EARNINGS PROFILES AND RETURN TO EDUCATION IN PANAMA

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Abstract

    This study uses household data from the National Household Survey (Encuesta de Hogares de Panamá) to present earning-profiles and return to education by gender in Panama. The purpose of this research is threefold. First, to analyze the distribution of the age-earning profile by gender. Second, to analyze the empirical fitness of the Mincerian earnings function. Third, to evaluate the returns to education by level of education (primary, secondary, and tertiary). A Mincerian earnings function was estimated for the data set to estimate the return on education. Some of the conclusions from this empirical paper are: (1) in general, women's earnings are much lower than those of men at every educational level; (2) there exist a greater earnings gap against females with a 5 year or more degree, than against females with 4 year bachelor degrees; (3) the age-earning profiles for university graduates females increases steadily over time until retirement age without presenting any concavity as normally seen; (4) fourthly, Mincerian returns on education show that the overall Panamanian return on primary education is very low, and much lower on average, than other developing countries. Finally, results show that females present a higher return on education than males. For policy purposes, the results suggest that special focus should be given to the educational investment on primary education, especially for distributional purposes. Results show that investment on primary education on women is justified on economic efficiency grounds, as well as on equity grounds.

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1.0 INTRODUCTION

Studies in the field known as "economics of human capital" have proliferated in the last three decades, especially on the issue of returns to education or investment in human capital creation.[1] The concept of human capital refers to the fact that individuals invest in themselves through education, training, or other activities, which allow them to raise their future income.

The human capital economics theory postulates that a person's income is a function of several factors such as education, training, experience, and ability, among others. Since economists see education as an investment, it is important to estimate its rate of return.[2] While the literature on return on education is very broad, but there are just a few number of studies that analyze the gender-earning differences, especially in less-developed countries. In the case of Panama, earning profiles and returns on education by gender and by level of education have not received much attention at all. The present paper makes a very simple initial attempt to analyze age-earning profiles by gender by using data from the 1994 Urban Households Survey and replicates standard analysis (Mincer, 1974) about estimating returns on education.

The purpose of this research is threefold. First, to analyze the age-earning profile by gender to see the concavity of the profile by gender and wage differentials between gender. Second, to analyze what variables particularly education and experience explain a substantial part of the variation in earnings in Panama. We have an interest in seeing how the human capital empirical models fit the data selected for this research. Third, to evaluate the returns to education by level of education (primary, secondary, and tertiary); and by gender. In the next section, a review of the different methodologies normally applied for estimating return on education is presented. Section 3 and 4, present the data used in this paper and earnings differentials by gender. Section 5 describes the methodology applied in this research for estimating return on education; Section 6 contains the rates of return to education for males and females by educational levels estimated. In Section 7, rates of return to education obtained are compared with other Latin-American countries. Finally, we summarize the conclusion of our analysis.

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[1] Becker, Schultz, and Mincer are normally identified as the originators of this new area of economics, which was established in the early 1960's. For a review about this field of economics, see Mincer (1974), Becker (1975), Schultz (1971) and Psacharopoulos (1973, 1984).

[2] For a review about international rates of return to education, see Psacharopoulos (1985, 1994).

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2.0   METHODOLOGICAL ISSUES ABOUT RETURN TO EDUCATION

2.1 Brief Review of Methodologies for Estimating Returns on Education

The estimates of return on investment in education can be obtained mainly by two different methodologies, which in theory, should lead to similar results. These methodologies are: (i) the elaborate or full discounting method; and (ii) the "earning function," which can use an extended earning function, or the basic earning function (Mincer, 1974).[3]

In order to apply the elaborate method, detailed data is needed about age-earnings by level of education, and it is necessary to find the discount rate that equates a stream of education cost, or investment to the benefits or returns at a given point of time. The annual benefits normally are measured by the earnings of the person by different levels of education which the rate of return is calculated, and the earning of a control group of an inferior level of education. Normally, the private rate of return is used to explain people's behavior in their educational decisions, and as a distributive effect of public resources. The social rate of return normally is used to define future educational investment policies.

The earning function methodology is derived from Mincer (1974) and consists of calculating a Mincerian semi-log function regression which the dependent variable is the natural logarithm of earning, years of schooling (S) and a set of other variables assumed to affect earnings (i.e., years of experience). Thus, the earning function can be written as:

$$\ln Y_i = \boldsymbol{b}_O + rS_i + \boldsymbol{d}X_i + u \tag{1}$$

In equation (1) the coefficient of years of schooling can be interpreted as the average private rate of return to an additional year of schooling, regardless of the educational level. This specification considers the assumption that labor markets function competitively, that there are no inequalities in basic intelligence, physical skills, or background. Griliches (1977) argues that the Mincer semi-log equation is rather an inflexible form.

