

IS EDUCATION MORE PROFITABLE FOR WOMEN? AN ECONOMIC ANALYSIS OF THE IMPACT OF SCHOOLING ON THE EARNINGS OF MEN AND WOMEN IN SRI LANKA*

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Introduction

The impact of education on the economic performance and well-being of individuals and nations is an area of considerable interest in the economic literature. Sri Lanka has been noted by economists as a country with an exceptionally high level of social well-being, including educational achievement, relative to its level of per capita income (see *Aturupane, Glewwe & Isenman, 1994*). The present paper addresses four specific issues concerning the economic impact of education in Sri Lanka. First, the determinants of earnings are analysed in a multivariate framework so that the existence of a significant positive relationship between education and earnings can be verified with other factors kept under control. Second, an idea of the profitability of educational investments is derived. Third, the existence and nature of gender specific variations in the pattern and profitability of educational investments are investigated. Fourth, the existence of labour market discrimination between men and women is analysed by decomposing the earnings differences between the sexes into gender specific differences in attainment levels of earnings determinants and gender based differences in rewards to attainment levels.

1.0 The Analytical Framework: Earnings Functions

The main analytical tools used in this study are earnings functions. Earnings functions are regression equations that relate individual earnings to their determinants. From the point of view of empirical investigation and policy formulation they possess three important features. First, they facilitate analysis by representing the idea of educational investment in a multivariate framework suitable for econometric estimation. Second, they enable the profitability of educational investments, especially the rate of return to education, to be calculated with relative ease. Third, they are highly flexible tools possessing a variety of applications, including extensions into the analysis of gender discrimination in the labour market.

An earnings function can be expressed as a functional relationship that relates earnings to its determinants:

$$Y = f(S, X, D) \quad \dots (1)$$

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where Y = earnings, S= schooling, X=experience and D are other determinants, such as vocational training, sectors of employment, social and cultural factors.

In order to make the general form of the earnings function in expression (1) above operational, it is necessary to specify an appropriate functional form. In the present study, we employ the most widely used functional form for earnings functions, the semi-logarithmic regression equation:

$$\text{Ln}Y = \alpha + \sum_{i=1}^7 \beta_i S_i + \gamma_1 X - \gamma_2 X^2 + \sum_{j=1}^J \delta_j D_j + u \quad \dots(2)$$

where LnY = logarithm of annual earnings; the S terms are dummy variables representing $i = 1 \dots 7$ different levels of schooling defined below, with a reference level of no schooling; X represents years of experience; D are a further $j = 1 \dots J$ set of earnings determinants defined below; and u is a stochastic disturbance term. The coefficients of the schooling level variables, β_i , in expression (2) above measure the extent to which each schooling level represented by the appropriate schooling variable raises earnings above the reference level of no schooling. The coefficients of the experience variables γ_1 and γ_2 measure the impact of experience on earnings. The coefficients of the other determinants of earnings, δ_j measure the impact of each of these variables on earnings.

1.0.1 *Measuring the Impact of Education on Earnings in Semi-Logarithmic Earnings Functions*

From expression (2) above it can be seen that β_i are the coefficients of zero-one dummy variables in an earnings equation in which the dependent variable is the logarithm of earnings. Hence, the value of the increase in earnings associated with schooling level i is given by the formula:

$$\left[e^{\beta_i} - 1 \right] \cdot 100. \quad \dots(3)$$

1.0.2 *Earnings Premia to Successive Levels of Education*

The distance between the coefficients of two neighbouring schooling levels, say β_i and β_{i-1} , indicate the extent to which the additional education represented by the higher level of schooling increases earnings. This is the earnings premium enjoyed by an individual who moves from the lower schooling level S_{i-1} to the higher level S_i . This earnings premium, for any two schooling levels S_i and S_{i-1} , can be defined as:

$$\theta_i = \beta_i - \beta_{i-1} \quad \dots(4)$$

where θ_i is the earnings premium to schooling level S_i .

