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Private Rate of Returns to Investment in Education for Teachers with Bachelor's Degree in Public Secondary Schools in Kenya

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Abstract
The theory of human capital postulates an increase in earnings at different levels of educational qualifications. However, there are mixed findings and interpretations on return to investment in education around the world. This is attributed to differences in methodology and methods of data analysis. By employing the Mincer regression equation this paper presents findings on private rate of return to investment in higher education for teachers with bachelor's degree using a sample of 484 teachers. Primary data was collected using a questionnaire. The multivariate regression results showed years of schooling negatively affected private rate of return to schooling for secondary school teachers having bachelor's degree, while experience and experience squared had positive effect on private rate of return to schooling. Based on Mincer regression equation generated, the private rate of return to schooling for secondary school teachers having bachelor's degree in Kenya was 58.18%. Owing to increasing direct private costs to education, it is profitable for individuals intending to invest in higher education do so at a younger age so as to reap maximally from investment in higher education.
Keywords: *Private Rate of Returns, Mincer Regression, Bachelor's Degree, Schooling, Earnings, Experience, Human Capital,*

1. Introduction

It is well documented in many research findings by scholars, researchers, and economists especially in the field of education that there exists a positive and statistically significant relationship between higher educational qualifications and private rate of return (Colclough, Kingdom & Patrinos, 2009). Besides, the theory of human capital projects an increase in earnings with level of education (Becker, 2009). It is assumed that educated workers earn more wages than less educated workers (Becker, 2009). It has also been demonstrated that education plays a significant role in one's earnings by imparting new knowledge and skills which raises the productivity of workers hence raising their earnings (Becker, 2009). It is assumed that there is a positive relationship between education and earnings. Several studies have demonstrated the rates of returns to investment in education.

For example, the findings of a study conducted by Montengo and Patrinos (2014) basing on a World Bank development report for 139 countries established that the return to schooling was approximately 1.5 percent on average. More recently, Patrinos (2016) while employing the Mincerian earning function established that returns to schooling around the world is about 5 to 8 percent. However, while analyzing the same using proxies, Patrinos (2016) established that the average returns to schooling was about 17 percent. Lemieux (2006) examined the "Mincer equation" thirty years after schooling, experience, and earnings and concluded that the "Mincer equation" is still a reliable standard for estimating wage determination equations as long as it is modified to include a quadratic function in potential experience rather than just a quadratic, allow for a quadratic term in years of schooling to account for the growing convexity in the relationship between schooling and wages, and allow for the potential experience.

Using data from National social economic survey, Comolo and Metto (2010) evaluated the returns to schooling in Indonesia and established that the returns to schooling ranged from 9 to 1.8 percent on average. Most empirical research studies employing the Mincerian earning function established that the relationship between education and earnings for most countries was concave (Psacharopoulos & Patrinos, 2004). These findings suggest that lower level of education have higher returns. However most recent empirical research from developing countries gives a different finding, that return to primary education are lower than returns to higher education. This suggests that education earning function is convex.

While employing the USA census data for 1960 Mincer established that the rate of return to investment in education was 10 percent while experience stood at 8 percent. Many scholars and researchers have acknowledged the Mincerian earning function in estimating returns to schooling due to its simplicity (Psacharopuolus, 1994). However, the mincer Model has various limitations. First, as an investment-decision variable, years of schooling and education attainment should be considered as endogenous, implying a possible bias in OLS estimates of the schooling coefficient. If those who extend education beyond compulsory schooling have greater ability than others, the estimated Mincer coefficient is biased upwards since part of the productivity differential is actually due to innate abilities or skills acquired outside school (ability bias).

In Malaysia, Shahar (2008) discovered that the private and societal rates of return for persons investing in vocational diploma education were 14 and 13 percent, respectively. Furthermore, the survey findings indicate that the rates of return in the private and public sectors were 7 and 8%, respectively. The findings suggest that investing in a polytechnic diploma was a viable option and a better one. Leyaro and Joseph (2019) conducted research in Tanzania that examined the returns to technical and vocational education among industrial workers utilizing the cross-section data from firm level. The findings established that education and on job training was more satisfying than vocational education. Further, the findings show that the marginal rates of return on a year of schooling ranged from 4.8 to 17.5 percent, but the marginal rates of return on a year of vocational education were between 1.4 and 2.8 percent.