The extended earnings function methodology can be applied to estimate the return to investment in education at different levels of education. This is done by converting the years of schooling variable into a series of dummy variables in accordance with the different types of education, such as primary, secondary, and tertiary education, or even among the different types of education such as humanistic or vocational. The private rate of return can be estimated from the extended earnings function by taking the differences between two adjacent dummy variable coefficients and dividing by the additional numbers of years from the next educational level.

From the methodologies explained before, the discounting of actual net age-earning profiles or full method is the most appropriate methodology to estimate the return to investment in education when there is going to be a comparison across countries. It is appropriate because it considers the history of

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[3] For further details about rate of return estimation methodologies, see Psacharopoulos and Ng (1994).

early earnings of the individuals. The net present value methodology has declined in popularity since net present values results are not easily compared across countries and currencies (Psacharopoulos, 1984). The main disadvantage with regard to the net age-earning profile methodology is the quantity of data required. Thus, this methodology is difficult to apply in less-developed countries where the data is very limited.

Although the Mincer earning function method is slightly inferior to the full method, researchers have found it very convenient for estimating returns to education in LDCs since less data is required. One problem of the Mincer earning function is the assumption of equating human capital with years of schooling and/or years of experience (Griliches, 1977).[4] If labor markets are not competitive, then relative wages across different levels of education are not necessarily the best measure of the relative productivity of the workers, unless government sets the wages according to some productivity rule. When wages are not a reliable measure of productivity, it may be preferable to measure the effect of education on physical measure of output, rather than using wage differentials as a proxy for productivity differences (Psacharopoulos and Woodhall, 1985, p. 46). Thus, if there are grounds for believing that under a non-competitive environment, where the observed earnings do not perfectly reflect productivity, then shadow wage rates rather than actual wage can be used to estimate the benefits of education

2.2 Returns on Education, Controversies and New Approaches

The rate of the return estimation for educational investment was questioned during the 1980s, especially the issue of whether the earnings pattern really reflects productivity (Klees, 1986; Leslie 1990; Behrman, 1987; Behrman and Birdsall, 1983, 1987).

As pointed out by Behrman and Birdsall (1987), the conventional wisdom is that returns on primary education are so high that policies should be directed to expand this sector. But a number of studies suggest that returns are not as high as prior studies suggest. Behrman and Birdsall (1983, 1985) in their study about earning in Brazil, they incorporated the measure of schooling quality into an analysis of the determinants of earnings. Thus, they argued that failure to include schooling quality, ability or other control variables (e.g., differences across region in prices) along the years of schooling in an earning equation is likely to cause upward bias in the estimation of returns to years of schooling.

While rate of return estimates are important for policy-making, some researchers argue that rate of return estimated econometrically by ordinary least squares (OLS) suffer from some drawbacks, thus, return estimates could be biased. This biased is the result of not considering individual's heterogeneity and the endogenity of schooling investment decisions are not considered.

In the 1990's several approaches have been proposed to tackle the self-selection and endogenity issues. The first approach is controlling for unobserved elements that may bias traditional OLS estimates. Thus, Blackburn and Neumark (1995) by including proxies for ability in earnings equations concludes that OLS estimates are biased upwards. Another group of studies is by using panel data for twins to estimate the return to schooling. Recent studies using this approach give varying results, while some studies find higher results than conventional OLS (Ashenfelter and Krueger, 1994), other studies reports lower returns compared with conventional OLS (Ashenfelter and Zimmerman, 1993). A second

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[4] For an explanation of this methodology pitfall, see Psacharopuolos (1994, p. 1326).

approach consist of including a "selectivity-correction" term in the earning equation. Studies using this approach reports higher return compared with OLS estimates (Bedi and Gaston, 1997). Lately, a third approach has been applied, which consist in using exogenous variation in educational attainment to provide instrumental variables (IV) estimates of the return to education. Most of these studies under this approach yield significantly to higher estimates of return to education (Harmon and Walker, 1995, Bedi and Gaston, 1999), although some studies find lower return (Angrist and Krueger, 1991).

Despite the criticism of rate of return estimates based on OLS, nothing can be said about the size and sign of the bias. While unobserved ability factors could bias OLS estimates upwards, the endogenity of schooling decisions may impact OLS estimates downward. Thus, given the fact that bias can not be determined theoretically, the overall bias of OLS estimates, if present, must be determined empirically for every specific case (Bedi and Gaston, 1999).

