



**THE RATES OF RETURN TO EDUCATION
IN BARBADOS**

by

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Abstract

Barbados is a small developing country that boasts one of the highest literacy rates in the world. This feat has been achieved as a result of substantial public subsidisation of education. By utilising the Mincerian method (1974), the paper estimates the rate of return to education (RORE) in Barbados. Given the level of public financing of all levels of education in Barbados (including university education), it is not surprising to find that university education has the highest private RORE. However, the implication of low social returns is worrisome, suggesting that government may need to rethink its policy on education in the future.

JEL Classification: I21, I28.

Keywords: Rates of return to education estimates, income distribution, Barbados.

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1. Introduction

Ever since the strong relationship between human capital accumulation and productivity in marketed and non-marketed activities was proven empirically, the world has seen massive investment in education [Romer, 1994]. Barro and Lee (1993) report that between 1960 and 1985, the percentage of the population over 25 years in a sample of 73 developing countries having access to no school dropped from 68.4% to 49.7%. Furthermore, those with access to primary and secondary school education rose from 25.8% to 31.4% and 5.5% to 14.6%, respectively. Furthermore, Schultz (1988) reports that the expected years of schooling increased by 32% from 1960 to 1987 in low-income countries, while 46% gains were achieved in middle-income countries that imported oil and 50% gains occurred in the upper middle-income group.

Educational attainment leads to efficiency in resource utilisation resulting in higher productivity and eventually higher income levels. But this investment good is relatively costly, and market-determined allocation may cause a skewness in income levels of the populous, thereby contributing to further unevenness in income distribution. Public subsidisation of education, however, can assist in a more equitable distribution of national income and thus government is well placed to effect not only strong economic growth, but income equality as well.

This is exactly what happened in Barbados, a small developing country in the Caribbean, which now boasts of having the highest literacy rates among developing countries and even surpassing some of those in the First World.¹

¹ See the United Nations Development Program's (UNDP) *Human Development Report 2000*.

From as early as the 1800s, Government recognised the importance of investing in education and, through subsidisation, made it available to all Barbadians. At present, schooling is compulsory for all Barbadians aged four to sixteen with students being required to put up minimal amount of funds through this primary and secondary level of education. Thereafter, students wishing to attend university are required to pay registration fees and the cost of textbooks, which is a small part of the overall cost.

The present paper is unique in that it does not attempt to model the contribution of human capital accumulation to economic growth; the relevant studies have already been attempted by Boamah (1997) and others. By recognising education as an investment good, the paper instead tries to calculate the rate of return to different levels of education in Barbados. This is regarded as a pertinent exercise and should serve as a useful guide to policy-makers planning future resource allocation to different levels of education in Barbados.

The remainder of the paper is presented as follows. *Section 2* gives a background of the education policy in Barbados. An examination of the methodologies used in estimating the returns to investment in education is then presented in *Section 3*. Using the extended Mincerian approach on one round of the household survey data for 1999, the rates of return to secondary and tertiary education in Barbados are derived in *Section 4*. The results and policy implications are discussed in the following section. *Section 6* of the paper gives a summary and conclusions.

2. Education Policy in Barbados

Barbados' achievement of literacy rates consistently above 95% is a reflection of a strong historical focus on "educating all the children". Evidence of this is borne out by Miller (1992), who reports that from as early as 1846 Barbados had elementary enrolment levels comparable to the highest in Western Europe. Furthermore, Barbados' legislature was the first in the region to provide substantial public funding for primary education [*op cit*, pp 120]. This was later followed up with a mandate of the Errol Barrow administration, which sought to extend "free" education to grammar schools in January 1961.² This was merely a stepping-stone to complete "free" education for children over 4 years old, irrespective of class, colour or creed.

2.1. Government Expenditure

The UNDP Human Development Report (2000) reports that Barbados' public expenditure on education to total expenditure between the period 1995 and 1997 averaged at 19.0%. In fact, with the exception of Singapore, Poland and Estonia, this represents the highest level of spending among the countries enjoying the highest ranks in the human development index. For the Caribbean, this ratio compares with 8.8%, 12.9% and 10.0% for Antigua and Barbuda, Jamaica and Guyana, respectively.

