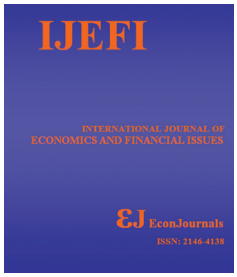

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Estimating the Economic returns of Education in KSA by using Mincerian Earnings Function

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ABSTRACT

This study aims to measure the economic rate of returns for investment in KSA. by using both basic and extended Mincerian Earnings Function. In addition to this, the comparison had been established between the results obtained and those of other researches in the same domain. We adopted in the research the model of Mincer in evaluating the rate of the economic returns according to previous classifications and the effective experience got by the individual in the work (measured by years). The result of the model application states that the economic return of university education in KSA has been improved by 10.35% based on the benchmark of Psacharopoulos International Return measured by 9.6%.

Keywords: The Individual Return, Earnings Function, Practical Experience, Theoretical Experience
JEL Classifications: I26, J24, J16

1. INTRODUCTION

Countries over the world paid particular attention to the education sector in general and higher education in particular, in order to achieve their objectives. These goals consist principally of the community service and upgrading its civilization height, as well as providing the state by the different specialists, technicians and experts in various fields (Richard Raymond and Michael Sesnowitz, 1975; Walter W. McMahon, 1975; Johnson, 1978; Rhoades, 1983). Therefore, the university could be considered as the main source of investment as the human wealth is considered as the most important and expensive fortunes of a society (Murray, 2007; Christian, 2013; Benlaria Houcine. Mostéfaoui Sofiane , 2018).

Due to the growing doubts about the feasibility of investment in higher education especially after an outbreak of some negative unforeseen consequences resulting from this type of investment, as well as the large amount of resources spent; necessary attempts have been made to evaluate the investment in higher education (Albert J. Robinson, 1971; Walter W. McMahon, 1974; B. M. Carven, B. Dick and B. Wood, 1983; Rajesh Kumar Sharma, 2006). These endeavors are coupled with the view of some economists that the evaluation of the investment in higher education is difficult and distinguished from the other approaches undertaken to evaluate other kinds of investments (Daniel C. Rogers, 1972; Briggs P. Dunn and W. Robert Sullins , 1982; Donald R. Winkler, 1984; Kathy L. Stafford, Sven B. Lundstedt, Arthur D. Lynn Jr, 1984). The intricacy refers intrinsically to the multiplicity of objectives and the presence of a large scale of non-economic returns. However, this picture might not discourage the ongoing processes to monitor and assess this type of investments (Tilak, 1995; Westerheijden, 1999; Aracil and Palomares-Montero, 2010; Cherednichenko and Yangolenko, 2013; Hocine and Sofiane, 2017).

In this context, the measurement of the return on investment in education presents the focus of the economic vision for the sector of education and the way to assess the feasibility of investing in this important arena for both the individual and social levels (Renshaw, 1960; Byron and Manaloto, 1990; McMillan and Western, 2000; Wigger, 2004; Van Den Berg and Hoffman, 2005;

Bhandari and Bordoloi, 2006; Carneiro et al., 2011). The objective of the measurement approach is to rationalize the economic and educational decisions in the community (Cunda and Miller, 2014; Yousapronpaiboon, (2014). In this context, 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 (Psacharopoulos, 1995; George Psacharopoulos and H.A. Patrinos, 2004).

1.2. The Sample of the Study

The models of Return-to-Education studies in several countries were based on the statistical approvals undertaken by the official authorities in the country, the fact that facilitates the analyses processes undertaken by the researchers. To examine the issue, we adopted in this study a questionnaire including 350 distributed copies and 325 retrieved ones.

The results of the (Table 1) below show that the average years of study for the total sample is estimated by 16.98% and for males and females by 15.97% and 15.98% respectively:

Additionally, the following (Table 2) presents the means of the ages for the males and females of the study. It indicates clearly the mean ages of females and males are nearly the same.