Finally, it is important to keep in mind that some approaches require of extensive and quality data, which in many cases restricts the methodology adopted by researchers, especially in LDCs. In our specific case, the Mincerian regression methodology is adopted to estimate the return on education.

3.0   THE DATA

3.1 Survey Data

The present study is based on data from the 1994 National Household Survey (Encuesta de Hogares de Panamá) collected by Contraloria General de la República de Panamá. The household data was carried out in all areas of Panama. The main questionnaire provides information on expenditures, income, employment, education and other characteristics of the household. The survey covered rural, indigenous and urban areas containing a total of 25,946 individual observations. After eliminating observation from rural and indigenous areas, as well as retired households and incomplete observations, the sample was reduced to 6,668 individual observations. Thus, the sample is of an urban work force only. The final ample is composed of 3,998 males and 2,670 females, equivalent to 60.0% and 40.0% of the total sample respectively. Some select characteristics of the sample are given in Table 3.1

TABLE 3.1
MEAN AND STANDARD DEVIATION OF THE SAMPLE

	Number of Observations	%	Mean	Standard Deviation
Background				
Age			35.0	11.0

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Years of schooling			10.8	4.06
Years of experience			18.2	12.0
Educational level				
Incomplete primary	363	5.4	3.41	1.23
Primary completed	1126	16.8	6.0	0.00
Incomplete secondary	1642	24.6	8.95	1.18
Secondary completed	1707	25.6	12.0	0.00
Technical or incomplete university	701	10.5	14.09	0.80
University graduate	1129	16.9	17.09	0.74
Earnings (US$/month)			394.6	485.0
Number of Observations	6668	100 %		

Source: Estimations by the authors using National Household Survey (Encuesta de Hogares de Panama, 1994) from Contraloría General de la República de Panamá.

Approximately 5.4% of the individuals have incomplete primary education, being the average rate of attendance 3.4 years of the 6 years required to complete primary education. Individuals with complete secondary education, as well as incomplete secondary education, are the groups with the highest representation in the sample, accounting for 24.6% and 25.6% respectively.

The mean years of schooling of the sample is 10.8, a value considerably high for a less-developed country like Panama. The mean years of schooling for Latin American and Caribbean countries obtained from these type of studies is only 7.9 years (Psacharopoulos, 1994). The high value obtained for Panama is the result of excluding rural, indigenous, and retired people from the original sample.[5]

4.0 EARNING PROFILES BY GENDER

As explained before, one of the goals of this research is to analyze the earning profiles across gender. As it is known, the education-earning profile is important for distributional purposes. Thus, governments committed to long-term redistribution of income must consider the relationship between education and earnings. The sample has been disaggregated by gender. Select characteristics of the sample used in this research are given in Table 4.1.

TABLE 4.1
MEAN AND STANDARD DEVIATION OF THE SAMPLE BY GENDER

	MALES				FEMALES			
	# of observ.	(%)	Mean	ST. D.	# of Observ.	(%)	Mean	ST. D.
Background								
Age			35.3	11.3			34.6	10.4
Years of schooling			10.48	4.01			11.41	11.07

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[5] The average years of schooling for Panama considering all population (urban and rural) using household data is only 7.4 years (IBD, 1999, p.46).

	MALES				FEMALES			
Years of experience			18.84	12.31			17.19	11.47
Educational level								
Incomplete primary	242	6.1	3.34	1.24	121	4.5	3.55	1.20
Primary completed	721	18.0	6.0	0.00	405	15.2	6.0	0.00
Incomplete secondary	1081	27.0	8.90	1.17	561	21.0	9.05	1.18
Secondary completed	1019	25.5	12.0	0.00	688	25.8	12.0	0.00
Technical or incomplete university	369	9.2	14.08	0.80	332	12.4	14.09	0.79
University graduate	566	14.2	17.15	0.74	563	21.1	17.03	0.74
Earnings (US$/month)			443.6	571.2			321.3	300.0
Observations	3998	100			2670	100		

Source: Estimations by the authors using Household Survey (1994) from Contraloría General de la República de Panamá

As shown in Table 4.1, the males exhibit a higher incomplete primary education rate (6.1%) and higher incomplete secondary education rate (27.0%) than females. Despite the years of schooling, males show a mean monthly income of (US$ 443.6) which is higher than the females' income (U$321.3), indicating an average income gap by gender of 28%.[6]

Females present a lower dropout ratio in primary education (4.5%), as well as in secondary education (21.0%) than males (6.1% for primary and 27% for secondary). Also females exhibit the highest proportion of individuals with a completed university education (21.1%) than males (14.2%). Nevertheless, females have the lowest income with a mean of US$321.3, despite their higher average years of schooling. Thus, previous results suggest that the income difference by gender requires further research in the sense of understanding whether this differences is the result of productivity differentials, number of hours worked, area of specialization, abilities (e.g. cognitive skills) or other factors (e.g. discrimination). The education-earning profile by gender derived from the sample used in this research is presented in Table 4.2.

