The Impact of Schooling Reform on Returns to Education in Malaysia

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ABSTRACT

The objective of this paper is to examine the impact of education reforms on earnings. One of the significant changes in the Malaysian education system was the schooling reform of 1970 that changed the medium of instruction from the English language to the Malaysian national language. Using data from the Household Income Surveys of 2002 and 2004, this paper updates the private rate of return to education. Applying a homogenous return model, using an ordinary least square (OLS) regression indicates that the private rate of returns to education is close to the world average. Using the Instrumental Variable approach, however, the impact of the schooling reforms indicates that the private rate of return to education is higher than the average.

1.   INTRODUCTION

Human capital development is a prerequisite to the preparation of Malaysia to become a knowledge-based economy and for sustaining economic growth. The capability and capacity in the management of new knowledge and technologies will be determined by the quality of its human capital. With globalization, this country 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 analytical skills. 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 respond to global change. Education will be crucial in the creation of a knowledgeable manpower to support new industries and economic activities, and to develop an information-rich society. 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 education system in Malaysia has changed gradually to meet the nation's needs and aspirations since independence in 1957. One of the significant changes was the school reform of 1970 when the English language was substituted by the Malaysian national language as a medium of instruction in the government schools.

The objective of this paper is to update estimation of the private rate of return to education in Malaysia, by estimating the average return for an additional year of schooling. Furthermore, this estimation will provide new evidence of returns by using the latest data sets. However, the main objective is to clarify the difference in the returns to different individuals due to the impact of the schooling reform. In addition of the Ordinary Least Squares (OLS) method by earlier studies, he alternative method, i.e. the Instrumental Variable (IV) is also

used, providing a new estimate of the returns for those who were affected by the educational reforms. This method is increasingly important in the literature because it also reduces the potential bias. Furthermore, it has never been applied to the Malaysian data.

The paper is organized as follows. The second section discusses previous studies of returns to education in Malaysia, followed by an account of the Malaysian education system and its reform. The fifth section is revealed the method of the study. The results are explained in the next section and, finally the conclusion.

2. REVIEW OF LITERATURE

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.

In the first category, Hoerr (1977) conducted the first cost-benefit analysis of education in Malaysia in 1973, using the "Malaysian Socio-Economic Sample Survey of Households, 1967-68". However, his study covered only a relatively small sample of 800. Nevertheless, it was an important benchmark in investigating the returns to education in Malaysia. His findings 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. Mazumdar (1981) used the 1970 Post Enumeration Survey (PES) and World Bank Migration and Employment Survey (MES) in 1975, which covered a small sample of male wage-earners and self-employed workers using information from three urban areas. Lee (1980) used non-random samples of 1,179 from the private sector and 792 samples from the public sector employees in Klang Valley.

These studies concluded that the earnings variation in human capital theory is largely explained by education. Chapman and Harding (1985) found that the average return to education was 9.37 percent. Unfortunately, these figures did not represent the Malaysian population as a whole but might be true for the return for their samples, which covered less than a thousand respondents.

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 woman was aged less than 50 years at the time of survey. It also included the earnings and occupational histories of the women, and the data for their husbands. Blau (1986), Gallup (1997) and Chung (2004) estimated the rate of return to education using these data. However, the results of their studies were inconsistent, probably because their objectives and methods were different. The average rate of return to an additional year of schooling education reported by Gallup was 7.6 percent. On the other hand, Blau and Chung did not report the overall return. Chung (2004) has estimated that the marginal returns to education were 12 percent for lower secondary, 17 percent for upper secondary, 26 percent and 17 percent for pre-university and higher education respectively.

Chung (2003) estimated the rate of return to schooling in Malaysia using a larger data set, the Malaysian Household Income Survey 1997. She found that the marginal gross return was higher at the upper secondary to pre-university level where an individual has an annual gross return of 22.9 percent. This result is consistent with the previous findings but contrasts with the study carried out by Hoerr. However, due to the many differences in the sample and estimation, a comparison between the earlier and later studies is difficult. For example, the

study conducted by Chung included more explanatory variables, such as number of wage earners in the household, self employed, marital status and gender.

