

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)**ScienceDirect**

Procedia Economics and Finance 5 (2013) 524 – 531

---

---

**Procedia**  
Economics and Finance

---

---

[www.elsevier.com/locate/procedia](http://www.elsevier.com/locate/procedia)

International Conference on Applied Economics (ICOAE) 2013

## Return To Investment In Human Capital And Policy Of Labour Market: Empirical Analysis Of Developing Countries

Mokhtar Maazouz  
*ISEM, CEE Msila University Algiers*

### Abstract

Our objective in this paper is to examine the relation which exists between education and the policy of labour market. In order to calculate the profitability of the investment in the human capital we adopt the theory of the human capital and the hypothesis of the labour market segmentation. This paper summarizes in theory, the evaluation in the rate of profitability compared to education considering the individuals. In segmented and competitor labour market, the rise of the level of education generates a rise of the rates of unemployment and the manufacturing units proceed to use the level of education like a quantitative index of employment.

To evaluate the rate of cost on the investment in the human capital, we applied the econometric method using the available resources on several levels in the education system, which affects consequently on the supply of labour in the labour market.

**Keywords:** *education rate of return; labour market policy; human capital investment,*

© 2013 The Authors. Published by Elsevier B.V. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).  
Selection and/or peer-review under responsibility of the Organising Committee of ICOAE 2013

---

### Introduction

The history of economic development revealed on the existence of relation between education and labour market, also the determination of human capital rate of return according to the concept of human development. This concept means mainly that the human being is a real fortune for the nations, whereas the human development is based on the widening of the human choices and increase in the effectiveness of each one, to get rid of the narrow and stationary state also the drifts which are imposed by the natural political and economic conditions.

The definition of human development according to Professor Amartin SEN that contributed to

develop the concept of “social rights” as an evaluation index to calculate the human welfare, whereas the traditional theories defined the welfare on the basis of utility. These remarks represent the paramount rights that everyone must have as political, social, and economic freedoms providing the opportunity to produce and develop the talents and invention. Also preserving human dignity to have better life, good health, the acquisition of various knowledge and the necessary resources for a suitable standard of living.

UN adopted this concept on the basis of an index to calculate the human development by referring to essential needs relating to the human being health conditions, the life expectancy and on the other hand, education as an index of literacy rate, scientific assets and the standard of living calculated by individual average income.

### 1-The theory of Human Capital

The theory of human capital was a subject to calculate the human capital rate of return that was developed by Minsser (1958); then continued by Schulerz E (1988) and Kard (1998). Several attempts were launched in order to discover the important role which is done by individual decisions and all depends on the rational economic behavior but the later is excluding from the field of application because of the existing differences between wages and distributions of incomes. These models relate primarily to the individual's decisions in human capital investment without any force of unspecified competition relating to the wages.

#### 1-1 Essential Hypothesis

Let's suppose that the education and training programs period is long, it can cause the differences and disparities between the incomes of employees knowing that the training program plays an increasing role in the productivity of workers.

-The vision of the individuals during taking the decision about training makes it possible to gain higher salaries afterward thus covering the costs of training.

- The cost of training programs is refund after this period

- Individual cannot have another training opportunity in the future when this preceding period is finished.

On the basis of these hypotheses and in an equilibrium and competing state, the distribution of income is equal to the current value of future flows translates by the following equation:

$$Y_s \int_s^{n+s} e^{-rt} dt = Y_0 \int_0^n e^{-rt} dt \quad (1)$$

$Y$  : annual income       $n$  : period of active life       $s$  : the number of schooling years