TABLE 4.2
EDUCATION-EARNING PROFILE AND EARNING GAP BY GENDER

	MALES		FEMALES		Gender
	Number of observations	Average Earnings (US$/month)	Number of observations	Average Earnings (US$/month)	Earning Gap (%)
Educational level					
Incomplete primary	242	297.1	121	122.6	-58.7
Primary completed	721	267.6	405	143.1	-46.5

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[6] IDB estimates an income gap for Panama of 25% when controlling for education, experience and experience squared. (IDB, 1999, p. 38).

Incomplete secondary	1081	305.9	561	197.1	-35.6
Secondary completed	1019	422.0	688	307.7	-27.1
Incomplete university o technical	369	520.7	332	383.6	-26.3
University graduate - 4-years degree	119	699.0	146	517.0	-26.0
University graduate - 5 years or more	447	991.3	417	623.0	-37.1
Total Number of observations	3998		2670		

Notes: A four years degree in Panama includes social sciences degrees such as accounting, business, economics, nursing, and educational degrees. Bachelor degrees with five of more years include medicine, engineering, architecture, and law.
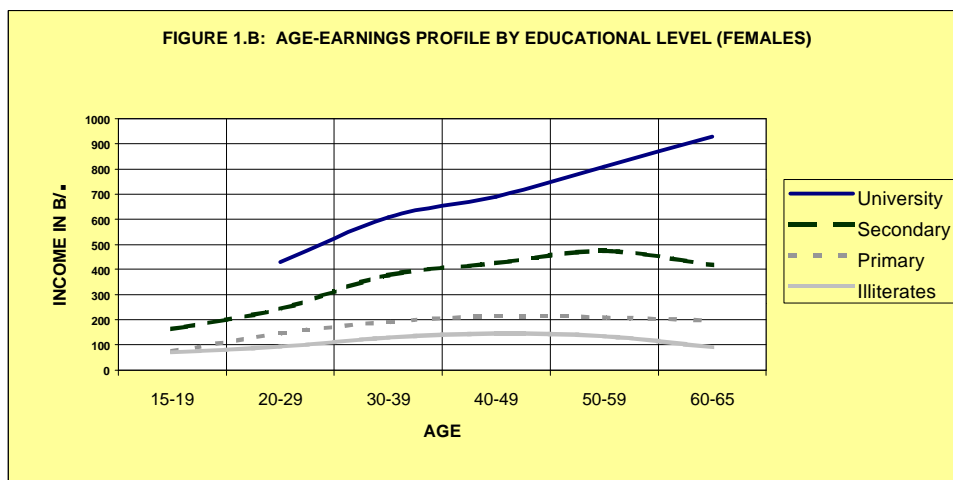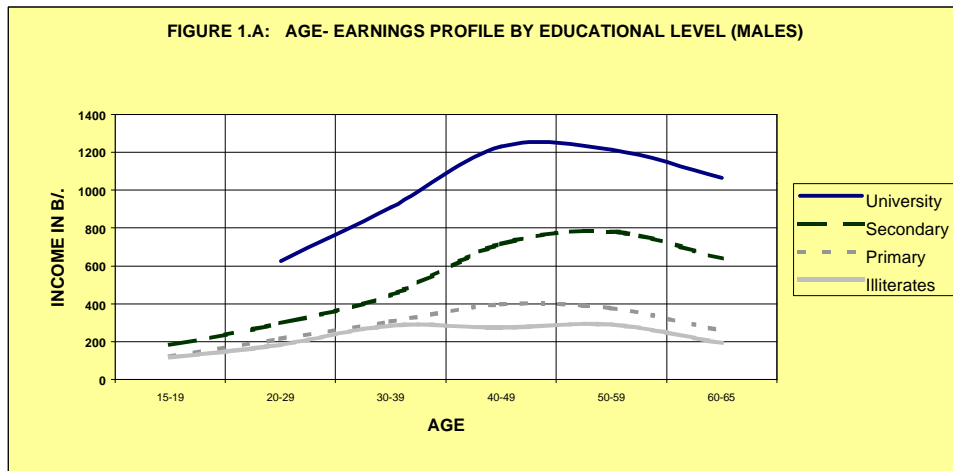Earning gap refers to the ratio of female