Research studies by Rugar, Ayodo and Agak (2010) on financial profitability of higher education among academic staff members in two public universities in Kenya established that as the level of education rise the earnings of the staff members also increase. The study concluded that the university level of education provided more private rate of return as compared to other levels of education at 47.8 percent. According to Becker (1993) the productivity of workers is directly influenced by skills gained through formal education and experience. It is assumed that the salary an employee is paid is not only a reward for that individual human capital but also for the time lost. This resonates with the belief by Schultz (1962) that education enhances skill acquisition and experience which influences productivity, hence stimulating economic growth.

The Kenyan government has continued to expand access to tertiary and university education due to the perceived benefits accruing from higher education. According to Knight and Sabot (1987) earnings inequality in Kenya has been very high which has necessitated many teachers in public secondary schools to enroll for higher education in anticipation of higher returns in the long run. The tremendous growth in university and college education in Kenya is attributed to the increased demand for university education. The perceived higher earnings accruing from higher educational attainment has motivated the expansion of university education in Kenya (World Bank, 2003; the Republic of Kenya, 2005). However, the gains from investments in education have not been evenly distributed in various levels of higher education; diploma level, Bachelor's, Master's, and Doctoral (Cheboi 2001; World Bank 2000; the Republic of Kenya, 2003).

Although the Teachers Service Commission in Kenya suspended the automatic promotion of teachers who acquire higher education qualifications based on the scheme of service in 2014 and introduced the career progression guidelines in 2016, many teachers have continued to invest a lot of money in enrolling in higher education even if the automatic promotion is not guaranteed. This is usually done in anticipation of higher returns in the future. The question many people ask is what is the rate of return to investment in education to higher education in Kenya? Is it worth investing in higher education? Is University education a good investment option for teachers? Therefore, understanding returns to investment in education is beneficial to parents, educational stakeholders and policy makers in making informed choices on the level of education to invest their scarce resources in so that they can maximize economic returns. In doing so they will be able to make an informed choice of whether to continue with higher level

of education or enter a job market early by assessing the cost involved in securing formal education and expected benefits in future.

In estimating the returns to investment in education by public secondary school teachers, age, teaching experience and level of education was used in the earning function. However, trade unions, ability, socio-economic factors, and school quality are important control variables which have a bearing on teachers' earnings. Utilizing the Mincerian earning function where years of schooling is used as a proxy to analyze returns to schooling, this paper resents findings of private rate of return to investment in higher education for teachers with bachelor's degree in public secondary schools in Uasin Gishu County Kenya.

2. Methodology

The paper utilizes stratified and simple random sampling techniques to draw a sample of 484 from 3,000 teachers who are employed by the Teacher's Service Commission in 80 public secondary schools. A questionnaire designed for the teachers generated the data for the study. The teachers' questionnaire was validated using face and content analysis. The reliability of the research instrument was determined using Cronbach alpha. A reliability coefficient of .7285 was obtained which was above the threshold of .70 according to Cronbach (1951), suggesting that the items had relatively high internal consistency. The unit of analysis was the secondary school teacher holding a bachelor's degree.

Data management involved several aspects. Data screening was done to examine whether there was extremely high or low correlation or uncorrelated items. Additionally, data was also screened for regression assumptions. Detection of regression assumptions was considered a vital action as they could alter the study findings and thus leading to wrong conclusion and recommendations. Data analysis was guided by the objective of the study which was to test the hypotheses that there is no statistically significant difference in private rate of return to investment in education for bachelors' degree holders in public secondary schools at 95percent confidence level using Jacob Mincer's regression model:

$$Ln\,Y = \alpha + \beta 1X + \beta 2Exp + \beta 3Exp^2 + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where; Ln Y is the natural logarithm of earnings, α is the constant, $\beta 1, \beta 2, \beta 3,$ are model estimates or coefficients, X is the years of schooling, Exp is the teaching experience, $Exp^2$is the teaching experience squared, and ε is the error term assumed to have zero mean and independent. The assumptions of the Multivariate Linear Regression Model were also tested.

3. Findings and Discussion

This paper sought to establish the private rate of return to investment in education for holders of bachelor's degree for public secondary school teachers in Uasin Gishu County Kenya. The outcome variable was the private rate of returns to investments in education (earnings). This section presents univariate and bivariate statistics for teachers with bachelor's degree; correlation analysis for teacher with bachelor's degree, multivariate modelling for teachers with bachelor's degree, model diagnostic's tests for the assumptions of a multivariate linear regression for bachelor's degree teacher, the hypothesis test, and discussion for private rate of return for bachelors' degree.

3.1 Descriptive Statistics

Table 1 presents descriptive statistics for categorical variables for teachers with bachelor's degree in Uasin Gishu County using the variables, age, terms of employment and promotion. The descriptive statistics in Table 1 indicate that there were more male (52.2%) than female (47.8%) teachers (with bachelor's degree (male = 216, female = 198). It was also observed that majority of the teacher respondents (64.49 percent) were in the age bracket of 30-39 years suggesting a youthful teaching force. Most of the teachers (93.2) % permanents terms of employment. However, only 14.5% of teachers had been promoted.