1.0.3 Private Rates of Return to Education

For an optimising individual the earnings premium accruing to a particular level of education will equal, at the margin, the cost of reaching that level of education. Hence, the private rate of return to the i 'th level of schooling can be computed, assuming that the only cost of education is foregone earnings, from the distance between the coefficients of the two neighbouring schooling levels, $\beta_i - \beta_{i-1}$, and the difference in the number of years attributed to each schooling level, $S_i - S_{i-1}$ as:

$$\rho_i = \frac{\beta_i - \beta_{i-1}}{S_i - S_{i-1}} \quad \dots(5)$$

Effectively, in this procedure, the rate of return ρ is being computed by the level specific formula:

$$\rho_i = \frac{\text{Ln}Y_i - \text{Ln}Y_{i-1}}{\Delta S} \quad \dots(6)$$

where ΔS is the difference in schooling between the two education levels (see *Psacharopoulos, 1980*).

Dougherty & Jimenez (1991) provide a proof of the validity of this procedure.

1.0.4 Limitations of the Rate of Return Methodology

It should be noted that the method of computing rates of return to schooling according to the formulae in expression (6) has certain limitations. It ignores externality effects and the non-monetary benefits of education, assumes that the individual will work continuously until the end of working life, disregards fluctuations in earnings associated with economic cycles, are based on a model in which risk and uncertainty play little part, run the risk of ascribing to education the contribution of forces such as family background and innate ability if the vector of other earnings determinants Z is not well-defined, and do not accommodate variations in schooling quality and regional earnings differences. Some of these limitations can be overcome through extensions to the analytical framework (see *Aturupane 1994*). Others require special data that is unavailable in Sri Lanka. For a discussion of the types of data required, see *Aturupane (1994)* Ch. 8.

1.0.5 The Earning Maximising Level of Experience.

Generally, in earnings functions, experience is entered as both a level term and a quadratic term, as in equation (2). This is because earnings normally rise with experience upto a particular level and then decline. This earnings -

experience pattern will be captured if the coefficient on the level experience term, γ_1 , is positively signed and the coefficient on the quadratic experience term, γ_2 , is negatively signed. The earnings maximising level of experience can be computed as follows:

Differentiate equation (2) with respect to X and set the resulting term equal to zero. This is the first order condition for a maximum, and yields:

$$\frac{dLnY}{dLnX} = \gamma_1 - 2\gamma_2X = 0 \quad \dots(7)$$

Rearranging expression (7) above yields the earnings maximising level of experience:

$$X = \gamma_1 / 2\gamma_2 \quad \dots(8)$$

2.0 Data and Definitions of Variables

The data for this study is taken from the Quarterly Labour Force Surveys of 1994 conducted by the Department of Census and Statistics. The sample was drawn from 8000 households, over four quarters in 1994, and covered all the provinces except the war torn Northern and Eastern Provinces. In this paper we focus the analysis on the sample of the data set engaged in wage employment, omitting self-employed individuals. This is done for several reasons. First, the accuracy of income data reported by the self-employed is likely to be lower. Second, part of the earnings of the self-employed will be a return to entrepreneurial activity rather than labour income. Third, it should be noted that a majority of the studies in the literature focus solely on individuals involved in wage employment, so that greater comparability is retained by restricting our analysis to the same sample.

The earnings variable employed in the equations above, then, is the logarithm of annual earnings for the wage employed sample. Annual earnings are obtained by multiplying the monthly earnings of individuals employed in the past year by twelve.

The schooling variable in our data is classified into seven categories, ranging from primary schooling to postgraduate education. These seven classes are: a) primary education (school years 1-5); b) lower secondary education (school years 6-8); c) upper secondary education (school years 9-10); d) completed GCE O/L ; e) completed GCE A/L; f) graduate and g) postgraduate. The average number of years of schooling for each educational category, which includes an allowance for grade repetition [Berhman & Deolalikar (1991) stress the importance of this in estimating earnings functions] are : No schooling = 0 years of schooling; lower primary education (1-5 years) = 3 years of schooling, lower secondary education (6-8 years)=7 years of schooling; upper secondary education

(8-10) = 10 years of schooling; completed GCE O/L = 12 years of schooling completed GCE A/L= 14 years of schooling; university graduate = 16 years of schooling; postgraduate degree holder= 18 years of schooling.

