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ESTIMATING THE RETURNS TO EDUCATION IN ALGERIA

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ABSTRACT

This study measures the private rates of return to education in Algeria using both basic and extended Mincerian earnings functions. To do so, a random sample of employees from Saida province in Algeria has been used. The findings of the study show that an additional year of schooling increases earnings by 9,5%. Returns from secondary education are the highest while returns from middle education are the lowest. It is also interesting to note that female workers tend to have higher returns than male workers. Furthermore, returns to education are higher in rural and public sector compared to urban and private sector respectively.

Contribution/ Originality: This study is one of very few studies which have estimated the private rates of return to education in Algeria. The main findings of this study are in line with the recent literature on the topic.

1. INTRODUCTION

Education plays a crucial role in determining wages. Evidence suggests that more educated workers earn higher wages, work in better paying firms, sectors, and occupations than their counterparts with less education (Schultz, 2003; Psacharopoulos and Patrinos, 2004).

In light of this evidence**,** it is worth noting that the estimation of the private rates of return to education within countries is so important because it enables to understand well the relationship between individuals' formal education and their earnings. For policy makers, the estimations can be used in education planning. In fact, the famous model presented by Mincer (1974) called 'Mincerian earnings function,' made possible the estimation of the rates of return to education within and cross-countries.

This paper is an attempt to estimate private rates of return to education in Algeria using both the basic and extended Mincerian earnings functions. Given to the lack of data in national census on people' schooling and their

earnings, this study uses a random sample of 525 employees in the province of Saida, located in the west of Algeria. The sample includes many characteristics such as gender, residence, sector of employment. This helps to estimate returns to education from various aspects.

Unfortunately, in Algeria as in many developing countries, the absence of a realistic educational planning -that is based on the estimation of the returns to education- led to distortions in labor markets and the phenomena of educated unemployment and over-education.

The paper is structured as follows: Section two discusses theoretical background of returns to education. Section three discusses data and model specifications. Section four presents the results and the discussions. Finally, the conclusion summarizes the main findings and states some policy implications.

2. LITERATURE REVIEW

The literature provides two major theories to explain differences in labor earnings; human capital theory (Becker, 1962) and the signaling theory (Spence, 1973). Human capital theory explains wage differentials as a result of an individual's productivity level enhanced by investment in formal education, health, and training, while the signaling theory assumes wage differentials are due to an individual's innate abilities that are signaled by an individual's characteristics which includes educational attainment (Kavuma *et al.*, 2015).

The estimation of the rates of return to education is based on the hypothesis of human capital theory. According to Mincer (1974) one additional year of schooling is resulted in an increase in individuals' earnings. For policymakers, the estimated rates of return to education are seen as useful means to allocate efficiently resources on education sector. For instance, if the rate of return to primary education is higher compared to the other levels of education, it will be appropriate and profitable to spend much money on primary schools.

In their seminal paper, Montenegro and Patrinos (2014) presented comparable estimates of the rates of return to education in139 economies, and they concluded that: (1) the returns to schooling are more concentrated around their respective means than previously thought; (2) the basic Mincerian model used is more stable than may have been expected; (3) the returns to schooling are higher for women than for men; (4) returns to schooling and labor market experience are strongly and positively associated; (5) there is a decreasing pattern over time; and (6) the returns to tertiary education are highest.

Nevertheless, the findings of empirical studies on returns to education within countries are not always homogenous given to various considerations such as the level of development of the country, the sample characteristics, and model specifications.

3. DATA DESCRIPTION AND MODEL SPECIFICATION

In order to estimate the private rates of return to education in Algeria, we have chosen a random sample of 525 employees in Saida province, located in the west of Algeria. We used SPSS version 18 for calculations and model estimation.

3.1. Data Description

The main characteristics of the sample used in this study are summarized in table (1). To estimate the basic earnings function, the required variables are mainly earnings, years of schooling and experience. According to Mincer (1974) experience is calculated based on age and years of schooling (exp = age – years of schooling – 6years).

Table-1. Sample characteristics

	Age	Earnings(DZD)*	Years of schooling	Years of experience
Mean	46,31	35.346,97	11,22	28,73
Standard deviation	22,02	20.710,42	5,07	24,65

Source: Author's calculations using SPSS 18.