The estimated returns to education were different 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 result in different estimated returns to education. Moreover, some of the studies, such as Gallup (1997) and Mazumdar (1981), emphasized income inequality rather than return to schooling. The explanatory variables in the earnings equations are also quite different. Blau (1997), for example, included occupational dummies which has an impact on the schooling coefficients. Nevertheless, this is common when researchers have different sets of potential regressors in a data set. The dissimilarity of methodological aspects and data availability, economic 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 schooling choice. Nevertheless, these studies that estimate the returns to education have made a great contribution to the literature relevant to Malaysia.

Our study is ask to estimate the rate of return for a later period. The Malaysian education system has been going through changes over several decades. Before proceeding to the estimation, therefore, we describe the structure of the education system the next section, followed by an account of the reforms.

3.   THE MALAYSIAN EDUCATION SYSTEM

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

Primary education starts at seven and continuous for 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. Reading, Writing and Calculating (Arithmetic) to be used in daily life. In 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 the development of personality, attitude and social values as well. Over the six years of primary education, students are assessed by continuous school-based assessment until, at the end of Year Six, they experience the first National Examination known as the Primary School Achievement Test (PSAT) to evaluate their performance. All students are automatically promoted to secondary school after completion of six years in primary school.

The normal duration of secondary schooling is five years but it is divided into two levels. Level one refers to Forms 1, 2 and 3 (Lower Secondary) and level two refers to Forms

4 and 5 (Upper Secondary). Under the New Integrated Secondary School Curriculum, secondary schools offer a comprehensive education programme with a wide range of subjects from the arts and sciences to vocational and technological education with a practical basis. 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. All Malaysian government schools use the same curriculum known as the Integrated Secondary School Curriculum. 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 in 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). Post-secondary education offers school leavers or students the opportunity to continue their studies after completing five years of secondary education. The options in post-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 are conducted by government and non-government agencies, or in the private sector. Form 6 education is a continuation of the five years of academic schooling that helps students to prepare themselves to qualify for university. It takes two years to complete the post-secondary education either in the science or the arts stream before the student can sit for the Higher School Certificate (HCE), conducted by the Malaysian Examination Council. This education systems has worked as a result of a series of reforms, notably in terms of language of instruction. Those reforms are explained in the following section.

4.   SCHOOLING REFORMS

The post-independence era was the starting point for the foundation, continuous change and development of the Malaysian education system. The early years of independence were 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 the medium of instruction, as addressed in the Razak Report of 1957. This report was reviewed by the Review Committee (known as Rahman Talib Report, 1960), which suggested that the public accept 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 (Ministry of Education, 1980).

The first impact of the changes was the upgrading of 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 a 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 this 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 addressed in New Economic Policy, 1971-1990. It also aimed to promote nationhood and national identity starting from the grassroots level (Neville, 1998). On top of that, the school reforms would 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).

Since the 1970s, the education system also reflected the changes in the needs of the labour market 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. 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 as other countries and should also take hold of 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's 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.

In estimating the returns to education, we will consider a period when those reform were all in place. We turn now to discussion of the method of estimation.

5.   THE METHOD

The empirical analysis of this study uses a human capital earnings function to estimate the private rate of return to education in Malaysia. Since the breakthrough by Mincer the earnings function has been widely used to estimate the returns to education. The empirical model used in this study starts from the Mincerian earnings function that is already known in the literature as a benchmark and will use this to estimate the average private rate of returns to education in Malaysia. The basic specification is:

$$\ln W_i = \alpha + \beta_1 S_i + \lambda_1 Exp_i + \lambda_2 Exp_i^2 + \varepsilon_i \qquad (1)$$

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

Applying simple Ordinary Least Squares (OLS) to the above equation, one can estimate the coefficient β_1 as the average of the private rate of return to schooling. The estimation of the parameters λ_1 and λ_2 are generally positive and negative respectively. Mincer (1974) claimed that weekly earnings were preferred as a dependent variable in the model. His argument was that individuals with more education tend 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 of annual or monthly earnings have been used as the dependant variable, depending on data availability. Consistently, the earnings variable in equation (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 (Willis, 1986). The method used here is preferable having regard to the data available and the log transformation is convenient for interpretation in this study. Therefore, this study uses monthly earnings as the dependent variable.

