BIBLIOGRAPHIC INFORMATION

Title	The Returns to Education Over Time: The Malaysian Outlook, 1984-1997
Source	http://phuakl.tripod.com/pssm/conference/day142.doc
Author 1	Chung, Tsung Ping
Author 2	NA
Author 3	NA
Publication/Conference	4th International Malaysian Studies Conference; 3-5 August 2004, Universiti Kebangsaan Malaysia, Bangi
Edition	NA
Document Type	Article
CPI Primary Subject	Economics
CPI Secondary Subject	Human Resource & Employment; Tertiary Education ; ;
Geographic Terms	Malaysia;

Abstract
The results in this paper show that the relative demand for higher educated workers have been increasing amidst increasing relative supply for the period of analysis. Relative wages for this period have also been increasing, highlighting the possibility of an increased demand for higher educated workers in Malaysia. Our results also show that there are higher returns accrued to the higher levels of education, namely at the pre-university and higher education level. This condition of higher returns to higher levels of education is possible given the stages of rapid industrialisation in Malaysia.

THE RETURNS TO EDUCATION OVER TIME: THE MALAYSIAN OUTLOOK, 1984-1997

Chung Tsung Ping

UNDP Malaysia
Wisma UN,
Block C, Kompleks Pejabat Damansara,
Jalan Dungun,
Damansara Heights,
50490 Kuala Lumpur.
chung.tsung-ping@undp.org

I obtained my Bachelor of Economics from UKM in 1995, the MA in Development Economics in 1998 and later, the Ph.D in Economics from the University of Kent at Canterbury, England in July 2002. Prior to working at the UNDP Malaysia Country Office, I was employed as a Research Officer at the Centre for the Economics of Education, London School of Economics from August 2002 to June 2004.

THE RETURNS TO EDUCATION OVER TIME: THE MALAYSIAN OUTLOOK, 1984-1997

Chung Tsung Ping

UNDP Malaysia

July 2004

Abstract

The returns to education trend in Malaysia can currently be analysed via the amalgamation of results from individual rate of returns to education studies conducted in different time periods. This approach is weakened by the individuality of each study by way of methodology, data and equation specifications. In this paper, we are able to provide indicative trends of the marginal gross returns to the different levels of education over time from 1984 to 1997 in Malaysia using the Malaysian Household Income Survey (HIS). The trends for the higher education levels appear to be increasing while the other educational levels display stable marginal gross rates of returns over time. In order for the returns to education to be stable over time, the demand for skilled labour must have increased alongside increasing supply of skilled labour. This prediction is confirmed using a demand and supply framework analysis. The results in this paper show that the relative demand for higher educated workers have been increasing amidst increasing relative supply for the period of analysis. Relative wages for this period have also been increasing, highlighting the possibility of an increased demand for higher educated workers in Malaysia. Our results also show that there are higher returns accrued to the higher levels of education, namely at the pre-university and higher education level. This condition of higher returns to higher levels of education is possible given the stages of rapid industrialisation in Malaysia.

THE RETURNS TO EDUCATION OVER TIME: THE MALAYSIAN OUTLOOK

1.   Introduction

The returns to education over time are deemed to be useful for educational planning purposes. According to Psacharopoulos (1989), the returns to education over time can be used to identify the impact of educational expansion policies on a country. It is also possible to gauge the elasticity of substitution between the different types of education labour by looking at the pattern of the returns to education over time. The reasons noted here are relevant to developing countries where resources are scarce and hence requires crucial decision making needs to be able to allocate the limited resources that the country faces.

The behaviour of the returns to education over time in Malaysia can currently be investigated via the amalgamation of results obtained from the different individual rate of returns to education studies that are available.[1] This method is however, weakened by the individuality of each study. These studies have provided an examination of the returns to education using different data sets, in some cases; the analysed samples are remotely different. For instance, in the Lee and Sivananthiran (1992) study, the authors only examined the returns to education for workers in selected industries within the manufacturing sector while in Idrus and Cameron (2000); results were drawn from a sample of respondents in a rural Malay area in Rantau, Malaysia.

In addition to the various samples used, different methodologies were applied to the data. In the pioneering study by Hoerr (1967), using the first set of nationally collected socio-economic survey data, the cost-benefit method was utilised to obtain a set of private and social returns to education. In the other studies that followed, the Mincerian earnings function was utilised. In the latter set of results, the Mincerian earnings function of each

---

[1] Studies examining the returns to education in Malaysia include Hoerr (1973); Mazumdar (1981); Lee (1980, 1989); Lee and Sivananthiran (1992) and Ruppert (1998) and Idrus and Cameron (2000).

study contained varying sets of independent variables. The inconsistent data sets, methodology and regression analysis does not allow one to distinguish if the changes in the trend of the rate of returns is caused by the real changes in the returns to investment on human capital or is caused by the different tools of analysis.

This paper aims to improve the analysis of the rate of returns to education over time in Malaysia. To do this, we will take advantage of the Household Income survey (HIS) data series provided by the Malaysian Government. From our knowledge, this study could be the first of its kind to be conducted on Malaysia as we are able to present a set of results derived from a consistently designed survey of the Malaysian population. To be able to present a set of returns to education using a consistent data set over time is rare, especially in the case of a developing country such as Malaysia.

For ease of reference, this introduction will be followed by a literature review on available studies detailing the returns to education over time for selected countries (Section 2) and in Section 3; the Malaysian education system is presented. Section 4 will discuss the data source whereas the methodology applied to derive the results will be presented in section 5. Section 6 details the estimation results while section 7 presents a simple demand and supply framework analysis to explain the trends of the returns to education over time. Section 8 concludes.

2. Review of literature

Two categories of results are prevalent from our review of the available studies on the behaviour of returns to education over time for selected countries. The first category consists of studies with results that conform to the traditional findings of declining returns to education and second, those that deviate from conventional wisdom whereby stable or increasing returns to education have been found. However, these two groups of studies share a common analysis in explaining the returns to education patterns. The trends are often found to conform to the movements in the demand and supply of the different types of workers (i.e. the low and high skilled workers). This section is a non-exhaustive

review of the available literature on the patterns of the returns to education over time and is presented according to the category of results.