The education levels of individuals were assigned on the following basis:

- S_1 = 1 if the terminal education level was primary schooling, zero otherwise.
 S_2 = 1 if the terminal education level was lower secondary schooling.
 S_3 = 1 if the terminal education level was upper secondary schooling.
 S_4 = 1 if the terminal education level was GCE O/L.
 S_5 = 1 if the terminal education level was GCE A/L.
 S_6 = 1 if the terminal education level was a university first degree.
 S_7 = 1 if the terminal education level was a post-graduate degree.

The experience variable needs to be constructed as a proxy, as length of work experience is lacking in the data. The commonly used method is a transform of the age variable, where years in school and six years for pre-schooling childhood are deducted from age. We use this transformation to define experience as :

$$\text{Experience} = \text{Age} - \text{Years of Schooling} - 6$$

In addition to investments in general human capital and signalling credentials in the form of general education, individuals may also invest in specific human capital in the form of vocational and technical training. The possession of such specific human capital can have an effect on a worker's earnings. Hence, a dummy variable is used to denote workers who have received vocational training.

In general, the private sector can be expected to have a more competitive and market-oriented labour market, while the public sector labour market is likely to be more welfarist and protected. Hence, a zero-one dummy variable is employed to distinguish between private sector and public sector employees, with the public sector as the base category.

The urban, rural and estate sectors offer differing employment and earning opportunities. The sector in which the worker is located, in consequence, is likely to have an impact on her earning opportunities. Hence, two dummy variables are used to denote individuals working in the urban sector and the estate sector, with workers employed in the rural sector forming the reference category.

Finally, cultural and social factors are defined in terms of two sets of variables, ethnicity variables and religion variables. Ethnicity and religion can play a role in determining earnings for a variety of reasons. First, the productivity of schooling may differ between ethnic or religious groups due to variations in such forces as out of school human capital investment. Second, the economic circumstances of groups may vary, with some groups facing different opportunity sets and cost conditions than others. Finally, there is the possibility of labour market discrimination among ethnic or religious groups.

The ethnicity variables are defined as zero-one dummy variables to distinguish Sri Lankan Tamils, Indian Tamils, and Other Races, which include Moors, Malays, Burghers etc., with the majority Sinhalese forming the reference category. The religion variables are also defined as zero-one dummy variables to distinguish Hindus, Muslims and Christians, with the majority Buddhists forming the reference category. This classification of individuals into ethnic and religious groups according to a scheme of variables has the potential to capture inter-group variations in such cultural and social factors as attitudes, beliefs, tastes and behaviour patterns relating to the labour market. An obvious example of such variation is the possibility that work ethics may differ across ethnic or religious groups.

2.0.1 Descriptive Statistics of the Data Set

The descriptive statistics of the data are presented in Table 1.

The evidence in Table 1 reveals that the average earnings of men are higher than the average earnings of women. This is a normal finding in most countries. The standard deviation of earnings, however, is higher for women than men, suggesting that earnings inequality may be greater for female workers than male workers.

The descriptive statistics reveal that, among men and women employed in the labour market, a higher proportion of women either have no schooling or are relatively well-educated, possessing GCE A/L's or higher educational qualifications. A higher proportion of men, conversely, are concentrated in the lower and middle education categories, primary schooling to GCE O/L's. The finding that a relatively high proportion of female workers tend to be uneducated is consistent with the notion that poor women tend to enter the labour market because their economic circumstances compel them to do so. The other finding, that a relatively high proportion of working women tend to have high educational qualifications, can be attributed partly to the fact that well - educated individuals face a high opportunity cost of foregone earnings if they fail to work and partly to the fact that women who desire to enter the labour market are more likely to seek higher educational qualifications to improve their earnings and career prospects.

Table 1: Descriptives Statistics of the Data Set.