As Table 4.2 shows, the mean annual earnings rise by educational level for both males and females. However, the earning differential between men and women declines as the level of education increases, up to four years of higher education. While women with no formal education earn approximately 41% of their male counterparts, the corresponding gender gap at the bachelor degree level for the social sciences (4-year degree) is reduced considerably. Earnings differences by gender increases again for a degree of five or more years, such as medicine, engineering and law, as well as for advanced degrees. Results suggest that further research is needed to undestand which factors could explain the increases in wage differentials for women with 5 years degree or more. It may well be that there is a gender discrimination against women with advance degree in Panama, but this fact must be empirically determined.[7] Earnings differentials, it may well be due to job segregation on a gender basis.

The fact that men with incomplete primary education have better earnings than those who completed primary education could be the reflection of several facts, such as how different age groups or income groups in Panama have different access to educational. Obviously this fact requires further research.

The large income differential by gender for women with no formal education, could be partially the result of women migration from rural to urban areas, where they are mainly employed as maids for domestic tasks in the city or in other low-paying jobs. One possible explanation for the lower earning gap for women with formal secondary education or technical education, could be by the fact that this group is mainly employed in the service sector, performing clerical, secretarial or management works, especially in the large banking and services sector that the Panamanian economy presents.

The age-education-earning profiles for men and women derived from the sample are presented in Figure 1A and 1.B respectively.

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[7] For example, application of Oaxaca decomposition technique permits to sort what portion of the wage differential can be explained as discrimination against women.

FIGURE 1.A: AGE- EARNINGS PROFILE BY EDUCATIONAL LEVEL (MALES)

FIGURE 1.B: AGE-EARNINGS PROFILE BY EDUCATIONAL LEVEL (FEMALES)

As shown in Figure 1.B, the earnings of women with primary education flatten at the age of 45 years, without presenting much concavity after that age. On the other hand, earning function for males with primary education present a strong concavity after 45 years old. The age-earning profile for female with higher education is increasing until retirement age without presenting any concavity as it is normally seen. One possible explanation of the age-earning profile for females is the economic sector where they are employed. Panama is a service-based economy, therefore, most of the urban females with secondary and university education are employed in services related jobs (e.g., banking sector, Panama Canal, insurance and others services), where productivity does not slow down as drastically as in other types of employment that usually employ males. The male earning-profile for university graduates follows the

common trend seen, which is increasing up to an age between 45 and 50, then the function flattens or decreases until retirement age.[8]

5.0   MODEL SPECIFICATION FOR ESTIMATING RETURN ON EDUCATION

The model used for the analysis is the human capital earning function is the familiar traditional tool in educational economics. Thus, the earning function can be written as follows:

Y = f(S,EX)   (1)

Where Y is the annual earning, *S* is the years of schooling, and *EX* is years of experience. We estimate the standard concave human capital earning function (Mincer, 1974). Thus, the specification of the model to be tested is as follows.[9]

$$\ln Y = b_0 + b_1 S + b_2 EX + b_3 EX^2 + b_4 S * EX + u$$ (2)

where *Y* is earnings, S is years of schooling, *EX* is experience and *u* is a disturbance term.   The coefficient β_1 provides an estimate of private return to education. A well-behaved age-earning profile is concave.   As the age increases, the earnings peak up to a certain point, then the earnings tend to fall until retirement age.[10]   While experience is highly correlated with a person's age, the quadratic form of the experience variable captures the concavity of the age-earning profile.   Thus, β_3 must be negative to be consistent with the theory and the empirical evidence.

In equation 2, the *S*EX* variable is the schooling-experience interaction variable. This variable is expected to capture the effect of the interaction between education and experience on earnings, thus, this would help us to determine whether any complementarity between schooling and experience might exist.

6.0   RESULTS

6.1 Aggregated Results and Explanatory Variables

To have a better understanding of the relative contribution made by the two human capital variables, four aggregated Mincerian earning equations are estimated. The equations are estimates using weighted least squares (WLS).[11]   The estimated earning functions are presented in Table 6.1

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[8] Empirical evidence shows the typical characteristics for an age-earnings-profile are; (1) that earnings rise with the age to a single peak and then flatten or fall until retirement age; (2) the profile is steeper for higher educated individuals than for those with a lower level of education; (3) the higher the level of education, the latter the age at which earnings reach their peak (Psacharopoulos and Woodhall, 1985, p. 40).
[9] Experience is generally defined in Mincerian way. i.e.,, experience = age - years of schooling - 6
[10] See Woodhall (1987).
[11] WLS were used instead of OLS to eliminate any feasible form of heteroskedasticity with the data that could reduce t-values under OLS.