The average of per capita income of the total sample was estimated by 8154 SAR (Table 3). The classification of the sample by gender and educational level reveals that the average per capita of the males' income is estimated by 9394 SAR higher than of females estimated by 6403 SAR (Figure 1):

Years of theoretical experience according to the Mincer methodology is defined by the age minus the years of education minus the predefined age for enrollment in the educational system (usually 6 years). This rate is measured in the study by 22% as it is shown by the (Table 4):

1.3. Model Specification

Mincer (1958) had developed the human capital theory by which the measurement of the rate of return on human capital had been applied. It is important to recall that the incentive to develop the human capital approach was to try to understand the role of individual decisions on the basis of economic behavior in interpreting wage inequality, as opposed to income distribution theories that consider such behavior outside the scope of analysis. Human capital models focus on human capital investment decisions by excluding all non-competitive forces with varying incomes. The basic assumptions of the model as developed by Mincer are:

- That the length of the training period or education is the main source of inequality in the incomes of workers and as well as it increases the worker's productivity. However, the training process requires a delay in income for a future period
- In making a decision on training, individuals are expected to obtain higher incomes in the future to compensate for the cost of training
- The cost of training should be limited to the opportunity cost of the income which means the income that would have been earned by the individual if he had not enrolled in the training institutions
- It is assumed that individuals do not decide to take future training after the completion of the first training period and the future income flows still remain constant even after the end of the first training period
- The interest rate used by individuals in determining future flows is assumed to be constant.

Table 1: Mean of the study years

	Total sample	Males	Females
Mean of the years	15,97	15,98	15.97
Observations	325	254	71

Table 2: Mean of the study ages

	Total sample	Males	Females
Mean of the years	39	41	38
Observations	325	254	71

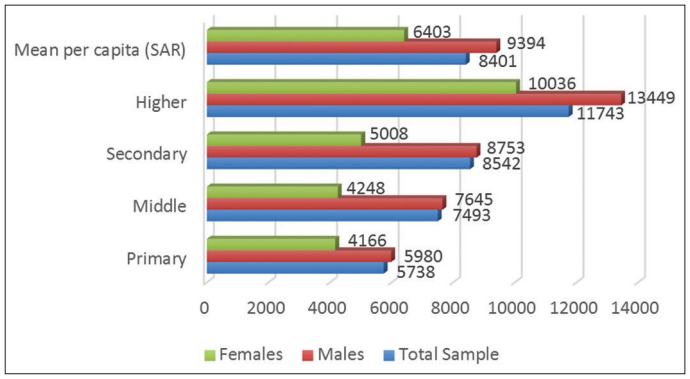
Table 3: Mean of the per capita incomes (SAR)

Mean of per capita income	Total sample	Males	Females
Primary	5738	5980	4166
Middle	7493	7645	4248
Secondary	8542	8753	5008
Higher	11743	13449	10036
Mean per capita (SAR)	8401	9394	6403

Table 4: Mean of practical and theoretical years

	Theoretical experience	Practical experience	Difference of experience	Rate of increase %
Total sample	18.26	14.99	3.27	22
Males	19.45	15.58	3.87	25
Females	17.07	14.4	2.67	19

Figure 1: Mean income by educational level (SAR)



The literature is abundant by different studies that measured the rates of return on education based on the theoretical approach as well practical one. The analyses reveal most common applied method in this field that tackle the estimation of the functions based on the dependent variable (logarithm of wages or income), and the independent variable is represented by the years spend in education enrollment as it is shown by the following model:

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

$$\log y_i = \alpha + \beta S_i + \delta X_i - \gamma EX^2 - \mu_i \quad (1)$$

In order to estimate the individual 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:

$$logyi = \alpha + \beta_1 PRIM_i + \beta_2 MOY_i + \beta_3 SEC_i + \beta_4 UNIV_i + \delta EXP_i + \gamma EXP_i^2 + \varepsilon_i \quad (2)$$

Where PRIM, MOY, 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:

$$r_{PRIM} = \frac{\beta_1}{S_{PRIM}}$$

$$r_{MOY} = \frac{\beta_2 - \beta_1}{S_{MOY} - S_{PRIM}}$$

$$r_{SEC} = \frac{\beta_3 - \beta_2}{S_{SEC} - S_{MOY}}$$

$$r_{UNIV} = \frac{\beta_4 - \beta_3}{S_{UNIV} - S_{SEC}}$$

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), Middle (three years), secondary (3 years), and university (4 years) respectively.

Where EX indicate the years of theoretical experience; α is a constant indicating the logarithm income of newly hired workers who have not received any education; β is the coefficient of years of schooling and in this case reflects the rate of individual return on education. The previous function assumes that the relationship between years of education and wage logarithms is linear. In other words, each additional year of education has the same return regardless of the level of education, while assuming that this relationship is nonlinear for years of experience. The return on years of experience is expected to be positive but decreases over time (negative sign).

