and Earnings in Europe: A Cross Country Analysis of Returns to Education*, Edward Elgar, Cheltenham, UK.

Hartog, J., 2000, 'Over-education and Earnings: Where are We, Where should We Go?', *Economics of Education Review*, 19, pp. 131-147.

Hashim, S. M., 1997, *Income Inequality and Poverty in Malaysia*, Rowman, Boulder.

Hassan, S., 2001, 'Education in Malaysia: Enhancing Accessibility, Capability and Quality', in *The First International Forum on Education Reform: Experience from the Selection Countries, 30 July-2 August*, Bangkok, Thailand.

Hausman, J., 1978, 'Specification Test in Econometric', *Econometrica*, 46(6), pp. 1251-1271.

Haveman, R. & Wolfe, B., 1995, 'The Determinants of Children's Attainments: A Review of Methods and Findings', *Journal of Economic Literature*, December 1995, pp. 1829-1878.

Hawley, J. D., 2004, 'Changing Returns to Education in Times of Prosperity and Crisis, Thailand 1985–1998', *Economics of Education Review*, 23, pp. 273-286.

Heckman J. J., 1990, 'Varieties of Selection Bias', *American Economic Review*, American Economic Association, Vol. 80(2), pp. 313-18.

Heckman, J. J. & Honoré, B. E., 1990, 'The Empirical Content of the Roy Model, *Econometrica*, Vol. 58, pp. 1121-49.

Heckman, J. J., Ichimura, H. & Todd, P., 1997, 'Matching as an Econometric Method Evaluation Estimator: Evidence from Evaluating a Job Training Programme', *Review of Economic Studies*, 64, pp. 605-654.

Heckman, J. J., Ichimura, H., Smith, J. & Todd, P., 1998, 'Characterizing Selection Bias using Empirical Data', *Econometrica*, Vol. 66, pp. 1017-98.

Heckman, J. J., & Vytlacil, E. J., 2000, 'The Relationship Bbetween Treatment Parameters within a Latent Variable Framework', Economics Letters, 66 (2000), pp. 33–39.

Heckman, J. J. & Li, X., 2004, 'Selection Bias, Comparative Advantages, Heterogeneous Returns to Schooling to Education: Evidence from China in 2000, *Pacific Economic Review* 9, pp. 155-171.

Hicks, N. L., 1980, 'Is There a Trade-off Between Growth and Basic Needs?', Finance and Development, 17 (2), pp. 17-20.

Hicks, N. L., 1987, 'Education and Economic Growth', in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies*, Pergamon Press, Headington Hill Hall, England.

Hoerr, O. D. 1973, 'Education, Income, and Equity in Malaysia', *Economic Development and Cultural Change*, Vol. 21, No. 2 (Jan., 1973), pp. 247-273.

Holmes, J., 2003, 'Measuring the Determinants of School Completion in Pakistan: Analysis of Censoring and Selection Bias', *Economics of Education Review*, 22, pp. 249-264.

Imbens, G. W. & Angrist, J. D., 1994, 'Identification and Estimation of Local Average Treatment Effects', *Econometrica*, Vol. 62, No. 2. (Mar., 1994), pp. 467-475.

Imbens, G. W., 2000, 'The role of Propensity Score in Estimating Dose-response Functions', *Biometrica*, 87, 3, pp. 706-710.

International Labour Office, 1970, *Yearbook of Labour Statistics*, Geneva.

International Labour Office, 1975, *Yearbook of Labour Statistics*, Geneva.

Johnson, E. N. & Chow, G. C., 1997, 'Rates of Returns to Schooling in China', *Pacific Economic Review*, 2 (2), 101-113.

Johnson, P. A. 2002, 'Intergenerational Dependence in Education and Income', *Applied Economics Letters*, 2002, 9, pp. 159-162.

Jomo, K. S. and Ishak, S., 1986, *'Development Policies and Income Inequality in Peninsular Malaysia'*, Institute for Advance Studies, University of Malaya, Kuala Lumpur:

Joy, L., 2006, 'Occupational Differences between Recent Male and Female College Graduates', *Economics of Education Review*, Vol. 15, No.3, pp. 207-212.

Jung, H. S. & Thorbecke, E., 2003, 'The Impact of the Public Expenditure on Human Capital, Growth, and Poverty in Tanzania and Zambia: A General Equilibrium Approach', *Journal of Policy Modelling*, 25 (2003), pp. 701-725.

Kakwani, N., Prakash, P. & Son, H., 1999, 'Growth, Inequality and Poverty: An Introduction', *Asian Development Review: Studies of Asian and Pacific Economic Issues*, Vol. 18, No. 2, pp. 1-21.

Kalwij, A., 2000, 'Estimating the Economic Return to Schooling on the Basis of Panel Data', *Applied Economics*, Vol. 32(1), pp. 61-71.

Kamermann, S. B., 2002, *Early Childhood Care and Education and Other Families Policies and Programs in South-East Asia.* UNESCO, Paris.

Kandker, S. R., 1990, *Labor Market Participation, Returns to Education and Male-Female Wage Differences in Peru.* Policy, Research, and External Affairs Working Papers WPS461, World Bank, Washington DC.

Kasianga, H., 2004, *Schooling Returns for Wage Earners in Burkina Faso: Evidence From the 1994 and 1998 National Surveys,* Centre Discussion Paper No. 892, Yale University.

Katarina, K., 1999, 'Were there no Returns to Education in The USSR? Estimates from Soviet-Period Household Data', *Labour Economics*, 6, (1999), pp. 417-434.

Katz, L. F., Loveman, G. W. & Blanchflower, D. G., 1993, *A Comparison of Changes in the Structure of Wages,* NBER Working Paper No. W4297, March 1993.

Knight, J. & Song, L., 2003, 'Increasing Wage Inequality in China: Extent, Elements and Evaluation', *Economics of Transition*, 4, pp. 597-620.

Koenker, R. & Hallock, K. F., 2001, 'Quantile Regression', *The Journal of Economics Perspectives*, Vol. 15, No.4 (Autumn), pp. 143-156.

Krugman, P., 1991, *Geography and Trade*, MIT Press, Cambridge MA.

Lächler, U., 1998, *Education and Earnings in Mexico,* World Bank Policy Research Working Paper 1949.

Lam, K., Omerod, C., Ritchie, F. & Vase, P., 2006, 'Do Company Wage Policies Persist in Face of Minimum Wage?', *Labour Market Trends*, March, pp. 69-82.

Lauer, C., 2005, *Education, Gender and Earnings in France and Germany: Level and Dispersion Effect,* Centre of European Economic Research Discussion Paper No. 04-54, ZEW.

Lee, K. H., 1980, *Education, earnings, and occupational status in Malaysia,* 1978, PhD thesis, Department of Economics, London School of Economics and Political Science, University of London.

Lee, K. H. &. Sivananthiran A., 1992, 'Employment, Occupational Mobility and Earnings in the Kuala Lumpur Urban Labour Market with Special Reference to Women in the Manufacturing Sector', Report Submitted to the International Labor Organisation/Asian Regional Team for Employment Promotion (ARTEP).

Leeuwen, B. V., 2005, *Estimating the Returns to Education in Indonesia, 1890-2002,* International Institute of Social History.

Levin, J. & Plug, E., 1999, 'Instrumenting Education and Returns to Schooling in Netherlands', *Labour Economics*, 6(4) pp. 521-534.

Lewin, H. M. & McEvan, P. J., 2001, *'Cost-effectiveness Analysis: Method and Applications,* 2nd edn, Sage Publications, Inc., California.

Li, H., 2003, 'Economic Transition and Returns to Education in China', *Economics of Education Review*, 22, (2003), pp. 317-328.

Link, C., Ratledge, E. & Lewis, K., 1980, 'The Quality of Education and Cohort Variation in Black-White Earning Differentials: Reply', *The American Economic Review*, Vol.70, No. 1 (Mar., 1980), pp. 196-203.

Liu, Z., 1998, 'Earnings, Education, and Economic Reform in China', *Economic Development and Cultural Change* 46, pp. 697–726.

Liu, P. & Wong, Yue, 1981, 'Human Capital and Inequality in Singapore', *Economic Development and Cultural Change*, Vol. 29, No. 2 (Jan., 1981), pp. 275-293.

Machin, S. & Vignoles, A., 2004, 'Educational Inequality: The Widening Socio Economic gap', *Fiscal Studies* (2004), Vol.25, No.2, pp. 107-128.

Maier, M., Pfeiffer, F. & Pohlmeier, W., 2004, *Returns to Education and Heterogeneity,*. Centre for European Economic Research Discussion Paper No. 04-34, ZEW.

Martins, P. S. & P. T. Pereira 2000, 'Does Education Reduce Wage Inequality? Quantile Regressions Evidence from 16 Countries', *Labour Economics* 11(3), pp. 355-371.

Maurer-Fazio, M., 1999, 'Earnings and Education in China's Transition to a Market Economy Survey Evidence from 1989 and 1999', *China Economic Review* 10 (1), pp. 17-40.

Maurer-Fazio, M. & Ngan Dinh, 2004, 'Differentials Reward to, and Contribution of, Education in Urban China's Segmented Labour Markets', *Pacific Economic Review*, 9:3 (2004).

Mavromaras, K. G. & Theodossiou, I., 2005, The Structure of Gender Differentials, in J. F. Ermisch and R. E. Wright (eds), *Changing Scotland: Evidence from the British Household Panel Survey*, The Policy Press, Bristol.

Mazumdar, D. & Ahmed, M., 1978, *Labour Market Segmentation and the Determinant of Earnings: A Case Study*, World Bank Staff Working Paper No. 278, World Bank, May 1978.

Mazumdar, D., 1981, *The Urban Labor Market and Income Ddistribution: A Study of Malaysia,* Oxford University Press, New York.

Meerman, J., 1974, 'The Definition of Income in Studies of Budget Incidence and Income Distribution', *Review of Income and Wealth*, 20, pp. 515-522.

Meerman, J., 1979, *Public Expenditure in Malaysia: Who Benefits and Why?* Oxford University Press, New York.

Meghir, C & Palme, M 1999, *Assessing the effect of Schooling on Earnings using a Social Experiment*, Working Paper Series in Economics and Finance 313, Stockholm School of Economics.

Mehmet, O., 1982, 'Malaysian Employment Restructuring Policies: Effectiveness and Prospects under the Fourth Malaysia Plan, 1980-85', *Asian Survey*, Vol. XXX, No. 10, October 1982, pp. 978-987.

Mehmet, O., 1988, *Development in Malaysia,* The Institute of Social Analysis (INSAN), Kuala Lumpur.

Meng, X. & Kidd, M. P., 1997, 'Labour Market Reform and Changing Structure of Wage Determination in China's State During the 1980s', *Journal of Comparative Economics* 25 (3), pp. 403-421.

Metcalf, D., 2007, *Why has the British National Minimum Wage had a Little or no Impact on Employment?,* CEP Discussion Paper No. 781, April 2007.

Miller, P. W., Mulvey, C. & Martin, N., 2004, 'A Test of Sorting Model of Education in Australia', *Economics of Education Review*, 23, pp. 473-482.

Mincer, J., 1972, *Schooling, Experience, and Earning,* National Bureau of Economic Research, Inc., New York.

Mincer, J., 1974, *Schooling, Experience and Earning,* Columbia University Press, New York.

Ministry of Education, Malaysia, 1980, *Education in Malaysia,* Dewan Bahasa dan Pustaka, Kuala Lumpur.

Ministry of Education, Malaysia, 1989, *The Integrated Secondary School Curriculum.* Curriculum Development Centre, MOE, Kuala Lumpur.

Ministry of Education, Malaysia, 1979, *Cabinet Committee Report on the Review of the Implementation of the Education Policy,* Dewan Bahasa dan Pustaka, Kuala Lumpur.

Ministry of Education, Malaysia, 1993, *Education in Malaysia,* Education Research and Planning Unit Division, MOE, Kuala Lumpur.

Ministry of Education, Malaysia, 2001, *Education in Malaysia,* Education Research and Planning Unit Division, MOE, Kuala Lumpur.

Ministry of Education, Malaysia, 2005, *Educational Statistics 2005,* Education Research and Planning Unit Division, MOE, Kuala Lumpur.

Ministry of Finance, Malaysia, 2004. *Economic Report, 2004/2005,* MOF, Kuala Lumpur.

Ministry of Finance, Malaysia, various years, *Economic Report,* Government Printing, Kuala Lumpur.

Moenjak, T. & Worswick, C., 2003, 'Vocational Education in Thailand: A Study of Choice & Reforms', *Economics of Education Review*, 22, pp. 99-107.

Mohd Ridzuan, N., 2001, 'The Challenge for Higher Education in Malaysia, in N. A. David (ed.), *"In an Era of a Knowledge-Based Economy, in Malaysia and the K-Economy: Challenge, Solutions and the Road Ahead",* Pelanduk Publications, Kuala Lumpur.

Monastiriotis, V., 2002, 'Human Capital Wages: Evidence for External Effects from the UK Regions', *Applied Economics Letters*, 2002, 9, pp. 843-846.

Moock, P. R., Patrinos, H. A. & Venkataraman, M., 2003, 'Education and Earnings in a Transition Economy: the Case of Vietnam', *Journal of Education Review*, 22 (2003), pp. 503-510.

Mwabu, G. and Shultz, T. P., 1996, 'Education and Return Across Quantile of The Wage Function: Alternative Explanations for Returns to Education by Race in South Africa', *The American Economic Review*, Vol. 86, No. 2, pp. 335-339.

Nehru, S., Swanson, E. & Dubey, A., 1993, *A New Database on Human Capital Stock: Sources, Methodology, and Results,* World Bank Policy Working Papers WPS 1124.

Nelson, R. R., & Pack, H., 1999, 'The Asian Miracle and Modern Growth Theory', *The Economic Journal,* 109 (July), pp. 416-36.