Table 1 outlines the level of Government's investment in education in Barbados over the last thirty years. Current expenditure, which captures spending on teachers' salaries and the purchase of books and other

educational equipment, has remained at a relatively constant level throughout the period, confirming Government's commitment to the development of human capital. This expenditure peaked at 24.7% in the first five-year period under review. It fell slightly to 22.2% during the period 1992/93 to 1996/97 but settled around 22.7% in 1998/99. For the entire period, the average current expenditure on education to total current expenditure was estimated at 23.1%. This compares with an estimated average of 17%, 16% and 15% on the general public service, economic services and health services, respectively – sectors that enjoy the second, third and fourth largest share of current expenditure.

On the other hand, capital expenditure on education fluctuated more rapidly, ranging from an average of 8.9% of total capital expenditure between 1982/83 and 1986/87 to 18.0% for the five-year period 1992/93 to 1996/97. During the review period, most of the capital spending was on the construction and refurbishment of primary and secondary schools, thereby facilitating the development objective of the Government.

More recently, Government's capital spending has focussed on human capital deepening through its Education Sector Enhancement Programme (Edutech 2000). The programme is being funded jointly by the Caribbean Development Bank, the Inter-American Development Bank (IDB) and the Government of Barbados. The project, which is estimated to cost approximately US\$194.4 million, with the IDB providing US\$85.0 million, the CDB some US\$31.5 million and the Government providing the remainder, is expected to be executed over a seven year period with fifteen schools

² Two types of secondary schools existed in the early 1960s. These were grammar schools such as Combermere, Christ Church Foundation and The Lodge which catered to the academically inclined and secondary modern schools such as St. Leonard's Boys and Girls and Princess Margaret which focussed on the more technical subjects.

involved in the first phase [*Barbados Economic and Social Report*, 1998 pp 60].

The Edutech programme's main objectives are to improve learning outcomes at the primary and secondary levels, along with enhancement in the range and relevance of skills of school leavers. Edutech 2000 has five main components: training, technology infusion, curriculum reform, and physical rehabilitation and project management [*op cit*, 60].

Table 2 gives a more detailed picture of current expenditure by decomposing it into the different levels of education; this break down is only available from fiscal year 1995/96. The short data set shows that most of the spending went towards primary level education prior to FY 1997/98. Thereafter, expenditure on secondary level took the lead. Whereas high level of expenditure at the primary and secondary levels reflect the large number of students attending these schools, the trend in tertiary level is better explained by the very high cost of providing this level of education. However, the average annual growth of 13.7% in the tertiary level spending suggests a significant expansion in enrolment rates.

2.2 Schooling

Pupils in Barbados enter primary school from about four years of age.³ The duration of primary education is approximately seven years. At this level, students learn the basic literacy and numeracy skills. Primary education culminates with an examination for entrance into a secondary school. Acceptance at a particular school is based on the examination results

³ Prior to primary school age, parents have the option of sending their children to nursery care and/or pre-school.

therefore implying a ranking of the secondary school system in Barbados. The curriculum at all secondary schools is virtually the same but some schools emphasise certain subjects more than others.⁴ On entry into secondary school, progress through the school is also based on end of year examination results making repetition a possibility and indeed a reality in the school system in Barbados.

Table 3 shows the gross enrolment ratios for all level of education in Barbados as well as at the aggregated level for the period 1970 to 1999. This ratio measures the percentage of the population at a particular level of education age that are actually pupils at that level. Thus, a ratio in excess of 100% implies that there were more students at primary school than were in the relevant population age group.

The total gross enrolment rates reached a peak at the beginning of the period when rates were recorded at 102.5% and 108.2% in 1970 and 1975, respectively. Since repetition is not allowed at the primary level, these rates can occur when schools make allowance for students who have performed so poorly on the secondary school entrance examination that the authorities put mechanisms in place for them to remain at the primary level.⁵ However, these rates have since fallen off and recorded 90.4% in 1991, suggesting less than perfect attendance at the primary level.