By calculating the integral we obtain:

$$Y_s e^{-st} (1 - e^{-rt}) = Y_0 (1 - e^{-rt}) \quad (2)$$

After calculation we have :

$$Y_s = Y_0 e^{rs} \quad (3)$$

The income equation is obtained after the logarithm calculation on the both sides which gives the following equation:

$$\ln Y_s = \ln Y_0 + rs \quad (4)$$

From this equation, the coefficient of schooling is equal to the human capital rate of return. This logarithmic equation does not take into account the investment carried out by individuals, who could in some cases develop their talents in their active life. These are considerations relating to an effect of experience in the determination of the grid of differences between wages. Moreover, contributions of Biker in developing

the global theory of investment in the human capital introduced the experience as a variable into the income equation; which induced a modification in income equation, by taking the following form:

$$\ln Y = \alpha + \beta s + \alpha x - \delta x^2 \tag{5}$$

$x$  : represents the number of experience years which is equal to the age minus the number of schooling years (school course) minus seven years.

**1-2 Model of Biker (1964, 1967)**

This model is based on the development in the global theory and the various questions of the human capital together. Biker was the first economist suggesting this model then the model is simplified by the others. Let's suppose that the average income (Y) which will be perceived with the individual depends on the level of education, and the individual decisions are made starting from the maximization of utility function based on the income and the cost of education.

The formulation of decision-making in education aims at maximizing the following equation by choosing the level of education.

$$U(s, y(s)) = \log y(s) - h(s); \quad y'(s) > 0, h'(s) > 0 \tag{6}$$

In several cost functions, the  $h(s)$  equation is convex, this formulation is generally considered according to the current value of income flows at the end of school course period of individual. We choose a level of education in order to maximize the equation under following condition:

$$h'(s) = \frac{y'(s)}{y(s)} \tag{7}$$

It is the condition where the marginal cost of education  $h(s)$  is equal to the marginal education rate of return represented by the percentage of the marginal education profitability to an income concerning a certain level of study. The equilibrium condition according to the formula (6) explains the disparities in wages according to the disparities in the levels of studies, arriving to a logarithmic income equation. It is noticed that the no identical choices of the levels of study between individuals induced disparities in the scholar costs which is represented by the equation of their preferences with the various choices of education. The welfare brought by education is represented by its rate of return. Then, Kard (1998) proposed the possibility of modelling these disparities as following.

$$\frac{y'(s)}{y(s)} = b_i - k_1 s, \quad h'(s) = r_i + k_2 s \tag{8}$$

$b_i$  and  $r_i$  are random variables, in addition,  $k_1, k_2$  are the nonnegative constants. By replacing this formula in the equation (7), we obtain the ideal choice of a level of education as a linear equation whose coefficients reflect the individual disparities as follow:

$$s_i = \frac{(b_i - r_i)}{k}, \quad k = k_1 + k_2 \tag{9}$$

On the basis of ideal choice, the definition of the marginal education rate of return is:

$$\frac{y'(s)}{y(s)} = b_i - k_i s_i^* = \frac{b_i k_2 + k_1 r_i}{k} \quad (10)$$

From this equation, we notice the disparities of the rate of education between the individuals except if the marginal cost of education is zero between the individuals  $r_i = r$  and does not depend on the level of education ( $k_2 = 0$ ). In some cases the marginal education rate of return between the individuals ( $b_i = b$ ) does not depend on the level of education ( $k_1 = 0$ ). By calculating the integral we obtain the following logarithmic equation:

$$\log y_i = \alpha_i b_i s_i - \frac{1}{2} k_i s_i \quad (11)$$

$\alpha_i$  is the constant of integral, the equation is general after the formula of Minsser which means that the disparities between individuals affect the profiles and the propensity of the income equation.

### 1-3 The thesis of segmented labour market

The thesis of segmented labour market was developed in favour of criticisms to the neo-classic theory. It carried out the use of rational behaviour by economic operators according to the supply and demand in the labour market. On the supply side, the theorists suppose that the employees maximize the utility function determined by the income and possible time for working according to the budgetary constraint given by the level of salary. In the framework of the human capital theory, the employee has the choice between the levels of education, then the investment in the human capital. In addition on the demand side, the productive units maximize their benefit by choosing a number of workers and adopting a level of wages as a data in competitive market.