Despite the popularity of using OLS with the Mincerian earnings function, its use raises a number of issues regarding the robustness of estimation. OLS regression of log earnings on schooling will produce a bias in estimation on β_1 because of the correlation between S_i and ε_i. The sources of bias could emerge from three sources. Firstly, returns bias occurs because of the correlation between marginal returns with the schooling choice of S_i. It is not very clear, but depends on the average returns among the sub-population of those with S_i. Schooling may be endogenous as a result of the individual's optimal schooling choice. Consequently, OLS estimates will be biased upward. Secondly, ability bias is due to the unobservable factor that is correlated with both schooling and wages, also leading to estimation bias. Moreover, if ability is believed to be associated with both wages and

schooling (Ashenfelter at el., 1999), estimates of the return to schooling will tend to be biased upwards (Griliches, 1977; Card, D 1999). However, most of the cases of omitted ability are biased by not more than 5-15 percent (Schultz, 1988). Finally, a third source of potential bias is associated with the measurement error. This bias, associated with schooling measurement, age and experience, is misreported in the data. The simple way to deal with this problem is to include the omitted variable in the equation. This means that ability becomes an explanatory variable in the equation. Nevertheless, it must be taken into consideration that ability itself is also influenced by schooling; hence, using the proxy, this variable will be biased downwards. But recently most researchers have used Instrumental Variable (IV) estimation to avoid this bias, although there is still no consensus about the correct approach.

The impact of schooling reform on the private rate of return to education in Malaysia can be estimated using the IV approach. Using IV, participants can be permitted to self-select into treatment and control, and one can subsequently tease out the exogenous impact using the instrument. The 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 the rate of return. The general endogenous schooling model consists of the two equations:

$$\ln W_i = X_i^{'}\delta + \beta_i S_i + \mu_i \qquad (2)$$

where

$$S_i = Z_i^{'}\alpha + \upsilon_i \qquad (3)$$

In equation (2), $\ln W_i$ is determined by a vector of exogenous variables X_i and years of schooling S_i. Meanwhile, the β_i's are interpreted as estimates of the private rate of return to education. Estimation of the equation (2) by OLS will yield consistent estimates of β_i if the

S_i is exogenous, so that 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 in which providing 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 (2) with the predicted or fitted value for schooling.

The estimation also known as two stage least squares (2SLS), which operates using two steps. First, estimate the effect of the IV variable (school reform of 1970) on schooling and, then estimate the effect of the instrumental variable on earnings. This is based on the assumption that the school reform 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 school reform on earnings (Ashenfelter et al., 1999). Many researchers apply IV estimation with different types of policy reforms to estimate returns to schooling and compare the results with those derived using OLS. For example, 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.

The exogenous impact on the Malaysian education system was the introduction of the Malaysian language as the official medium of instruction, and this is the instrument chosen in this study. Under these circumstances, those students born after 1963 automatically used the national language in the learning process. 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 ($Z_i = 1$) 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

schooling for those who were affected by the policy reform. Borrowing the terminology from the literature on "treatment effects", Z_i (exposure to different education system reform) is independent of individual ability and the reduced form schooling residual (Heckman & Vytlacil, 2000), 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., 2000; Blundell et al., 2004).