Table (2) presents the distribution of employees per level of education. It seems that people with tertiary and secondary education constitute the large portion in this sample. Each of them exceeds the quarter and together represents nearly 65% of the total sample.

Table-2. Distribution of employees per level of education

	No education	Primary education	Middle education	Secondary education	Tertiary education	Total
No. of observations	57	50	74	145	199	525
Percentage (%)	10.9	9.5	14.1	27.6	37.9	100

Source: Author's calculations using SPSS 18.

With respect to gender, male workers represent 77,91% of the total workers. Also, 84,19% of the employees are working in the public sector, and 88,76% of them are living in urban areas. (Table 3)

Table-3. Employees' distribution by gender, sector and residence

	Gender		Sector		Residence	
	Male	Female	Private	Public	Rural	Urban
No. of observations	409	116	83	442	59	466
Percentage (%)	77.91	22.09	15.81	84.19	11.24	88.76

Source: Author's calculations using SPSS 18.

3.2. Model Specification

The private rate of return to education is estimated first using the basic earnings function developed by Mincer (1974):

$$\ln Y_i = \alpha + \beta S_i + \gamma_1 EX_i + \gamma_2 EX_i^2 + e_i$$

Where *ln y* is the log of monthly earnings, *S* is the number of years of schooling of individual i, and *exp*, *exp²* are years of experience and its square respectively. The coefficient on years of schooling (β) represents the average private rate of return to one additional year of schooling, regardless of the level of education.

In order to estimate the private rate of return to different levels of education, the continuous years of schooling variable *(S)* would be converted into dummy variables representing the different levels of education:

$$\ln Y_i = \alpha + \beta_1 PRIM_i + \beta_2 SEC_i + \beta_3 UNIV_i + \gamma_1 EX_i + \gamma_2 EX_i^2 + e_i$$

where*PRIM*, *SEC* and *UNIV* are dummy variables indicating primary, secondary and university education respectively. Then the private rates of return to these levels of education could be calculated as follows:

* 1 US dollar = 110 DZD (Algerian Dinar).

$$r_{(PRIM)} = \frac{\beta_1}{S_{PRIM}},$$

$$r_{(SEC)} = \frac{\beta_2 - \beta_1}{S_{SEC} - S_{PRIM}},$$

$$r_{(UNIV)} = \frac{\beta_3 - \beta_2}{S_{UNIV} - S_{SEC}},$$

Where *S(prim)*, *S(sec)* and *S(univ)* represent the average number of years of schooling for the three levels of education; primary (six years), secondary (three years), and university (four years) respectively.

4. RESULTS AND DISCUSSIONS

Table (4) reports results of the basic Mincerian earnings function for the full sample. Based on the sample used in this study, the average private rate of return to education is estimated at 9,5%. This finding means that an additional year of schooling is resulted on average in an increase of 9,5% in the monthly earnings for Algerian employees regardless gender, residence or the sector of employment. The estimated rate of return for Algeria is close to the world average rate of return according to Montenegro and Patrinos (2014) which is 10%.

Table-4. Private rate of return to education (full sample)

Variable	Basic earnings function
Schooling (S)	0.095 (0.007)
Experience (E)	0.023 (0.002)
Experience squared (E^2)	-0.000048 (0.00)
Constant	8.621 (0.129)
No. ofobservations	525
R-squared	29.6

Source: Author's calculations using SPSS 18.

Table-5. Private rates of return by level of education

Variable	Extended earnings function
Schooling (S)	-
Experience (E)	0.023 (0.002)
Experience squared (E^2)	0.000086- (0.00)
Primary	0.550 (0.107)
Middle	0.697 (0.101)
Secondary	1.148 (0.098)
Tertiary	1.482 (0.11)
Constant	8.656 (0.133)
No. ofobservations	525
R-squared	30,3

Source: Author's calculations using SPSS 18.

In the next step**,** the extended earnings function will be used to estimate the private rates of return for the different levels of education namely primary, middle, secondary and tertiary education.Table (5) shows the estimated private rates of return by educational level before using the appropriate methods mentioned earlier in model specifications.