Beyond, the theory focused on the supply side to explain the disparities observed on the level of the wages and the level of income distribution. The thesis of segmented labour market also criticized the neo-classic theory by advancing the absence of a direct relation between the productive forces of employees and the level of salaries, as well as the mobilization of the employees in various jobs. This thesis considers that the labour market is not an only competitive market but also in the form of many isolated segmented markets. These considerations are relative to the different levels of the salaries. According to the literature, the definition of segmentation of labour market and the causes of their appearance are different. Indeed, a common factor consists in the existence of a primary market (executive posts) and secondary market (small jobs).

On this basis 3 theses are fixed:

- A) The existence of the classes for the labour market is difficult to determine by available statistics
- B) The obstacles facing the movements of labours explain clearly why the labour markets are unable to reach a balance between supply and demand.
- C) Each class of labour market of work has its own mechanisms, to choose the labours and to determine the wages; so the theory of human capital is considered to be inapplicable in the low classes of labour market.

## 2- Empirical Implementation

### 2-1: The useful results of income equation

Many studies tried to calculate the education rate of return according to the theory developed by

Minsser and Biker. According to Biker, the good empirical methods presented in this domain consist primarily the estimate of income equation where the dependent variable is the logarithm of salary. In addition, the independent variables are defined according to the level of education (the number of schooling years, level of study and the professional experience which is squared)

$$\log y_i = \alpha + \beta s_i + \lambda x_i - \delta x_i^2 + \mu_i \quad (12)$$

$$\log y_i = \alpha + \sum \beta_k D_{ik} + \lambda x_i - \delta x_i^2 + v_i \quad (13)$$

The parameters  $\mu_i$  and  $v_i$  represent the random errors the estimated equation. It was already noticed that the coefficient of schooling years of study in the equation (12) is equal to the education rate of return, therefore to calculate this rate in a fixed period of education in the equation (13) it is necessary to withdraw the coefficient of the estimate of preceding level of education by dividing the product on the period of a certain level of education.

The Psacharopoulos efforts (1994) in the determination of education rate of return applied in the developing countries were translated to distinguish following propositions:

A) a decrease in education rate of return with the increase in the level of education; i.e. the rate of return for the primary education level is higher than the secondary and the university level. Moreover the per capita rate of return is higher than the global rate, according to the following table:

**Table N°1: rate of return relating to the different levels of education**

Rate of return of Public Education				Rate of Return of Private Education		
Regions	Primary	Secondary	University level	Primary	Secondary	Supérieure
Sub Saharien Africa	24,3	18,2	11,2	41,3	26,6	27,8
Asia	19,9	13,3	11,7	93,0	18,9	19,9
Europe, Middle East, North Africa	15,5	11,2	10,6	17,4	15,9	21,7
Latina America and the Caraïbe	17,9	12,8	12,3	26,2	16,8	19,7
Countires of OECD	14,4	10,2	8,7	21,7	12,4	12,3
The World	18,4	13,1	10,9	29,1	18,1	20,3

Source : Psacharopoulos. (1994).

B) A decrease in the rate of return in various levels of education and the increase in the average income of individual, also the average education rate of return. The table number 2 provides the principal results in the case of different levels of education:

**Table N° 2 : Return rate of the different levels of education and income level**

Total Income	Return rate of public education			Return rate of private education		
	Income Primary	Secondary	University level	Primary	Secondary	University level
Lower than 610 \$	299 23,4	15,2	10,6	35,2	19,3	23,5
Lower than 2449\$	1402 18,2	23,4	11,4	29,9	18,7	18,9
Upper middle 7619\$	4184 14,3	10,6	9,5	21,3	12,7	14,8
Higher than 7619\$	1310 -	10,3	8,2	-	12,8	7,7
World	2020 20,0	13,5	10,7	30,7	17,7	19,0

Source : Psacharopoulos

Whereas table N° 3 shows the compatible results in the case of average rate by using the income function.