*New Straits Time*, Editorial, 'Too early to go', 30th April, 2007.

Nikolaou, A. & Theodossiou, I., 2006, 'Returns to Qualifications and Occupation for Males and Females: Evidence from The British Workplace Employee Relations Survey (WERS) 1998', *Applied Economics Letters*, 2006, 13, pp. 665-673.

OECD, 1995, *Education at Glance 1995*, Organization for Economic Co-operation and Development, Paris, France.

OECD, 1998, *Human Capital Investment: An International comparison,* Centre for Educational Research and Innovation, Paris, France.

OECD, 2000, *Financing Education-Investment and Returns: Analysis of the World Education Indicators*, 2002 Edition, Paris, France.

OECD, 2004, *Education at Glance 2004,* Organization for Economic Co-operation and Development, Paris, France.

Okposin, S. B., Abdul Hamid, A. H. & Boon, H. O., 2005, *The Changing Phase of Malaysian Economy,* Pelanduk Publications, Kuala Lumpur.

Palme, M. O. & Wright, R. E., 1992, 'Gender Discrimination and Compensating Differentials in Sweden', *Applied Economics*, 24, pp. 751-759.

Papps, K. L., 2004, *Income Inequality and Gender in New Zealand, 1998 – 2003,* IZA Discussion Paper No. 1365, October 2004.

Paris, W. L. & Willis, R. J., 1993, 'Daughters, Education and Family Budgets: Taiwan Experiences', *Journal of Human Resources*, 28 (4), pp. 863-893.

Patrinos, H. A. & Sakellariou, C., 2004, *Schooling and Labor Market Impacts of a Natural Policy Experiment*, Policy Research Working Paper 3459, World Bank.

Pereira, P. T., & Martins, O., 2000, *Does Education Reduce Wage Inequality? Quantile Regressions Evidence from European Countries,* IZA Discussion Paper No. 120, February 2000.

Plug, E. J. & Levin, J., 1999, 'Instrumenting Education and the Returns to Schooling in The Netherlands', *Labour Economics* 6 (1999), pp. 521-534.

Pons, E. & Gonzalo, M. T., 2001, *Returns to Schooling in Spain: How Reliable are IV Estimates?,* Working Paper No. 446, November 2001, Queen Mary, University of London.

Psacharopoulos, G. & Patrinos, H. A., 2002, *Returns to Investment in Education: A Further Update,* World Bank Policy Research Working Paper 2881, September 2002, Latin America and the Caribbean Region, World Bank.

Psacharopoulos, G. & Alam, A., 1991, 'Earnings and Education in Venezuela: An Update for the 1987 Household Survey', *Economics of Education Review, 10* (1), pp. 29–36.

Psacharopoulos, G. & Patrinos, H. A., 2004, 'Returns to Investment in Education: A Further Update', *Education Economics*, Vol. 12, No. 2, August 2004, pp. 111-134.

Psacharopoulos, G., 1973, *Returns to Education: An International Comparison,* Elsevier, Amsterdam.

Psacharopoulos, G., 1980, 'Returns to Education: An Updated International Comparison', in T. King (ed.), *Education and Income,* Staff Working Paper No. 402, World Bank, Washington, Reprinted in *Comparative Education* 17, pp. 321-41.

Psacharopoulos, G., 1981, 'Returns to Education: An Updated International Comparison', *Comparative Education'*, 17 (3), pp. 321-341.

Psacharopoulos, G., 1985, 'Returns to Education: A Further International Update and Implications', *Journal of Human Resources* 20(4), pp. 583-604

Psacharopoulos, G., 1987, 'Earnings Functions', in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies*, Pergamon Press, Headington Hill Hall, England.

Psacharopoulos, G., 1994, 'Returns to Investment in Education: A Global Updates', *World Development*, 22 (9), pp. 1325-1343.

Psacharopoulos, G. & Arriagada, M. A., 1986, 'The Educational Composition of the Labour Force: An International Comparison', *International Labour Review*, Vol. 125, No. 5, September-October 1986, pp. 561-574.

Psacharopoulos, G. & Woodhall, M., 1985, *Education for Development: An Analysis of Iinvestment Choices,* Oxford University Press, Washington.

Psacharopoulos, G., 1993, *Returns to Investment in Education: A Global updates*, Policy Research Working Papers WPS 1067, Latin America and the Caribbean Region, World Bank.

Rahimah, H. A., 1998, 'Educational Development and Reformation in Malaysia: Past, Present and Future', *Journal of Educational Administration*, Vol. 36. No. 5, 1998, pp. 462-475.

Rahmah, I. & Rogayah, M. Z., 2003, 'Earnings Differentials Determinants between Skills in the Malaysian Manufacturing Sector', *Asian Economic Journal 2003*, Vol. 17 No. 4, pp. 325-340.

Rahmah, I., 1998, *Sumbangan Pendidikan Kepada Ekonomi Malaysia* (A Contribution of Education to Malaysian Economy), 1970-1996, Unpublished Manuscript.

Ramlee, I., & Marinah, A., 2004, ' Cost and Willingness to Pay for Preschool Education in Urban Areas, *The Proceeding of the National Research Finding Conference*, pp. 323-329, Reviera Hotel, Melaka, 16 – 17 June.

Rati, R., 1996, 'Level Of Development and Rate of Returns to Schooling: Some Estimates From Multicountry Data', *Economic Development and Cultural Change*, pp. 839-857.

Ratnavadivel, N., 1999, 'Teacher Education: Interface between Practices and Policies the Malaysian Experience 1979-1997', *Teaching and Teacher Education* 15(1999), pp. 193-213.

Rosenzweig, M. R., 1976, 'Nonlinear Earnings Functions, Age and Experience: A Nondogmatic Reply and Some Additional Evidence', *Journal of Human Resources*, 11 (Winter 1976), pp. 23-27.

Rummery, S., Vella, F. & Verbeek, M., 1999, 'Estimating the Returns to Education for Australian Youth Via Rank-Order Instrumental Variables', *Labour Economics*, 6, (1999), pp. 491-507.

Rubb, P., 2003, 'Over-Education in the Labor Market: A Comment and Re-Analysis of a Meta-Analysis', *Economics of Education Review*, 22 (2003), pp. 621-629.

Ruppert, E., 1998, *Managing Foreign Labour in Singapore and Malaysia: Are there Lessons for GCC Countries*? World Bank Working Paper No.2053, World Bank.

Ryoo, J., Nam, Y-S & Carnoy, M., 1993, 'Changing Rates of Return to Education over Time: A Korean Case Study', *Economics of Education Review*, Vol. 12(1), pp.71-80.

Sakellariou, C., 2003, 'Rate of Returns to Investment in Formal and Technical Education in Singapore', *Education Economics*, 11(1), pp. 73-87.

Sakellariou, C, & Patrinos, H. A., 2004, *Economic Volatility and Returns to Education In Venezuela: 1992-2002*, Policy Research Working Paper 3459, World Bank.

Sakellariou, C., 2004, 'The Use of Quintile Regressions in the Estimating Gender Wage Differentials: A Case Study of The Philippines', *Applied Economics*, 2004, 36, pp. 1001-1007.

Sakellariou, C., & Patrinos, H. A., 2004, *Schooling and Labor Markets Impacts of a Natural Policy Experiment*, World Bank Policy Research Paper 3460, November 2004.

Savanti, P. M. & Patrinos, H. A., 2005, *Rising Returns to Schooling in Argentina, 1992-2002: Productivity or Credentialism*?, World Bank Policy Research Working Paper 3714, September 2005.

Schafgans, M., 1998, 'Ethnic Wage Differences in Malaysia: Parametric And Semiparametric Estimation Of The Chinese-Malay Wage Gap', Special Issue: Application of the Semiparametric Methods for Micro-Data, *Journal of Applied Econometrics*, Vol. 13, No. 5, (Sep.– Oct., 1998), pp.481–504.

Schultz, T. P., 1988, 'Education Investment and Returns', in H. Chenery and T. N. Srinivasan (ed.), *Handbook of Development Economics*, Volume I, Elsevier Science Publisher B.V., Amsterdam.

Schultz, T. P., 1993, 'Investment in Schooling and Health of Women and Men: Quantiles and Returns', *Journal of Human Resources*, 28 (4), pp. 694-734.

Schultz, T. P., 2003, *Evidence of Returns to Schooling in Africa from Household Surveys: Monitoring and Restructuring the Market from Education*, Centre Discussion Paper No. 875, Economic Growth Centre, Yale University, Disember 2003.

Schultz, T. P., 2003a, 'Human Capital, Schooling and Health', *Economics and Human Biology*, 1, p. 207-221.

Sicherman, N., 1991, 'Overeducation' in the Labour Market', *Journal of Labour Economics*, Vol. 9, pp.101-22.

Siphambe, H. K., 2000, 'Rates of Return to Education in Botswana', *Economics of Education Review*, 19 (2000), pp. 291–300.

Sluis, J., Praag, M. & Witteloostuijin, A., 2004, *Comparing the Returns to Education for Entrepreneurs and Employees,* Timbergen Institute Discussion Paper TI 2004-104/3, Amsterdam, Netherlands.

Snograss, D. R., 1996, *Education in East Asian Development: Some Issues and Cases,* Development Discussion Paper No. 547 (August), Harvard Institute and Fellow of Harvard College.

Solmon, L. C., 1987, 'The Range of the Educational Benefits', in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies,* Pergamon Press, Headington Hill Hall, England.

Sotomayor, O. J., 2004, 'Education and Changes in Brazilian Wage Inequality, 1976-2001', *Industrial and Labor Relations Review*, Vol.58. No.1 (October 2004), pp. 94-111.

Stiglitz, J., 2002, *Globalization and its Discontents*, The penguin Press, London, England.

Sweetman, A. & Dicks, G., 1999, 'Education and Ethnicity in Canada', *The Journal of Human Resources*, XXXIV, 4, pp. 668-696.

Tao, Y. D., 2005, 'Determinants of Schooling Returns during the Transition: Evidence from Chinese Cities', *Journal of Comparative Economics*, 33(2005), pp. 244-264.

Tan, J. P. & Mingat, A., 1992, *Education in Asia: A Comparative Study of Cost and Financing*, The World Bank, Washington D.C.

Tanzi, V. & Chu, K., 1998, *Income Distribution and High-quality Growth*, MIT Press, Cambridge, MA.

Teulings, C. and van Rend, T., 2002, *Education, Growth and Income Inequality*, CEsifo Working Paper No. 653 (4), Centre of Economics Studies & Ifo Institute for Economic Research, Germany, January, 2002.

Todaro, M., 1989, *Economic Development in the Third World*, 4th edn, Longman, London.

Trostel, P. A., 2004, 'Returns to Scale is Providing Human Capital from Schooling', *Oxford Economic Papers* 56 (2004), pp. 461-484.

Trostel, P. A., Walker, I. & Woolley, P., 2002, 'Estimates of the Economic Return to Schooling for 28 countries', *Labour Economics*, 9 (2002), pp. 1-16.

Tsang, M. & Kidchanapansich, S., 1992, 'Public Resources and Quality of Primary Education in Thailand', *International Journal of Educational Research*, 17(2), pp. 179-178.

Tsang, M., 1995, Public and Private Costs of Schooling in Developing Countries, in M. Carnoy (ed.), *International Encyclopaedia of Economics of Education*, Cambridge University Press, Cambridge UK.

Tsang, M., 2002, Comparing the Costs of Public and Private Schools in Developing Countries, in H. Lewin & P. McEwan (eds.), *Cost-effectiveness and Education Policy*, Eye on Education, Inc., Larchmont, NY.

Ulrich, L. 1998, *Education and Earnings Inequality in Mexico*, World Bank Policy Research Working Paper 1949, World Bank, Washington DC.

UNESCO, 2003, *Higher Education in Asia and the Pacific 1998-2003*, Report on Meeting of Higher Education Partners, Paris, 23-25 June 2003.

UNESCO, 2003a, *Financing Education-investments and Returns: Analysis of the World Education Indicators,* 2002 Edition, Paris, UNESCO.

United Nation, 2005, *Millennium Achievement Goals Report 2005*, United Nation, New York.

Uusitalo, R., 1999, 'Return to Education in Finland', *Labour Economics*, 6 (1999), pp. 569-580.

Van der Meer, P. H., 2006, 'The Validity of Two Education Requirement Measures', *Economics of Education Review* 25(2006), pp. 211-219.

Vella, F. & Gregory, R. G., 1996, 'Selection Bias and Human Capital Investment: Estimating the Rates of the Return to Education for Young Male', *Labour Economics*, 3, (1996), pp. 197-219.

Verdugo R. R. & Verdugo, N. T., 1989, 'The Impacts of Surplus Schooling on Earnings: Some Additional Findings', *Journal of Human Resources*, 24, No. 4, pp. 629-643.

Verry, W. R., 1987, 'Educational Cost Function, in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies,* Pergamon Press, Headington Hill Hall, England.

Vieira, J. A. C., 1999, 'Return to Education in Portugal', *Labour Economics* 6 (1999), pp. 535-541.

Voon, JP 2001, 'Measuring Social Return to Higher Education Investments in Hong Kong: Production Function Approach', *Economics of Education Review*, 20, (2001), pp. 503-510.

Waizey, J., 1968, 'What Some Economists Said about Education', in *Reading the Economics of Education,* UNESCO, France.

Warwick, N., 1998, 'Restructuring Education in Malaysia: The Nature and Applications of Policy Changes', *Higher Education Policy II* (1998), pp. 257- 279.

Weiss, A., 1995, 'Human Capital vs. Signalling Explanations of Wages', *Journal of Economic Perspectives*, 9 (4), pp. 133-154.

Weiss, R. D., 1970, 'The Effect of the Education on Earnings of Blacks and Whites', *The Review of Economics and Statistics*, Vol. 52, No. 2, pp. 150-159.