Table 5: Estimation of mincer model according to the theoretical experience

Independent variable	Total sample	Males	Females
Constant (α)	9.4155*	9.5066*	9.2139*
	(22.9455)	(18.0625)	(12.89946)
Years of Study (β)	0.1135*	0.1224*	0.1046*
	(4.9475)	(3.0655)	(2.9946)
Years of Theoretical Experience (δ)	0.0265	0.0274	0.0282
	(1.3452)	(0.7654)	(1.7865)
Square of Theoretical Experience (γ)	0.0028	0.0041	0.0017
	(1.4567)	(1.5678)	(1.6753)
R^2	56.4563	65.5672	53.456
Fisher Test F	14.7654	15.6754	12.2976
Observations N	325	254	71

*Significant at 5%

1.4. Estimating the Individual Returns of Education by Using Basic Earnings Function

In order to estimate the rate of return of education in KSA, and in line with the requirements of the study, we adopt the Basic Earnings Function developed by Mincer (1974). The software used in the estimation process is EVIEWS 9.0. The results are represented by the following Table 5:

By estimating the return function presented by equation 01 via the OLS method (Table 5), it is revealed that the special rate of return for the total sample, male and female are: 11.35%, 12.24% and 10.46%, respectively. In addition to this, the values of Student test of (t) indicate the significance of the constant parameter C and the coefficient of the years of study B, as well as the non-significance of the years of experience their squares. These observations are added to those related to the average explanatory capacity in the three cases in which R2 takes the values of 56.45%, 65.56%, 53.45% for the total sample, males and females respectively. On the other hand, the values of the Fisher statistic indicate that the model is statistically acceptable, and that the explanatory variables explain the level of the income logarithm (in the case of the total sample, the males and the females) despite the fact that the coefficient of determination is average. The value of the Fisher statistic indicates that the model is accepted statistically.

Based on these results, we cannot rely on years of theoretical experience because:

- The reduction in the average age of the sample studied in the three cases: 39, 41 and 38, respectively.
- The high level of economic waste represented by the number of years of decline
- Not taking into account the turnover rate.

These and other factors have had a significant impact on the difference between the average theoretical and practical experience. This difference goes beyond practical experience per se. That is why we will rely on years of practical experience in estimating the rate of return rather than the theoretical one (Table 6):

The rate of return reflects reduced outcomes for the complete sample from 1% to 10.35% by replacing the practical experience with the theoretical one. Thus, each extra year spent in higher

Table 6: Estimation of mincer model according to the practical experience

Independent variable	Constant (α)	Years of study (β)	Years of practical experience (δ)	Square of practical experience (γ)	R^2	Fisher test F	Observations N
Total sample	9.7641*	0.1035*	0.0265	0.00274	59.6753	18.879	200
	(22.9455)	(4.9475)	(1.3452)	(1.4567)	0.045	0.0243	

*Significant at 5%

education results in an rise of 10.35% in monthly wages. According to model assumptions, the return on years of experience is positive and declining over time (Table 6).

The Fisher test values and the explanatory power of the R2 model indicate the significance and suitability of the model as a whole to explain the issue (Table 6).

The above (Table 7) and Figure 2 indicate that the rate of return on education in males is higher than that of females (11.74% for males versus 9.96 % for females).

Table 7: Mincerian returns to education by gender

Independent variable	Males	Females
Constant (α)	9.6451*	10.8764*
	(19.4537)	(16.6754)
Years of study (β)	0.1174*	0.0996*
	(4.5673)	(3.8743)
Years of practical experience (δ)	0.0276	0.0281
	(1.4354)	(1.8765)
Square of practical experience (γ)	0.0047	0.0035
	(1.3245)	(1.9123)
R^2	59.6543	67.7654
Fisher test F	13.6754	14.6754
Observations N	254	71

*Significant at 5%

Table 8: Mincerian returns to education by residence

Independent variable	Rural	Urban
Constant (α)	8.7543*	9.6754*
	(17.6347)	(15.7383)
Years of study (β)	0.1068*	0.1151*
	(3.5463)	(4.6574)
Years of practical experience (δ)	0.0176	0.0091
	(1.6372)	(1.8765)
Square of practical experience (γ)	0.0048	0.0045
	(1.2345)	(1.8649)
R^2	51.9847	62.4534
Fisher test F	15.6543	16.4576
Observations N	65	260