Discrete Variables	Male Workers		Female Workers	
	Sample Proportion		Sample Proportion	
No schooling	0.038		0.183	
Primary schooling	0.157		0.130	
Lower Secondary schooling	0.194		0.101	
Upper Secondary schooling	0.243		0.165	
GCE O/L qualified	0.228		0.237	
GCE A/L qualified	0.104		0.120	
Graduate	0.027		0.052	
Postgraduate	0.009		0.012	
Technically Trained	0.193		0.201	
Public Sector Employees	0.316		0.401	
Private Sector Employees	0.684		0.599	
Urban Sector Employees	0.595		0.545	
Rural Sector Employees	0.339		0.320	
Estate Sector Employees	0.065		0.130	
Sinhalese	0.772		0.787	
Sri Lankan Tamil	0.083		0.090	
Indian Tamil	0.042		0.076	
Other Races	0.103		0.047	
Buddhist	0.710		0.747	
Hindu	0.097		0.137	
Muslim	0.099		0.040	
Christian	0.094		0.076	
Continuous Variables	Mean	Std. Dev.	Mean	Std. Dev.
Earnings	2717.80	2293.20	2325.10	1665.80
Years of Experience	21.44	12.36	18.88	12.43
Weeks Worked	46.37	9.48	45.73	10.17
Sample Size	4882		2169	

The proportion of working individuals who have received vocational and technical training is slightly higher among women. This is consistent with the idea that women who work, or plan to work, are more likely to make specific human capital investments than women who do not enter the labour market. Further, women who have received vocational training are likely to face higher opportunity costs of earnings foregone if they do not work.

A higher proportion of women are employed in the public sector, while a higher proportion of men are employed in the private sector. This finding can largely be attributed to the fact that the public service usually offers jobs with fixed working hours and employment conditions that are relatively stable and predictable. These features are likely to be attractive to women, who also often have household chores and duties to perform after work.

Among both gender groups most individuals work in the urban sector, followed by the rural sector with the estate sector last. This is to be expected, as the urban sector offers the widest range of relatively well paid jobs. The high proportion of women in the estate sector can be attributed to the very specific types of work available in this sector, some of which, especially at the low skill levels have been traditionally done by women for generations.

Among the ethnic groups, the pattern of employment is fairly similar for both sexes, except that a relatively high proportion of female workers are drawn from the Indian Tamil community. This is to be expected, however, as many of the estate sector workers, of both sexes, are drawn from this ethnic group. Among the religious groups, the findings are fairly similar for both sexes, with the exception of Muslim women, who form a relatively small proportion of the labour force.

The mean experience years show that the average level of experience of men is approximately two-and-a-half years higher than that of women. This is consistent with the findings on education levels, as a higher proportion of working men have lower education levels, which implies that they will be leaving school and entering the labour market earlier than women, so that they will tend to have somewhat more working experience.

The mean number of weeks worked are very close for men and women. The standard deviations, too, are very similar. This suggests that the extent of labour supply among both men and women are equal.

3.0 Econometric Estimation and Results

The econometric model shown in expression (2) was estimated, using least-squares techniques, for men and women separately. The presence of heteroscedasticity was detected using the Breusch-Pagan test [(see *Greene* (1993)]. Hence, in order to obtain efficient estimates, the White procedure[see *Greene* (1993)] was adopted to construct the variance-covariance matrix of errors. The reported 't' statistics are based on the standard errors obtained through this procedure.

The estimated coefficients of the model are reported in Table 2.

Table 2: Earnings Functions for Men and Women, Least Squares Estimates.