Welch, F., 1973, 'Black and Whites Differences in Returns to Schooling', *The American Economic Review,* Vol. 63, No. 5 (Dec., 1973), pp. 893 – 907.

Willis, R. J. & Rosen, S., 1979, 'Education and Self-selection', *The Journal of Political Economy*, Vol. 87, No. 5, Part 2: Education and Income Distribution (Oct., 1979), S7-S36.

Willis, R. J., 1986, 'Wages Determinants', in O. Eshenfelter & R. Layard (eds.), *Handbooks of Labor Economics,* Vol. 1, Elsevier Science Publishers B.V, North Holland.

Woodhall, M., 1987, 'Economics of Education: A Review', in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies,* Pergamon Press, Headington Hill Hall, England.

Woodhall, M., 1987, 'Human Capital Concepts in Economics of Education', in G. Psacharopoulos (ed.), *Economics of Education: Research and Studies,* Pergamon Press, Headington Hill Hall, England.

Woodhall, M., 1972, *Economic Aspects of Education: A Review of Research in Britain,* National Foundation for Educational Research (NFER) in England and Wales, Lancaster.

World Bank, 1993, *The East Asian Miracle: Growth and Public Policy,* Oxford University Press, New York.

Wright, R. E., 2001, *The Rate of Return to Private Schooling*, Labour Economics Research Program, Centre for Economic Policy Research (CEPR), London.

Young, A., 1995, 'The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience', *Quarterly Journal of Economics* 110 (3), pp. 641-80.

Yussof, M., Abu Hassan, F., and Abdul Jalil, S., 2000, *Globalisation, Economic Policy, and Equity: The Case and Malaysia,* OECD, Paris.

Zakaria H. A., 2000, 'Education Development and Reformation in Malaysia Education System: Challenges in the New Millennium', *Journal of Southeast Asian Education,* 1 (3), pp. 113-133.

Zhang, J., Zhao, Y., Park, A. & Song, X., 2005, 'Economics Returns to Schooling in Urban China, 1988 to 2001', *Journal of Comparative Economics* 33 (2005), pp. 730-752.

# Appendix 1-MALAYSIAN EDUCATION SYSTEM

## Table 1A: Malaysian Education System

| World education indicator (WEI) level s (WEI) | Description of program | Entrance requirement | Qualifications awarded | Typical starting age | Typical ending age | Theoretical duration of the programme | Theoretical cumulative duration | Notes | ISCED97 Flows |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Pre-school | School age | | 5 | 6 | 1 | .... | | 0 |
| 1 | Primary | School age | Primary school assessment (UPSR) | 7 | 12 | 6 | 6 | | 1A |
| 2A | Lower secondary (*Forms 1 -3*) | Primary | Lower secondary assessment (*LCE/SRP*) | 13 | 15 | 3 | 9 | Pupils from Chinese and Tamil primary schools spend a year in the Remove class to become proficient in Bahasa Malaysia language. | 2A |
| 3C | Upper secondary (Forms 3-5) | Lower secondary assessment (LCE/SRP) | Certificate of education (MCE/SPM) | 16 | 17 | 2 | 11 | | 3C |
| 3C | Upper secondary (Forms 3-5), technical and vocational | Lower secondary assessment (LCE/SRP) | Certificate of education (MCTE/SPMV) | | | | | | |
| 3A | Pre-university (Form 6, GCE, A-level) | Certificate of education (MCE/SPM) | Higher school certificate of examination (HSC/STPM), General Certificate of Education (GCE) | 18 | 19 | 2 | 13 | Two-year pre-university course that prepares students for the higher school certificate examination | 3A |
| 3A | Pre-university matriculation | Certificate of education (MCE/SPM) | | 18 | 19 | 2 | 13 | | |
| 4C | Post-secondary, teacher training | Certificate of education (MCE/SPM) | Teaching certificate | 18 | 19 | 1 | 13 | Training for pre- and primary teachers[1] | 5C |
| 4C | Skills training | Certificate of education (MCE/SPM) | Certificate | 18 | 18-19 | | | | |
| 5B | Tertiary, teacher training | Certificate of education (MCE/SPM) | Teaching diploma, Diploma of education | 18 | 20-21 | 2-3 | 14 | Training for pre-primary and primary teachers[1] | 5B |
| 5B | Tertiary, polytechnic | Certificate of education (MCE/SPM) | Certificate or diploma in various engineering fields | 18 | 20-22 | 2-4 | 14 | | |
| 5A | University, (1st short) | Higher school certificate of examination (HSC/STPM), General Certificate of Education (GCE) | Bachelor's degree | 20 | 23-24 | 3-4 | 17 | | 5A |
| 5A | University, (2nd long) | Higher school certificate of examination (HSC/STPM), General Certificate of Education (GCE) | Bachelor's degree | 20 | 25-26 | 5-6 | ..... | These programmes include medicine, dentistry, veterinary science and engineering | |
| 6 | Master's (2nd) | Bachelor's degree | Master's degree | 23 | 24-25 | 2 | ..... | | 6 |
| 6 | Doctorate | Master's degree | Doctorate | 24+ | 2&+ | 3-7 | ..... | | |

Notes : [1] The implementation of the *Program Khas Pensiswazahan Guru* (Teachers Graduates Special Programme) has given opportunity to primary teachers to upgrade their qualifications into bachelor's degree level.

# Appendix 2- HOUSEHOLD INCOME SURVEY (HIS)

## 1. The Method of Survey

According to the DOS (1996), this survey has been designed using two-stage stratified sample. The first stage sampling unit is the Enumeration Block, which covers about 80-120 unit living quarters with an estimated population of 600. The Enumeration Blocks are selected using a probability proportionate to size (PPS) linear systematic selection scheme to ensure that it will be more representative for the sample. In the second stage, a sample from the living quarters is selected from each of the sampled Enumeration Blocks which covers both urban and rural areas. HIS did not cover the institutional households which are only represented by 3 percent of the Malaysian households. This means that it only represented the private households in Malaysia. For example in 1980, HIS covered 29,079 households which comprised more than one percent of the total of the Malaysian population, including both rural and urban areas. The survey was actually the smallest sample size as compared to the later HIS. For example, after 1984 HIS covered more than 60,000 samples sizes; 60,934 households in 1984; 60,934 in 1987 and 63,438 in 1989. It is important to state here that "household" is the unit of enumeration based on the arrangement made by an individual person, or group living together and sharing the food or other essentials. Therefore, "household" consists of persons who may be related to each other or unrelated.

Field enumerators interviewed the selected households to collect the data. Normally, DOS provides the supporting materials, such as interview guideline

manuals for each enumerator to maintain the approach consistently. The completed questionnaires will be returned to the regional office for checking, editing and clerical coding to ensure the quality of the fieldwork. Any incomplete or related problems will be referred immediately to the field enumerator to be re-interviewed. After completing the clerical coding and processing, all the data will be sent to the headquarters for further evaluation and checking. These procedures are important in obtaining reliability and to minimize errors in sampling to the level of acceptance. The supervisors will examine about ten percent of the completed questionnaires for random checking as a routine procedure to ensure that any errors are at a minimum level. Then, the questionnaires will be passed to the data entry clerks for the data entry. At this point, the data processing, editing and checking will be carried out again so that errors, duplicates, and missing data are identified, and corrections are made before analysing.

## 2. The Variables in HIS

For the purpose of this study, HIS may be the best source to obtain data about earnings and education in a wide coverage. It does consist of vital items for income surveys that will cover the research objectives, especially the development of earning profiles and further estimates of returns to schooling.

The first part of the survey comprises the household members' particulars where they cover the demographic variables. The basic identification particulars consist of state, town, name and ethnic group of respondent, address, age, and occupation. Details about an individual's characteristics that will be derived from

HIS as important explanatory variables are sex, date of birth, age at the last birthday, ethnic group, marital status and school attendance.

The last three items of household members' particulars refer to schooling variables. Firstly, school attendance representing the respondents who are not in school, currently in school or have completed schooling. Individuals in school will be excluded, but those with no schooling or completed schooling will be included in the study. Secondly, the highest level of formal education in HIS is indicated by the level of schooling. Finally, years of schooling are also described by the highest certificate obtained at school, college or university. In identifying years of schooling, there is also a problem in getting the absolute number. However, one could measure at least the minimum years of schooling.

The concept of income in HIS is very comprehensive. Source of income consists of the earnings derived from wages, salaries, and other receipts from employers, commissions, and net incomes from self-employment, income from rent, interest, dividend and royalties. In addition, incomes other than earnings also include royalties, scholarship and intermittent receipts. Indeed, it can be stated that it covers both money incomes, income in kind and receipts as well. Income in kind includes wages payment in kind, goods and services given free of charges to an employee, value of home produce consumed within the household, for instance the products of agricultural and livestock for family uses. However, estimating returns to education in this study refers to individuals in the labour market, therefore only those between 14 and 65 years will be included.

### 3. Source of Income in HIS

The earning sources of separate individuals, by economic activities, who are self-employed/employer or employee will be included in this study. While the unpaid family workers, housewives or those looking after the home, students, children not at school and others are excluded from the samples. Other than that, HIS also provides the types of occupation and industry. Given this information this study will sustain interest. One could investigate the returns to education not only by social characteristics but also by involving the participation in labour market. Households and individuals earnings in MHIS are reported annually. In HIS data, the monthly incomes are derived from annual income, which is annual income divided by 12. Hence, the monthly income will convert to log monthly wages.

Under the HIS, the sources of earnings consist of the Total Paid Employment Income (INCS01), Total Other Earned Incomes (INCS02), Total Property Incomes (INCS03) and Total Currents Transfers Received (INCS05). The Gross Grand Total (INSC07) was derived from the sum of those incomes [INSC07= INCS (01) + (02) + (03) + (05)]. Monthly income is the Gross Grand Total divided by twelve (12). INCS01 consists of wages and salaries from paid employment income (including allowances, bonuses, other cash and etc.). INCS02 is the total income from self employment comprising agriculture and non-agriculture activities, rent of house or other properties or lodging. Meanwhile, earnings from royalties, rent from agriculture land, interest and dividends are the items in the Total Property Incomes (INCS03). For the Total Currents Transfers Received (INCS05), all income recipients will be asked how much did he/she earn during the last twelve (12) months from remittances (from other household from within and outside the country, alimony,

scholarships/bursaries/fellowships, pensions, other period payments received and gift in cash or in kind. Monthly incomes will be used as a dependent variable in this thesis. However, it is transformed to natural log as explained before.

## 4. Head of Household Particulars

The variables approved by EPU for this study can be divided into two components. The first component is the identification particulars, which are State, Strata, Total of Number of Usual Household Members and Total Number of Income Recipients. The second part is the schooling variables. It covers the highest level of formal education and the certificate (highest) obtained at school, college or university. The coding and explanations for all variables are below.

### *a. Region and State*

This variable consists of the region where the head of household lived at the time of the survey was conducted. For the variable "region", the coding is 01 for Peninsular Malaysia, 02 and 03 for Sabah/Labuan and Sarawak, respectively. HIS also provides data by states. The coding was 01 to 14 for the fourteen states and federal territories in HIS 1995 to 2002, but the HIS 2004 for the state of Sabah and Labuan (12) was carried out separately. Thus coding for Sabah was 12 and for the Federal Territory of Labuan 15. The coding for each state is as follows- 01-Johor, 02-Kedah, 03-Kelantan, 04-Melaka, 05-Negeri Sembilan, 06-Pahang, 07-Penang, 08-Perak, 09-Perlis, 10-Selangor, 11-Trengganu, 12-Sabah, 13-Sarawak, 14-FT Kuala Lumpur and 15-FT Labuan. For the purpose of this thesis, these states then were identified by zone. South

Zone consists of 3 states (Johor, Melaka, and Negeri Sembilan); Klang Valley or Central Zone are Kuala Lumpur and Selangor; East of Kelantan, Terengganu and Pahang. Meanwhile, the states of Penang, Perlis, Perak and Kedah are the North Zone. Finally, Zone Sabah and Sarawak includes both states and Labuan. Klang Valley is covered by two states, which are FT Kuala Lumpur (capital city of Malaysia) and Selangor. These states are highly populated and become a centre of business, finances and services. It also becomes a centre of federal government administration.

***b. Stratum***

Malaysian HIS was classified by stratum using the population of gazette and built-up areas. "Metropolitan" was defined a population of 70,000 and above, while "Urban Large" defined the population of 10,000 to 74,999 people. Populations between 1,000 and 9,000 are defined as "Urban Small". Finally, all other areas were classified as "Rural". For the purpose of urban and rural analyses, the strata are amalgamated into "Urban" for "Metropolitan plus Urban Large" and "Rural" for "Urban Small plus Rural". The coding in this thesis are 01 for "Urban" and 02 for "Rural".

***c. Marital status***

Marital status consists of four groups of persons. First, those who reported themselves as "single" or "never married" will be coded 01 in the data. Second, "married" refers to persons who are married at that time of enumeration. The term "married" is endorsed by law or by religious rites or are living together by mutual agreement. It is coded 02 in the survey. Widowed (03), refers to those who had not remarried after the

death of the spouse at the time of survey. Finally, "divorced" refers to those who terminated their marriages either through law or religious arrangement or separated for a long time without any possibility of reconciliation. These persons were coded as 04 in the survey.

### *d. Schooling*

Schooling variables in Malaysian Household Income Survey were divided by "educational attainment" and "highest certificate obtained". The educational attainment refers to the highest level in which a person has completed schooling or is currently attending, in a public or private educational institution that provides formal education. It is categorized as follows:

(i) No formal education

Refers to persons who never attended school in any of the educational institutions that provide a formal education.

(ii) Primary

Refers to those whose highest level of education attained was standard 1 to 6 or its equivalent.

(iii) Secondary

Refers to those whose highest level of education attained was from form 1 to form 5, GCE 0 Level or its equivalent.