TABLE 6.1
RESULTS ON BASIC MINCER-TYPE EQUATIONS

	Ln Y			
	Equation 1	Equation 2	Equation 3	Equation 4
Constant	4.555	3.686	3.505	3.110
	(170.78)	(105.74)	(95.21)	(47.35)
Years of Schooling (S)	0.105	0.137	0.133	0.162
	(46.67)	(60.72)	(59.13)	(35.46)
Experience (EX)		0.027	0.058	0.085
		(35.05)	(24.49)	(19.48)
Experience-Square (EX2)			-0.0007	0.00098
			(-13.74)	(-15.46)
Schooling-Experience (S*EX)				-0.00156
				(-7.26)
R^2	0.246	0.364	0.381	0.386
Durbin-Watson	1.70	1.70	1.70	1.70
Number of observations	6,668	6,668	6,668	6,668

Note: t-statistics in parenthesis. The estimation made using *Weighted Least Squares (WLS)*.

Except the interaction variable (*S*EX*) and the experience variable (*EX*) of equation 4, all the coefficients have the expected signs. The relationship between education and earning is strong (equation 1). Education by itself explains about 25% of the variance in earnings. As expected, education is a relatively more important variable than experience. The addition of experience to the model raises the explanatory power of the model (equation 2).

The original Mincerian model (equation 3) produces a better fit than the model considering the interaction variable. As expected, the coefficient of EX2 is negative in equation 3. Equation 3 confirms the concave nature of the age-education earnings shown in Figures 1.A and 1.B. The inclusion of EX2 decreased slightly the regression coefficient of education (S) and also increased the coefficient of determination (R^2) marginally. All the coefficients have the right sign. The model explains 38% of the variation in earnings. The explanatory power of the model is robust, and comparable to the results from studies from other less developed countries (Psacharopoulus and Ng, 1994).

The interaction variable included in equation 4 is not statistically significant. The negative coefficient of the interaction variables may suggest that education and experience may be substitutes in determining earnings. Since, equation 4 is not a much better fit than equation 3, therefore, we used equation 3 to analyze returns on education by gender and by level of education in the next sections. Results from equation 3 show that the average rate of return to education is about 13.3%.

6.2 Returns by Gender Using the Complete Sample

In this section, equation 3 is used to analyze returns by education level and disagregated by gender. The estimated equations by gender are presented in Table 6.2

TABLE 6.2
EARNING FUNCTION AT AGGREGATED LEVEL BY GENDER

	Ln Y		
	Both Genders	Males	Females
Constant	3.505	3.637	3.274
	(95.21)	(78.17)	(61.60)
Years of Schooling (S)	0.133	0.127	0.150
	(59.13)	(44.30)	(46.88)
Experience (EX)	0.058	0.066	0.048
	(24.49)	(21.76)	(14.23)
Experience-Square (EX2)	0.00098	-0.0009	-0.0006
	(-15.46)	(-13.24)	(-7.27)
R^2	0.381	0.38	0.48
Durbin-Watson	1.70	1.81	1.88
Number of observations	6,668	3,998	2,670

Note: t-statistics in parenthesis. The estimation made using *Weighted Least Squares (WLS).*

Results obtained show that the human earnings' function as elsewhere explains approximately 40% of relative earnings variation. The Mincerian earnings' function fit better the females' sample than the males' sample. Overall, the return on education is 13.3%. Despite the fact that females earn less than males, the rates of return to investment in female education (15%) is higher than males (12.7%).

One possible explanation for higher return on education for females could be that the educational-earning profile function for women is much steeper than for males (Table 3.3), therefore, a higher rate of return is observed. Note that the absolute earning of men and females is not under comparison when estimating rate of returns. What it is being compared are the absolute earnings of more-educated to less-educated women.