Although all primary school students must go on to secondary school, the gross enrolment rates are noticeably lower than at the primary level.

⁴ It is only recently that schools catering to the special needs of slow learners have been introduced in Barbados. These schools place less emphasis on general academic studies and more on vocational and training courses.

⁵ Examples of these types of institutions are Christ Church Girls' Composite, St. Lawrence Composite and Hindsbury Composite.

Possible reasons for this trend are the high dropout rates and the incidences of expulsion. The rates range from 78.9% to 91.8%. The latter suggests that nearly 91.8% of the secondary school aged-students were actually enrolled students in secondary school in 1984. The most recent information (1989) indicates that the gross enrolment rate was 84.6%, a significant fall-off from the 91.8% five years prior.

As a result of compulsory attendance of Barbadian students to primary and secondary school, school life expectancy averages around 12 years.

The most complete data set on enrolment rates is available for tertiary education. Abstracting from 1988 and 1989, the rates have generally been on the rise since 1970. This is expected as an increasing number of persons recognise the value of a university education. More importantly, though, persons seem to be responding to the devices that employers use to ascertain the employees' ability. Since employers screen ability of potential employees by observing their level of educational attainment, many persons have been responding to these devices by pursuing further education. In addition, the relatively cheap cost of acquiring university education makes the rate of return at this level quite attractive for Barbadian students.

3. Rates of Return to Investment in Education

The rate of return to education (RORE) relates to the benefits of investing in education after accounting for all the costs. The literature defines two types of returns to education – private and social. Schultz (1988) describes "the private rate of return as the internal rate that equalises the present discounted private opportunity and the direct cost of schooling with

the discounted value of the private after-tax gains". On the other hand, "the social rate adds the public and private subsidies that the individual student and family do not bear to private costs, and augments the private gains to include taxes and any net positive social externalities that are not captured by the private individual and their family".

In other words, social rates of return refer to the net benefit to the society as a whole of the government subsidising education. In contrast, private rates refer to the net benefits accrued to an individual for having foregone income to attain education and any direct costs of education. In addition, in a public-subsidised system of education, the social rates would be lower than private returns because one must account for public spending on education.

Knowledge of these two RORE can be very useful in guiding policy-makers in their allocation of resources to different levels of education. More specifically, the higher the RORE, *inter alia*, the more resources should be invested in that level of education.

3.1. Literature Survey

George Psacharopoulos, who is regarded as the leading authority on RORE for all levels of education, has calculated these estimates for all parts of the globe [See Psacharopoulos, 1973, 1981, 1985, 1994]. The main findings by him and others are that rates of return to educational investment vary across different levels of education [Schulz, 1988; Psacharopoulos, *op cit*]. Moreover, the conventional wisdom is that the rates of return have been highest at the primary school level, and decreasing as the level of education

increases. This assertion would suggest that policy-makers should concentrate most of their expenditure on the provision of universal quality primary education where there are the highest returns to the society as a whole.

While higher education allows a few to earn more money, basic education allows 'many' to gain literacy and numeracy skills. The latter skills are beneficial to society both in market and non-market activities. In terms of market activities, these literacy and numeracy skills will allow workers to better understand assignments and therefore carry out tasks more efficiently and productively. Also, one worker's educational attainment may have a 'spill-over' effect on other workers therefore making workers more productive, which in turn benefits the society as a whole.

In relation to non-market activities, farmers with just basic primary education are more likely to adopt methods of enhancing their output than farmers who have not benefited from any years of schooling [Ramirez *et al*, 1997]. Similar evidence is borne out in the household where literate mothers are more likely to have fewer children than illiterate ones. With literacy skills therefore, women are better able to understand the importance of family planning and enjoy the benefits of having fewer children; i.e. by having smaller amounts of children, increase the quality of life of each child. In addition, research has shown that when women in the household increase their power through earning their own income, a larger share of the money is spent on food with higher nutritional contents as well as on the education of their offspring. In other words, women invest more in human capital. Thus,

benefits of basic education are not limited to market activities and suggests that enhancement of lower levels of education should be priority.⁶

While the social rates of return are the smallest at the university level, the private rates of return (in a subsidised system) are by far the largest. This is so because the government pays the tuition fees and may even provide a maintenance allowance. It is estimated that provision of university education costs authorities up to 100 times more than provision of basic education [World Bank, 1986]. Thus on attaining the degree, individuals may earn a large salary without having put forward much of its cost. The society gains little because productivity is not necessarily increased and the only form of cost recovery is via taxation on income.

