

Return to education in Algeria

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Abstract:

The earning function presented by Mincer (1974) has been largely used to estimate the private rate of return to education in developed and less developed countries alike. However, this approach is a matter of many criticisms from different aspects. Some researchers focus on the problem of endogeneity of education and others on the measurement error of education variable. But the bias of the rate of return due to the measurement error of experience variable has not been given much importance.

The present paper tends to estimate primarily the private rate of return to education in Algeria using a random sample of employees in two different regions in the country; Tlemcen in the north and Adrar in the south. In this stage, estimates are based on the OLS method. Results show that the rate of return is 7.2 per cent (6.4 per cent for males and 9.5 per cent for females). Then, the potential experience in the earning function will be replaced by the effective experience. The main finding is that the rate of return decrease by about one per cent. Finally, in order to correct bias of the rate of return due to OLS method, we will use father education as an instrumental variable.

Key words: Rate of return, education, experience, Mincer equation, Algeria.

1. Introduction and theoretical background

In the framework of the human capital theory, investment in education carried out by individuals awards them better wages. This evidence is obviously seen in labor market: the well-educated workers earn considerably more than their less-educated peers. From an economic point of view, this finding has been empirically confirmed by numerous studies worldwide. In a seminal paper, Mincer (1974) estimated the effects of schooling on wages at around 10% using US census data. This result has been found as a world average by Psacharopoulos (2002). The method presented by Mincer is the widely used method. Under this approach, the measured impact of schooling is the average increase in wage accruing to an individual as a result of one additional year of education. The estimates of the returns to education obtained this way are called Mincerian returns.

There are several raisons for the popularity of Mincer equation according to Anders Bjorklund et al (2002); the most important one is the pragmatic use of results from human capital theory to derive an estimating earnings equation. It is also important to translate the causal wage effect of schooling into a measure of the return on investment in schooling that can be compared with similar measures of the return on other investments. In addition, the schooling coefficient is closely related to the marginal internal rate of return to education.

However, this idea has been a subject of controversy, many researchers are skeptical about the fact that education leads necessarily to higher wages. Seminal papers presented by Arrow (1973) and Spence (1973) argued that education is used by employers as a screening device in order to identify better workers and used by those workers to signal their potential high productivity. This means that education is correlated to better wages and thus there is no causal effect.

On the other hand, the earning function has been criticized from different sides. According to Griliches (1977), the great problem faced by economists when they tend to estimate returns to

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education by using earning function is the endogeneity of education. Therefore, studies refer to instrument variables method in order to correct the resulted bias due to that problem.

Ashenfelter and krueger (1994) in their study on identical twins showed that the effects of ability, race, social class and family background could lower estimated returns to education by about 25%. Furthermore, Ashenfelter and Rouse (1998) showed that error in the measurement of human capital acquired may lead to an under-estimation of rates of return by as 30% (the neglect of education quality for example).

Among the criticisms about the earning function is the problem of over-education which is not taken into account in the estimation of the rate of return. Duncan and Hoffman (1981) in their study have compared results of estimation between the required education and over-education; they found that the estimated rate of return of required education is higher than of over-education. This finding means that the earning function is based merely on the demand side of labor market and neglect the supply side.

The aim of the present study is threefold; firstly we shall apply the earning function to Algeria in order to estimate the rate of return to education which never estimated before the current paper. Secondly, we will focus on the experience measurement problem which has not been given much importance in the literature compared to schooling measurement. Finally, we will try to use father education as an instrument variable since the estimation of the earning function is biased due to the OLS method.

Thus, this paper is organized as follows:

The second section present the data and the methodology used in this study. Then, in the third section, we discuss the results of the estimation of the rates of return to education in Algeria. In the last section, we shall conclude this paper with the main findings and policy options.

2. Data and methodology

In order to estimate returns to education in Algeria, we have chosen a random sample of 600 employees in two wilayates: Tlemcen in the north and Adrar in the south. The total number of employees for whom the necessary information on wage, education, labor market experience and other family background is available is 407.