Studies which found declining returns to education amongst others include Riveros (1990) for Chile, Demetriades and Psacharopoulos (1987) for Cyprus, Appleton *et. al.* (1995) for Kenya, Funkhouser (1998) for Costa Rica, Palme and Wright (1998) for Sweden, Doraisamy (2000) for India and Fersterer and Winter-Ebmer (1999) for Austria.

Majority of these studies obtained different trend results by gender and by educational levels. The reasons associated with the observed declines were increases in the stock of human capital in Chile and Cyprus, a deduced offsetting in the cost of education in Kenya and the interaction of demand and supply of education in Costa Rica and India. In Austria, the reduced employment opportunities of highly educated labour appear to have caused large decrease in the returns to the tertiary level of education. These studies provide justification to the economic theory of diminishing marginal returns to capital.

Breaking away from traditional results, we find two sub categories of studies with results that deflect from conventional wisdom. Studies that find *increasing* returns to education over time consist of those conducted by Ryoo *et. al.* (1993) for the Republic of Korea, Vila and Mora (1998) for Spain, Chevalier and Walker (1999) for the United Kingdom, two separate studies by Katz and Murphy (1992) and Arias and Mcmahon (2000) for the United States and Hartog *et. al.* (2001) for Portugal. The second group of "unconventional" results are those which have found *stable* returns to education over time. This group is supported by a smaller number of studies as compared to the number of studies with evidence of increasing returns to education over time. Stable returns to education were found in Taiwan by Gindling *et. al.* (1995), Hægeland, *et. al.* (1999) and Green *et. al.* (2000) for Brazil - which had a mix of stable, increasing and decreasing trends.

Changes in the structure of the economy were possible reasons for the increased returns to education in Korea and in Spain. The structural changes in Korea were due to the rapid

industrialisation in the country. The industrialisation of Korea led to the changing needs of the country as reflected in the changing demand for skilled workers. This increase in the demand for skilled workers subsequently led to an increased level of premium paid to those with higher skill levels. Ryoo *et. al*. (1993) had also attributed the increase in the returns to education to the expansion of education at the junior and senior high school level which was implemented to achieve universal attainment rates.

In Spain, six factors were thought to be the cause of increasing returns to education. They are:- (a) an increased demand for graduates in the public sector, (b) changes in the employment population's educational attainment, (c) the occurrence of a more active involvement of women in both the education system and labour market, (d) Spain's move towards service-oriented economy in the 1980s, (e) an increase in the technicality of new production processes in the manufacturing sector increasing the demand for higher skilled blue collared workers and (d) an increase in the demand for graduates by the public sector.

Portuguese results indicate an increase in the returns to education over the 1980s and 1990s time period (Hartog *et al*., 2001). This increase occurred in particular after Portugal joined the EU in 1986. Reasons for the increase in the returns were attributed to a rise in demand for educated workers, outstripping the supply of educated workers and the effect of a skill-biased technology change due to changes in industry.

The stable returns to education in Taiwan for the time period of 1978 to 1991 were deemed to be caused by the interaction of demand and supply. The relative demand for more educated workers must have increased alongside increasing relative supply of educated workers, a spill over from the educational and skill expansion in Taiwan. Similarly, in Norway, Hægeland, *et. al*. (1999) used the interaction of demand and supply of educated workers to explain the stability of the returns to education. The stability of the rate of returns in Norway is thought to have been caused by an increase in the relative supply from educational expansion.

Green, *et. al* (2000) found either a stable or declining trend in the returns to the lower level of education using a set of Brazilian household surveys from 1981 to 1998. They found an increasing trend (especially after 1992) in the returns to the college education level. During the period analysed, Brazil's trade sector was undergoing various economic reforms which included the liberalisation of the trade sector. It was concluded that amidst these trade reforms, demand for the highly skilled workers must have increased alongside rising supply. On the other hand, the decline in the returns to the lower levels of education is attributed to rising supply, as demand for the lower skilled workers did not appear to have increased.

3.   Education in Malaysia.

The Malaysian education system comprises of 6 years of primary education, 3 years of lower secondary education and 2 years of upper secondary education. Education is free for the first 11 years. The post secondary education level involves 2 years of pre-university preparation, which if taken further would lead to a 4-year local university education.[2]

Figure A1 in the appendix charts the education system in Malaysia. Malaysians are allowed to begin their primary education in vernacular type schools, i.e. schools where the language of instruction is conducted in the Chinese or Tamil language. However, those who opt for these vernacular streams are required to undergo an extra year known as "*remove classes*" before being allowed to enter into the national type secondary schools where the medium of instruction is in Bahasa Malaysia. After completing the first three years of lower secondary schooling, students can choose to enter into the

---

[2] There are alternative routes to obtain a degree other than via a local university. For those who are unable to enter the local universities, the alternative route involves registering into a private university or college to pursue a university degree (These are the 3+0 programmes, which became widely known after and during the financial crisis in 1997) or a twining programme, where the person will spend 1 to 2 years in Malaysia with the final year or final two years spent in a university overseas.

technical, vocational or academic streams of the upper secondary educational level prior to entering into the pre-university level.

Using the Barro and Lee (1993, 2001) educational attainment data set, figure 1 shows the average years of schooling in Malaysia since 1960 while figure 2 details the condition by educational attainment levels. From figure 1, the average years of schooling has increased over the years with an average of almost 6 years of schooling in 1995.
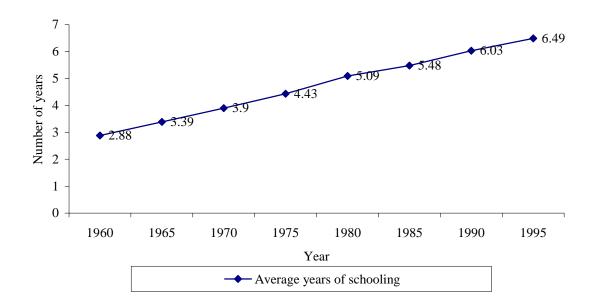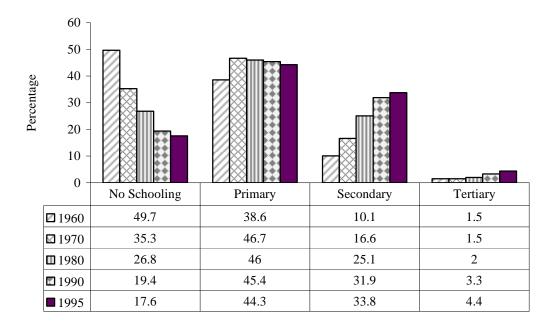
Figure 1: Average years of Schooling, 1960-1995

Source: Barro-Lee educational attainment data set (2001)

In figure 2, the percentage of those aged 15 years and above having no schooling is decreasing while those having attained secondary level schooling have been on the increase since 1960. Tertiary level education has also increased from 1.5% in 1960 to 4.4% in 1995. The changes in the education sector in Malaysia have been rapid since the launch of the Sixth Malaysia Plan (1991-1995) which emphasised on human resource development. This study would provide interesting insights into this sector which has consistently been developed by the Government, first as a nation building tool, and later expanding it to an important economic growth contributor since the early 1990s.

