PRIVATE RETURNS TO EDUCATION: A STUDY ON BHUTAN, KENCHO

NIRAMOL ARIYAARPAKAMOL

Graduate School of Development Economics, NIDA, Thailand
E-mail: kendrooo@gmail.com

Abstract - This paper attempts to estimate the private rate of returns to schooling for workers in Bhutan, using the Mincerian earning framework with pooled regression models. The study uses six waves of Bhutan's labor force survey data extending from the year 2010 to 2015 for those workers born in the year 1929 to 2000. The results show one extra year of schooling increased an hourly real wage by around 9 percent, and that one additional year of work experience increased an hourly real wage by around 5 percent. This indicates that the private returns to education were higher when accomplishing one additional year of schooling in comparison with gaining one additional year of work experience in Bhutan.

Keywords - Mincerian Earning Framework, Pooled Regression, Private Returns, and Real Wage.

I. INTRODUCTION

Education has been widely accepted as a key determinant of the economic and social development of a country and in most of the countries around the world, education has been used as a policy tool to enhance the living standard of people by increasing income. With the objective of improving the living standard and enhancing human development, the Royal Government of Bhutan has conferred top priority to the development of education sector by allotting the highest share of the annual budget to the education sector in last several years. However, despite the fact that government gives much of focus on developing education sector by investing a huge amount of resources, there are no explicit studies carried out to determine returns to schooling in Bhutan. Thus, this study focuses on estimating returns to schooling in Bhutan.

The studies which examine the returns to schooling typically adopt the Mincerian earning framework,developed by Jacob Mincer (1974) as a foundation for estimation. Indeed, this model has been used extensively by researchers to study the earning differences between individuals with different levels of human capital like years of schooling and work experience. Many studies provide evidence of a positive influence of schooling on private earnings i.e. increase in earnings is associated with an increase in years of schooling (Psacharopoulos & Patrinos, 2004). In fact, the available studies evidently suggest investment in schooling as a key to improve the individuals' living standard by the means of increasing income. Furthermore, education also enhances human capital which leads to higher productivity and long-run economic growth.

This study presents estimations of returns to schooling based on pooled OLS analysis using Mincer's earnings function as base. Mincer's (1974) earnings function states that earnings fundamentally depends on schooling and experience. Other potential determinants of earnings such as gender, workers' skill level, industry of employment are also included in the model.

The rest of the paper is arranged as follows; section 2 discusses related literature. Section 3 presents empirical methodology employed whereas section 4 discusses data and variables used to estimate returns to education. Section 5 presentsimportant empirical results and lastly section 5 concludes with a short summary.

II. RELATED LITERATURE

The act of estimating returns to education has been one of the important economic analyses since the late 1950s.The Mincer's (1974) earnings function is widely considered as the foundation for estimating the rate of returns to education and his basic model comprises a semi-log linear function regressing log of earnings on years of schooling and experience. The coefficient on years of schooling essentially illustrates approximate percentage change in earnings with an extra year of schooling accomplished by individuals.

In Psacharopoulos (1985, 1989,1994a,1994b); Psacharopoulos & Patrinos (2004); and Peet, Fink, & Fawzi (2015), the researchers principally focused on estimating returns to schooling for developing countries. To be specific, Peet, Fink, & Fawzi (2015) showed that the average returns to education for 25 sampled developing countries is 7.6%.It was also found that females had higher returns than males; an additional year of education increased female earnings by 8.6% but by only 7.1% for males.

Some studies estimated returns to education for different employment status. For instance, Kavuma (2014) showed that for both wage employees and self-employed, an extra year of schooling was associated with an increase in earnings of 15% and the time trend in his model showed a greater increase in earnings over lifetime for self-employed than wage-employment. Additionally, some research attempted to examine the subsequent returns to education after a certain policy implementation. For

example, Polat (2017) focused on estimating regional returns to education after Turkey adopted higher education expansion policy. The findings indicatedthat the policy hada considerable positive impact on earnings for low-educated households in some regions and had increased returns in terms of wages for local level although the country was experiencingrapid increase in numbers of graduates due to the policy.

Along the same line, there are alsonumerous studies conducted to estimate the rate of returns to education but using different estimation approaches viz., instrumental variables approach (Kane & Rouse, 1993); (Kerr & Quinn, 2010), panel estimation (Harmon, Oosterbeek, & Walker, 2000), a pseudo-panel approach (Himaz & Aturupane, 2012); (Warunsiri & McNown, 2010), and control function method (Blundell, Dearden, & Sianesi, 2001). Although the researchershave employed different approaches to estimate the rate of returns to education, the vast majority of the studies have employedMincer's earning function as a groundwork for estimation.

III. METHODOLOGY

Using 6 waves of Bhutanese Labor Force Surveys, this study aims to estimate the private rate of returns to education based on the Mincer's wage regression.

Fundamentally, Mincerian earnings function states the relationshipbetween earnings and schooling, and experience as follows;

$$lnw = \beta_0 + \beta_1 S + \beta_2 X + \beta_3 X^2 + u \quad (1)$$

Where; lnw is natural logarithm of earnings (i.e. hourly wage), S the years of schooling, Xas the years of work experience,and X^2as the experience squared.