Dependent Variable	Men Ln Y		Women Ln Y	
Explanatory Variable	Coefficient	t' Statistic	Coefficient	t' Statistic
Constant	8.6070	72.55	8.4321	51.16
Primary Schooling	0.0330	0.78	0.0528	1.14
Lower Secondary Schooling	0.1483	3.40	0.2136	3.73
Upper Secondary Schooling	0.3120	7.09	0.5310	8.70
GCE O/L Qualified	0.5645	12.64	0.7928	13.99
GCE A/L Qualified	0.7556	14.97	0.9254	14.68
Graduate	1.0411	16.95	1.2585	17.11
Postgraduate	1.3604	12.92	1.5095	13.24
Experience	0.0198	9.37	0.0111	3.56
Experience Squared	-0.0003	-7.53	-0.0002	-2.89
Technically Trained	0.1853	9.35	0.1125	3.99
Logarithm of Weeks Worked	0.2669	9.17	0.2298	5.57
Private Sector Employees	-0.1865	-10.67	-0.2001	-6.81
Urban Sector Employees	0.0895	5.46	0.1389	5.18
Estate Sector Employees	-0.1580	-3.79	0.1618	2.70
Sri Lankan Tamil	-0.0926	-1.76	-0.1199	-1.30
Indian Tamil	-0.1906	-2.89	-0.0294	-0.30
Other Races	0.1346	1.47	0.2963	3.38
Hindu	0.1187	2.03	0.1237	1.33
Muslim	-0.1058	-1.15	-0.1693	-1.76
Christian	0.1778	6.23	0.1994	3.92
R ²	0.385		0.481	
\bar{R}^2	0.382		0.476	
F	152.16		99.40	
	[20,4861]		[20,2148]	
X _H ²	236.80		262.91	
	[20]		[20]	
Sample Size	4882		2169	

Note : F = Value of F statistic for joint statistical significance of coefficients. X_H² = Breusch - Pagan test for heteroscedasticity. Terms in square brackets are degrees of freedom. All 't' values have been constructed using heteroscedasticity - consistent standard errors.

The F statistics reveal that the regression coefficients are jointly significant, for both the male and female equations. The adjusted \bar{R}^2 values indicate that the model explains approximately 38 percent of the variation in the logarithm

of earnings for men and 48 percent of the variation in the logarithm of earnings for women. The explanatory power of these equations is consistent with findings from studies of other countries employing similar earnings functions, which commonly explain around one-third of the variance of the logarithm of earnings [Murphy & Welch (1990)]. The somewhat higher explanatory power of the equation for women is also normal.

The coefficients of the education variables show that schooling, from lower secondary education onwards, enhances earnings for both men and women in a statistically significant way. Further, the impact on earnings rises as the level of schooling increases. These findings are consistent with the human capital and screening models of education, both of which postulate a positive relationship between education and earnings. A comparison of the schooling coefficients between the male and female equations shows that the effect of education in raising earnings is stronger for women, relative to men, over all schooling levels.

The experience terms in the earnings functions are also highly significant and correctly signed, satisfying the *a priori* expectation of a concave shaped experience-earnings profile. From the values of the experience coefficients it can be calculated, using the formula in expression (8), that earnings peak at approximately thirty three years of experience for men and twenty eight years of experience for women. This is close to the normal range of thirty to forty years documented in studies internationally [see Aturupane (1994), Ch.3].

Post-school human capital investments in the form of vocational and technical training also raise earnings significantly. The impact is stronger for men than for women. Typically, a man enjoys an earnings increase of nineteen percent if he has received technical or vocational training while a woman enjoys an earnings gain of eleven percent if she has received technical or vocational training.

The logarithm of weeks worked shows that the supply of labour plays a significant role in the determination of the earnings of men and women. The impact of labour supply is slightly stronger on male earnings than on female earnings.

Individuals working in the private sector earn less than individuals working in the public sector, for both sexes. The reason for this is that for lower level occupations the private sector pays relatively less than the public sector. It is also true that the private sector pays higher level occupations more generously than the public sector. However, a considerable majority of employees in both sectors belong to lower level occupations. Hence, when the occupations are all pooled together, as in the present analysis, the smaller earnings at the lower occupation levels dominate.

The coefficients of the sectoral dummy variables suggest that both male and female workers in the urban sector enjoy higher earnings than workers in the rural and estate sectors. This finding is reasonable, as the urban sector offers a larger range of well-paid jobs than the other two sectors. Among men, employees in the rural sector earn more than employees in the estate sector. This is to be expected, as the estate sector offers a narrow range of relatively poorly paid jobs. Among women, however, female employees in the estate sector earn more than their counterparts in the rural sector. This may be attributed to the fact that female labour in both sectors occupy relatively lower level jobs, but the earnings of estate sector workers in the lower level occupations are protected by minimum wage legislation and unionisation.