6

Figure 2: Educational level Attainment - Percentage of Population aged 15 years and over

	No Schooling	Primary	Secondary	Tertiary
☐ 1960	49.7	38.6	10.1	1.5
☒ 1970	35.3	46.7	16.6	1.5
☐ 1980	26.8	46	25.1	2
☐ 1990	19.4	45.4	31.9	3.3
■ 1995	17.6	44.3	33.8	4.4

Source: Barro-Lee educational attainment data set (2001)

4.   Data Source

The data consist of a series of the Malaysian Household Income Survey (HIS) data collected by the Department of Statistics.[3] The HIS is primarily designed to collect information on annual household earnings, its sources and other social indicator data such as education, health, water supply, electricity, housing and mode of transportation. The HIS is conducted once in every two to three years whereby the questionnaire is administered together with the Labour Force Survey, which is conducted annually. In total, six data sets[4] were available for analysis. These data sets include the 1984, 1987, 1989, 1992, 1995 and 1997 data sets.

---

[3] Ownership lies with the Economic Planning Unit (EPU).

[4] Approval to use these six data sets was granted by the Malaysian Government via the Economic Planning Unit in September 2000.

The advantage of using this set of data is that it will provide us with results that are representative of the Malaysian population in addition to producing reasonably updated returns to education in Malaysia. The income data that is available is also one of the most comprehensive measures of an individual's earnings in Malaysia and we believe that no other data set contains such details. The survey population includes all those living in private quarters in the whole of Malaysia. This definition of survey population does not include persons living in institutions such as hotels, hostels, hospitals, boarding schools, military barracks and the prisons (Malaysia, 1998). There were no significant changes in the questionnaire used in all 6 years; hence the results are free from any bias due to changes in the questionnaire design.

In the HIS, we are able to divide the educational levels into 6 categories of educational attainment. They consist of those with no formal education (NOFED), those who did not obtain any certificate (NOCERT), the lower secondary level (LOWSEC), the upper secondary education level (UPPSEC), the pre-university level (PREUNI) and the tertiary education level (HIGHED). The analysis is confined to those in the labour force, i.e. those aged 15 to 64 years old. Table 1 lists the sample sizes that are available for analysis.

Table 1: Sample Size for analysis in HIS 1984-1997

Year	Sample Size Analysed
1984	75,643
1987	82,027
1989	85,527
1992	86,522
1995	57,986
1997	59,134

5.   Methodology

We estimate a Mincer type earnings function for each set of the HIS. In the original Mincer earnings function,[5] potential experience (measured by age-years of schooling-school starting age) and its squared value are used. However, to avoid any measurement error of using potential earnings, we adopt the usage of age and age^2 in our estimating equation.[6]

$$\ln Y_i = \alpha + \gamma_1 age + \gamma_2 age^2 + \beta_i S_{dum} + \delta_i X_i + \varepsilon_i \qquad (1)$$

where $\ln Y_i$ is the logarithm of annual earnings, S_{dum} is a list of dummy variables indicating achievement of one particular level of education, age and age^2 are the usual proxy variables for experience and X_i is a vector of control variables, i.e. marital status, gender, the logarithm of the number of hours worked in a week[7] and ε_i is the error term.

The trends and patterns of the returns to education is analysed by examining the marginal gross returns to each successive level of education. The marginal gross returns are calculated using the formula[8] as applied by Mazumdar (1980). It is this marginal gross return that will give us the returns to education for each additional year taken to achieve

---

[5] The Mincerian Earnings Function is also known as the Human Capital Earnings Function.

[6] Harmon *et. al.* (2000) note that when age and age^2 are used as proxies in the earnings function, one would expect the results to be lower than those obtained using potential experience.

[7] It should be noted that this number of hours worked may not depict an average or typical week of work. The question used to obtain this figure is, *"How many hours did you work last week? (Including extra work, work on secondary job, etc)"*. Based on the question asked, the number of hours worked may be more than a typical week if the respondent had indeed worked on a secondary job or had to perform some over time work in that particular week.

[8] The following formula is applied to calculate the marginal gross returns.

$R_{(lowsec\ vs.\ nocert)} = [(antilog\ (\beta_1/S_{lowsec} - S_{nocert})) - 1]* 100,$

$r_{(uppsec\ vs.\ lowsec)} = [\ (antilog\ (\beta_2 - \beta_1)/(S_{uppsec}-S_{lowsec})) - 1] * 100$

$r_{(preuni\ vs.\ uppsec)} = [\ (antilog\ (\beta_3 - \beta_2)/(S_{preuni}-S_{uppsec})) - 1] * 100$

$r_{(highed\ vs.preuni)} = [\ (antilog\ (\beta_4 - \beta_3)/(S_{highed}-S_{preuni})) - 1] * 100$

where S stands for the number of years of schooling of the subscripted educational level (S_{nocert}=4.5, S_{lowsec}=9, S_{uppsec}=11, S_{preuni}=13 and S_{highed}=17). The number of years of schooling for each level of education is assumed to remain constant over time.

the next level of education. These marginal gross returns are then plotted onto a graph to provide an indication of the pattern and trend of the returns to each successive level of education.

6.   Estimation Results

In this section, the results for the overall sample and by gender will be discussed. Table A1 in the Appendix details the full estimation results of equation (1) for the overall sample. Figure 3 shows the marginal gross returns to education for the overall sample.