*Significant at 5%

Table 9: Mincerian returns to education by level of education

Independent variable	Total sample	Males	Females
Constant (α)	9.4155*	9.7791*	09.8967*
	(17.8641)	(19.4537)	(16.6754)
Primary (β_1)	0.1562*	0.1665*	0.1446*
	(4.4012)	(4.4693)	(3.8432)
Middle (β_2)	0.1346*	0.1486*	0.1211*
	(4.5423)	(4.2276)	(3.7635)
Secondary (β_3)	0.1624*	0.1845*	0.1412*
	(4.3241)	(4.1362)	(3.5643)
Higher (β_4)	0.0985	0.1025*	0.0945*
	(3.7451) *	(3.9856)	(3.2342)
Years of practical experience (δ)	0.0261	0.0256	0.0291
	(1.8624)	(1.5674)	(1.9672)
Square of practical experience (γ)	0.00364	0.0049	0.0038
	(1.8641)	(1,7654)	(2,1073)
R^2	47.6753	46.4532	47.9543
Fisher test F	10.4673	10.3451	11.4532

*Significant at 5%

The (Table 8) and (Figure 3) indicate the determination of the Mincer function by residence shows that the rate of return from education in urban areas is greater than the rate of return in rural areas (11.51% in urban areas and 10.68% in rural areas). This result is in line with international standards.

1.5. Estimating the Individual Returns of Education by Using Extended Earnings Function

In order to estimate the private rate of return to different levels of education in KSA, and in line with the requirements of the study, we adopt the extended Earnings Function (2). The results are represented by the following Table 9;

The Table 9 and Figure 4 above indicate the rate of return for the four levels of education. It is clear that secondary education is the best level of education for individual investment in education, as it yields the highest rate of return 16.65%. It is surprising, then, that primary education is more profitable for individual investment in education than for higher education, a result that is inconsistent with most empirical studies. Middle education, on the other hand, is the less profitable investment for individuals in education.

2. DISCUSSION OF THE RESULTS

The Table 10 below and Figure 5 demonstrate the distinct outcomes of the individual education return rate for this research.

Figure 2: Return rate by gender

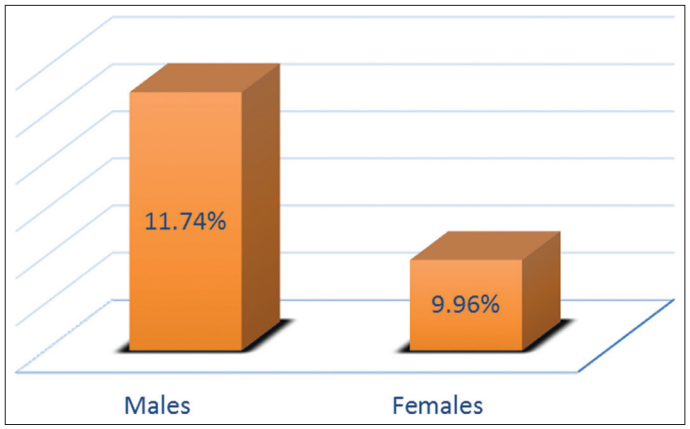


Figure 3: Rate of Return by Residence

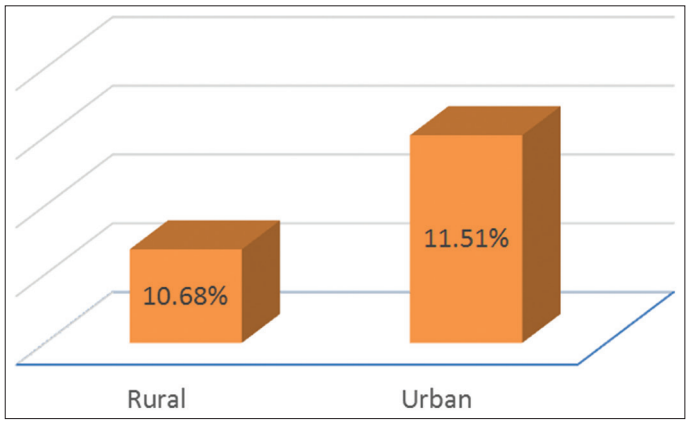


Table 10: Results of the individual return rate estimation

Indicator	Total sample	Gendre		Place of residence		Levels of education			
		Males	Females	Rural	Urban	PRIM	MIDL	SEC	UNIV
Rate of return (%)	10.35	11.74	9.96	9.68	11.51	15.62	13.46	16.24	10.35
Observations total	325	254	71	65	260	66	46	90	123
Observations N	325	325		325		325			