6.3 Returns by Educational Level (extended human capital earning function)

Fitting an extended human capital earning function allows us to estimate the earnings premium by educational levels. Thus, it is feasible to determine which educational level presents a higher return for females. The estimated Mincerian equations by educational levels are presented in Table 6.3

TABLE 6.3
RESULT BY GENDER AND BY LEVEL OF EDUCATION USING ENTIRE SAMPLE
(Extended Human Capital Function)

	Ln Y		
	Both sexes	Males	Females
Constant	4.267	4.413	3.921
	(91.18)	(77.05)	(53.21)
Primary (*B1*)	0.273	0.235	0.377
	(6.525)	(4.711)	(5.529)
Secondary (*B2*)	0.911	0.804	1.211
	(20.98)	(15.36)	(17.32)
University (*B3*)	1.597	1.554	1.851
	(34.92)	(27.68)	(25.65)
Experience (EX)	0.0604	0.066	0.053
	(24.81)	(21.32)	(14.82)
Experience-Square (EX2)	-0.000848	-0.000947	-0.000769
	(-15.91)	(-14.36)	(-9.237)
R^2	0.37	0.37	0.45
Durbin-Watson	1.70	1.81	1.87

Note: t-statistics in parenthesis. The estimation made using *Weighted Least Squares (WLS).*

From the results of the extended earning function (Table 6.3), private return to education can be estimated by comparing adjacent educational levels coefficient and dividing by the number of additional years of schooling.[12] Estimated private return by educational levels and by gender can be found in Table 6.4

TABLE 6.4
RETURN TO EDUCATION BY GENDER AND LEVEL OF EDUCATION (%)

Educational Level	RATE OF RETURN (in percentage)		
	All sample	Men	Women
Primary Education	4.6 %	3.9%	6.3%
Secondary Education	10.6%	9.5%	13.9%
Higher Education	13.5%	14.7%	12.6%

The overall higher return to education for females compared with males is due to return on primary and secondary education. In secondary education, returns for females (13.9%) are more than 4 points higher than males (9.5%). It is important to note that pattern of returns by levels of education in Panama is contrary to the normal pattern observed in many less-developed countries. In general, studies

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[12] The rate of return for primary, secondary and tertiary are as follows:

$$r(prim) = \frac{b1}{Sprim}, r(\sec) = \frac{b2 - b1}{S\sec}, r(univ) = \frac{b3 - b2}{Suniv}$$

from Mincerean approach shows that the highest return to education is found in primary education and/or secondary education, with the lowest return on higher education (see Table 7.1).

One feasible explanation for the low return on primary and secondary education observed could indicates that the Panamanian service-oriented economy is not able to absorb the people with this level of education efficiently. Thus, the low return could be the result of the type of education which could be not adequate for the market demand. It could also be the result of the deterioration of the quality of education in the last three decades which has been extensively documented (Bernal et al, 1999).

7.0 PANAMANIAN RATES OF RETURN IN THE LATIN AMERICAN CONTEXT

Before comparing rates of return on education, it is important to understand the methodology used in obtaining the estimates. In general, it is a very difficult task to make cross comparisons of rates of return, since many authors do not always specify the sample used (for example, urban, rural, national or local) or the methodology applied.   Rates of return across countries cannot claim a high degree of uniformity in methodology and accuracy, therefore caution should be kept in comparing rates of return. Greater importance should be given within-country estimates that are based on a common sample and methodology. Table 7.1 presents results for Latin American countries using the same methodology (Mincerian return to education) as the one applied in this research.

TABLE 7.1
LATIN AMERICAN AGGREGATED MINCERIAN RETURN TO EDUCATION

Country	Year	Overall		Males	Females	Males	Females
		Mean Years of schooling	Overall rate of Return (%)	Years of schooling	Years of schooling	Rate of Return (%)	Rate of Return (%)
Argentina	1980	7.9	9.3	8.1	7.8	8.0	9.8
	1989	9.1	10.3	8.7	9.8	10.7	11.2
Brazil	1979	5.3	11.4	5.2	5.5	11.8	8.9
	1989	5.3	14.7	5.0	5.9	15.4	14.2
Colombia	1980	6.9	18.6	7.0	6.8	18.6	17.3
	1989	8.2	14.0	8.1	8.3	14.5	12.9
Costa Rica	1981	6.7	16.8	5.9	9.5	15.6	20.6
	1989	6.9	10.9	6.4	8.1	10.5	13.5
Paraguay	1983	8.2	11.6	8.4	7.7	10.5	11.7
	1990	9.1	11.5	9.1	8.9	10.3	12.1
Uruguay	1981	8.5	10.3	9.9	8.0	9.1	11.9
	1989	9.0	9.7	8.7	9.3	9.0	10.6
Venezuela	1981	7.3	11.8	6.7	8.7	11.2	14.0
	1989	9.1	8.4	7.9	10.2	8.4	8.0
Panama	1979	8.5	13.0	7.8	9.6	12.3	15.7
Panama	1989	9.2	13.7	8.6	10.1	12.6	17.1
Panama	1994	10.8	13.3	10.5	11.4	12.7	15.0

Source: Psacharopoulos (1992, Table A-3). Panama (1994) estimations by the authors.