From Figure 3, the marginal gross returns to education over time for the lower educational levels (the NOCERT and LOWSEC levels) are stable. At the UPPSEC level, marginal gross returns declined in the 1980s followed by a stable level of marginal gross returns in the early years of 1990. Marginal gross returns for the UPPSEC educational level in 1997 increased to levels achieved in 1984. There is a declining trend in the PREUNI marginal gross returns until 1995 where the returns increased slightly (3 percentage points) from 1995 to 1997. At the HIGHED educational level, marginal gross returns increased in the 1980s and stabilised in the late 1980s until 1997.

The results for the male sample are detailed in Table A2 in the Appendix. Figure 4 charts the marginal gross returns over time for the male sample in the HIS. Overall, the marginal gross returns to the different levels of education for males can be considered to be fairly stable. The year-to-year changes are small (between 1 to 2 percentage points) for all the education levels with the exception of the HIGHED level. At the HIGHED level, the marginal gross returns were on the increase for males in the 1980s. After 1992, the marginal gross returns begin to decline. Although there is an indication of a declining trend, the returns in 1997 are higher than the returns in 1984 (15 percent).

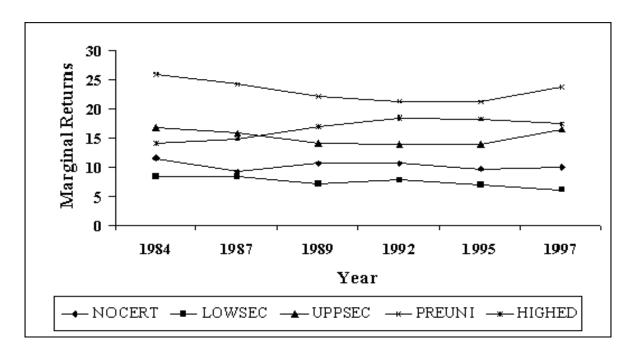**Figure 3: Marginal Gross Returns to Education, Overall Sample HIS 1984-1997**

Figure 4: Marginal Gross Returns to Education, Male sample HIS 1984-1997
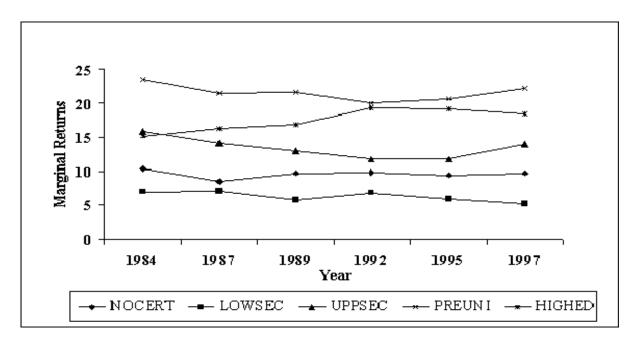

Figure 5 presents the marginal gross returns to education for the female sample. The full estimation results are displayed in the Appendix (Table A3). From Figure 5, declining marginal gross returns to education are observed for females from 1984 to 1997 for all

11

educational levels except the UPPSEC and HIGHED education level. At the NOCERT level, the female marginal gross return is fairly stable from 1984 to 1997. The marginal gross returns declined by 4 percentage points at the LOWSEC level while at the PREUNI level, the marginal gross returns declined by 6 percentage points.[9]
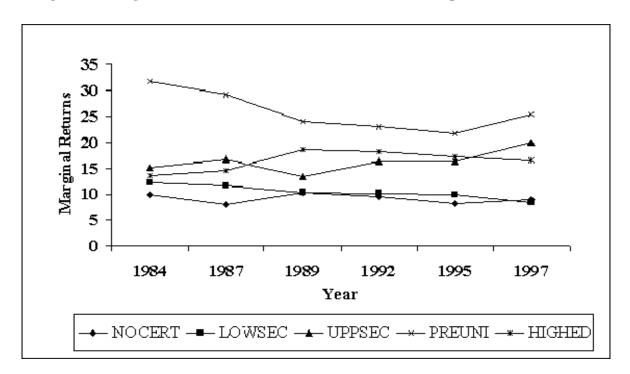
Figure 5: Marginal Gross Returns to Education, Female sample HIS 1984-1997

The marginal gross returns for each level of education for females in Malaysia appear to be higher than those obtained in the male sample, with the exception of returns to the HIGHED level, where the males have slightly higher marginal gross returns. Analysis of the other variables indicates that the marital status of a respondent has a positive effect on the logarithm of annual earnings for the overall and male sample. In this case, a married individual is found to be earning a higher level of earnings relative to a non-married

---

[9] We have also applied the sample selection correction technique, using the 2-step Heckman procedure on the female sample. The results show that sample selection did occur given the significant inverse mills ratio in our analysis result. The marginal gross returns to education for females were declining for all levels of education, with the exception of the LOWSEC and HIGHED level where the trend was stable after correcting for sample selection.

12

individual.[10]   The results for the female sample indicate a negative impact between marital status and the logarithm of annual earnings. The results here mirror those found in Korenman and Neumark (1991), Gray (1997) and Cornwell and Rupert (1997). These studies report that married men get higher wages than non-married men and unmarried women earn higher wages than married women.

6.1 The phenomenon of higher marginal gross returns to higher levels of education.

The estimation results indicate that the marginal gross returns to lower levels of education are lower compared to the marginal gross returns over time to higher levels of education in all of our samples.   Generally, the returns by educational level are usually found to be higher for the lower educational levels as compared to the higher educational level. This phenomenon of higher marginal gross returns to higher levels of education,[11] which we have found in our result, is similar to that reported in Ryoo, *et. al.*'s (1993). The researchers note that the phenomenon of higher returns to higher levels of education is possible especially during periods of rapid industrialisation and educational expansion. Ryoo, *et. al.* (providing evidence of similar findings in other studies[12]) called for an exception to the generally accepted results of higher private and social returns for primary schooling relative to the higher levels of schooling. During periods of rapid industrialisation, the pay-off to higher education is better than the pay-off to lower levels of education.

In the Malaysian context, Malaysia began to focus on industrialisation after the reinstating of the administration under Dr. Mahathir Mohammad in 1981.   The

---

[10] An individual is considered to be non-married if he/she is single, separated, divorced or if he/she is a widow or widower.