(iv) Tertiary

Includes those whose highest level education is above form 5.

Years of schooling were derived by using educational attainment for each level of education. Years of schooling and coding in HIS are shown by Table 2A below.

**Table 2A: Educational Attainment**

| Educational Attainment | Years of Schooling | Code |
|---|---|---|
| No formal education | 0 | 01 |
| Primary 1 | 1 | 02 |
| Primary 2,3 | 2.5 | 03 |
| Primary 4, 5 | 4.5 | 04 |
| Primary 6 | 6 | 05 |
| Form 1, 2 | 7.5 | 06 |
| Form 3 | 9 | 07 |
| Form 4 | 10 | 08 |
| Form 5 | 11 | 09 |
| Lower 6 | 12 | 10 |
| Upper 6 | 13 | 11 |
| College/Diploma | 14 | 12 |
| Degree | 17 | 13 |

As shown in Table 2A, education attainment from different levels of schooling has been transformed to years of schooling. Therefore, Primary 1 is equal to 1 year of schooling. However, years of schooling for Primary 2 and 3 become 2.5 years (average). The average (2.5) is used due to the difficulty of separating those between Primary 1 and 2. The same applies to Primary 4, 5 and Form 1 and 2.

"The highest certificate obtained" refers to the highest certificate obtained from the public or private educational institution that provides formal education. The certificates in formal education in Malaysia are:

(i) PMR/SRP/LCE

Refers to *Penilaian Menengah Rendah (PMR), Sijil Rendah Pelajaran (SRP) or* Lower Certificate of Education (LCE).

(ii) SPM/MCE

This is refers to *Sijil Pelajaran Malaysia (SPM)* or Malaysian Certificate of Education (MCE) or its equivalent to Senior Cambridge Certificate, General Certificate of Education, O Level and Malaysia Certificate of Vocational Education.

(iii) STPM/HSC and its equivalent

These certificates refer to *Sijil Tinggi Persekolahan (STPM/STP)* or Higher School Certificate (HSC) or its equivalent (Sijil Tingi Agama) and General Certificate of Education A Level and its equivalent.

(iv) Diploma

Refers to diploma or equivalent certificate obtained after category (ii) and (iii) from polytechnic or college prior to a degree qualification.

(v) Degree

Refers to degree (Bachelor, Masters or PhD) obtained from public or private higher institution or its equivalent.

(vi) Not applicable

Refers to those persons who have no formal education.

(vii) No certificate

Refers to those persons who are currently attending school or who have completed schooling without receiving any certificate.

The certificate obtained represents the level of qualification. For instance, those who obtained LCE completed at least lower education. MCE holders were categorized under upper secondary, and pre-university is referring to Diploma, HSC and its equivalent. While, higher education refers to those who completed the university level. The coding in MHIS is shown in by Table 2B.

**Table 2B: Educational Qualifications**

| Certificate obtained | Level of Qualification | Code |
|---|---|---|
| LCE/PMR | Lower secondary | 01 |
| SPM/MCE | Upper secondary | 02 |
| SPMV/SPMV | Upper secondary | 03 |
| STPM/HSC | Pre-university | 04 |
| Diploma/Certificate | Pre-university | 05 |
| Degree | University | 06 |
| Not applicable | No formal education | 08 |
| No certificate | No certificate | 09 |
| Unknown | Missing values | 99 |

Table 2C shows the approximate number of years schooling based on the highest educational credentials.

**Table 2C: Levels of Certificate[1]**

| | Level of certificates in MHIS | Age | Assumed years of schooling |
|---|---|---|---|
| 01 | Lower Certificate of Education | 15 | 9 |
| 02 | SMV | 17 | 11 |
| 03 | Malaysian Certificate of Education | 17 | 11 |
| 04 | Higher School of Certificate | 19 | 13 |
| 05 | Diploma Certificate | 19 | 14 |
| 06 | Degree | 22 | 17 |
| 09 | None certificate | n.a | 0 |
| 99 | Unknown | n.a | 0 |

[1] Degrees is includes those obtained post-degree certificates.

Problems may appear from the highest-level education obtained by an individual because there is no restriction on a student sitting an examination. Except for a degree at the higher learning institution, a student can sit for the particular exam several

times until they obtain the good results in order to apply at the university level. The total number of diplomas held is also very difficult to estimate. After MCE, students who successfully completed Secondary 5 (MCE) has a choice to enrol for a diploma course or continue at lower six levels. The length of diploma level depends on the course taken which are from two to 3 and half years. Due to the unavailability of data, one could assume that the diploma level needs an additional three years of schooling. Therefore, perhaps the years of schooling may be extra or less by half or one year as reported by the level of certificate. However, it is strongly believed that the percentage of the respondents involved in this situation is very small. In this case, the former is the best choice to measure the years of schooling.

***e. Employment status or Activity***

Employment status refers to the position or status of persons during the time of survey. The classification of the status in MHIS is as follows:

(i) Self-employed/Employer

A person who operates a business, a plantation or other trade and employs one or more workers to help him.

(ii) Employee

A person who works for a public or private employer and receives regular remuneration in wages, salary, commission, tips or payment in kind.

(iii) Unpaid family worker

A person who works without pay or wages on a farm, business or trade operated by another member of family.

(iv) Housewife/looking after home

A person who is not working and caring for children at home.

(v) Student

Refers to a student at school, college or higher learning institutions.

(vi) Child not at school

Refers to child who does not attend school or age below schooling ages.

(vii) Others

Refers to pensioners, old ages, and etc.

The coding for status of respondents in HIS begins with 01 for (i), 02 for (ii) and up to 07 for (vii) respectively. The earnings function only is limited to those who receive an income or earnings, therefore the persons under category (iii) to (vi) were dropped from the sample.

## 5. Unit of Analysis

The unit of analysis in this thesis is individuals not the households. However, the data in HIS refer to household heads, especially for earnings variables, where it is the mean income of household head as reported in the HIS. Therefore, to suit with the human capital functions the estimation is restricted to single earners of household heads.

## 6. Data Application

Estimating returns to education in this thesis uses Malaysian Household Income Survey 1995, 2002 and 2004. These data cover almost ten years. Any kind of usage and analysis of the raw HIS data needs special permission from the Economic Planning Unit (EPU), the Department of Prime Minister which acts as the data trustee. The preparation to gather the data began in April 2006. The important documents for the application included the completed official form, passport-sized photo, research proposal and supervisor's supporting letter for submission to EPU. Our research proposal was then sent by EPU to the local university research centres, which are University of Malaya and National University of Malaysia for their comments and recommendations regarding the impact, interest and related issues in this study. Furthermore, the implication of this study will also will be revised according to national security and social implication. Any issues contradictory to government policies, such us national integration or racial groups were prohibited. Therefore, HIS data was kept by EPU under classified data. The application was approved by Research and Evaluation Committee, Macroeconomics Unit of EPU on October 2006 and the HIS data were released 3 weeks later.

## 7. Restriction and Limitation of HIS

The HIS was released by EPU in STATA software package's programs are HIS data from 1995 to 2004. As mentioned above, this thesis will only be analyzing and discussing within the limitations and contexts as approved by the EPU. The first problem to emerge was regarding the respondents or observations, which are only limited to the head of households for each survey. It is defined as a head of person or group of related or unrelated persons, who usually live together, make common provision for food and other essentials of living and sleep in the selected living quarters for at least four out of seven nights of the reference week. An exception is made in the case of fishermen, hunters and loggers who are considered as household members regardless of whether they sleep in the living quarters or not. Therefore, analysing, estimating and findings are limited to this condition only.

Secondly, the earnings variable released by EPU is the "mean of household income", but the other related variable refers to the head of household. This requires a further calculation in order to get the individual's income to fit the human capital model. Apparently, some of the observations will drop from the actual population. Therefore, the analysis, estimating and findings are limited to single earners of households.

To estimate the comprehensive returns to education and income distribution continuously after 30 years of NEP, it needs samples of data starting from early 1970s until the current household income survey. However, due to the limitations of data availability this study will be focusing on the 1990s onwards only. In addition, educational or economic policies, particularly the long-term plan, for example NEP will require more time before achieving the target and objectives. Assuming the person enters primary education at the early stage of NEP's, then, it will take at least

12 years to complete at least his/her pre-university education. Therefore, at least two or three sets of data in ten years time will be analyzed in order to estimate the returns to schooling and income disparity. Meaning that in this study, it requires three of the cross-sectional data sets in 1990s and the most recent data. Apart from that, this study also intends to look at and compare the previous findings for the basic indicator, for example studied by Anand (1983) and Chung (2003). Finally, the race variable is not allowed for the findings and discussions, therefore this study did not examine the wage gap between racial groups.

In spite of that, HIS data also has several advantages in estimating the returns to schooling. The information on individual earnings was difficult to collect by the researcher due to the costs and time limitation. More than that, data on income are sensitive for most of the people. Getting the information on the precise earnings needs more authority and ability. The HIS survey represents a continuing attempt to gather cross-sectional data since 1980s, and also represents the Malaysian population. Furthermore, the variables and clauses are not largely altered since the previous survey. Apart from that, HIS has national instrumentation allowing comparison among stratum, region and group.

# Appendix 3 – RTE: INTERACTION DUMMIES

**Table 3A: Human Capital Earnings Function: Interaction of Years and Schooling Dummies, Age 15-64 (HIS 1995-2004)**

| Variables | Coef. | Robust Std. Err. | t | P>t | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Schooling | .1056 | .0014892 | 70.92 | 0.007 | .1027 | .1085 |
| Exp | .0444 | .0009 | 51.22 | 0.000 | .0427 | .0461 |
| Exp2 | -.0005 | .0000 | -33.35 | 0.000 | -.0006 | -.0005 |
| Single | .0058 | .0092 | 0.62 | 0.533 | -.0124 | .0237 |
| Divorced | -.2207 | .0194 | -11.40 | 0.000 | -.2587 | -.1828 |
| Widow | -.2336 | .0244 | -9.59 | 0.000 | -.2813 | -.1858 |
| Employee | .0317 | .0072 | 4.41 | 0.000 | .0176 | .0458 |
| Rural | -.2508 | .0058 | -43.60 | 0.000 | -.2621 | -.2395 |
| Central | .1119 | .0089 | 12.49 | 0.000 | .0943 | .1294 |
| East | -.2956 | .0087 | -33.90 | 0.000 | -.3127 | -.2785 |
| North | -.2033 | .0080 | -25.30 | 0.000 | -.2191 | -.1876 |
| Sabah & Sarawak | -.0924 | .00874 | -10.61 | 0.000 | -.1094 | -.0753 |
| Year 2002 | .1912 | .0198 | 9.68 | 0.000 | .1525 | .2299 |
| Year 2004 | .3045 | .0199 | 15.33 | 0.000 | .2655 | .3434 |
| Year 2002*Schooling | .0015 | .0019 | 0.79 | 0.430 | -.0022 | .0052 |
| Year 2004*Schooling | -.0051 | .0019 | -2.73 | 0.006 | -.0088 | -.0014 |
| Constant | 5.6641 | .0207 | 273.64 | 0.000 | 5.6235 | 5.7047 |
| R-squared | 0.4145 | | | | | |
| F | 1613.02 | | | | | |
| Observations | 41,542 | | | | | |

## Table 3B: Human Capital Earnings Function: Interaction of Years and Certificates Dummies, Age 15-64 (HIS 1995-2004)

| Variables | Coef. | Robust Std. Err. | t | P>t | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Sch | 0.0679 | 0.0025 | 27.53 | 0.000 | 0.0630 | 0.0727 |
| Exp | 0.0487 | 0.0009 | 54.89 | 0.000 | 0.0469 | 0.0504 |
| Exp2 | -0.0007 | 0.0000 | -41.08 | 0.000 | -0.0007 | -0.0007 |
| Female | -0.2411 | 0.0088 | -27.37 | 0.000 | -0.2584 | -0.2238 |
| Single | 0.0388 | 0.0089 | 4.35 | 0.000 | 0.0213 | 0.0563 |
| Employee | 0.0294 | 0.0071 | 4.15 | 0.000 | 0.0155 | 0.0433 |
| Rural | -0.2619 | 0.0056 | -46.39 | 0.000 | -0.2729 | -0.2508 |
| Central | 0.0847 | 0.0088 | 9.68 | 0.000 | 0.0676 | 0.1019 |
| East | -0.3123 | 0.0086 | -36.44 | 0.000 | -0.3291 | -0.2956 |
| North | -0.2054 | 0.0079 | -26.12 | 0.000 | -0.2208 | -0.1900 |
| Sabah & Sarawak | -0.1209 | 0.0086 | -14.12 | 0.000 | -0.1378 | -0.1042 |
| Year 2002 | 0.2718 | 0.0292 | 9.29 | 0.000 | 0.2145 | 0.3291 |
| Year 2004 | 0.4231 | 0.0288 | 14.72 | 0.000 | 0.3668 | 0.4794 |
| Primary education | -0.0007 | 0.0243 | -0.03 | 0.975 | -0.0485 | 0.0469 |
| Lower Sec | 0.0131 | 0.0305 | 0.43 | 0.668 | -0.0466 | 0.0728 |
| Upper Sec | 0.1318 | 0.0328 | 4.02 | 0.000 | 0.0676 | 0.1962 |
| Pre-university | 0.2671 | 0.0437 | 6.12 | 0.000 | 0.1815 | 0.3527 |
| Higher education | 0.6025 | 0.0448 | 13.46 | 0.000 | 0.5149 | 0.6903 |
| Year 2002* No Certificate | -0.0943 | 0.0303 | -3.11 | 0.002 | -0.1538 | -0.0348 |
| Year 2002* Lower Sec | -0.0945 | 0.0323 | -2.93 | 0.003 | -0.1578 | -0.0312 |
| Year 2002* Upper Sec | -0.1002 | 0.0308 | -3.25 | 0.001 | -0.1606 | -0.0397 |
| Year 2002* Pre-university | 0.0293 | 0.0417 | 0.70 | 0.483 | -0.0525 | 0.1110 |
| Year 2002* Higher Education | -0.0033 | 0.0409 | -0.08 | 0.937 | -0.0836 | 0.0771 |
| Year 2004* No Certificate | -0.2035 | 0.0299 | -6.81 | 0.000 | -0.2621 | -0.1449 |
| Year 2004* Lower Sec | -0.2163 | 0.0317 | -6.83 | 0.000 | -0.2784 | -0.1542 |
| Year 2004* Upper Sec | -0.1938 | 0.0303 | -6.39 | 0.000 | -0.2532 | -0.1343 |
| Year 2004* Pre-university | -0.0886 | 0.0408 | -2.17 | 0.030 | -0.1685 | -0.0087 |
| Year 2004* Higher Education | -0.1222 | 0.0403 | -3.03 | 0.002 | -0.2014 | -0.0431 |
| Constant | 5.9279 | 0.0246 | 240.88 | 0.000 | 5.8797 | 5.9761 |
| R-squared | 0.4421 | | | | | |
| F | 1063.5 | | | | | |
| Observations | 41542 | | | | | |