Table (1): means of selected variables by sex and region

Variable	total	males	females	north	south
Age	42,45				49,12
45,15					
Years of schooling		11,41	10,65		13,0
12,19					9,88
Years of potential exp	23,79	27,88	17,44		33,03
19,15					19,15
Years of effective exp	16,50	18,88	11,27	22,38	13,84
13,84					
Earning / month (DZ)	31508,62	32717,54	28603,31	29149,64	32710,04
32710,04					
Number of observations	407	286	121		137
					270

Unlike many other studies, we have been able to use the effective labor market experience in the Mincerian earning function. This will enable us to compare results of the rate of return when we use the potential experience -as it is done in the majority of research- with this case when we use the effective experience. In addition, the study tends to tackle the problem of endogeneity of schooling variable in the earning function by using instrumental variables (IV) of family background.

The rate of return to education is estimated first using the earning function (Mincer, 1974):

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

When $\ln y$ is the log of monthly labor market experience, S is the number of years of schooling of individual i , and \exp and \exp^2 are years of experience and its square. The coefficient on S (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 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:

$$\ln Y_i = \alpha + \beta_1 \text{PRIM}_i + \beta_2 \text{SEC}_i + \beta_3 \text{UNIV}_i + \gamma_1 \text{EX}_i + \gamma_2 \text{EX}_i^2 + e_i$$

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:

$$r(\text{PRIM}) = \frac{\beta_1}{S_{\text{PRIM}}}$$

$$r(\text{SEC}) = \frac{\beta_2 - \beta_1}{S_{\text{SEC}} - S_{\text{PRIM}}}$$

$$r(\text{UNIV}) = \frac{\beta_3 - \beta_2}{S_{\text{UNIV}} - S_{\text{SEC}}}$$

Where $r(\text{prim})$, $r(\text{sec})$ and $r(\text{univ})$ represent the average number of years of schooling for the three levels of education in Algeria; primary, secondary and university respectively.

3. Estimates of returns to education

The estimation of the simple earning function shows that the private rate of return on another year of schooling is 7.2%. This is almost similar to the average in the MENA region which is 7.1% but is lower than the world average 10% (Psacharopoulos, 2004).

The estimates for Algeria are low compared with the returns to education estimated for other transition economies. For example, in Hungary, compos (2003) estimated the rate of return to 11.2%. Zhang (2005) found in his study on china 10.2. In zchek republic, Filter (1999) estimated the rate to return to 9%.

However, the estimates for Algeria are in the meanwhile higher than other transition economies such as Ukraine 4.2% (Gorodnichenko, 2005), Vietnam 4.8% (Mook, 2003) or Poland 7% (Psacharopoulos & Patrinos, 2002).

Table (2): earning function with potential experience (dependant variable is log monthly earnings)

variable	total	males	females
constant	9,033	9,488	8,510
years of schooling		0,072 (10,38)	0,064 (7,79)
potential exp		0,025 (3,66)	0,004 (1,48)
exp squared	0,00 (-2,35)	0,00 (-0,19)	-0,001 (-1,33)
R ²		25,6	24,4
N	407	280	114

The estimated rate of return for Algeria (7.2%) is higher than that found in mid-1980s by Benhabib jess et al (1994); 4.2%.⁶⁴ This over-time evidence has been found also in most worldwide studies. The transition into market economy leads eventually to higher returns to education. In Russia, for instance, the rate of return to schooling has been raised from 2.7% in 1985 to 9.2% in 2002. In Slovenia, also there was an increase from 4.0% in 1988 to 8.1% in 1997 (Stanovnik, 1997). The rate of return for china increased from 4.0% to 10.2% during the period 1988 to 2001 (Zhang, 2005).

When the earning functions are estimated separately, females experience higher returns to education than do males; 9.5% versus 6.4%. This result is with line of worldwide pattern according to Psacharopoulos (2004) findings.