The ethnicity variables show that the difference in earnings between men from the Sinhalese, Sri Lankan Tamil and Other Race groups are all insignificant, although at a level of confidence less than the conventional level, say ten percent, Sri Lankan Tamil men earn significantly less than Sinhalese men. One important reason for this is likely to be the large-scale emigration of the more educated, talented and able Tamils. The results also show that Indian Tamil men earn significantly less than the other groups. Among women, there is no statistically significant difference in earnings between the Sinhalese, Sri Lankan Tamils and Indian Tamils. But women from the other races category earn significantly more than women in the other groups.

Among religious groups, Hindu and Christian men earn significantly more than Buddhist and Muslim men while Christian women earn significantly more than women in other religious groups.

Muslim women earn less than other women. However, it should be observed from the magnitudes of the coefficients that the earnings differences are fairly small.

4.0 The Impact of Education on Earnings

The impact of educational attainment on male and female earnings, calculated according to the formula in expression (3), is shown in Table 3.

The evidence in Table 3 reveals that both men and women enjoy steep earnings gains as they move up from low to high levels of education. The earnings gain accruing to men rises from sixteen percent at the lower secondary education level to two hundred and ninety percent at the postgraduate level. Similarly, the earnings gain accruing to women rises from twenty four percent at the lower secondary education level to three hundred and fifty two percent at the postgraduate level. These are very substantial gains.

Table 3: The Impact of Education on Male and Female Earnings.

Education Level	The Percentage Impact of Education on Earnings relative to No Schooling	
	Men	Women
Primary Schooling	3.36 ¹	5.42 ¹
Lower Secondary Schooling	15.99	23.81
Upper Secondary Schooling	36.62	70.06
GCE O/L Qualified	75.86	120.96
GCE A/L Qualified	112.89	52.29
Graduate	183.23	251.98
Postgraduate	289.78	352.45

¹This value is based on a coefficient that is statistically insignificantly different from zero.

It should also be noted that at each level of education, the impact of education on earnings is stronger among women than among men. Thus, *ceteris paribus*, women appear to enjoy higher earnings gains from education than men. This can be attributed, to a considerable extent, to the fact that the women who move up the education system, especially to its highest levels, are individuals with a high level of talent and motivation. Hence, the average level of human capital accumulated by women through the education system is likely to be greater than the average level accumulated by men who reach that same level of education. Also, women who enter the labour market are a subset of especially gifted and motivated individuals. This will be reflected in the manner in which their education affects their labour productivity and job performance.

5.0 Earnings Premia to Education

The premium accruing to earnings from education, for each successive set of education levels, is shown in Table 4. The calculations reported are based on expression (4).

Table 4 reveals that for men, the highest earnings premium to education is enjoyed as they move up from graduate to postgraduate levels, followed by movement from the GCE A/L to a university degree and the successful completion of GCE O/L's respectively. For women, the University first degree provides the highest earnings premium, followed by upper secondary schooling and completion of the GCE O/L. The high earnings gains at the University degree and postgraduate levels is to be expected, as educational opportunities at these levels are quantity constrained, so that the few individuals who do reach them receive substantial benefits.

Table 4: Earnings Premia to Successive Levels of Education, by Gender.

Earnings Premia to Successive Levels of Education (Percentages)		
Levels of Education	Men	Women
Primary Schooling	3.30 ¹	5.28 ¹
Lower Secondary Schooling	11.53	16.08
Upper Secondary Schooling	16.37	31.74
GCE O/L Qualified	25.25	26.18
GCE A/L Qualified	19.11	13.26
Graduate	28.55	33.30
Postgraduate	31.93	25.11

¹This value is based on a coefficient that is statistically insignificantly different from zero.

6.0 Rates of Return to Education

The profitability of investments are generally measured in terms of their comparative rates of return. From expressions (5) and (6), it was seen that the rate of return to education for an individual at a specific schooling level is the earnings premium between that level and the level immediately preceding it, divided by the length of time spent in moving from the lower to the higher level of education. The rates of return to education, based on this formula, are presented in Table 5.

Table 5: Private Rates of Return to Education, by Gender.