[11] Between the two higher levels of education, i.e. PREUNI and HIGHED, the marginal gross returns to the former level of education is higher than the latter category. This result poses an interesting research area, whereby a study could be conducted to gauge how employers view those with a PREUNI or HIGHED education in terms of the level of skills possessed by the individual. Our results seem to imply that the PREUNI qualification has higher marginal gross returns than a HIGHED qualification.

[12] The other studies quoted included Mohan (1986) for Bogota, Chung (1990)'s study on Hong Kong and an older paper by Carnoy and Marenbach (1975) for the USA.

industrialisation period started with the steel industry and the national car project. In 1986, the first Industrial Master Plan, 1986-1995 was implemented to provide a blueprint for an accelerated industrial development. GDP growth for this period that we are analysing, 1984 to 1997 was high, as indicated in Figure 6 below. The average GDP growth rate for this period 1984 to 1997 was 7.9 percent.
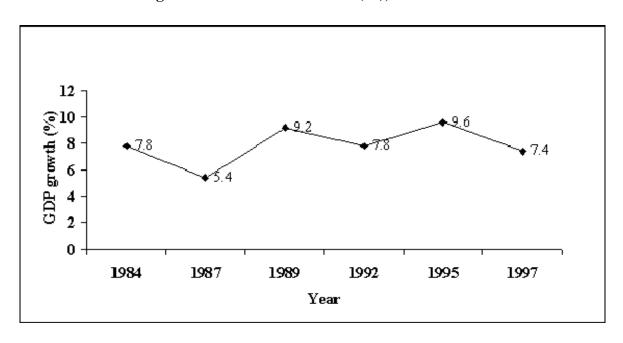
Figure 6: Annual GDP Growth (%), 1984-1997

We believe that the occurrence of higher marginal gross returns to higher levels of education relative to lower levels for education in Malaysia can be explained and linked to the industrialisation process that occurred in the country.

7. The demand and supply of labour

In this section, we apply a simple demand and supply model used by Katz and Murphy (1992) to provide a formal explanation of the trends in the Malaysian returns to education from 1984 to 1997. In this analysis, the 3 main elements in the demand and supply model are relative wages, relative demand and relative supply of higher educated workers.

14

The data set for each year is firstly divided into 16 cells, i.e. by gender and 8 experience levels. The 8 experience levels cover those with 1–5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35 and 36-40 years of experience.[13] Fixed weights are then calculated for each of the 16 cells by using the cell's average share of total employment over the period of analysis. These fixed weights are then used to compute the HIGHED/LOWSEC wage premium by taking the ratio of the average annual wages of a HIGHED graduate and LOWSEC qualifier multiplied by the fixed weights.

Figure 7 shows the log relative wages of the high skilled to low-skilled individuals in Malaysia in 1984 to 1997. Relative wages appear to have risen from 1984 to 1987 and are stable from 1987 to 1989, only to decline in 1992. It stabilised between 1992 and 1995 and increased again in 1997.
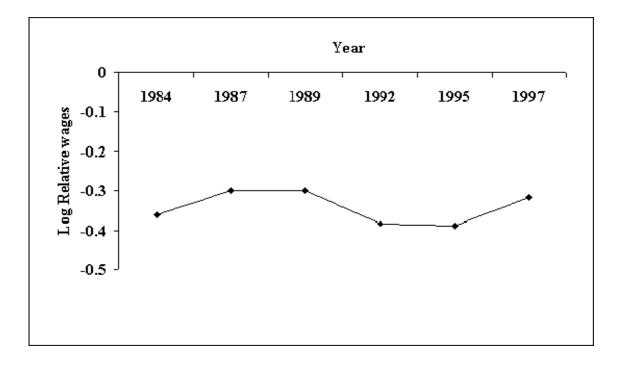
Figure 7: Log of Relative Wages, 1984-1997

Katz and Murphy (1992) proposed two explanations to illustrate the changes in relative wages. The first relates the change in relative wages to a change in the relative market

---

[13] Experience is calculated as (Age-years of schooling-6)

price of skills possessed by the high-skilled and low-skilled individuals. The second explanation draws in on the quality of the two groups of individuals by looking at the changes in the composition of the low-skilled and high-skilled individuals. We seek to use the first of the two explanations noted in Katz and Murphy's paper to explain the relative wages trend in Malaysia from 1984 to 1997.

At the end of this analysis, we want to determine the degree to which the change in relative wages is driven by fluctuations in the growth of supply verses the growth of demand side factors. In order to do this, we need to estimate the relative supply of the HIGHED and LOWSEC individuals. The relative supply of skilled labour is computed by using the values of the coefficients obtained from 4 regressions.[14] Unfortunately, we are faced with a small number of observations (n=6) for this analysis. To suit the condition of the data that we have, we assume that the lower education group, i.e. the NOFED and NOCERT is a linear combination of the LOWSEC group (requiring that we set HIGHED=0 in the original Katz and Murphy demand and supply model). On the other hand, those with UPPSEC and PREUNI qualification are a linear combination of the HIGHED group (setting LOWSEC=0).[15] The 'value' of a person with a particular qualification is measured by the individual educational group's average wages (notated by WNOCERT, WNOFED, WLOWSEC, WUPPSEC, WPREUNI and WHIGHED). Table 2 shows the results obtained from the 4 regressions.

---

[14] These regressions do not contain an intercept term and have White corrected standard errors.
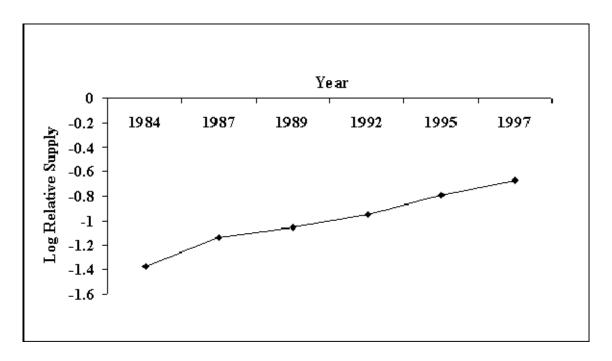
[15] In the Katz and Murphy paper, the regressions for this part of the model were based on the assumption that each group of individuals (measured by their average wages) is a linear combination of the HIGHED and LOWSEC individuals. However, the results that we obtained were rather peculiar, which motivated this modification to the calculation of the relative supply. We suspect that the peculiar results obtained using the original Katz and Murphy assumption is caused by the small number of observation that we have.