**Table N°3 : average education rate of return and the level of income**

Total income	Average income (\$)	Average schooling years	Rate of return (%)
Lower than 610\$	301	6,4	11,2
Middle 2449\$	1383	8,4	11,7
Middle 7619\$	4522	9,9	7,8
Higher than 7619\$	13699	10,9	6,6
World	3665	8,7	10,1

Source : Psacharopoulos.

***Rate of return =le Coefficient of number of schooling years in the Minsser income equation.***

These results show that the female education rate of return is higher than male and the difference between the average rates for the both sexes is 1% in the favour of female. Thus, the output of education is different based on the economic sector in which the individual is employed. These results also released a considerable effect according to Psacharopoulos in the formulation of the efficiency policies, particularly in developing countries to lead a rational policy in public expenditure to various levels of education.

The study is related to some developing economies, the estimation of equation is defined according to the schooling period that is squared (the number of schooling years) and the interaction between the experience and the duration of schooling as a variable in the model of human capital. Also other explanatory factors consist of personal character (the age, social situation and the experience in immigration), the whole of recruitment characteristics (standard of job, field of the economic activity, the stability of employment,

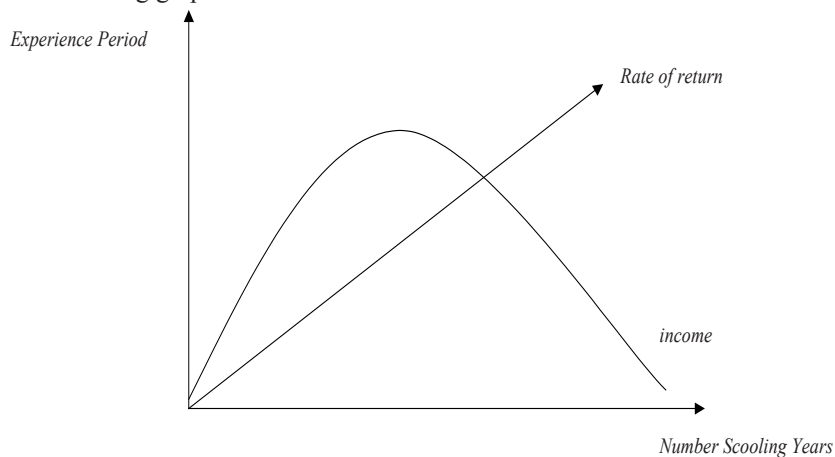
adherence to the trade unions, working period and the characteristics of the family (the number of individuals, family volume, the number of immigrants, the average rate of education and average income.)

### 2.2: estimated results:

Results show that the factor of determination in the case of equation estimation on the basis of schooling period as an explanatory variable is about 0,035 then reaching to 0,23 if the only explanatory variable is the experience in labour market.

This factor of determination is improved by reaching to 0,37 with the two explanatory variables (the number of schooling years and the experience.) Finally we note that the experience variable as the determinant of the income is more important than the variable of schooling period.

Taking into account all the explanatory variables, the determinant factor reached to 0,62 which is considered as a powerful explanatory index. Therefore, the output of human capital, means the variation of consequent income to the variations of the number of schooling years, and the duration of experience in the labour is shown in the following graph:



Graphic N° 1 :the return of human capital

### **Conclusion**

In this paper we tried to examine the bases of the relation existed between human investment outputs in developing countries in education sector, as well as the labour market. In the framework of the neo-classic theory, the decision for joining to education system is made by people having a rational behaviour and in a competitive market. Therefore, the employment supply in comparison to the various levels of education and other markets as well depend on the output of education estimated by individuals. Within the framework of a segmented market, the productive units hope to maximize their profits by recruiting labours in various posts according to the requirement of the post depending on the talents and experiences.

The positive relation between the levels of education and the level of salary makes it possible to face a rise in the levels of education. Consequently this situation is resulted to a rise in the rates of unemployment, particularly in the urban labour market. The calculation of human investment output makes it possible to adopt a public expenditure policy between different economic sectors, and a better exploitation of the resources allocated for various sectors of education. This study implies that primary education teaching is an essential level where the rate of return in the human investment is higher.