Furthermore, while most policy-makers believe that low-income families stand to benefit significantly from 'free' university education, research suggests that a larger proportion of the total enrolment in higher education is from students who can afford to pay for education [World Bank, 1986]. Thus, subsidisation of university education does not reduce income inequality and can instead exacerbate it because higher income families stand to benefit most [See Colclough (1996) pp 591]. Therefore, in the interest of a more equitable and efficient educational system, governments are considering recovering cost of providing education.

However, the poor economic growth performance of many of the developing countries that might have already achieved 100% enrolment rates in primary and/or secondary education would suggest that the human capital

⁶ The expansion of primary education will also ensure that more females have access to basic education and hence narrow the gap between female and male enrolment rates that still prevails in many developing countries. Indeed, the finding that the rates of return are higher amongst girls should encourage governments to let more females into the system.

hypothesis does not hold for all countries and may even question the RORE [Bennell, 1996]. Indeed, the phenomenal growth in South East Asian countries has not been universal as economies of Latin America and Sub-Saharan Africa continue to stagnate. While human capital accumulation in Asia has generally been responsible for much of its economic growth, similar investment in the other countries has not had the same returns.

There are three prominent criticisms of the RORE estimates. Firstly, many argue that schooling 'picks out' but does not augment student's ability. This implies that the number of years of schooling should be no indication of the level of productivity of the student but that potential productivity is determined by innate ability. Secondly, the screening hypothesis suggests that employers gauge the ability of the worker by the number of years that he/she has been in school. In addition, in order to receive higher wages, students recognising this trend may signal to potential employers that they have education. Lastly, as mentioned earlier there may be many externalities contributing to the productivity of individuals. Thus, the RORE estimates may possess an upward bias suggesting that returns of human capital investment are higher than they are in reality and this may help to explain the poor performance in Sub-Saharan Africa.

3.2. Methodology

Authors have employed two main methods in their estimation of RORE. The "full" or "elaborate" method looks at detailed age-earnings profile by level of education and seeks to find the discount rate that equates a stream of education benefits with a stream of education costs at a given point in time.

The stream of benefits is identified as the earnings advantage of graduates of the education level of interest over earnings of a control group of graduates of a lower education level. On the other hand, the stream of costs is calculated as the earnings foregone while in school (measured by the mean earnings of graduates of the education level of the control group) in the private rate of return estimates. To get the social rate, this result is augmented by the true resource costs of schooling i.e. the cost of public subsidisation.

The stylised age-earnings profiles, which are adapted from Psacharopoulos (1995), are illustrated on Figure 1 where 18 years and 23 years are the assumed ages of secondary and university graduates, respectively. Direct costs relate the expenditure on education by the individual in the case of private rate of return. This is added to the costs incurred by the state in its provision of education when calculating the social RORE. While the earnings for secondary school leavers continue to grow over time due to the accumulation of years of job experience, they are not as high as those students who completed a university degree.

However, to capture the total costs of pursuing up to university level, the income foregone while pursuing the university degree (i.e. the indirect costs) must be accounted for. On the diagram, this is captured in the costs above the x-axis, where income foregone for the life-span of university is assumed to be five years. The RORE to say university education is calculated via the following formula.

$$\sum_{t=1}^5 \frac{(W_u - W_s)}{(1+r)^t} = \sum_{t=1}^5 (W_s + C_u)(1+r)^t, \quad (1)$$

where W_u - earnings of university graduates;
 W_s - earnings of secondary school graduates;
 C_u - direct costs of university education;
 r - rate of return to university education.