Table 2: Regression Results leading to the Calculation of Relative Supply

Independent variable	WLOWSEC	WUNIV
WNOFED	0.420	0
WNOCERT	0.962	0
WUPPSEC	0	0.221
WPREUNI	0	0.382

The results in Table 2 indicate that a person with NOFED is equivalent to a total of 0.42 of a LOWSEC person and a NOCERT person is 0.962 of a LOWSEC person. At the other end, a person with an UPPSEC qualification is 0.221 of a HIGHED person and a person with a PREUNI qualification is 0.382 of a person with a HIGHED qualification. These coefficients are used to form the supplies of HIGHED and LOWSEC equivalents. Figure 8 shows the log of relative supply computed for the time period of 1984 to 1997.

Figure 8: Log Relative Supply of skilled Labour, 1984-1997

Relative supply has increased over the time period of our analysis from Figure 8. There does not appear to be any obvious fluctuation in the relative supply. At this point, it does not give us the impression that supply itself is enough to explain the changes in the HIGHED wage premium.

Moving on to measure the relative demand of HIGHED graduates, we use the relationship between the log of relative wages, demand and the log of relative supply.

Katz and Murphy's relative demand model is as follows: -

$$\log RW = \frac{1}{\sigma}[D(t) - \log RS] \tag{2}$$

where log RW is the log of relative wages; σ is the elasticity of substitution between HIGHED and LOWSEC qualifiers; D(t) is the relative demand and Log RS is the log of relative supply.

Rearranging equation (2), relative demand can be calculated using the following equation: -

$$D(t) = \sigma \log RW + \log RS \tag{3}$$

We substitute σ with various elasticities of substitution to measure relative demand. We use σ ranging from 0.5 to 4. Figure 9 shows the measured log of relative demand with the different elasticities of substitution. Looking across the board, there is an upward trend in the log of relative demand of the HIGHED graduates. However, at the lower levels of σ, the upward slope of the relative demand curve is markedly clearer (when σ is from 0.5 to 1.0) compared to the log of relative demand with higher elasticity of substitution (when σ is equal to 2.0 and above).
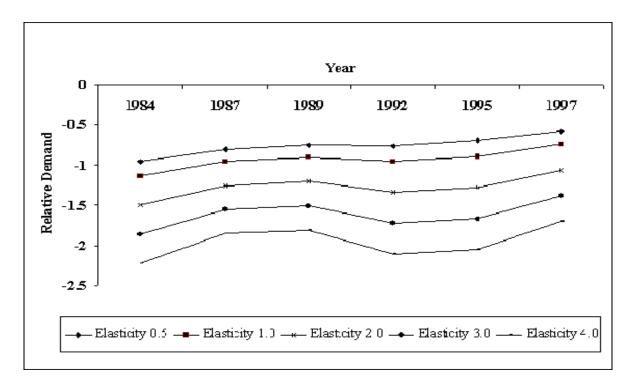
Figure 9: Relative Demand, 1984-1997

8.   Conclusion

This paper examines the marginal gross returns to education in Malaysia over the period 1984 to 1997 using a series of nationally collected data sets. The availability of results estimated from consistently collected datasets improve the current option available for economists to examine the trends in the returns to education in Malaysia. Using the results from individually conducted rate of returns to education studies to examine the changes over time in Malaysia is flawed by the uniqueness of each individual study. This paper rectifies this shortcoming and provides an insight into the returns to education trend from 1984 to 1997 through the analysis of the marginal gross returns to education.

We find that the marginal gross returns to education have been fairly stable for all education levels (with the exception of the HIGHED level) for both the overall and male samples from 1984 to 1997. At the HIGHED level, an increasing trend is evident. In the female sample analysis, a mixture of patterns is obtained. The returns for the NOCERT level among the females is stable while at the LOWSEC and PREUNI education levels,

the returns have been declining. At the UPPSEC and HIGHED levels, the returns to education for our female sample increased from 1984 to 1997.

For all samples, higher returns are obtained the higher the education level. Such results confirm the pattern of higher returns to higher levels of education as obtained in previous individual Malaysian studies on the returns to education. The Malaysian phenomenon of higher marginal gross returns to higher levels of education can be attributed to the rapid industrialisation that occurred in Malaysia during the time period of our analysis.

Utilising a demand and supply framework adopted from Katz and Murphy (1992), we are drawn to note that the relative demand for higher educated (HIGHED) workers have been increasing amidst increasing relative supply from 1984 to 1997. This provides a feasible explanation for the increase in the marginal gross returns to education for the higher education levels in Malaysia. Given the accelerated industrial development in the mid-1980s, we would expect the relative demand for higher educated workers to have exceeded the supply of higher educated workers. The increased demand for higher educated workers is further plausible considering that relative wages in Malaysia have increased slightly from 1984 to 1997.

References

Appleton, S, Bigsten, A and Kulundu Manda, D (1999), "Educational expansion and economic decline: returns to education in Kenya 1978-1995" WPS/99-6. Centre for the study of African economics, University of Oxford.

Arias, O. and McMahon, W.M. (2000), "Dynamic rates of return to education in the U.S.," *Economics of Education Review*, Vol. 20 (1), pp. 121-138.

Barro, R.J & Lee, J.W. (1993), "International comparisons of educational attainment," *Journal of Monetary Economics*, Vol. 21, pp. 363-394.

_____ (2001), "International data on educational attainment: updates and implications," *Oxford Economic Papers*, Vol. 53 (3), pp. 541-563.

Carnoy, M. and Marenbach, D. (1975), "The return to schooling in the United States, 1939-69," *Journal of Human Resources*, Vol. 10, pp. 312-331.

Chevalier, A. and Walker, I., (1999), "Further results on the returns to education in the UK," Discussion paper, July 1999, Keele University.

Chung, Y-P (1990), "Changes in rates of return to education over time: the case study of Hong Kong." Paper presented at the Comparative and International Education Society, March, 1990 (mimeograph).