Table 1: Descriptive Statistics for Categorical Variables

		Frequency	Percent
Gender	Male	216	52.2
	Female	198	47.8
	Total	414	100
TOE	Permanent	386	93.2
	Contract	28	6.8
Promotion	Yes	60	14.5
	No	354	85.5
	Total	414	100

In addition, Table 2 presents descriptive statistics for continuous variables for teachers with bachelor's degree in Uasin Gishu County using the variables, age, years of schooling, costs, experience and earnings. The descriptive statistics in Table 2 show that it takes an average of 16 years of schooling up to the bachelor's level. To earn a bachelor, it costs averagely Kshs. 283,225.70. Out of their investment in higher education the descriptive statistics indicate that the bachelors graduate on average will start recouping their investments with a starting salary of Kshs 30,343.29 with mean earnings of Kshs 54,047. The values for skewness and kurtosis for all the statements with regard to the KM were within the acceptable value of < 3 for skewness and value of < 10 for kurtosis (Kline, 2005, 2011) respectively as shown in Table 2. Hence, the results suggest that there is a normal distribution of the variables.

Table 2. Descriptive Statistics of Continuous Variables

Obs=414	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
Age	29.00	5.00	37.09	4.66	.31	-.23
Years of schooling	3.00	6.00	4.05	.38	3.10	6.37
Experience	2.00	25.00	11.31	6.63	.14	-1.14
Costs	1000.00	57000.00	283225.66	171484.57	.22	-1.65
Earnings	1500.00	11000.00	54047.88	17512.73	.06	.26

Obs=Observation, Std. dev. =Standard Deviation

3.2 Pairwise Correlation Analysis

A correlation of the study variables in Table 3 indicates years of schooling and cost were negatively and significantly correlated with private rate of return for teachers with bachelor's degree in public secondary schools (r=-.331, ρ<.05 and r = -.243, ρ<.05 respectively). Experience and age had significant and positive relationship with private rate of return for teachers with bachelor's degree in public secondary schools (r=-.639, ρ<.05 and r = -.600, ρ<.05 respectively). However, gender had insignificant relationship with (r=-.059, ρ<.05 and r = -.243, ρ<.05 respectively).

Table 3: Correlation Analysis for the Variables

	Earnings	YoS	Exp	Exp^2	Gender	Age	Costs
Earnings	1						
YoS	-.331*	1					
Exp	.639**	.029	1				
Exp^2	.627**	.038	.968**	1			
Gender	.059	-.026	.09	.077	1		
Age	.600**	.007	.820**	.813**	.106*	1	
Costs	-.243**	-.051	-.012	-.097*	.028	-.03	1

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Keywords: Yos =Years of Schooling, Exp=Experience,

3.3 Multivariate Modeling for Teachers with Bachelor's Degree

Jacob Mincer's regression model was used estimate private rate of returns to investments in education (earnings) using years of schooling, experience as predictors while gender, age and cost were used as control variables. Results in table 4, showed that 48.4% variation of private rate of return to schooling for holders of a bachelor's degreeof primary teachers can be predicted using years of schooling and experience while being controlled by gender, age and cost. The F-statistic = 95.525 with a significance (Prob>F = .000) for the model indicates that the Jacob Mincer equation was fit to estimate parameters. Further the R square of the model (45.53 percent) indicates that the variables (experience, years of schooling and experience squared explained) explained 45.53 of the variations in private rate of return to schooling for holders of a bachelor's degree.

Further, the results in model 2 showed that the years of schooling was a negative factor for private rate of return to schooling for secondary school teachers having bachelor's degree (β=.203, ρ<.05). Experience and experience squared were positive and a significant predictor for private rate of return to schooling for primary teachers having bachelor's degree (β=.203, ρ<.05 and β=.400, ρ<.05respectively).

In model 1, control variables (age, cost and gender) predicted 11.6% variation in private rate of return to schooling for primary teachers having bachelor's degree. Age had significant positive effect on private rate of return to schooling for primary teachers having bachelor's degree (β=.203, ρ<.05), while cost had significant negative effect on private rate of return to schooling for primary teachers having bachelor's degree (β=.125, ρ<.05).