Table (6) displays the estimated private rates of return for the four levels of education. It is shown clearly that secondary education is the best educational level for individual investment in education since it yields the highest rate of return (15,03%). Then it is surprisingly found that primary education is more profitable for individual investment in education than tertiary education; such a result which is inconsistent with most empirical studies. By contrast, middle education is the less profitable investment in education for individuals.

Table-6. Estimated private rates of return to different levels of education

Level of education	Primary	Middle	Secondary	Tertiary
Rate of return (%)	9.16	4.90	15.03	8.35

Source: Author's calculations using SPSS 18.

The Mincerian equation could be used also to calculate the private rates of return to education for both men and women separately. Table (7) shows that investment in education is more profitable for women (13,5%) than men (9,2%). This result has been largely confirmed in literature (Psacharopoulos and Patrinos, 2004; Montenegro and Patrinos, 2014).

Table-7. Private rates of return by gender

Variable	Male	Female
Schooling (S)	0.092 (0.007)	0.135 (0.02)
Experience (E)	0.02 (0.003)	0.008 (0.014)
Experience squared (E^2)	-0.000042 (0.00)	0.001 (0.00)
Constant	8.753 (0.152)	8.009 (0.327)
No. ofobservations	409	116
R-squared	30.2	30.6

Source: Author's calculations using SPSS 18.

Table (8) presents the estimations of the private rates of return to education when residence factor is taken into consideration. Unlike what was expected, returns to education in rural areas are higher than those in urban areas. One can justify this by the existence of better job opportunities in rural areas for those who have primary or secondary education.

Table-8. Private rates of return by residence

Variable	Rural	Urban
Schooling (S)	0.110 (0.026)	0.093 (0.007)
Experience (E)	0.028 (0.02)	0.023 (0.002)
Experience squared (E^2)	- 0.000098 (0.00)	-0.000048 (0.00)
Constant	8.404 (0.431)	8.650 (0.136)
No. ofobservations	59	466
R-squared	36.7	28.7

Source: Author's calculations using SPSS 18.

With respect to the sector of activity, the evidence shows that employees who work in the public sector are best rewarded compared to those working in the private sector. For employees in public sector, an additional year of schooling raises their earnings by 9,9% whereas employees in private sector increase their earnings only by 6,9%. This finding means that public sector is more attractive for job seekers in Algeria since it offers better rewards.

Table-9. Private rates of return by sector

Variable	Public	Private
Schooling (S)	0.099 (0.007)	0.069 (0.020)
Experience (E)	0.025 (0.002)	0.021 (0.019)
Experience squared (E^2)	- 0.000051 (0.00)	0.00 (0.00)
Constant	8.546 (0.139)	8.914 (0.420)
No. ofobservations	442	83
R-squared	31.1	15.2

Source: Author's calculations using SPSS 18.

5. CONCLUSION

This study attempted to estimate the private rates of return to education in Algeria. The study has used data of a random sample of employees in Saida province, located in the west of Algeria. Using both basic and extended forms of the Mincerian earnings function, many important findings have been obtained.

First of all, The private rate of return to education in Algeria is estimated at 9,5%. This result is roughly equal to the world average rate of return to education (10%); nevertheless, more institutional reforms are required in the labor market in order to enhance the returns to education in the future.

Second, the private rate of return to female schooling is higher compared to that of male schooling which means that female investment in education is profitable in Algeria. Therefore, it is important to strengthen both female education and women's employment, especially in tertiary sector.

Third, the private rate of return to secondary education is higher than the rates of return to the other levels of education. This finding means that the labor market provides better rewards for graduates of secondary education. This implies that the government should give priority to secondary education from both quantitative and qualitative perspectives. In contrary, tertiary education witnesses diminishing returns given to the high levels of educated unemployment.

Four, returns to education in rural areas are higher than those in urban areas. This unexpected result may be explained by the existence of more job opportunities in rural areas. Therefore, the state intervention is required to provide more schooling and more jobs for people living in rural areas.

Finally, returns to education in public sector are better than in private sector. Also, this unexpected finding means that working in public sector is the better choice to job seekers to earn better incomes.

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