This output is more and more increasing in the situation in which the experience and the level of

education are considered as two explanatory variables. So, it is implemented in developing countries to reformulate their education policies and also to facilitate the access of individuals to the various fields of study and training courses in companies, in order to have a new knowledge and to improve their experiences.

However, the structural policies of adjustment carried out by developing countries previously did not result in their awaited objectives such as productivity and efficiency in the sectors. These policies emphasises on the importance of using the price index as an indicator to mobilize the resources to investment particularly in the educational sector.

Negative effects in the social sector and the tendency towards the fall in the rates of investment, such as investment in the sector of education, and the persistence of imbalance in labour market, pushed some countries to re-examine their applied reforms and to try to make them more effective and transparent. It causes the education system to be self sufficient and to improve the relation between the labour market and the higher education.

## References

- Amartya Sen (2003) « le Capital humain », les Cahiers de Sciences Economiques. Paris
- Ashenfelter, O, and A, Krueger (1994) « Estimates of the economic return to schooling from a new sample of twins, » *The American Economic Review*, Vol 84, N°5, pp. 1157-1174
- Barro.R.J (2000) « les facteurs de la croissance économique : une analyse transversale par pays » *Economica*, Paris.
- Barro R «(1993) « comparaison mondiale de l'éducation » *revue d'économie monétaire*
- Barro R.J(1993) « des renseignements mondiale sur l'éducation », le centre de développement mondiale, Université de Harvarde :www.cid.harvarde.edu
- Banque mondiale (2000), « l'enseignement supérieur dans les pays en développement, effondrement et des promesses » rapport d'équipe de travail sur l'enseignement supérieure et la société. (Washington DC, World Bank)
- Banque mondiale (2007), « Développement and the next generation » rapport de développement dans le monde. (Washington DC, World Bank.)
- Bennell . P (1996), "Rates of Return to education :Does the Conventional Patterns Prevail in sub-Sahara Africa?", *World Development*, Vol.24.N°1.pp183-199
- Behrman, Jere R. and Nancy Birdsall ,(1987), " Comment on returns to education : A further international up-date and implications" *The Journal of Human Resources*. Vol 22, N° 4, pp.603-606
- Biker . J (1964) « le Capital humain : analyse théorique et empirique du secteur de l'éducation », Clombia, Press. New York.
- Britschitte L, (1999,B) « est ce l'éducation un rendement sur la croissance dans la région moyen orient et l'Afrique du Nord », discussion paper, Banque Mondiale, Washington.DC).
- Filed.S.G (1975) "Higher education and income distribution in a less developed country" *Oxford Economic Paper*, Vol27 N°2 pp.245- 259
- Knight, J.B, R.H, Sabot and D.C Hovey,(1992) « Is the rate of return of primary schooling really 26 percent?" *Jornal of African Economies*, Vol 1, N°2.
- Lucas.R (1988) , « autour des mécanismes de développement économique » *Revue d'économie monétaire*.
- Mingat, Alain, Jee-peng Tan and Monzurul Hoque, (1985) "Recovering the cost of public higher education in LDSs: To what extent are loan schemes an efficient instrument ?" *Discussion Paper, Education and Training Series* (Washington, DC:World Bank Education Department.
- Minsser. J (1974), « education, experience, et revenu » *Imp*, Colombia University. New York.
- Psacharopoulos.G (1988). « Education and development: A review "World Bank Research Observer, Vol 3, N° 1 PP.99-116.
- Psacharopoulos.G (1994). « Returns to investment in education : A global update, *Wold development* Vol 22, N° 9 PP.1325-1343.
- Radji Assaad (1997) « les effets de recrutement et politique de revenu dans le secteur publique sur le marché du travail égyptien », *Revue de la Banque Mondiale de l'exposition économique*.