## Table 3C: Human Capital Earnings Function: Interaction of Years and Years of Schooling Dummies, Age 15-64 (HIS 1995-2004)

| Variables | Coef. | Robust Std. Err. | t | P>t | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Exp | .0503 | .0009 | 56.05 | 0.000 | .0485 | .0520 |
| Exp2 | -.0007 | .0000 | -41.96 | 0.000 | -.0007 | -.0007 |
| Female | -.2015 | .0098 | -20.48 | 0.000 | -.2208 | -.1822 |
| Single | .0409 | .0089 | 4.58 | 0.000 | .0234 | .0583 |
| Widow | -.0873 | .0203 | -4.29 | 0.000 | -.1271 | -.0474 |
| Divorced | -.1091 | .0245 | -4.45 | 0.000 | -.1572 | -.0611 |
| Employee | .0318 | .0071 | 4.51 | 0.000 | .0180 | .0457 |
| Rural | -.2597 | .0056 | -46.11 | 0.000 | -.2708 | -.2487 |
| Central | .0845 | .0087 | 9.70 | 0.000 | .0674 | .1015 |
| East | -.3079 | .0085 | -36.13 | 0.000 | -.3246 | -.2912 |
| North | -.2045 | .0078 | -26.14 | 0.000 | -.2199 | -.1892 |
| Sabah & Sarawak | -.1258 | .0086 | -14.70 | 0.000 | -.1425 | -.1090 |
| Year 2002 | .2998 | .0295 | 10.17 | 0.000 | .2421 | .3576 |
| Year 2004 | .4549 | .0290 | 15.67 | 0.000 | .3979 | .5118 |
| Year 1 | .1203 | .0602 | 2.00 | 0.046 | .0023 | .2382 |
| Year 2 & 3 | .2016 | .0299 | 6.74 | 0.000 | .1429 | .2602 |
| Year 4 & 5 | .2787 | .0282 | 9.88 | 0.000 | .2234 | .3339 |
| Year 6 | .4022 | .0216 | 18.62 | 0.000 | .3599 | .4445 |
| Year 7 & 8 | .6313 | .0297 | 21.28 | 0.000 | .5731 | .6894 |
| Year 9 | .6172 | .0224 | 27.52 | 0.000 | .5732 | .6612 |
| Year 10 | .6290 | .0465 | 13.52 | 0.000 | .5378 | .7202 |
| Year 11 | .8764 | .0221 | 39.64 | 0.000 | .8330 | .9197 |
| Year 12 | .7395 | .1421 | 5.20 | 0.000 | .4610 | 1.018 |
| Year 13 | 1.1386 | .0321 | 35.47 | 0.000 | 1.0756 | 1.2015 |
| Year 14 | 1.3706 | .0322 | 42.61 | 0.000 | 1.3075 | 1.4336 |
| Year 17 | 1.9634 | .0339 | 57.92 | 0.000 | 1.8969 | 2.0298 |

## Table 3C: Human Capital Earnings Function: Interaction of Years and Years of Schooling Dummies, Age 15-64 (HIS 1995-2004) (...Continued)

| Variables | Coef. | Robust Std. Err. | t | P>t | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Year 2002*Year 1 | -.0908 | .0865 | -1.05 | 0.294 | -.2604 | .0788 |
| Year 2002*Year 2 & 3 | -.0882 | .0448 | -1.97 | 0.049 | -.1759 | -.0004 |
| Year 2002*Year 4 & 5 | -.1313 | .0439 | -2.99 | 0.003 | -.2173 | -.0452 |
| Year 2002*Year 6 | -.1294 | .0318 | -4.06 | 0.000 | -.1918 | -.0670 |
| Year 2002*Year 7 & 8 | -.1348 | .0439 | -3.07 | 0.002 | -.2208 | -.0489 |
| Year 2002*Year 9 | -.1073 | .0319 | -3.35 | 0.001 | -.1700 | -.0446 |
| Year 2002*Year 10 | .0576 | .06712 | 0.86 | 0.391 | -.0739 | .1891 |
| Year 2002*Year 11 | -.1213 | .0309 | -3.93 | 0.000 | -.1818 | -.0608 |
| Year 2002*Year 12 | .0885 | .1829 | 0.48 | 0.629 | -.2702 | .4472 |
| Year 2002*Year 13 | -.1668 | .0487 | -3.43 | 0.001 | -.2622 | -.0714 |
| Year 2002*Year 14 | -.0525 | .0418 | -1.26 | 0.209 | -.1345 | .0295 |
| Year 2002*Year 17 | -.2275 | .0450 | -5.05 | 0.000 | -.3157 | -.1392 |
| Year 2004*Year 1 | .0027 | .1016 | 0.03 | 0.979 | -.1964 | .2018 |
| Year 2004*Year 2 & 3 | -.1362 | .0442 | -3.08 | 0.002 | -.2229 | -.0495 |
| Year 2004*Year 4 & 5 | -.2035 | .0429 | -4.75 | 0.000 | -.2876 | -.1195 |
| Year 2004*Year 6 | -.2413 | .0314 | -7.68 | 0.000 | -.3029 | -.1797 |
| Year 2004*Year 7 & 8 | -.2703 | .0438 | -6.17 | 0.000 | -.3561 | -.1845 |
| Year 2004*Year 9 | -.2326 | .0316 | -7.37 | 0.000 | -.2945 | -.1707 |
| Year 2004*Year 10 | -.2238 | .0658 | -3.40 | 0.001 | -.3528 | -.0948 |
| Year 2004*Year 11 | -.2201 | .0304 | -7.24 | 0.000 | -.2797 | -.1605 |
| Year 2004*Year 12 | -.2599 | .1728 | -1.50 | 0.132 | -.5986 | .0787 |
| Year 2004*Year 13 | -.2491 | .0469 | -5.32 | 0.000 | -.3409 | -.1573 |
| Year 2004*Year 14 | -.1928 | .0412 | -4.68 | 0.000 | -.2735 | -.1120 |
| Year 2004*Year 17 | -.3475 | .0445 | -7.81 | 0.000 | -.4347 | -.2602 |
| Constant | 5.894 | .0248 | 237.80 | 0.000 | 5.8451 | 5.9422 |
| R-squared | 0.4469 | | | | | |
| F | 618.82 | | | | | |
| Observations | 41542 | | | | | |

*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

# Appendix 4 – MEAN OF INCOME

**Table 4A: Mean of Monthly Income by Level of Education, 1995-2004**

| Level of Education | Mean of Monthly Income (MYR) | | | | | Marginal gross (%) | | |
|---|---|---|---|---|---|---|---|---|
| | 1995 | 2002 | 2004 | Changed (%) | Annual Growth 1995-2004 (%) | 1995 | 2002 | 2004 |
| No formal education | 643.15 | 791.28 | 1048.27 | 62.99 | 7.00 | - | - | - |
| No certificate | 949.63 | 1220.92 | 1423.49 | 49.90 | 5.54 | 47.65 | 54.30 | 35.79 |
| Lower secondary | 1201.17 | 1520.57 | 1780.31 | 48.21 | 5.36 | 26.49 | 24.54 | 25.07 |
| Upper secondary | 1501.18 | 1880.43 | 2163.65 | 44.13 | 4.90 | 24.98 | 23.67 | 21.53 |
| Pre-university | 1850.68 | 2651.43 | 3045.40 | 64.56 | 7.17 | 23.28 | 41.00 | 40.75 |
| Higher education | 3088.59 | 4466.91 | 5692.76 | 84.32 | 9.37 | 66.89 | 68.47 | 86.93 |

# Appendix 5 - HUMAN CAPITAL EARNINGS FUNCTION, AGE 15-64

## Table 5.1A: Human Capital Earnings Function, Age 15-64 (HIS 1995)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Schooling | .1059 | .0018 | 59.30 | 0.000 | .1024 | .1094 |
| Exp | .0484 | .0015 | 33.16 | 0.000 | .0455 | .0513 |
| Exp2 | -.0006 | .0000 | -22.32 | 0.000 | -.0007 | -.00056 |
| Female | -.2181 | .0171 | -12.75 | 0.000 | -.2516 | -.1846 |
| Single | (dropped) | | | | | |
| Employee | .0134 | .0121 | 1.11 | 0.267 | -.0103 | .0371 |
| Rural | -.2475 | .0098 | -25.33 | 0.000 | -.2666 | -.2283 |
| Central | .1206 | .0157 | 7.68 | 0.000 | .0898 | .1514 |
| East | -.3356 | .0151 | -22.24 | 0.000 | -.3652 | -.3061 |
| North | -.2163 | .0134 | -16.16 | 0.000 | -.2426 | -.1901 |
| Sabah & Sarawak | -.0417 | .0144 | -2.89 | 0.004 | -.0699 | -.0134 |
| Constant | 5.6495 | .0316 | 177.79 | 0.000 | 5.5872 | 5.7118 |
| R-squared | 0.3936 | | | | | |
| F | 804.39 | | | | | |
| Observations | 14,726 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.1B: Human Capital Earnings Function, Age 15-64 (HIS 2002)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Schooling | .1051 | .0018 | 57.03 | 0.000 | .1015 | .1087 |
| Exp | .0381 | .0016 | 24.16 | 0.000 | .0351 | .0412 |
| Exp2 | -.0005 | .0000 | -15.66 | 0.000 | -.0006 | -.0004 |
| Female | -.1037 | .01778 | -5.83 | 0.000 | -.1386 | -.0688 |
| Single | .1140 | .0165 | 6.93 | 0.000 | .0818 | .1463 |
| Widow | -.0794 | .0311 | -2.56 | 0.011 | -.1404 | -.0185 |
| Divorced | -.0825 | .0357 | -2.31 | 0.021 | -.1525 | -.0126 |
| Employee | .0753 | .0126 | 5.96 | 0.000 | .0505 | .1001 |
| Rural | -.2392 | .0099 | -24.04 | 0.000 | -.2588 | -.2197 |
| Central | .1306 | .0149 | 8.77 | 0.000 | .1014 | .1597 |
| East | -.3027 | .0148 | -20.44 | 0.000 | -.3317 | -.2737 |
| North | -.2018 | .0139 | -14.49 | 0.000 | -.2291 | -.1745 |
| Sabah & Sarawak | -.0895 | .0154 | -5.81 | 0.000 | -.1197 | -.0593 |
| Constant | 5.837 | .03189 | 183.07 | 0.000 | 5.7746 | 5.899 |
| R-squared | 0.3937 | | | | | |
| F | 618.39 | | | | | |
| Observations | 13324 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.1C: Human Capital Earnings Function, Age 15-64 (HIS2004)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Schooling | .1004 | .0018 | 55.26 | 0.000 | .0969 | .1039 |
| Exp | .0292 | .0016 | 18.29 | 0.000 | .0260 | .0323 |
| Exp2 | -.0003 | .0000 | -9.70 | 0.000 | -.0003 | -.0002 |
| Female | -.0859 | .0180 | -4.76 | 0.000 | -.1212 | -.0505 |
| Single | .1513 | .0172 | 8.80 | 0.000 | .1176 | .1849 |
| Widow | -.0074 | .0291 | -0.25 | 0.800 | -.0643 | .0496 |
| Divorced | -.0400 | .0369 | -1.08 | 0.278 | -.1124 | .0323 |
| Employee | .0179 | .0125 | 1.44 | 0.149 | -.0064 | .0424 |
| Rural | -.2994 | .0101 | -29.75 | 0.000 | -.3191 | -.2796 |
| Central | .0939 | .0157 | 5.98 | 0.000 | .0631 | .1247 |
| East | -.2563 | .0152 | -16.89 | 0.000 | -.2861 | -.2266 |
| North | -.1886 | .0142 | -13.26 | 0.000 | -.2165 | -.1607 |
| Sabah & Sarawak | -.1551 | .0152 | -10.18 | 0.000 | -.1849 | -.1253 |
| Constant | 6.0672 | .0329 | 184.65 | 0.000 | 6.0028 | 6.1317 |
| R-squared | 0.3893 | | | | | |
| F | 570.26 | | | | | |
| Observations | 13492 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.2A: Human Capital Earnings Function (Qualifications), Age 15-64 (HIS1995)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| No certificate | .3439 | .0223 | 15.45 | 0.000 | .3003 | .3876 |
| Lower Secondary | .5606 | .0253 | 22.12 | 0.000 | .5109 | .6103 |
| Upper secondary | .7933 | .0254 | 31.29 | 0.000 | .7436 | .8429 |
| Pre university | 1.0557 | .0351 | 30.07 | 0.000 | .9869 | 1.1245 |
| Higher | 1.5659 | .0315 | 49.76 | 0.000 | 1.5043 | 1.6277 |
| Exp | .0528 | .0015 | 34.57 | 0.000 | .0498 | .0559 |
| Exp2 | -.0008 | .0000 | -28.25 | 0.000 | -.0009 | -.0008 |
| Female | -.2678 | .0172 | -15.55 | 0.000 | -.3015 | -.2340 |
| Single | (dropped) | | | | | |
| Employee | .0152 | .0121 | 1.25 | 0.210 | -.0086 | .0389 |
| Rural | -.2715 | .0098 | -27.78 | 0.000 | -.2906 | -.2523 |
| Central (Klang Valley) | .0903 | .0156 | 5.78 | 0.000 | .0596 | .1207 |
| East | -.3691 | .0150 | -24.56 | 0.000 | -.3985 | -.3396 |
| North | -.2266 | .0133 | -17.07 | 0.000 | -.2527 | -.2006 |
| Sabah & Sarawak | -.07941 | .0146 | -5.44 | 0.000 | -.1079 | -.0508 |
| Constant | 6.0204 | .0339 | 177.78 | 0.000 | 5.9540 | 6.0868 |
| R-squared | 0.3966 | | | | | |
| F | 579.56 | | | | | |
| Observations | 14726 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.2B: Human Capital Earnings Function (Qualifications), Age 15-64 (HIS2002)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| No certificate | .2504*** | .0248 | 10.10 | 0.000 | .2018 | .2991 |
| Lower Secondary | .4306*** | .0281 | 15.35 | 0.000 | .3756 | .4856 |
| Upper secondary | .6532*** | .02781 | 23.48 | 0.000 | .5986 | .7077 |
| Pre university | 1.0857*** | .03151 | 34.44 | 0.000 | 1.0239 | 1.1475 |
| Higher education | 1.6133*** | .0353 | 45.74 | 0.000 | 1.5442 | 1.6824 |
| Exp | .0477*** | .00161 | 29.77 | 0.000 | .0446 | .0509 |
| Exp2 | -.0007*** | .00001 | -25.20 | 0.000 | -.0008 | -.0007 |
| Female | -.1344*** | .0177 | -7.61 | 0.000 | -.1689 | -.0998 |
| Single | .1149*** | .0163 | 7.06 | 0.000 | .0829 | .1468 |
| Widow | -.0947*** | .0308 | -3.08 | 0.002 | -.1551 | -.0344 |
| Divorced | -.0978*** | .03491 | -2.80 | 0.005 | -.1663 | -.0293 |
| Employee | .0677*** | .01261 | 5.35 | 0.000 | .0429 | .0924 |
| Rural | -.2513*** | .0099 | -25.38 | 0.000 | -.2707 | -.2318 |
| Central (Klang Valley) | .0994*** | .01471 | 6.75 | 0.000 | .0705 | .1282 |
| East | -.3188*** | .01471 | -21.61 | 0.000 | -.3477 | -.2899 |
| North | -.2029*** | .01381 | -14.70 | 0.000 | -.2299 | -.1758 |
| Sabah & Sarawak | -.1177*** | .01531 | -7.68 | 0.000 | -.1477 | -.0876 |
| Constant | 6.2589*** | .03531 | 177.22 | 0.000 | 6.1897 | 6.328 |
| R-squared | 0.4065 | | | | | |
| F | 510.40 | | | | | |
| Observations | 13324 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
*Significant at 10 % level.