Demetriades, E. and Psacharopoulos, G (1987), "Educational expansion and the returns to education: evidence from Cyprus." *International Labour Review*, Vol. 26(5), pp. 597-602.

Department of Statistics (1992), *"Household Income Survey: Codebook"* (in the Malay language), Department of Work Force and Social, DOS, Kuala Lumpur.

Department of Statistics (1996), *"Labour Force Survey: Codebook"* (in the Malay language), Department of Work Force and Social, DOS, Kuala Lumpur.

Duraisamy, P. (2000), "Changes in returns to education in India, 1983-94: by gender, age-cohort and location," Economic Growth Centre, Yale University, Centre Discussion Paper No. 815.

Funkhouser, E. (1998), "Changes in the returns to education in Costa Rica." *Journal of Development Economics*, Vol. 57, pp. 289-317.

Gindling, T.H, Goldfarb, M. and Chang, C-C. (1995), "Changing returns to education in Taiwan: 1978-91." *World Development*, Vol. 23(2), pp. 343-356.

Green, F., Dickerson, A, and Arbache, J.S. (2000), "A picture of wage inequality and the allocation of labour through a period of trade liberalisation: the case of Brazil," *World Development*, Vol. 29 (11), pp. 1923-1939.

Hægeland, T., Klette, T.J. and Salvanes, K.G. (1999), "Declining returns to education in Norway? Comparing estimates across cohorts, sectors and over time," *Scandinavian Journal of Economics*, Vol. 101 (4), pp. 555-576.

Hartog, J, Pereira, Pedro T. and Vieira, José A.C., (2001), "Changing returns to education in Portugal during the 1980s and early 1990s: OLS and quantile regression estimators, *Applied Economics*, Vol. 33, pp. 1021-1037.

Hoerr, O.D. (1973), "Education, income and equity in Malaysia," Economic *Development and Cultural Change,* pp.247-273.

Idrus, A. and Cameron, S. (2000), "Returns to education between the self-employed and employed sectors: evidence from Malaysia," *The Pakistan Development Review*, Vol. 39 (4), pp. 263-268.

Katz, L.F. and Murphy, K.M. (1992), "Changes in relative wages, 1963-1987: supply and demand factors," *Quarterly Journal of Economics*, Vol.107 (1), pp. 35-78.

Lee, K.H. (1980), *Education, earnings, and occupational status in Malaysia, 1978*, Ph.D. thesis, Department of Economics, London School of Economics and Political Science, University of London.

_____ (1989), "Report of the reverse tracer study of workers," Report Submitted to the International Labour Organisation and the Government of Malaysia under the Education and Training Module, Malaysian Human Resources Development Planning Project.

Lee, K-H and 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 Labour Organisation/Asian Regional Team for Employment Promotion (ARTEP).

Malaysia (1998), *"Labour Force Survey Report 1997,"* Department of Statistic, Malaysia.

Mazumdar, D. (1981), *"The urban labor market and income distribution: A study of Malaysia,"* Oxford University Press, Published for the World Bank.

Mincer, J. (1974), " *Schooling, experience and earnings*." National Bureau of Economic Research.

Mohan, R. (1986), "Work, wages and welfare in a developing metropolis." Oxford: Oxford University Press.

Palme, M.O. and Wright, R.E., (1998), "Changes in the rate of return to education in Sweden: 1968-1991, *Applied Economics*, Vol. 30, pp.1653-1663.

Riveros, L.A. (1990), "The economic return to schooling in Chile. An analysis of its long-term fluctuations," *Economics of Education Review*, Vol. 9 (2), pp.111-121.

Ruppert, E. (1998), "Managing foreign labour in Singapore and Malaysia: are there lessons for GCC countries," World Bank Working Paper #2053.

Ryoo, J.K., Nam, Y-S and 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.

Vila, L-E.and Mora, J-G. (1998), "Changing returns to education in Spain during the 1980s." *Economics of Education Review*, Vol. 17 (2), pp. 173-178.

Appendix

Table A1: Human Capital Earnings Function, Overall Sample, 1984 - 1997

Variables	1984	1987	1989	1992	1995	1997
Constant	3.497***	2.931***	2.857***	3.401***	4.200***	3.869***
	(0.048)	(0.046)	(0.046)	(0.046)	(0.057)	(0.057)
AGE	0.114***	0.126***	0.132***	0.104***	0.098***	0.102***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
AGE^2*100	-0.136***	-0.148***	-0.152***	-0.119***	-0.112***	-0.115***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NOCERT	0.491***	0.395***	0.464***	0.456***	0.419***	0.432***
	(0.011)	(0.010)	(0.010)	(0.010)	(0.013)	(0.014)
LOWSEC	0.851***	0.755***	0.773***	0.791***	0.722***	0.699***
	(0.013)	(0.013)	(0.013)	(0.012)	(0.015)	(0.016)
UPPSEC	1.161***	1.051***	1.034***	1.052***	0.982***	1.006***
	(0.012)	(0.012)	(0.011)	(0.011)	(0.014)	(0.015)
PREUNI	1.620***	1.484***	1.434***	1.439***	1.364***	1.435***
	(0.016)	(0.015)	(0.014)	(0.014)	(0.017)	(0.017)
HIGHED	2.143***	2.039***	2.061***	2.115***	2.034***	2.073***
	(0.020)	(0.017)	(0.017)	(0.017)	(0.020)	(0.020)
MARRY	0.142***	0.156***	0.164***	0.103***	0.070***	0.040***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.008)	(0.007)
LNHOUR	0.489***	0.580***	0.569***	0.611***	0.511***	0.615***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.012)	(0.012)
MALE	0.447***	0.394***	0.401***	0.375***	0.370***	0.400***
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
R^2	0.39	0.41	0.41	0.41	0.38	0.40
Sample Size	75,643	82,026	85,516	86,506	57,986	59,134

Figures in parenthesis are White-corrected standard errors
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table A2: Human Capital Earnings Function, Male Sample,
1984 - 1997