The RORE based on the full method have been calculated for the Organisation for Economic Co-operation and Development (OECD) and the regions of Sub-Saharan Africa, Latin America and the Caribbean and Asia. However, a perusal of the literature reveals that Jamaica and The Bahamas are the only Caribbean countries to have been examined by researchers [See Psacharopoulos (1985) and Psacharopoulos and Ng (1994)].

Table 4 shows the social and private RORE estimates done by Psacharopoulos (1994) for different regions in the world. In line with the foregoing discussion, one can observe that the private rates are higher than the social rates for all levels of education. The divergence is largest in Sub-Saharan Africa where the private RORE at the primary level is almost doubled the social rates. In all regions except Europe, the Middle East and North Africa, the primary RORE (social and private) are the highest showing that the returns associated with investment in primary education surpass all other levels of education. This reflects the prevalence of illiteracy in countries of Sub-Saharan Africa, Asia and Latin America and the Caribbean relative to the more developed countries thereby making the completion of primary education a major achievement, which will be richly rewarded in the labour market. The lowest RORE are in the developed countries because these population are becoming more educated and the supply of graduates

(particularly at the secondary and university level) begins to outstrip their demand in the labour market. Therefore, as countries become more developed, these ROREs decline enabling developing countries to catch up with their developed counterparts.

The second method is called the short-cut method, so named because of its less-demanding data requirements. The basis of this method is the assumption of flat curves in the age-earnings profile. Thus, this method is a more crude measure of RORE. The following formula illustrates this procedure.

$$\text{privateRORE} = \frac{\bar{W}_u - \bar{W}_s}{5(\bar{W}_s)} \quad \text{and} \quad \text{socialRORE} = \frac{\bar{W}_u - \bar{W}_s}{5(\bar{W}_s + C_u)} \quad (2)$$

Therefore, this measure assumes that earnings is constant throughout the university life-span and is useful in situations where the extensive data is not available.

A third, but related, method is called the "basic" earnings function or Mincerian method (see Mincer, 1974). It is one of the more popular methods because of the ease of estimation. This method may be represented follows:

$$\ln W = a + b * YRSCH + c * YRSEXP + d * (YRSEXP)^2 \quad (3)$$

where W - earnings;
 $YRSCH$ - years of schooling;
 $YRSEXP$ - years of labour market experience.

The coefficient b is interpreted as the average private return to one additional year of education, c the marginal returns to experience and d the diminishing returns to years of experience. In fact, the b coefficient is the equal to the private RORE derived from the short-cut method above (see equation 2).

Table 5 highlights the RORE estimates using the Mincerian approach. The highest RORE is associated with the least developed region, while the converse is true for the developed countries. That is,

$$b = \frac{\partial \ln W}{\partial S} = \frac{W_s - W_o}{W_o} \cdot \frac{1}{\Delta S} = \frac{W_s - W_o}{\Delta S W_o} = \text{privateRORE}^7 \quad (4)$$

However, to have a more explicit analysis by different level of education, this earnings function can be extended by replacing the variable $YRSCH$ with three dummies pertaining to the completion of each level – primary, secondary and tertiary, where the controlled group are those with no education.

To my knowledge, only one study has come close to calculating the RORE for Barbados, though not explicitly acknowledging that this was done [Coppin, 1996]. Utilising the Mincerian approach, Coppin (1996) regresses average weekly earnings on the dummies representing highest level of education attained, institutional and on the job training, experience and dummies relating to white collar and government employment and marital status.

However, in theory the coefficient b does not truly capture the returns to education because no cost element is taken into consideration. Instead, it

measures the marginal effect of different levels of schooling on earnings (marginal wage effect). Psacharopoulos (1994) suggests a way around this problem by relating the cost of education to the wage effect. He contends that in an extended (dummy) specification each education coefficient has to be related to the one referring to the previous educational level and divided by the number of years of incremental years of schooling separating the two levels in order for the result to be interpreted as a rate of return.

In addition, Psacharopoulos argues that results from the regression such as the one carried out by Coppin (1996) that have fitted the earnings function with so many variables other than human capital variables, are inappropriate for measuring the RORE. This is so because it biases the returns to education, reporting earnings functions only within occupation and thus artificially biases downward the return to education [Becker, 1964].