## Table 5.2C: Human Capital Earnings Function (Qualifications), Age 15-64 (HIS2004)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| No certificate | .1634 | .0242 | 6.76 | 0.000 | .1160 | .2107 |
| Lower Secondary | .3665 | .0273 | 13.43 | 0.000 | .3129 | .4199 |
| Upper secondary | .6208 | .0273 | 22.79 | 0.000 | .5674 | .6743 |
| Pre university | 1.0328 | .0303 | 34.09 | 0.000 | .9734 | 1.0922 |
| Higher education | 1.5614 | .0345 | 45.24 | 0.000 | 1.4938 | 1.6291 |
| Exp | .0416 | .0016 | 25.54 | 0.000 | .0384 | .0447 |
| Exp2 | -.0006 | .0000 | -20.09 | 0.000 | -.00064 | -.0005 |
| Female | -.1250 | .0176 | -7.09 | 0.000 | -.1596 | -.0905 |
| Single | .1399 | .0169 | 8.27 | 0.000 | .1068 | .1731 |
| Widow | -.0469 | .0284 | -1.65 | 0.099 | -.1027 | .0088 |
| Divorced | -.0616 | .0361 | -1.70 | 0.088 | -.1325 | .0092 |
| Employee | .0102 | .0123 | 0.83 | 0.409 | -.0139 | .0344 |
| Rural | -.3026 | .0099 | -30.50 | 0.000 | -.3221 | -.2832 |
| Central (Klang Valley) | .0549 | .0155 | 3.55 | 0.000 | .0246 | .0853 |
| East | -.2764 | .0149 | -18.45 | 0.000 | -.3057 | -.2469 |
| North | -.1959 | .0141 | -13.93 | 0.000 | -.2235 | -.1683 |
| Sabah & Sarawak | -.1951 | .0151 | -12.88 | 0.000 | -.2248 | -.1654 |
| Constant | 6.4599 | .0355 | 181.91 | 0.000 | 6.390 | 6.5295 |
| R-squared | 0.4162 | | | | | |
| F | 518.54 | | | | | |
| Observations | 13,492 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.3A: Human Capital Earnings Function (Years of Schooling), Age 15-64 (HIS1995)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Primary 1 | .1077 | .0612 | 1.76 | 0.079 | -.0123 | .2278 |
| Primary 2, 3 | .1987 | .0303 | 6.56 | 0.000 | .1393 | .2581 |
| Primary 4, 5 | .2723 | .0286 | 9.51 | 0.000 | .2162 | .3284 |
| Primary 6 | .3889 | .0235 | 16.53 | 0.000 | .3428 | .4351 |
| Form 1, 2 | .6195 | .0316 | 19.64 | 0.000 | .5577 | .6814 |
| Form 3 | .6091 | .0254 | 23.95 | 0.000 | .5593 | .6589 |
| Form 4 | .6202 | .0476 | 13.03 | 0.000 | .5269 | .7136 |
| Form 5 | .8821 | .0257 | 34.32 | 0.000 | .8317 | .9325 |
| Lower 6 | .7394 | .1449 | 5.10 | 0.000 | .4554 | 1.0233 |
| Upper 6 | 1.1487 | .0345 | 33.26 | 0.000 | 1.081 | 1.2164 |
| College | 1.3849 | .0347 | 39.95 | 0.000 | 1.317 | 1.4529 |
| University | 1.9708 | .0366 | 53.90 | 0.000 | 1.8991 | 2.0424 |
| Exp | .0547 | .0015 | 36.07 | 0.000 | .05169 | .0576 |
| Exp2 | -.0008 | .0000 | -26.98 | 0.000 | -.0008 | -.0007 |
| Female | -.2453 | .0169 | -14.46 | 0.000 | -.2786 | -.2120 |
| Single | (dropped) | | | | | |
| Employee | .0191 | .0119 | 1.60 | 0.110 | -.0043 | .0424 |
| Rural | -.2535 | .0096 | -26.36 | 0.000 | -.2723 | -.2346 |
| Central (Klang Valley) | .1029 | .0153 | 6.72 | 0.000 | .0729 | .1329 |
| East | -.3455 | .0148 | -23.34 | 0.000 | -.3745 | -.3165 |
| North | -.2136 | .0131 | -16.35 | 0.000 | -.2392 | -.1879 |
| Sabah & Sarawak | -.0707 | .0143 | -4.96 | 0.000 | -.0987 | -.0428 |
| Constant | 5.8554 | .0341 | 171.78 | 0.000 | 5.7887 | 5.9222 |
| R-squared | 0.4199 | | | | | |
| F | 438.73 | | | | | |
| Observations | 14726 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 5.3B: Human Capital Earnings Function (Years of Schooling), Age 15-64 (HIS2002)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Primary 1 | .0307 | .0629 | 0.49 | 0.625 | -.0926 | .1540 |
| Primary 2, 3 | .1122 | .0338 | 3.32 | 0.001 | .0461 | .1784 |
| Primary 4, 5 | .1510 | .0340 | 4.44 | 0.000 | .0843 | .2177 |
| Primary 6 | .2697 | .0256 | 10.52 | 0.000 | .2194 | .3199 |
| Form 1, 2 | .4928 | .0356 | 13.86 | 0.000 | .4231 | .5625 |
| Form 3 | .4991 | .0279 | 17.91 | 0.000 | .4445 | .5538 |
| Form 4 | .6807 | .0511 | 13.31 | 0.000 | .5804 | .7809 |
| Form 5 | .7398 | .0280 | 26.38 | 0.000 | .6849 | .7948 |
| Lower 6 | .8149 | .1181 | 6.90 | 0.000 | .5835 | 1.0464 |
| Upper 6 | .9548 | .0406 | 23.53 | 0.000 | .8753 | 1.0344 |
| College | 1.2961 | .0326 | 39.86 | 0.000 | 1.2324 | 1.3599 |
| University | 1.7156 | .0355 | 48.34 | 0.000 | 1.6461 | 1.7852 |
| Exp | .0479 | .0016 | 30.03 | 0.000 | .04485 | .0511 |
| Exp2 | -.0007 | .0000 | -23.12 | 0.000 | -.0007 | -.0006 |
| Female | -.1282 | .0174 | -7.35 | 0.000 | -.1624 | -.0940 |
| Single | .1111 | .0160 | 6.92 | 0.000 | .0797 | .1426 |
| Widow | -.0970 | .0301 | -3.22* | 0.001 | -.1561 | -.03797 |
| Divorced | -.0923 | .0345 | -2.68 | 0.007 | -.1599 | -.02472 |
| Employee | .0699 | .0125 | 5.61 | 0.000 | .0455 | .0944 |
| Rural | -.2399 | .0098 | -24.55 | 0.000 | -.2591 | -.2207 |
| Central (Klang Valley) | .09984 | .0145 | 6.87 | 0.000 | .0713 | .1283 |
| East | -.3098 | .0146 | -21.27 | 0.000 | -.3384 | -.2813 |
| North | -.2030 | .0136 | -14.89 | 0.000 | -.2297 | -.1763 |
| Sabah & Sarawak | -.1172 | .0151 | -7.73 | 0.000 | -.1469 | -.0875 |
| Constant | 6.1344 | .0355 | 172.73 | 0.000 | 6.065 | 6.2040 |
| R-squared | 0.4212 | | | | | |
| F | 397.35 | | | | | |
| Observations | 13324 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.

## Table 5.3C: Human Capital Earnings Function (Years of Schooling), Age 15-64 (HIS2004)

| | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Primary 1 | .1273 | .0809 | 1.57 | 0.116 | -.0313 | .2859 |
| Primary 2, 3 | .0649 | .0324 | 2.01 | 0.045 | .0015 | .1284 |
| Primary 4, 5 | .0818 | .0328 | 2.49 | 0.013 | .0174 | .14613 |
| Primary 6 | .1786 | .0253 | 7.05 | 0.000 | .1289 | .2283 |
| Form 1, 2 | .3909 | .0357 | 10.95 | 0.000 | .3209 | .4608 |
| Form 3 | .4044 | .0275 | 14.68 | 0.000 | .3504 | .4584 |
| Form 4 | .4162 | .0490 | 8.49 | 0.000 | .3201 | .5123 |
| Form 5 | .6669 | .0277 | 24.11 | 0.000 | .6126 | .7211 |
| Lower 6 | .4983 | .0975 | 5.11 | 0.000 | .3072 | .6894 |
| Upper 6 | .8935 | .0386 | 23.15 | 0.000 | .8179 | .9692 |
| College | 1.1838 | .0317 | 37.32 | 0.000 | 1.1217 | 1.246 |
| University | 1.6176 | .0349 | 46.41 | 0.000 | 1.5492 | 1.6859 |
| Exp | .0413 | .0016 | 25.25 | 0.000 | .0381 | .0445 |
| Exp2 | -.0005 | .0000 | -18.46 | 0.000 | -.0006 | -.0005 |
| Female | -.1147 | .0176 | -6.54 | 0.000 | -.1493 | -.0805 |
| Single | .1445 | .0168 | 8.60 | 0.000 | .1116 | .1775 |
| Widow | -.0425 | .0283 | -1.50 | 0.134 | -.0980 | .0130 |
| Divorced | -.0661 | .0358 | -1.85 | 0.065 | -.13623 | .00402 |
| Employee | .0104 | .0123 | 0.85 | 0.397 | -.01367 | .0344 |
| Rural | -.3004 | .0099 | -30.45 | 0.000 | -.3198 | -.2811 |
| Central (Klang Valley) | .0562 | .0154 | 3.64 | 0.000 | .0259 | .0865 |
| East | -.2712 | .0149 | -18.21 | 0.000 | -.3004 | -.2421 |
| North | -.1923 | .0139 | -13.74 | 0.000 | -.2197 | -.1649 |
| Sabah & Sarawak | -.1967 | .0151 | -13.06 | 0.000 | -.2263 | -.1673 |
| Constant | 6.388 | .0358 | 178.52 | 0.000 | 6.3186 | 6.4587 |
| R-squared | 0.4231 | | | | | |
| F | 382.05 | | | | | |
| Observations | 13,492 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