Table 4. Regression Analysis

	Model 1 B (Std. Error)	**Model 2 B (Std. Error)**
Control Variables		
(Constant)	3.948(.056) **	4.28(.103)
Gender	.001(.013)	.000(.012)
Age	.122(.001) **	.009(.002) **
Costs	-.125(.000) **	-.000(.000) **
Predictors		
Years of schooling		-.203(.016) *
Experience		.319(.004) **
Experience squared		.400(.030) **
Mode Summary Statistics		
R	.341	.696
R Square	.116	.485
Adjusted R Square	.107	.477
Std. Error of the Estimate	.13352	.12539
Change Statistics		
R Square Change	.116	.369
F Change	95.525	19.311
df1	3	3
df2	410	407
Sig. F Change	.000	.000

a Dependent Variable: earning

From the above results the following Jacob Mincer's regression model was generated in estimating private rate of return to schooling for public secondary school teachers having bachelor's degree:

$$Ln\,Y = 4.28 - .203X + .319Exp + .400Exp^2 + \varepsilon$$

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Where; Ln Y is the natural logarithm of earnings, α, X is the years of schooling, Exp is the teaching experience, Exp^2 the teaching experience squared, and $\varepsilon$is the error term assumed to have zero mean and independent. Based on the model private rate of return to schooling for primary teachers having bachelor's degree was 58.18%.

4. Discussion

The purpose of this study was to explore the private rate of return to investments in higher education by teachers in public Secondary Schools in Uasin Gishu County who are holders of bachelor's degree. The control variables are important in establishing the true effect of education on earnings in this study the following variables were controlled sex, number of years in school, experience, union membership. The outcome variable was private rate of return to investment in education in terms of lifetime earnings for teachers who are holders of Bachelor's degree. The Explanatory variables in this study are the levels of tertiary education that is Bachelor's degree.

Mincer developed an econometric model that demonstrates that an individual's income increases at a decreasing rate throughout their lifetime, resulting in a concave function of time, assuming that people invest in education to the point where the cost of investment equals the present value of education gains.

The "basic earnings functions technique," which dates back to Mincer (1974), entails fitting of a semi-log ordinary least squares (OLS) regression utilizing the natural logarithm of earnings as the dependent variable and years of labor market experience and its square as independent variables. No matter what educational level this year of schooling relates to, the coefficient on years of schooling in this semi-log earnings functions specification may be seen as the average private rate of return to one extra year of study (Psacharopolous, 1994; Grindling et al., 1995; Cohen & House, 1994).

The finding of this study concurs with the investigation by Deolaliker (1993) who projected the rate of return to investment in education in Indonesia employing the National social economic survey from 1987.The study findings established that the rate of return for primary schooling was about 10 percent while the rate of return for secondary and tertiary education was around 20 percent. However, another empirical study on return to schooling in Indonesia was conducted by Duflo (2001) his research findings established that returns to investment in education were about 6.8 to 1.6 percent. While employing the USA census data for 1960 Mincer established that the rate of return to investment in education was 10% and experience was 8%.

Using data from National social economic survey, Comolo and Metto (2010) also evaluated the returns to schooling in Indonesia and established that the returns to schooling ranged from 9 to 1.8 percent on average. Leyaro and Joseph (2019) examined the returns to technical and vocational education among industrial workers in Tanzania. Utilizing the cross-section data from firm level the findings established that education and on job training was more satisfying than vocational education. The marginal rates of return on a year of schooling ranged from 4.8 to 17.5 percent, but the marginal rates of return on a year of vocational education were between 1.4 and 2.8 percent.

Employing the Mincerian earning function while utilizing the three methods of calculating rate of return to educational investment in Taiwan and data from may work force review of Taiwan area from 1978 to 1991 (Sakellariou, 2003). The findings established that the private rates of return to Taiwan are higher for higher level of education and lowest for lower levels of education. The findings from the above study were in contrast to the general findings of Psacharaopuluos (1994).

5. Conclusion

The purpose of this paper was to evaluate the private rate of return to investment in education for teachers who are holders of Bachelor's degree in Uasin Gishu County. From the findings the rate of return for a bachelor's degree holder was 58.18% and the marginal rate of return was 4.55%. The findings suggest that investment in higher education is beneficial in that majority of the teachers who were holders of bachelor's degree were promoted and earned more as compared to teachers who were diploma holders.

Teachers with bachelor's degree had a mean experience of 11.31 years with the least experience of 2 years and the most experienced teacher had 25 years teaching experience. The cost of attaining bachelor's degrees was averaged at

Kshs 283,225.7. On average, the starting salary was Kshs 30,343.29. Mean earning or gross pay was Kshs 54,047 also a bachelor's degree holder earns at least Kshs 15,000 and at most Kshs 110, 000.

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