In general, the estimates obtained from the extended Mincerian approach are higher than those based on the full method implying some upward bias in the former estimates.

4. Empirical Analysis

4.1. Data and Methodology

Utilising one round of the continuous household sample survey data for 1999, the RORE were calculated for Barbados. The original data set consists of 3000 individuals. However, after the adjustments were made to exclude unemployed persons and persons not willing to give enough details, 1690 remained. This data consist of weekly earnings, highest level of education

⁷ Since $\Delta \ln$ is a growth rate between the wages of persons with and without schooling.

attained, number of years of job experience, sex and age. Table A in the appendix gives an age-earning profile of the data used in the exercise.

The number of males in the sample is 859. Also, the sample includes only persons who have completed one of the three main levels of education - primary, secondary or university - and of course no education. Thus, the affect of technical or vocational training is not examined. The number of persons completing primary education was 341, secondary school education was 1093, while 252 of the 1690 individuals sampled were university graduates. Hence only three persons in the sample had not completed any education therefore attesting to the easy access of education to Barbados and that over 95% of the persons take advantage of its free availability.

Using the Mincerian approach, the following extended earnings function was estimated for the data for Barbados. The results are presented in Table 6A.

$$\ln E = \beta_0 + \beta_p * D_p + \beta_s * D_s + \beta_u * D_u + \beta_1 * X + \beta_2 * X^2 \quad (5)$$

where E - average weekly earnings for each individual;

D_p - dummy with one assigned for individuals who have completed primary school and zero elsewhere;

D_s - dummy with one assigned for individuals who have completed secondary school and zero elsewhere;

D_u - dummy with one assigned for individuals who have completed university and zero elsewhere;

X - average years of experience on the job;

4.2. Results and interpretation

The small number of observations for the persons with no education distorted the results. More specifically, the results reveal that the mean earnings of persons with no education are higher than persons with primary education. This is an unrealistic find and the three persons with no education were therefore dropped from the sample. The resulting regression has dummies for secondary and tertiary education with the controlled group being persons with only primary education. The pitfall of this refinement is that it is extremely difficult, if not impossible, to ascertain the rate of return for the controlled group. With 1687 observations remaining, results of the extended earnings function regression given in Table 6B.

Given the heteroscedastic nature of cross-sectional data, the standard errors used are those of the Newey-West HAC Standard Errors and covariance with a lag truncation of 7. Therefore, the t-statistics reported in the table are valid and can be used to interpret the statistical significance of the variables in the regression. The results are consistent with expectation that secondary education is more highly rewarded than primary education and that university education is more rewarded than both primary and secondary education. When sex is included into the specification, a slightly better fit is obtained. Its significance in the regression confirms that the men are better paid than their female counterparts.

However, the study is interested in the RORE not just the coefficients of the above regressions. According to Psacharopoulos (1995), the private RORE for secondary and university is calculated as follows.

$$privateRORE_s = \frac{\beta_s}{S_s} \quad \text{and} \quad privateRORE_u = \frac{\beta_u - \beta_s}{S_u - S_s} \quad (6)$$

Table 7 presents a set of estimates that are based on different assumptions of foregone income. The private RORE to secondary education ranges from 4.8% to 8.0%, depending on the assumptions on the number of years of income foregone while pursuing the given level of education. In other words, for every private dollar spent (of foregone income) on secondary education has a return of between 4.8% and 8.0%. These estimates are significantly lower than those reported for Latin America and the Caribbean in Table 4 but only slightly below those for the OECD. This suggests that Barbados is at a more advanced stage in the secondary school educational attainment than its developing counterparts.

Given the fact that the private rates of return are higher than the social rates in public subsidised education, it can be postulated that the social rates for secondary education in Barbados may be zero or in fact negative.

The results for university education suggest that for every dollar of foregone income, the return to that level of education is between 12.8% and 20.9%. This is not surprising given the fact that this level of education is almost fully subsidised by Government. Moreover, since university education is "freely" available, the subsidisation of students from higher income homes may aggravate income inequality within the country. It does, however, provide an opportunity for students from low-income homes to increase their future income through the attainment of education.