**Table 5.4A: Marginal Gross Returns to Schooling (Coefficients), HIS 1995**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 0.11 | 0.09 | 0.16 | 0.28 | 0.51 | 0.50 | 0.51 | 0.77 | 0.63 | 1.04 | 1.28 | 1.86 |
| **Year 2 & 3** | 0.09 | 0.20 | 0.07 | 0.19 | 0.42 | 0.41 | 0.42 | 0.68 | 0.54 | 0.95 | 1.19 | 1.77 |
| **Year 4 & 5** | 0.16 | 0.07 | 0.27 | 0.12 | 0.35 | 0.34 | 0.35 | 0.61 | 0.47 | 0.88 | 1.11 | 1.70 |
| **Year 6** | 0.28 | 0.19 | -0.07 | 0.39 | 0.23 | 0.22 | 0.23 | 0.49 | 0.35 | 0.76 | 1.00 | 1.00 |
| **Year 7 & 8** | 0.51 | 0.42 | 0.35 | 0.23 | 0.62 | -0.01 | 0.00 | 0.26 | 0.12 | 0.53 | 0.77 | 1.35 |
| **Year 9** | 0.50 | 0.41 | 0.34 | 0.22 | -0.01 | 0.61 | 0.01 | 0.27 | 0.13 | 0.54 | 0.78 | 1.36 |
| **Year 10** | 0.51 | 0.42 | 0.35 | 0.23 | 0.00 | 0.01 | 0.62 | 0.26 | 0.12 | 0.53 | 0.76 | 1.35 |
| **Year 11** | 0.77 | 0.68 | 0.61 | 0.49 | 0.26 | 0.27 | 0.26 | 0.88 | -0.14 | 0.27 | 0.50 | 1.09 |
| **Year 12** | 0.63 | 0.54 | 0.47 | 0.35 | 0.12 | 0.13 | 0.12 | -0.14 | 0.74 | 0.41 | 0.65 | 1.23 |
| **Year 13** | 1.04 | 0.95 | 0.88 | 0.76 | 0.53 | 0.54 | 0.53 | 0.27 | 0.41 | 1.15 | 0.24 | 0.82 |
| **Year 14** | 1.28 | 1.19 | 1.11 | 1.00 | 0.77 | 0.78 | 0.76 | 0.50 | 0.65 | 0.24 | 1.38 | 0.59 |
| **Year 17** | 1.86 | 1.77 | 1.70 | -0.39 | 1.35 | 1.36 | 1.35 | 1.09 | 1.23 | 0.82 | 0.59 | 1.97 |

**Table 5.4B: Marginal Gross of Returns to Schooling (%), HIS 1995**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 11.37 | 6.35 | 5.11 | 6.50 | 10.28 | 8.14 | 7.44 | 11.69 | 8.01 | 15.27 | 19.90 | 34.02 |
| **Year 2 & 3** | 6.35 | | 3.82 | 5.99 | 10.46 | 7.81 | 6.99 | 11.54 | 7.55 | 15.10 | 19.78 | 33.67 |
| **Year 4 & 5** | 5.11 | 3.82 | | 8.25 | 13.84 | 8.90 | 7.57 | 12.92 | 7.94 | 16.50 | 21.50 | 35.72 |
| **Year 6** | 6.50 | 5.99 | 8.25 | | 17.29 | 8.21 | 6.51 | 12.75 | 6.99 | 16.25 | 21.34 | 15.52 |
| **Year 7 & 8** | 10.28 | 10.46 | 13.84 | 17.29 | | -0.69 | 0.03 | 8.58 | 2.83 | 12.68 | 17.69 | 30.13 |
| **Year 9** | 8.14 | 7.81 | 8.90 | 8.21 | -0.69 | | 1.12 | 15.69 | 4.64 | 17.88 | 23.45 | 36.28 |
| **Year 10** | 7.44 | 6.99 | 7.57 | 6.51 | 0.03 | 1.12 | | 31.39 | 6.33 | 23.21 | 28.71 | 40.85 |
| **Year 11** | 11.69 | 11.54 | 12.92 | 12.75 | 8.58 | 15.69 | 31.39 | | -13.30 | 15.28 | 21.78 | 32.84 |
| **Year 12** | 8.01 | 7.55 | 7.94 | 6.99 | 2.83 | 4.64 | 6.33 | -13.30 | | 50.59 | 45.36 | 48.52 |
| **Year 13** | 15.27 | 15.10 | 16.50 | 16.25 | 12.68 | 17.88 | 23.21 | 15.28 | 50.59 | | 26.65 | 31.88 |
| **Year 14** | 19.90 | 19.78 | 21.50 | 21.34 | 17.69 | 23.45 | 28.71 | 21.78 | 45.36 | 26.65 | | 19.67 |
| **Year 17** | 34.02 | 33.67 | 35.72 | 15.52 | 30.13 | 36.28 | 40.85 | 32.84 | 48.52 | 31.88 | 19.67 | |

**Table 5.5A: Marginal Gross Returns to Schooling (Coefficients), HIS 2002**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | University |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 0.03 | 0.08 | 0.12 | 0.24 | 0.46 | 0.47 | 0.65 | 0.71 | 0.78 | 0.92 | 1.27 | 1.68 |
| **Year 2 & 3** | 0.08 | 0.11 | 0.04 | 0.16 | 0.38 | 0.39 | 0.57 | 0.63 | 0.70 | 0.84 | 1.18 | 1.60 |
| **Year 4 & 5** | 0.12 | 0.04 | 0.15 | 0.12 | 0.34 | 0.35 | 0.53 | 0.59 | 0.66 | 0.80 | 1.15 | 1.56 |
| **Year 6** | 0.24 | 0.08 | 0.12 | 0.27 | 0.22 | 0.23 | 0.41 | 0.47 | 0.55 | 0.69 | 1.03 | 1.45 |
| **Year 7 & 8** | 0.46 | 0.38 | 0.34 | 0.22 | 0.49 | 0.01 | 0.19 | 0.25 | 0.32 | 0.46 | 0.80 | 1.22 |
| **Year 9** | 0.47 | 0.39 | 0.35 | 0.23 | 0.01 | 0.50 | 0.18 | 0.24 | 0.32 | 0.46 | 0.80 | 1.22 |
| **Year 10** | 0.65 | 0.57 | 0.53 | 0.41 | 0.19 | 0.18 | 0.68 | 0.06 | 0.13 | 0.27 | 0.62 | 1.03 |
| **Year 11** | 0.71 | 0.63 | 0.59 | 0.47 | 0.25 | 0.24 | 0.06 | 0.74 | 0.08 | 0.21 | 0.56 | 0.98 |
| **Year 12** | 0.78 | 0.70 | 0.66 | 0.55 | 0.32 | 0.32 | 0.13 | 0.08 | 0.81 | 0.14 | 0.48 | 0.90 |
| **Year 13** | 0.92 | 0.84 | 0.80 | 0.69 | 0.46 | 0.46 | 0.27 | 0.21 | 0.14 | 0.95 | 0.34 | 0.76 |
| **Year 14** | 1.27 | 1.18 | 1.15 | 1.03 | 0.80 | 0.80 | 0.62 | 0.56 | 0.48 | 0.34 | 1.30 | 0.42 |
| **Year 17** | 1.68 | 1.60 | 1.56 | 1.45 | 1.22 | 1.22 | 1.03 | 0.98 | 0.90 | 0.76 | 0.42 | 1.72 |

**Table 5.5B: Marginal Gross Returns to Schooling (%), HIS 2002**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | University |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 3.12 | 5.66 | 3.65 | 5.40 | 9.04 | 7.47 | 10.17 | 10.32 | 10.82 | 12.66 | 19.57 | 27.45 |
| **Year 2 & 3** | 5.66 | | 1.98 | 4.87 | 9.26 | 7.27 | 10.21 | 10.27 | 10.73 | 12.59 | 19.71 | 27.38 |
| **Year 4 & 5** | 3.65 | 1.98 | | 8.40 | 13.58 | 9.25 | 12.70 | 12.34 | 12.57 | 14.52 | 22.56 | 30.25 |
| **Year 6** | 5.40 | 4.87 | 8.40 | | 16.67 | 8.60 | 12.71 | 12.01 | 12.08 | 14.06 | 22.39 | 29.51 |
| **Year 7 & 8** | 9.04 | 9.26 | 13.58 | 16.67 | | 0.42 | 8.27 | 8.01 | 8.45 | 10.68 | 18.97 | 25.23 |
| **Year 9** | 7.47 | 7.27 | 9.25 | 8.60 | 0.42 | | 19.91 | 13.61 | 12.38 | 14.43 | 24.38 | 29.69 |
| **Year 10** | 10.17 | 10.21 | 12.70 | 12.71 | 8.27 | 19.91 | | 6.09 | 7.18 | 10.51 | 21.26 | 25.93 |
| **Year 11** | 10.32 | 10.27 | 12.34 | 12.01 | 8.01 | 13.61 | 6.09 | | 7.80 | 11.99 | 24.81 | 27.56 |
| **Year 12** | 10.82 | 10.73 | 12.57 | 12.08 | 8.45 | 12.38 | 7.18 | 7.80 | | 15.01 | 30.90 | 29.23 |
| **Year 13** | 12.66 | 12.59 | 14.52 | 14.06 | 10.68 | 14.43 | 10.51 | 11.99 | 15.01 | | 40.68 | 28.50 |
| **Year 14** | 19.57 | 19.71 | 22.56 | 22.39 | 18.97 | 24.38 | 21.26 | 24.81 | 30.90 | 40.68 | | 17.37 |
| **Year 17** | 27.45 | 27.38 | 30.25 | 29.51 | 25.23 | 29.69 | 25.93 | 27.56 | 29.23 | 28.50 | 17.37 | |

**Table 5.6A: Marginal Gross Returns to Schooling (Coefficients), HIS 2004**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | University |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 0.13 | -0.06 | -0.05 | 0.05 | 0.26 | 0.28 | 0.29 | 0.54 | 0.37 | 0.77 | 1.06 | 1.49 |
| **Year 2 & 3** | -0.06 | 0.06 | 0.02 | 0.11 | 0.33 | 0.34 | 0.35 | 0.60 | 0.43 | 0.83 | 1.12 | 1.55 |
| **Year 4 & 5** | -0.05 | 0.02 | 0.08 | 0.10 | 0.31 | 0.32 | 0.33 | 0.59 | 0.42 | 0.81 | 1.10 | 1.54 |
| **Year 6** | 0.05 | 0.11 | 0.10 | 0.18 | 0.21 | 0.23 | 0.24 | 0.49 | 0.32 | 0.71 | 1.01 | 1.44 |
| **Year 7 & 8** | 0.26 | 0.33 | 0.31 | 0.21 | 0.39 | 0.01 | 0.03 | 0.28 | 0.50 | 0.50 | 0.79 | 1.23 |
| **Year 9** | 0.28 | 0.34 | 0.32 | 0.23 | 0.01 | 0.40 | 0.01 | 0.26 | 0.09 | 0.49 | 0.78 | 1.21 |
| **Year 10** | 0.29 | 0.35 | 0.33 | 0.24 | 0.03 | 0.01 | 0.42 | 0.25 | 0.48 | 0.48 | 0.77 | 1.20 |
| **Year 11** | 0.54 | 0.60 | 0.59 | 0.49 | 0.28 | 0.26 | 0.25 | 0.67 | -0.17 | 0.23 | 0.52 | 0.95 |
| **Year 12** | 0.37 | 0.43 | 0.42 | 0.32 | 0.50 | 0.09 | 0.48 | -0.17 | 0.50 | 0.40 | 0.69 | 1.12 |
| **Year 13** | 0.77 | 0.83 | 0.81 | 0.71 | 0.50 | 0.49 | 0.48 | 0.23 | 0.40 | 0.89 | 0.29 | 0.72 |
| **Year 14** | 1.06 | 1.12 | 1.10 | 1.01 | 0.79 | 0.78 | 0.77 | 0.52 | 0.69 | 0.29 | 1.18 | 0.43 |
| **Year 17** | 1.49 | 1.55 | 1.54 | 1.44 | 1.23 | 1.21 | 1.20 | 0.95 | 1.12 | 0.72 | 0.43 | 1.62 |

**Table 5.6B: Marginal Gross Returns to Schooling (%), HIS 2004**

| Schooling | Year 1 | Year 2 & 3 | Year 4 & 5 | Year 6 | Year 7 & 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | University |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year 1** | 13.58 | -4.03 | -1.27 | 1.05 | 4.64 | 3.99 | 3.72 | 7.15 | 4.08 | 9.60 | 15.64 | 21.49 |
| **Year 2 & 3** | -4.03 | | 0.85 | 3.44 | 6.42 | 6.22 | 5.61 | 9.71 | 5.71 | 11.22 | 16.49 | 25.68 |
| **Year 4 & 5** | -1.27 | 0.85 | | 6.78 | 9.06 | 8.46 | 7.22 | 12.23 | 6.89 | 14.73 | 21.16 | 29.16 |
| **Year 6** | 1.05 | 3.44 | 6.78 | | 15.76 | 8.44 | 6.70 | 12.59 | 6.28 | 14.91 | 21.66 | 29.24 |
| **Year 7 & 8** | 4.64 | 6.42 | 9.06 | 15.76 | | 0.91 | 1.71 | 12.71 | 14.51 | 11.87 | 18.62 | 25.37 |
| **Year 9** | 3.99 | 6.22 | 8.46 | 8.44 | 0.91 | | 1.19 | 15.01 | 21.03 | 15.77 | 23.61 | 39.40 |
| **Year 10** | 3.72 | 5.61 | 7.22 | 6.70 | 1.71 | 1.19 | | 28.49 | 30.58 | 20.39 | 28.87 | 33.21 |
| **Year 11** | 7.15 | 9.71 | 12.23 | 12.59 | 12.71 | 15.01 | 28.49 | | -15.51 | 12.72 | 75.57 | 26.46 |
| **Year 12** | 4.08 | 5.71 | 6.89 | 6.28 | 14.51 | 21.03 | 30.58 | -15.51 | | 48.47 | 49.25 | 41.25 |
| **Year 13** | 9.60 | 11.22 | 14.73 | 14.91 | 11.87 | 15.77 | 20.39 | 12.72 | 48.47 | | 33.69 | 26.57 |
| **Year 14** | 15.64 | 16.49 | 21.16 | 21.66 | 18.62 | 23.61 | 28.87 | 75.57 | 49.25 | 98.50 | | 18.10 |
| **Year 17** | 21.49 | 25.68 | 29.16 | 29.24 | 25.37 | 39.40 | 33.21 | 26.46 | 41.25 | 26.57 | 18.10 | |