6.   DATA AND RESULTS

This study uses data from the Malaysian Household Income Survey (HIS) for the years 2002 and 2004. It is provided by Economic Planning Unit (EPU), Prime Minister's Department, Malaysia. HIS2002 covered about 37,763 households in Malaysia. 11.42 percent or 4,313 observations from this survey were dropped from the estimation as not being in the labour force. It also excludes people with no income at the time of survey. Those with extraordinary earnings, i.e. more than MYR50,000 per month are also excluded. For HIS2002, only 5 observations earned an amount equal to or more than this. Students, pensioners, housewives and unpaid workers were also not included. This group consists of 3,760 observations from the whole population. The final sample of HIS2002 is 13,324 observations or approximately 35.29 percent of the total heads of households in the surveys. The HIS2004 included information from 36,481 household heads. Initially, 22.19 percent of these observations were dropped from the population because they were not in the labour force. Next, the pensioners, students, home makers and unpaid workers were excluded. This left 13,492 from the HIS2004, approximately 36.98 percent from the total of household heads in HIS2004. The descriptive statistics are shown by Table 1.

Table 1: Descriptive Statistics

Mean	Years	
	2002	2004
Monthly Income (MYR)		
Pooled	1974.34	2063.74
Urban	2290.73	2551.39
Rural	1486.88	1474.61
Employees	2069.26	2129.34
Self-employed	1750.00	1915.20
Schooling (years)		
Pooled	9.03	9.04
Urban	9.85	10.03
Rural	7.78	7.84
Employees	7.78	7.84
Self-employed	7.29	7.30
Certificate		
Pooled	2.19	2.24
Urban	2.45	2.56
Rural	1.78	7.84
Employees	2.43	2.49
Self-employed	1.62	1.68
Age (years)		
Pooled	40.27	40.93
Urban	39.05	39.48
Rural	42.14	42.68
Employees	38.09	38.89
Self-employed	45.42	45.54
Experience (years)		
Pooled	24.23	24.89
Urban	22.20	22.44
Rural	27.36	27.84
Employees	21.31	22.09
Self-employed	31.13	31.24
Overall Sample	13,324	13,492

The mean monthly income in 2002 was MYR1974.34 and increased to MYR2063.76 in 2004. As compared between strata, monthly income for those who had settled in the rural areas decreased slightly from MYR1486.88 to MYR1474.61 during 2002 to 2004. Meanwhile, the monthly income for urban areas in year 2002 and 2004 is MYR2290.73 and MYR2551.39 respectively. These figures show that the income gap between strata has widened. Meanwhile, earnings for those who were employed were 18.24 percent higher than those who self-employed or employers in 2002. The earnings gap between these two groups, however, declined in 2004. Employees received only 11.18 percent higher than self-employed in 2004. In absolute figures, they earned about MYR1915.20 and MYR2129.34 (in current

price) in 2002 and 2004 respectively. The earnings gap between employees and the self-employed decreased during this period.

The means for schooling, certificate obtained, age and experience increased slightly during years 2002 to 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 levels of education, with persons in urban areas more likely to be better educated. For example, in 2004, the mean of schooling for urban areas was 10.03 years but for the rural areas only 7.84 years. The mean certificate obtained was different between these two groups by almost 1 point. The gap of the mean educational attainment between rural and urban samples is very noticeable. The mean of schooling in 2004 for rural samples (7.84) doesn't reach the mean figure of urban samples for year 1995 (9.16). In 2002, years of schooling for the self-employed and employed was 7.29 years and 9.78 years respectively. It differed by 1.69 years. The figures increased to 7.30 years for the 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 certificate also shows the same trend during this time of period. The educated workers are more likely to receive earnings in wages, and participate as an employee in the labour market.

The mean age for the pooled sample in 2002 was 40.27, which increased to 40.93 in 2004. The mean of experience increased from 24.23 years in 2002 to 24.89 years in 2004. The mean age for the urban sample was 39.05 years, and 42.14 years for the rural in 2002. In 2004, the mean age for the rural sample was 42.68 (increased by 1 year) and 39.48 for the urban sample. The mean of experience was 22.20 years in 2002, and increased to 22.44 years in 2004. In the meantime, the mean of experience of the rural sample was about 27 years in 2004. Obviously, the samples indicated that persons from the rural areas were older than the urban by more than 2 years. However, the age difference within groups was obvious for the

self-employed and employees. For HIS2002, the mean age for employees was 7 years less than the self-employed (45.42 years for self-employed and 38.09 for employee). The same trend was found for HIS2004. In terms of experience, the mean for the self-employed in 2002 was 31.13 years but only 21.31 years for employees. These figures were raised to 31.24 and 22.09 in 2004 for the self-employed and employees, respectively. Interestingly, the samples have shown an enormous difference between the means of age and experience between the self-employed and employees, where employees were younger than the self-employed. Moreover, the mean of experience for the self-employed was 10 years greater than for employees not only for HIS2002, but it also for HIS2004.