With the assumption of five years of foregone income, the private RORE to university level education is on par with those in the OECD. However, as the assumptions change the RORE are more in line with the rest of Latin American and the Caribbean.

4. Summary

The paper attempted to estimate the rate of return to education in Barbados. Because of the high level of education in Barbados, only estimates of the return to secondary and tertiary education could be derived. The results confirmed that university education has a higher private rate of return than secondary education in a state subsidised system. However, one must be mindful that, given the profitability of investment in university education, the income distribution may not be affected as both the rich and the poor students increase their prospects of wealth in the future. The paper, however, is quick to admit that subsidisation helps poorer students.

Furthermore, based on the fact that the RORE from the Mincerian method are generally higher than those obtained from the full method, one can postulate that the estimates presented in Table 7 contain an upward bias. Hence, given the level of public subsidisation, it implies that the social rates of return to secondary and tertiary education are even lower. This suggests that Government may not be seeing the rate of return on this investment good called education.

APPENDIX

Table A

Age-Earnings Profile for a sample of Barbadian workers

Age	No education	primary	secondary	Tertiary
16			216.7	
17		150.0	220.0	
18			206.3	250.0
19		150.0	253.6	200.0
20		150.0	228.3	260.0
21		150.0	240.3	370.0
22		150.0	267.2	470.0
23			254.9	500.0
24			218.1	450.0
25		150.0	257.1	225.0
26		250.0	298.2	541.7
27		310.0	283.3	570.8
28		250.0	284.3	525.0
29		350.0	311.5	608.3
30		200.0	292.9	500.0
31		150.0	315.0	577.8
32		250.0	324.2	506.3
33		190.0	350.0	600.0
34	150.0	383.3	338.0	725.0
35		212.5	310.3	650.0
36		350.0	326.5	558.3
37		350.0	309.8	535.7
38		194.4	353.7	587.5
39		333.3	339.2	687.5
40		376.7	376.7	670.8
41	550.0	233.3	337.5	770.0
42		307.1	312.5	714.3
43		235.7	386.0	725.0
44	150.0	264.3	356.0	570.0
45		250.0	320.6	630.0
46		364.3	459.4	655.0
47		270.0	414.3	800.0
48		250.0	422.5	783.3
49		386.7	403.6	500.0
50		240.9	380.0	700.0
51		300.0	296.7	633.3
52		285.3	376.3	766.7
53		285.7	485.0	764.3
54		300.0	334.4	750.0
55		357.7	478.6	670.0
56		266.7	325.0	675.0
57		172.2	512.5	800.0
58		303.8	425.0	800.0
59		283.3	150.0	450.0

Age	No education	primary	secondary	Tertiary
60		238.2		
61		190.0	450.0	750.0
62		312.5	433.3	
63		207.1	150.0	
64		150.0		
65		264.3	750.0	750.0
66		275.0		
67		150.0		
68		350.0		800.0
70		150.0	208.9	
72		450.0		450.0
73			550.0	
74		150.0		
76		350.0	650.0	
77		150.0	800.0	

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Table 1
Government Expenditure on Education

Period	Education to Total Current Expenditure Ratio	Education to Total Capital Expenditure Ratio
1972/73 – 1976/77	24.7	12.8
1977/78 – 1981/82	23.5	13.0
1982/83 – 1986/87	22.9	8.9
1987/88 – 1991/92	22.2	15.1
1992/93 – 1996/97	22.3	18.0
1997/98 – 1998/99	22.7	12.4
Average	23.1	13.4

Source: Central Bank of Barbados, *Economic Financial Statistics* various issues.