# Appendix 6 – HUMAN CAPITAL EARNINGS FUNCTION, AGE 39-64 & 41-64

## Table 6A: Human Capital Earnings Function, Age 39-64 (HIS 2002)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Schooling | .0962 | .0026 | 36.37 | 0.000 | .0910 | .1014 |
| Exp | .0195 | .0057 | 3.43 | 0.001 | .0084 | .0306 |
| Exp2 | -.0002 | .0001 | -2.98 | 0.003 | -.0004 | -.0001 |
| Female | -.1125 | .0277 | -4.06 | 0.000 | -.1669 | -.0582 |
| Single | .1804 | .0338 | 5.33 | 0.000 | .1141 | .2467 |
| Widow | -.0101 | .0432 | -0.23 | 0.815 | -.0949 | .0747 |
| Divorced | -.0675 | .0472 | -1.43 | 0.152 | -.1599 | .0249 |
| Employee | .0797 | .0151 | 5.27 | 0.000 | .0501 | .1094 |
| Rural | -.2643 | .0138 | -19.12 | 0.000 | -.2914 | -.2372 |
| Central | .1540 | .0223 | 6.90 | 0.000 | .1103 | .1977 |
| East | -.2783 | .0209 | -13.34 | 0.000 | -.3192 | -.2374 |
| North | -.2004 | .0191 | -10.48 | 0.000 | -.2379 | -.1629 |
| Sabah & Sarawak | -.0494 | .0220 | -2.25 | 0.025 | -.0926 | -.0063 |
| Constant | 6.2039 | .1169 | 53.09 | 0.000 | 5.9747 | 6.4329 |
| R-squared | 0.4238 | | | | | |
| F | 404.50 | | | | | |
| Observations | 7,383 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 6B: Human Capital Earnings Function, Age 41-64, (HIS2004)

| Variables | Coefficient | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Schooling | .0892 | .0028 | 31.50 | 0.000 | .0836 | .0947 |
| Exp | -.0076 | .0066 | -1.16 | 0.248 | -.0205 | .0053 |
| Exp2 | .0002 | .0001 | 1.86 | 0.063 | -8.4000 | .0003 |
| Female | -.0634 | .0291 | -2.17 | 0.030 | -.1205 | -.0062 |
| Single | .2575 | .0381 | 6.76 | 0.000 | .1829 | .3322 |
| Widow | .0812 | .0451 | 1.80 | 0.072 | -.0073 | .16966 |
| Divorced | .0036 | .0559 | 0.06 | 0.949 | -.1060 | .1131 |
| Employee | .0174 | .0160 | 1.09 | 0.276 | -.01399 | .0488 |
| Rural | -.3508 | .0150 | -23.32 | 0.000 | -.3803 | -.3213 |
| Central | .1483 | .0238 | 6.22 | 0.000 | .1016 | .1951 |
| East | -.1995 | .0217 | -9.21 | 0.000 | -.2419 | -.1570 |
| North | -.1748 | .0203 | -8.59 | 0.000 | -.2141 | -.1346 |
| Sabah & Sarawak | -.0442 | .0230 | -1.92 | 0.055 | -.0893 | .0009 |
| Constant | 6.7545 | .1418 | 47.65 | 0.000 | 6.4766 | 7.0324 |
| R-squared | 0.4257 | | | | | |
| F | 356.40 | | | | | |
| Observations | 6,836 | | | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

# Appendix 7 – RETURNS TO EDUCATION (BY STATES)

**Table 7A: Returns to Education by States, Age 15-64 (HIS 1995)**

| Variables | Constant | Schooling | Experience | Experience squared | R-squared | F | Sample |
|---|---|---|---|---|---|---|---|
| Pooled | 5.3482*** | .1172*** | .0496*** | -.0007*** | 0.3061 | 1778.94 | 14,726 |
| | (.0281) | (.0018) | (.0015) | (.0000) | | | |
| Johor | 5.7003*** | .1051*** | .0451*** | -.0006*** | 0.2335 | 111.11 | 1,434 |
| | (.1018) | (.0067) | (.0049) | (.0001) | | | |
| Kedah | 5.6056*** | .0942*** | .0268*** | -.0003*** | 0.2247 | 85.31 | 887 |
| | (.1101) | (.0066) | (.0058) | (.0001) | | | |
| Kelantan | 5.0256*** | .1166*** | .0491*** | -.0007*** | 0.3178 | 110.48 | 801 |
| | (.1272) | (.0081) | (.0065) | (.0001) | | | |
| Melaka | 5.5684*** | .1008*** | .0453*** | -.0006*** | 0.3293 | 66.60 | 515 |
| | (.1165) | (.0084) | (.0067) | (.0001) | | | |
| N. Sembilan | 5.6982*** | .0854*** | .0538*** | -.0009*** | 0.2673 | 80.23 | 681 |
| | (.1069) | (.0063) | (.0062) | (.0001) | | | |
| Pahang | 5.4298*** | .0959*** | .0512*** | -.0007*** | 0.2442 | 85.84 | 1,086 |
| | (.1063) | (.0065) | (.0064) | (.0001) | | | |
| Penang | 5.3433*** | .1027*** | .0634*** | -.0009*** | 0.3171 | 139.34 | 958 |
| | (.0947) | (.0079) | (.0043) | (.0001) | | | |
| Perak | 5.6278*** | .0864*** | .04035*** | -.0006*** | 0.2148 | 97.34 | 1,450 |
| | (.0920) | (.0060) | (.0048) | (.0001) | | | |
| Perlis | 5.4269*** | .0886*** | .0359*** | -.0004** | 0.1945 | 33.41 | 419 |
| | (.2112) | (.0099) | (.0117) | (.0002) | | | |
| Selangor | 5.5018*** | .1172*** | .0583*** | -.0008*** | 0.2968 | 164.00 | 1,653 |
| | (.0899) | (.0059) | (.0049) | (.0001) | | | |
| Terengganu | 4.8631*** | .1343*** | .0427*** | -.0005*** | 0.3752 | 118.79 | 800 |
| | (.1341) | (.0082) | (.0066) | (.0001) | | | |
| Sabah | 5.0994*** | .1338*** | .0528*** | -.0006*** | 0.4095 | 341.92 | 1,485 |
| | (.0793) | (.0045) | (.0048) | (5.0994) | | | |
| Sarawak | 5.0729*** | .1318*** | .0727*** | -.0009*** | 0.4449 | 370.66 | 1,542 |
| | (.0708) | (.0045) | (.0041) | (.0001) | | | |
| FT Kuala Lumpur | 5.5619*** | .1234*** | .0355*** | -.0002*** | 0.2761 | 105.48 | 1,016 |
| | (.1103) | (.0073) | (.0067) | (.0002) | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level.

## Table 7B: Returns to Education by States, Age 15-64 (HIS 2002)

| States | Constant | Schooling | Experience | Experience squared | R-squared | F | Sample |
|---|---|---|---|---|---|---|---|
| Pooled | 5.6425*** | .1174*** | .0423*** | -.0004*** | 0.3052 | 1704.35 | 13,225 |
| | (.0284) | (.0019) | (.0014) | (.0000) | | | |
| Johor | 6.0454*** | .0884*** | .0464*** | -.0007*** | 0.2057 | 125.00 | 1546 |
| | (.0861) | (.0063) | (.0038) | (.0000) | | | |
| Kedah | 5.6198*** | .1123*** | .03491*** | -.0004*** | 0.2874 | 97.50 | 852 |
| | (.1276) | (.0076) | (.0064) | (.0001) | | | |
| Kelantan | 5.2152*** | .1185*** | .0459*** | -.0005*** | 0.3274 | 130.44 | 856 |
| | (.1240) | (.0067) | (.0073) | (.0001) | | | |
| Melaka | 5.9117*** | .1053*** | .0312*** | -.0004*** | 0.3055 | 59.83 | 467 |
| | (.1318) | (.0087) | (.0067) | (.0001) | | | |
| N. Sembilan | 5.7763*** | .1104*** | .0449*** | -.0006*** | 0.3096 | 58.33 | 482 |
| | (.1478) | (.0102) | (.0068) | .0001 | | | |
| Pahang | 5.8617*** | .1047*** | .02679*** | -.0003*** | 0.2658 | 105.74 | 966 |
| | (.0933) | (.0067) | (.0043) | (.0001) | | | |
| Penang | 5.4477*** | .1169*** | .0628*** | -.0009*** | 0.3236 | 131.36 | 862 |
| | (.1065) | (.0081) | (.0046) | (.00013) | | | |
| Perak | 5.7339*** | .1039*** | .0366*** | -.0005*** | 0.2463 | 112.59 | 1,223 |
| | (.1089) | (.0066) | (.0052) | (.0002) | | | |
| Perlis | 5.5922*** | .1174*** | .0256*** | -.0003* | 0.3179 | 62.81 | 419 |
| | (.1723) | (.0103) | (.0091) | (.0002) | | | |
| Selangor | 5.7242*** | .1162*** | .0556*** | -.0008*** | 0.3155 | 195.92 | 1,591 |
| | (.0883) | (.1162) | (.0046) | (.0001) | | | |
| Terengganu | 5.4892*** | .1117*** | .0355*** | -.0004*** | 0.3269 | 74.68 | 653 |
| | (5.4892) | (.0084) | (.0065) | (.0001) | | | |
| Sabah | 5.1253*** | .1482*** | .0494*** | -.0005*** | 0.3973 | 247.15 | 1,195 |
| | (.0954) | (.0058) | (.0058) | (.0001) | | | |
| Sarawak | 5.5782*** | .1157*** | .0515*** | -.0006*** | 0.3570 | 222.24 | 1,158 |
| | (.08362) | (.0054) | (.0047) | (.0000) | | | |
| FT Kuala | 5.4829*** | .1356*** | .0544*** | -.0006*** | 0.3922 | 215.24 | 1,055 |
| Lumpur | (.0857) | (.0058) | (.0039) | (.0001) | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level

## Table 7C: Returns to Education by States, Age 15-64 (HIS 2004)

| States | Constant | Schooling | Experience | Experience squared | R-squared | F | Sample |
|---|---|---|---|---|---|---|---|
| Pooled | 5.7483*** | .1154*** | .0351*** | -.0004*** | 0.2963 | 1595.12 | 13,492 |
| | (.0291) | (.0019) | (.0014) | (.0000) | | | |
| Johor | 6.2763*** | .0808*** | .0379*** | -.0001*** | 0.1674 | 81.24 | 1474 |
| | (.0919) | (.0061) | (.0043) | (.0001) | | | |
| Kedah | 5.8889*** | .1006*** | .0200*** | -.0001 | 0.2512 | 96.56 | 988 |
| | (.1067) | (.00651) | (.0052) | (.0001) | | | |
| Kelantan | 5.6102*** | .0859*** | .0437*** | -.0005*** | 0.2455 | 94.46 | 1,004 |
| | (5.610) | (.0066) | (.0063) | (.0001) | | | |
| Melaka | 6.4238*** | .0781*** | .0213*** | -.0003*** | 0.2083 | 27.99 | 385 |
| | (.1579) | (.0109) | (.0077) | (.0001) | | | |
| N. Sembilan | 6.0914*** | .0907*** | .0413*** | -.0006*** | 0.2123 | 29.90 | 405 |
| | (.1636) | (.0119) | (.0091) | (.0002) | | | |
| Pahang | 5.9068*** | .1022*** | .0369*** | -.0004*** | 0.2623 | 89.04 | 883 |
| | (.0999) | (.0070) | (.0047) | (.0001) | | | |
| Penang | 5.7640*** | .1121*** | .0452*** | -.0005*** | 0.2718 | 73.05 | 697 |
| | (.1196) | (.0087) | (.0064) | (.0001) | | | |
| Perak | 5.9786*** | .0984*** | .0275*** | -.0004*** | 0.2551 | 102.99 | 1,201 |
| | (.10295) | (.0067) | (.0051) | (.0001) | | | |
| Perlis | 5.8478*** | .0955*** | .0278*** | -.0003** | 0.2268 | 23.75 | 349 |
| | (.1920) | (.0128) | (.0084) | (.0003) | | | |
| Selangor | 5.9521*** | .1142*** | .0422*** | -.0006*** | 0.3345 | 184.56 | 1,400 |
| | (.0860) | (.0054) | (.0045) | (.0001) | | | |
| Terengganu | 5.5373*** | .1184*** | .0239*** | -.0002* | 0.3210 | 109.04 | 792 |
| | (.1364) | (.0078) | (.0065) | (.0001) | | | |
| Sabah | .5.3668*** | .1294*** | .0335*** | -.0002*** | 0.3561 | 269.49 | 1,593 |
| | (.0797) | (.0048) | (.0045) | (.0001) | | | |
| Sarawak | 5.5177*** | .1226*** | .0504*** | -.0005*** | 0.3925 | 232.81 | 1,77 |
| | (.0847) | (.0052) | (.0046) | (.0001) | | | |
| FT Kuala | 5.3833*** | .1387*** | .0632*** | -.0008*** | 0.3856 | 168.98 | 975 |
| Lumpur | (.1042) | (.0068) | (.0054) | (.0001) | | | |
| FT Labuan | 5.6122*** | .1329*** | .0419** | -.0003 | 0.3067 | 15.51 | 169 |
| | (.3061) | (.0239) | (.0183) | (.0005) | | | |

Robust standard errors in parentheses.
*** Significant at 1 % level.
** Significant at 5 % level.
* Significant at 10 % level