Variables	1984	1987	1989	1992	1995	1997
Constant	4.090***	3.498***	3.417***	3.902***	4.659***	4.221***
	(0.057)	(0.055)	(0.054)	(0.055)	(0.066)	(0.070)
AGE	0.122***	0.134***	0.139***	0.114***	0.106***	0.110***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
AGE^2*100	-0.146***	-0.159***	-0.163***	-0.132***	-0.122***	-0.127***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NOCERT	0.446***	0.364***	0.423***	0.425***	0.406***	0.414***
	(0.013)	(0.012)	(0.012)	(0.013)	(0.016)	(0.017)
LOWSEC	0.747***	0.674***	0.677***	0.719***	0.661***	0.642***
	(0.016)	(0.015)	(0.015)	(0.014)	(0.018)	(0.019)
UPPSEC	1.042***	0.939***	0.921***	0.944***	0.884***	0.906***
	(0.015)	(0.014)	(0.014)	(0.014)	(0.017)	(0.018)
PREUNI	1.464***	1.326***	1.312***	1.307***	1.258***	1.310***
	(0.020)	(0.019)	(0.018)	(0.017)	(0.021)	(0.021)
HIGHED	2.031***	1.929***	1.930***	2.015***	1.959***	1.981***
	(0.023)	(0.020)	(0.021)	(0.021)	(0.025)	(0.025)
MARRY	0.223***	0.239***	0.249***	0.180***	0.125***	0.111***
	(0.009)	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)
LNHOUR	0.417***	0.500***	0.497***	0.538***	0.453***	0.590***
	(0.011)	(0.010)	(0.011)	(0.011)	(0.014)	(0.014)
R^2	0.35	0.39	0.40	0.38	0.35	0.38
Sample Size	52,575	56,541	58,669	58,902	39,730	39,673

Figures in parenthesis are White-corrected standard errors
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table A3: Human Capital Earnings Function, Female Sample,
1984 - 1997

| Variables	1984	1987	1989	1992	1995	1997
Constant	3.480***	2.809***	2.721***	3.337***	4.065***	3.970***
	(0.087)	(0.083)	(0.082)	(0.082)	(0.103)	(0.097)
AGE	0.108***	0.118***	0.125***	0.098***	0.097***	0.095***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
AGE^2*100	-0.133***	-0.140***	-0.145***	-0.114***	-0.114***	-0.110***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NOCERT	0.431***	0.346***	0.445***	0.414***	0.354***	0.388***
	(0.020)	(0.019)	(0.019)	(0.018)	(0.024)	(0.025)
LOWSEC	0.950***	0.838***	0.890***	0.851***	0.783***	0.752***
	(0.024)	(0.025)	(0.024)	(0.022)	(0.027)	(0.029)
UPPSEC	1.233***	1.149***	1.143***	1.154***	1.087***	1.116***
	(0.021)	(0.021)	(0.020)	(0.019)	(0.025)	(0.026)
PREUNI	1.785***	1.660***	1.572***	1.573***	1.480***	1.569***
	(0.026)	(0.024)	(0.024)	(0.022)	(0.028)	(0.028)
HIGHED	2.297***	2.205***	2.253***	2.240***	2.112***	2.183***
	(0.037)	(0.032)	(0.031)	(0.029)	(0.035)	(0.033)
MARRY	-0.027**	0.006	0.016	-0.043***	-0.045***	-0.085***
	(0.012)	(0.011)	(0.011)	(0.010)	(0.012)	(0.012)
LNHOUR	0.555***	0.670***	0.648***	0.678***	0.571***	0.630***
	(0.017)	(0.016)	(0.016)	(0.017)	(0.021)	(0.020)
R^2	0.36	0.38	0.36	0.38	0.36	0.37
Sample Size	23,068	25,485	26,847	27,604	18,256	19,463
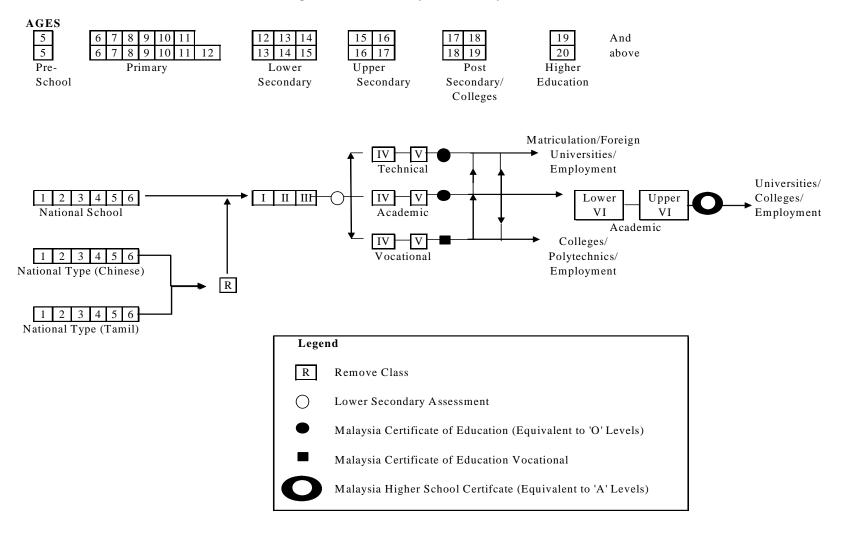
Figures in parenthesis are White-corrected standard errors
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Figure A1: Education System in Malaysia

AGES

5
5

Pre-School

6	7	8	9	10	11	
6	7	8	9	10	11	12

Primary

12	13	14
13	14	15

Lower Secondary

15	16
16	17

Upper Secondary

17	18
18	19

Post Secondary/ Colleges

19
20

Higher Education

And above

1	2	3	4	5	6

National School

1	2	3	4	5	6

National Type (Chinese)

1	2	3	4	5	6

National Type (Tamil)

R

I	II	III

IV V Technical → Matriculation/Foreign Universities/ Employment

IV V Academic

IV V Vocational → Colleges/ Polytechnics/ Employment

Lower VI — Upper VI Academic → Universities/ Colleges/ Employment

Legend

R — Remove Class

○ — Lower Secondary Assessment

● — Malaysia Certificate of Education (Equivalent to 'O' Levels)

■ — Malaysia Certificate of Education Vocational

◉ — Malaysia Higher School Certifcate (Equivalent to 'A' Levels)

Source: Ministry of Education, Malaysia

26