Given this heterogeneity in the sample, we will use the IV approach to estimating rate of return to education in Malaysia. But we will also generate OLS estimates for comparison with other studies.

These data were subjected first to the same kind of OLS analysis used by various studies for Malaysia. The return to education in the homogenous return model is constant across individuals. The empirical results were derived from the estimation using equation 1 as presented by Table 2. Column 2 and 4, reported the OLS estimates for year 2002 and 2004, respectively. It estimated the Mincerian earnings equations where the natural log of monthly earnings received by an individual is a function of years of schooling, potential experience and its square, while the control variables used dummies for gender, marital status, household heads' activities and location (settlement type and zone of residential).

Table 2: The Private Rate of Returns to Education, 2002-2004

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)	(.0134)	(.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 instrument at first stage		0.9311 (0.000)		0.9173 (0.000)
F-test		9644.73		7534.30
[p-value]		[0.000]		[0.000]
Endogeneity test-Wu Hausman				
F-test		7.5676		7.3390
[p-value]		[0.0059]		[0.0068]
Chi-sq		7.5714 (0.0059)		7.344 (0.0067)
Observations	13,324	13,324	13,492	13,492

Robust standard errors in parentheses.
** Significant at 1 % level.
*Significant at 5 % level.

The average private rate of return for an additional year of schooling was 10.51 percent in year 2002 and 10.04 percent in 2004. One additional year of experience increased earnings by 4 percent in 2002 and 3 percent in 2004. With the exception of the dummy for employee (in

2004), all parameters are significant at 0.05 levels or better in all years. Most of the coefficients are significant at the 0.01 level. The results show the Malaysian data are consistent with the basic human capital model. Regression on earnings function by controlling gender, marital status, activity and area of residence give results that are in line with the basic theory. Schooling and experience are positively correlated with earnings but experience squared is negatively correlated.

The average return to education based on a homogenous return model (OLS) for Malaysia is consistent with the average return for middle-income countries, which is 10.7 percent (Psacharopoulos & Patrinos, 2002) and slightly higher than the Asian average. The private rate of return 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 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 the return for Malaysia. For example, an average return in Thailand (Hawley, 2004) was estimated at between 10.3 and 10.7 percent from 1985 to 1998. Both Malaysia and Thailand enjoyed considerably higher returns compared to the rest of Southeast Asia. In Vietnam, for example, average returns from education for an additional year of schooling were 4.8 percent for the overall sample, and 3.4 and 6.8 percent for males and females, respectively (Moock et al, 2003), whereas in Indonesia young people benefited slightly more those than those in Vietnam from an additional year at 7.0 percent in 1995 (Duflo, 2001).

Now we consider the heterogeneous returns model, i.e. IV approach. This is the first application of this approach to Malaysia. The first step of estimation is to examine the relevance and validity of the instrument. The strong correlation between dummy D70 with

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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 which included the dummy D70 (Bound et al., 1995; Patrinos & Sakellariou, 2004). The results of tests using a dummy year of changing the medium of instruction in schooling are statistically significant. The F-test is equal to 9644.73 and p-value is 0.000 for HIS2002 and 7534.30 (p = 0.000) for HIS2004. With regard to the quality of the D70's dummy, the F-test on excluded variables and partial R^2, is reported in the first row under Test Result at the bottom of the Table 1 (Column 3 and 5). Furthermore, the "robust" regression approach is used in case heteroskedastic errors are present.