Figure 4: Individual rates of return by level of education

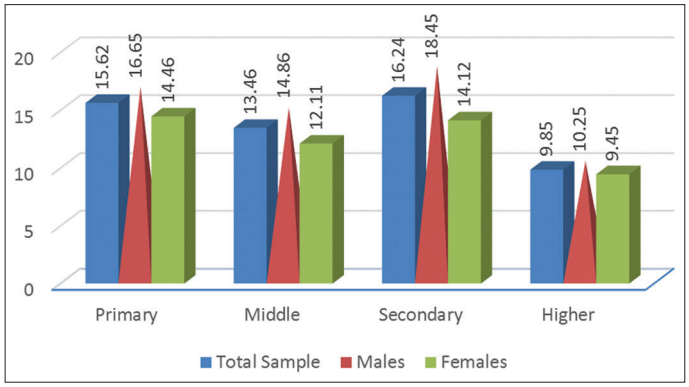
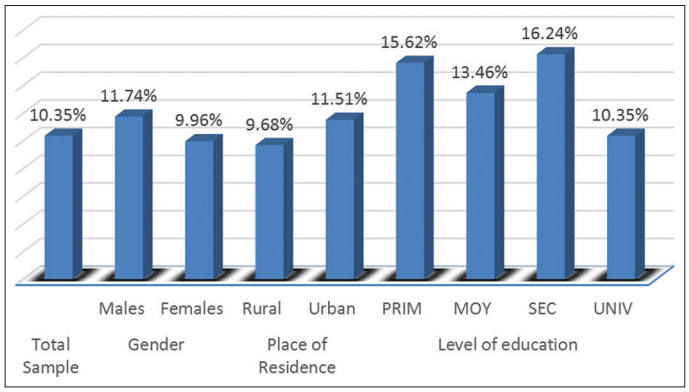


Figure 5: Results of individual rates of return



The findings are linked to the overall sample by gender, Place of Residence and education levels:

The most significant findings of the Mincer Equation estimation method can be summarized as follows:

- After replacing practical experience by theoretical one and recasting the model again, we obtain generally accepted statistical results.
- There is a convergence of outcomes between practical experience and theoretical experience.
- The explanatory capacity of the estimated models remains acceptable and above from the average.
- The rate of return of education for the total sample is 10.35%. It is higher than the rate of return that Psacharopoulos got in his study which is 9.6%. The latter is close to 10% as the international standard in this field, and it is higher than the regional rates, which amounted to 9.6% in Asia and 6.8% in OECD countries (George Psacharopoulos and H.A. Patrinos, 2004).
- The rate of return from education for males (11.74%), which is higher than the rate of return for females (9.96%), the gap between them is about 2% on average. As well as the same result for all levels of education, we found that the rate of return from education for males is higher than the rate of return for females. This result corresponds to the results of international studies as the rate of return for males exceeds his peers in the following regions: European countries in transition (17.5%), Latin America (13.4%) and sub-Saharan Africa (12.5%). This is quite the opposite of the rate of return for females in the regions: Latin America (12.3%) and Sub-Saharan Africa (8.7%). However, these results highlight the important fact that the role of women in the economic growth is low. This is due to a number of factors. The most important one is the low social awareness in these areas. In addition to the negative view of the role of women in economic activity as well as the influence of customs and traditions.
- 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 (16,24%). It was then established that primary education (15.62 %) is more lucrative for individual investment in education than higher education (9.45%), which is consistent with the research of Psacharopoulos and global norms.
- The individual rate of return to secondary education is greater than the rate of return to other levels of education. This finding implies that the labor market offers better benefits for secondary school graduates. This means that the government should give priority to secondary education from both quantitative and qualitative perspectives. On the contrary, higher education witnesses a decline in yields due to elevated rates of educated unemployment.
- The rate of return by place of residence is estimated at 11.51% for urban areas, which is higher than the return rate estimated at 9.68% for rural areas. These results are in line with international standards. This is due to the fact that the division into rural and urban areas adopted by the official authorities seems to be correct.

3. CONCLUSION

The study of the feasibility and evaluation of investment projects requires a rigorous scientific approach to ensure that the decisions taken achieve economic development as long as the natural and material resources are limited, as is the case in Developed countries. In fact, researches about the evaluation of investment in university education in KSA are still scarce. In light of this, this study comes as an attempt to examine how to evaluate this type of investment in KSA.

4. FINDINGS

- Techniques and models are employed to evaluate education return on investment. Maybe the most common is the return-

cost and the earning function methodology of Mincer, despite criticism of their right, for precise outcomes and easy use.

- The rate of return of education for the total sample is 10.35%. It is higher than the rate of return that Psacharopoulos got in his study which is 9.6%.
- The findings of this research are correlated with previous research comparable to the values of individual and social higher education returns, which are comparable to separate countries.

In general, the results demonstrate the economic feasibility of the individual in KSA since the graduate joins the business life and the rate of individual return exceeds that of the market interest rate.

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