Table 2

Current Expenditure by Education Level

Period	Primary	Secondary	Tertiary
1995/96	71.5	69.9	51.5
1996/97	74.9	74.5	52.4
1997/98	78.3	76.8	75.7
1998/99	85.6	94.0	79.6
1999/00	80.7	92.5	86.9

Source: Ministry of Education

Table 3

Enrolment Rates by Level of Education

Period YEAR	Total	Gross Enrolment Ratio		
		Primary	Secondary	Tertiary
1970	66.5	102.5	--	3.4
1975	68.6	108.1	78.9	8.7
1980	66.4	85.5	88.1	14.8
1981	66.7	85.9	86.3	18.2
1982	67.3	87.5	86.9	18.5
1983	69.5	92.5	87.9	19.2
1984	71.3	98.7	91.8	19.8
1988	70.4	95.6	87.5	16.9
1989	68.4	93.0	84.6	17.1
1990	--	--	--	27.2
1991	--	90.4	--	28.4
1992	--	--	--	26.0
1993	--	--	--	26.4
1994	--	--	--	27.5
1995	--	--	--	28.7

Source: UNESCO, Institute for Statistics.

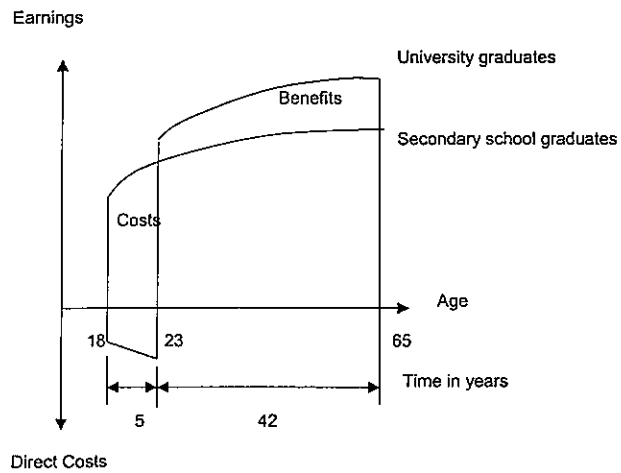


Figure 1: Stylised Age Earnings Profiles

Table 4

Return to investment in education by level using the "full" method

Geographical location	Social			Private		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Sub-Saharan Africa	24.3	18.2	11.2	41.3	26.6	27.8
Asia	19.9	13.3	11.7	39.0	18.9	19.9
Europe/Middle East/North Africa	15.5	11.2	10.6	17.4	15.9	21.7
Latin American and the Caribbean	17.9	12.8	12.3	26.2	16.8	19.7
OECD	14.4	10.2	8.7	21.7	12.4	12.3
World	18.4	13.1	10.9	29.1	18.1	20.3

Source: Psacharopoulos (1994)

Table 5

The coefficient on years of schooling: Mincerian rate of return

Geographical Location	Average Years of schooling	Coefficient (%)
Sub-Saharan Africa	5.9	13.4
Asia	8.4	9.6
Europe/Middle East/ North Africa	8.5	8.2
Latin American and the Caribbean	7.9	12.4
OECD	10.9	6.8
World	8.4	10.1

Source: Psacharopoulos (1994)

Table 6A

Regression Results (1)

Variable	Regression 1		Regression 2	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	5.163	14.463	5.017	14.481
D _p	-0.031	0.088	-0.008	0.023
D _t	0.207	0.579	0.244	0.700
D _u	0.634	2.322	0.887	2.540
X	0.051	5.720	0.048	5.528
X ²	-0.001	-2.993	-0.001	-2.947
Sex			0.244	10.049
Adjusted R ²	0.25		0.30	
F-statistic	115.3		117.5	
Observations	1690		1690	

Table 6B

Regression Results (2)

Variable	Regression 1		Regression 2	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	5.133	133.284	5.010	124.951
D _s	0.239	7.430	0.251	7.729
D _u	0.866	20.163	0.895	20.993
X	0.050	5.644	0.048	6.302
X ²	-0.001	-2.900	-0.001	-3.268
Sex	--	--	0.244	9.798
Adjusted R ²		0.26		0.30
F-statistic		144.182		141.066
Observations		1687		1687

Table 7

Rate of Return Estimates

Level of Education Completed	Private Rate of Return (five years of foregone income at secondary and university)	Private Rate of Return (four years of foregone income secondary and university)	Private Rate of Return (three years of foregone income secondary university)
Secondary	4.8	5.9	8.0
University	12.5	15.0	20.9