Results from both the 2002 and 2004 reduced-form 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. This is evidence that the D70 dummy can be used as a valid instrument for schooling. In addition, any potential endogeneity in schooling was also being checked. Using the well-known Durbin-Wu and Hausman's test, the hypothesis that the OLS estimates differ is accepted at the significance level of 1 percent. All diagnostic tests of relevancy and validity having been satisfied. D70 was therefore acceptable as the instrument for IV. All the diagnostic test results are presented in the bottom rows (Test Result) in Table 1. By obtaining the original controlling variables, dummies for gender, marital status, activity and region (zone), the results suggest that IV estimates were somewhat higher than those derived using 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 those resulting from the use of OLS. It is frequently found in the literature that the standard error from IV estimation is higher than that from OLS (for

example, see Card, 1999 & 2001). These results are in line with Brunello & Miniaci (1999) for Italy. They used data from male household 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 10 percent, as with our findings. Meghir and Palmer (1999) examined the impact of the Swedish school reforms, i.e. the extension of compulsory schooling by one year, and this also corresponded with our findings. Their result, obtained using the exogenous variation induced by reform assignment, led to a point estimate that was higher than that derived using 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 study estimates exceeded OLS estimates by 3.1 and 1.6 percentage points respectively. But after they controlled for studies that produced no interesting results and the insignificant difference between the IV and the least-squares estimates, the differences were only 1.8 and 0.9 percentage points respectively (Fuente & Ciccone, 2002). Duflo (2001) examined the effect of the school construction program in Indonesia on education and earnings. She found returns to education ranging from 6.8 to 10.6 percent. Patrinos and Sakellariou (2004) estimates for Venezuela found the private rate of return was 12 percent higher when using compulsory education. Uusitalo (1999) used changes in education sector "L/70" but the result was not as significant as those for the UK or other countries. A few studies in urban China also indicate that IV is higher than OLS by between 4 and 5 percentage points such as Giles et al. (2004), Heckman & Li (2004) and Fleisher et al. (2005). However, they used family background, quality of elementary education and other instruments related to socio-economic

indicators as the instrument. In contrast, some studies provide the opposite findings. For example, Vieira (1999) considered legal changes in compulsory education in Portugal using data drawn from Quadros de Pessoal for the years 1986 and 1992. The results showed high standard errors and OLS estimates that were higher than those derived using 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 for this is probably the difficulty in data availability.

7. CONCLUSION

Our estimate of the average private rate of return for an additional year of schooling in Malaysia was 10.51 and 10.04 percent for 2002 and 2004, respectively. An additional year of experience has increased earnings by 3 to 5 percent for all years of surveys. The Mincerian human capital model, fitted well with the Malaysian data. The model's coefficients and signs were in line with the theory. The schooling parameters show the private rate of return to education was similar to the world average and slightly higher than the average of Asia. The estimation of the private rate of return to education using the IV approach is higher than results from using OLS by approximately 10 to 11 percent. However, this result should be interpreted carefully. Because either the impact of policy reforms or potential bias of OLS estimation could effected the results of estimation. If the OLS estimation is consistent, therefore, the higher returns estimated by IV reflect the impact of the school reform of 1970 on returns to education. On the other hand, if one considered the hypothesis that OLS underestimated the return, then, the school reform of 1970 is a good instrument for the IV

approach. Essentially, it is impossible to separate between the methodological and exogenous impact in estimating the returns to education.

To sum up, the findings of this study are as follows. Firstly, I found the average private rate of returns for Malaysia to be almost consistent with the world average. The homogenous return was about 10 percent, equal to the world average and slightly higher than the Asian average. Secondly, the most important finding is that the returns to schooling in Malaysia are best characterised by the heterogeneous returns model, implying that returns vary across individuals. By using the IV method, I estimated the LATE from schooling reforms and found the returns to be higher than the estimate using OLS. Using two sets of data, HIS2002 and HIS2004, the private rate of return to education increased between 10 and 15 percent compared to conventional OLS-based estimation. It is likely that the difference in estimates of rates of return to education using the OLS and the IV methods are not solely due to the well-known tendency for IV to result in higher estimates than OLS. It is also likely due to the fact that the schooling reform that is the chosen instrument in the IV method has itself generated higher positive returns.

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