The average rate of return estimated for Panama (13.7%) is consistent with the results from previous studies. The rate of return for females in Panama has been decreasing over time, and has

remained constant for males. Panama's overall rate of return is comparable with other Latin American countries. Panamanian women present the highest years of schooling in Latin American. In Panama, women present a higher rate of return as opposed to men, which is a consistent pattern for most of the Latin America countries. Table 7.2 present a summary results on the average return to education by gender and level of education at international level.

TABLE 7.2
AVERAGE RETURN TO EDUCATION BY GENDER AND LEVEL OF EDUCATION (%)

Educational Level	Men	Women	Methodology Used
Primary	20.1	12.8	Full-method
Secondary	13.9	18.4	Full-method
Higher	13.4	12.7	Full-method

Source: Psacharopoulos (1994).

The international empirical evidence (Table 7.2) shows that the highest return can be found on primary education for males, and secondary education for females. In Panama, the highest return is observed in higher education (13.5%) and the lower in primary education (4.65%), which is contrary to the empirical results from many countries.

Psacharopoulos and Ng (1992) conducted the only study reporting Panama's returns on education by level of education. Using an extended Mincerian function, the returns to education reported are 11.8%, 14.2% and 18.1% for primary, secondary and tertiary education, respectively for 1989 data from the Comisión Económica para Latino América (CEPAL). Using a full method, the returns to education reported are 5.7%, 21.0% and 21.01% for primary, secondary and tertiary education, respectively for 1989 data. Our results for primary education (4.6%) are consistent with the rate of return estimated by Psacharopoulus and Ng using the full-method (5.7%). Based on these two studies, it can be concluded that Panama's return on primary education is the lowest rate of return on primary education in Latin America. Hence, results founds for primary education are the reflection of the deficiencies that primary school system presents in Panama. [13]

8.0 SUMMARY AND CONCLUSIONS

Several conclusions can be drawn from this empirical paper. The peaks of the earnings profiles for women are lower than those for men at every educational level. The results from the earning profiles by gender suggest that further research is needed to understand which factors could explain the increases in wage differentials for women with 5 year or more university degree. It may well be that there is a gender discrimination against women in Panama, but this fact must be empirically determined. Gender discrimination, if present, is likely to be at lower levels of education, especially among those with no formal schooling or primary education.

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[13] It is clear that access and quality of education in primary system discriminates against poor people. Close to 30% of poor primary and 12% secondary students do not have textbooks, as compared with only 5% of the non-poor at both levels. Close to 60% of all primary students in indigenous areas do not have access to books (WB, 2000, p.15).

The male age-earning profile follows the common trends, which is increasing up to an age between 45 and 50 and then the function flattens or decreases until retirement age. It seems that the Panamanian services-based economy causes the age-earnings profile for female university graduates to increase steadily until retirement age without showing any concavity after certain age as it is normally observed.

Our brief and simple empirical test for traditional human capital theory suggests that education is more relevant than experience for explaining earnings. Education by itself explains about 25% of the variance in earnings. Education and experience together can explain about 38% of the variance in earnings. These results are comparable with other results from developing countries.

The rates of return to primary education from this study is confirmed by a previous study. The rate of return to primary education is quite low compared with other international estimates. The low rate of return could partially be attributed to the dramatically change in labor market conditions. In other words, the rate of employment creation in not adequate to absorb all the people with primary education entering into the labor market.

Earnings evidence and higher return on education for females suggest that a public policy that promotes primary education and facilitates the access of rural women to education could result in higher earnings and in a reduction in the inequality of the earnings by gender. Investment in women's education can be justified on economic efficiency grounds as well as on equity grounds.

Education in Panama appears to exacerbate poverty and income inequalities. The earnings profiles and higher rate of return observed for higher education indicates that the difference in earnings between the groups with no formal education or primary education and the highly skilled worker is large, which maybe the main reason why income distribution has been unchanged in Panama for the last three decades. In the 70s, the Gini-coefficient reported is 0.55 (Kakwani, 1980), in the 80s the Gini-coefficient is 0.56 (Lecaillon et al., 1984), and finally in the Living Standard Measures Survey (LSMS) in 1997 the Gini-index based on income is 0.60 which puts Panama as one of the most unequal countries in the world (World Bank, 2000. p. 8)

The rising pattern of private rates of return to education by level of education suggest that there exists room for more private participation at the university and maybe at the secondary level. Thus, future public policies toward educational expansion, recovery and quality improvement in Panama should be directed more toward primary education to increase the current low return and to reduce income inequalities.

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