Results show also that workers in south country realize higher returns to education than those working in the north of Algeria, 8.2% and 6.7% respectively. This finding refers to the wage policy which favors working in the south by giving people special earning premiums.

The earning function is fitted using dummy variables for different levels of education (table 3). The results are used to estimate the private rates of return to the three levels of education. It is obvious that return to primary education is weak especially for males (less than 0.5%). Moreover, there is not a huge difference between returns to secondary and university education (almost 1%). Also, the estimations are consistent with world trends except the case of females; high is the level of education, high is the rate of return to schooling (Psacharopoulos, 2004).

Table (3): earning functions with schooling levels

variable	total	males	females
constant	9,43	9,84	8,96
prim		0,133(1,22)	0,035(0,28)
sec		0,399(3,39)	0,294(2,16)
univ		0,775(6,64)	0,597(4,46)
Potential exp		0,031(4,15)	0,015(1,42)
exp squared	00(-3,53)		00(-1,63)-0,001(-4,41)
R ²	21,5	19,9	37,3
N	395	278	115

As noted earlier, most studies on returns to education that applied the earning function uses the potential labor market experience as suggested by Mincer (1974). It is worth noting that this methodology does not account to the likelihood of unemployment. Therefore, we have interviewed individuals in our sample about their effective experience. We have replaced the potential experience by effective one in the earning function. Consequently, the private rate of return to schooling decreased by about 1%, which means that this one is downward biased due to measurement error of experience variable.

Table (4): earning function with effective experience (dependant variable is log monthly earnings)

variable	total	males	females
constant	9,43	9,84	8,96
years of schooling		0,062(10,78)	0,059(8,57)
effective exp		0,039(4,68)	0,029(2,82)
exp squared	-0,001(-3,22)	-0,001(-2,24)	-0,001(-1,89)
R ²		26,4	23,7
N	360	249	111

In order to deal with the problem of education endogeneity in the earning equation which biased the rate of return, we use father education as an instrument variable:

First we shall estimate the reduced form equation:

⁶⁴ The authors used production functions method to estimate the rate of return to education and not the earning function method.

$$\text{Educ} = 14.73 - 0.075\text{exp} - 0.002\text{exp}^2 + 0.16\text{fetheduc}$$

$$(16.24) \quad (-1.13) \quad (-2.31) \quad (3.29)$$

$$R^2 = 41.6 \quad F = 64.324 \quad N = 274$$

Then, the estimation of the rate of return based on the instrument variable is compared to the OLS method in the following table:

Table (5): earning functions with OLS and IV methods

	OLS	IV
Constant	9,48	10,19
Educ	0,064(7,79)	0,019(0,35)
Exp	0,004(0,48)	0,001(0,02)
Exp ²	00(-0,19)	00(-0,82)
R ²	24,4	8,1
F	29,74	7,82
N	280	271

Results of IV method are not statistically significant for both education and experience variables. Moreover, Fisher test is lower than 10% and according to Bound et al (1994) this instrument variable which is father education could not be accepted in this case.

4. Policy options

Based on our empirical findings, one can advance the following policy recommendations:

- (1) The private rate of return to education in Algeria is estimated to 7,2%. This result which is lower than the world average implies that major institutional reforms are required in the labor market in order to enhance the returns to education in the future.
- (2) The rate of return to women's schooling (9,5%) means that female investment in education is profitable in Algeria. Therefore, it is important to enlarge female education and women's opportunities in the labor market.
- (3) There are not a huge difference between investment in secondary and university education since the rate to university education does not exceed that of secondary education more than 0,5%.
- (4) The literature actually focus more on the measurement error of education in the earning function whereas that of experience variable does not despite of the resulted bias of the rate of return due to the used methodology of experience by Mincer.
- (5) It is pressing to rethink both education quality and labor policy to improve returns to education in Algeria.
- (6) Our study has not been precedent by previous papers on the rate of return to education in Algeria; therefore, more efforts are needed in order to advance research in this matter in the future.

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