Private Rates of Return to Education (Percentages)		
Levels of Education	Men	Women
Primary Schooling	1.10 ¹	1.76 ¹
Lower Secondary Schooling	2.88	4.02
Upper Secondary Schooling	5.46	10.58
GCE O/L Qualified	12.63	13.09
GCE A/L Qualified	9.56	6.63
Graduate	14.28	16.65
Postgraduate	15.97	12.56

¹This value is based on a coefficient that is statistically insignificantly different from zero.

The evidence in Table 5 reveals that the rate of return to education at the lowest two schooling levels is very low. However, as the education level increases the rate of return to schooling, too, rises. Among men, the highest return is enjoyed by individuals with postgraduate qualifications, followed by university graduates and the GCE O/L qualified. Among women, graduates enjoy the highest returns, followed by the GCE O/L qualified and individuals with postgraduate degrees. The individuals who find education most profitable are female university graduates, with a rate of return of nearly seventeen percent, followed by male postgraduates with a rate of return of sixteen percent.

Rates of return to education by major world regions, and some selected countries, are presented in Table 6 and Table 7, respectively for purposes of comparison.

Table 6: Rates of Return to Education by Country Type.

World Region	Private Rates of Return to Education (Percentages)		
	Primary Education	Secondary Education	Higher Education
Africa	45	26	32
Asia	31	15	19
Latin America	32	23	23
Intermediate	17	13	13
Advanced	na	12	12

Source: Psacharopoulos (1985), Table 1, p 586. na= Not available due to the absence of a control group with no education.

The results in Table 5 and Table 6 reveal that, in general, the rates of return to education in Sri Lanka are very different to those for the major country groupings. Typically, the latter show very high rates of return to primary education, especially among developing countries, followed by higher education and secondary education. In Sri Lanka, in contrast, rates of return are highest at the higher education levels and lowest at the primary education levels. In terms of magnitudes, however, the rates of return in Sri Lanka at the secondary and higher education levels are reasonably close to the average levels of the Asian region.

Table 7: Estimates of Rates of Return to Education, Selected Countries.

Country	Private Rates of Return to Education (Percentages)		
	Primary Education	Secondary Education	Higher Education
India	33.4	19.8	13.2
Pakistan	3.5	11.6	13.1
Hong Kong	na	19.0	25.0
South Korea	na	8.0	12.0
Botswana	99.0	76.0	38.0
Malawi	15.7	16.8	46.6
Kenya	28.0	33.0	31.0
Venezuela	16.2	10.9	14.9
Ecuador	13.0	10.0	15.0
Argentina	30.00	9.0	11.0
Chile	27.6	11.0	10.3

Source: *Aturupane (1994), Table 3.5, p 58. na = Not available due to the absence of a control group with no education.*

A comparison of the results in Table 5 and Table 7 shows that at the secondary education and higher education levels the Sri Lankan rates of return are closest to Ecuador and Venezuela. These are both middle income developing countries, rather than a low income nation like Sri Lanka, with more prosperous and advanced economies. Among Asian countries the Sri Lankan rates of return are closest to those of Pakistan. In fact, at the primary education level, the rates of return in the two countries are very similar.

7.0 Testing for Discrimination: Decompositions of Male and Female Earnings.

In this section, we explore the possibility of gender-based labour market discrimination. In Table 1 it was seen that the average earnings of men, 2717.80 Rupees per month, comfortably exceeded that of women 2325.10 Rs. per month. Thus, average female earnings are only eighty six percent of average male earnings. This raises the possibility that women are at the receiving end of discriminatory behaviour by employers. In order to investigate this possibility, we use a method that has gained prominence in the literature on labour market discrimination, the Oaxaca decomposition [see *Sapsford & Tzannatos (1993), Ch.9*].

The logic underlying the Oaxaca decomposition is as follows. The lower earnings that women receive can be due to one of two causes. First, it could be the result of women possessing less of the endowments that determine earnings, such as education, experience, training etc. Earnings differences due to this factor can be said to be explained and justifiable. Second, for equal personal endowments, women may be receiving lower financial rewards. Earnings differences due to this factor can be considered to be unexplained and attributed, at least partially, to gender biased discrimination. The Oaxaca decomposition separates earnings differences between two groups into two parts, earnings differences resulting from differences in productive personal endowments and earnings differences resulting from differences in rewards to equal endowments. The magnitude of this latter difference can be considered the upper bound on discrimination. Thus, evidence of the existence and extent of labour market discrimination can be uncovered by examining the magnitude of the discriminatory component of the difference between male and female earnings.

The application of the Oaxaca decomposition is as follows. Denote the estimated earnings functions of men and women as:

$$\begin{aligned} \ln Y &= a_m + B_m X_m + e_m \\ \ln Y &= a_f + B_f X_f + e_f \end{aligned} \quad \dots(9)$$

where the subscript m represents males, the subscript f represents females, a_m, a_f = male and female constant terms, X_m and X_f are the vectors of personal endowments of men and women, B_m, B_f are the vectors of coefficients of the regression models and e_m, e_f are the random error terms of the model. Deducing the female earnings function from the male earnings function, rearranging the variables and coefficients, and using the result that the expected value of the error terms are zero, we can derive decompositions of the earnings functions. The first decomposition, which is based on the assumption that women get the same pay as men, is given by the expression:

$$\ln W_m - \ln W_f = [(a_m - a_f) + (X_f)(B_m - B_f)] + [(X_m - X_f)B_m] \quad \dots(10)$$

where the left hand side of expression (10) is taken at the average logarithms of male and female earnings. The second decomposition, which is based on the assumption that men get the same pay as women, is given by the expression:

$$\ln W_m - \ln W_f = [(a_m - a_f) + (X_m)(B_m - B_f)] + [(X_m - X_f)B_f] \quad \dots(11)$$

where the left hand side of expression (11) is taken at the average logarithms of male and female earnings.

These two methods give two indices of discrimination. Since neither dominates the other on theoretical or empirical grounds, we use both methods in this paper.

The information needed to carry out the two decompositions are found in the descriptive statistics of the data set and the estimated regression coefficients. The results of the two decompositions are presented in Table 8.

Table 8: Results of the Decomposition Test for Wage Discrimination.

	Results from Equation (10) (Males as base)	Results from Equation (11) (Females as base)
Percentage difference in logarithmic earnings to be explained	100	100
Proportion attributable to differential rewards accruing to personal characteristics (percentage)	61	51
Proportion attributable to differential endowments of personal characteristics (percentage)	39	49

The results in Table 8 show that the proportion of the difference between male and female earnings that can be attributed to variations in personal endowments is thirty nine percent or forty nine percent, depending on whether the male based decomposition or the female based decomposition is used. Either way, more than half the difference in earnings is not explained by objective factors. This fact does not mean that half the difference in earnings is not explained by objective factors. This fact does not mean that the entire remaining earnings difference is due to labour market discrimination. There may be other economic forces in operation, such as the payment of compensating wage differentials to men who undertake physically arduous work or overtime payments to male workers on night shifts. But the large earnings differential due to different rewards accruing to equal enfwoments does suggest the existence of a substantial volume of labour market discrimination against women.

Examination of the regression coefficients suggest that the discrimination may be occurring through three main channels. Controlling for other factors, female labour is paid less than male labour, female technically trained individuals are paid less than male technically trained workers and female individuals employed in the private sector are paid less than male individuals.

It should also be noted that part of the gender difference in earnings attributed to differences in the personal endowments of men and women may itself be the result of gender discrimination at stages outside the labour market. For instance, parents may attach greater value to the quality of education received by their sons or they may provide greater encouragement to their male children to move onto higher levels of education. These would lead to lower levels of human capital investment for girls, resulting in lower female earnings later in life.

Conclusion

The present paper shows that education plays an important role in determining earnings for both men and women in Sri Lanka. At each particular level of education, the impact of schooling on earnings is stronger for women. There are also high earnings premia and rates of return to schooling, especially at the higher levels of education. In addition to education, there are a variety of other factors which are significant determinants of earnings. These include work experience, technical training, labour supply and sector of employment. There is evidence of some differences in earnings between the main ethnic and religious groups in the country, but the magnitude of these differences is slight. Finally, there is also evidence of wage discrimination against women in the labour market.

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