Within the framework of standard Mincerian earnings function, the other important variables of interest will be incorporated, and the study will estimate a pooled regression model as follows;

$$lnw_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \beta_4 male_i + \beta_5 rural_i + \beta_6 divorce_2i + \beta_7 single_3_i + \beta_8 skill_1_i + \beta_9 skill_3_i + \beta_{10} skill_4_i + \beta_{11} reg_1_i + \beta_{12} fam_wrk3_i + \beta_{13} own_act4_i + \beta_{14} emplyr5_i + \beta_{15} agri_1_i + \beta_{16} inds_2_i + \varepsilon_i \quad (2)$$

Where; i – represent different individuals, lnw_i – isnatural log of hourly real wage of individual i, Si and X_i can be represented as years of schooling and years of potential work experience of individual i[1], and Xi^2 – experience squared which is an indicator for an individual's experience over the lifetime, $male_i$ – dummyfor male gender, $rural_i$ – dummy for rural area, divorce_2i and $single_3_i$ – dummies for marital status of individual i, $skill_1_i$; $skill_3_i$;skill_4i – dummies for skill levels based on International classification[2], reg_1i; fam_wrk3_i ; own_act4_i ; $emplyr5_i$ – dummies for nature of employment of individual i. where; reg_1i – Regular paid employee, fam_wrk3_i – Family worker (Agriculture/Non-Agriculture),own_act4_i – Own-account worker (Agriculture/Non-Agriculture), $emplyr5_i$ – employers, $agri_1_i$ and$inds_2_i$ – dummies for major industries in which individuals i works[3], ε_i – measures individual-specific errors and βj – parameters that need to be estimated.

Some researchers have argued that individual's education qualification as more influential in determining returns to education compared to the number of schooling years attained. So, to test for such non-linearity of returns to education along the education profile, the returns to each level of education will be estimated in this paper by including dummies for educational level with higher secondary level of education as a reference group.

IV. DATA AND VARIABLES

This study uses six waves of Bhutan's labor force surveys conducted by Ministry of Labor and Human Resources, covering all twenty districts in Bhutan between 2010 and 2015. The labor force survey in Bhutan is carried out on annual basis with aims to deliver a quantitative framework for the preparation of national plans, programs and the formulation of policies that affect Bhutan's labor market.

Following the Mincer's earnings function, the log of hourly real wage is used as dependent variable and the years of schooling and potential experience as explanatory variables. The hourly wages used are from primary occupation only. The wages were given in nominal terms, so they were converted to real wages using Bhutan's Consumer Price Index given for respective survey years[4].This study accounts only the completed years of schooling and the education system in Bhutan is categorized into four different levels viz; primary education, lower secondary education, upper secondary education, and bachelors' degree and above[5].

There are 10 categories of primary or main occupations given in the data and they are all classified into four different levels of skills based on International Standard Classification of Occupation (ISCO, vol-08). Additionally, all 17 categories of industries available in the sample data were classified under three major industry (agriculture, industry, and services) based on international standard industrial classification (ISIC).The sample employed in this study is limited to

[1]If the data for actual experience are not available, Mincer suggested using potential experience of individuals which can be derived as; Experience = age of individual – years of schooling – 6 years (i.e. age before getting into school).

[2] The categories of occupation were classified into four levels of skills based on International Standard Classification of Occupation (ISCO, vol-08).

[3] All categories of industry are classified into three major industriesbased on International Standard Industrial Classification (ISIC, revision-4).

[4]CPI: 2010 (100), 2011 (111.34), 2012 (120.74), 2013 (129.19), 2014 (139.8), 2015 (146.12).

[5] Due to lower number of people with master's degree and Ph.D. in Bhutan, there are no separate data for them so those individuals with master's degree and Ph.D. are categorized under bachelor's degree and above.

those individuals whose ages are 15 or above at the time of each survey.

Table 4.1shows average monthly real earnings from primary occupation by age group. The statistics shows a general increasing trend of average monthly real earnings with higher age group. Unlike for other years, for the year 2013 and 2014, the age group 45-54 have received highest average monthly real earning from primary occupation. As expected, the average monthly real earning decreases significantly for age group 65 and above for all past six years.

Table 4.1Average monthly real earnings from primary occupation by age group

Age group	2010	2011	2012	2013	2014	2015
15-24	6439	7531	7864	7565	7805	8562
25-34	9581	9633	10829	10668	11217	11862
35-44	10784	11177	11342	12176	12406	12123
45-54	12720	11703	11120	12448	13247	12345
55-64	14297	11882	11631	12250	12639	14931
65 +	8974	5947	8273	8930	11237	9482

Table 4.2 displays average monthly real earnings from primary occupation by education attainment. The average monthly real earning increases with higher levels of education for each year and the earnings from bachelor's degree and above remains as highest compared to all other levels of education for all six survey years.

Table 4.2 Average monthly real earnings from primary occupation by education attainment.

Education	2010	2011	2012	2013	2014	2015
No Edu	7218	6416	7777	7452	9392	9598
Primary	7206	7695	9154	9953	9330	9540
Lower secondary	8344	8958	11243	11199	11037	11037
Higher secondary	11568	12201	15039	11937	10964	12325
Bachelor's degree &above	16166	16430	22062	19215	19776	19223

The workers with bachelor's degree and above earn approximately 2.2 times larger than their counterparts with no education in the year 2010. The earnings gap appears to be persistent throughout the years at about 2.0 – 2.8 times. Furthermore, the statistics show that the earning from bachelor's degree and above is approximately 1.4 times larger than earning from the higher secondary level of education in the year 2010.The earnings gap between these two levels of education appears to be in the range of 1.3 – 1.8 times throughout the years.

V. RESULT AND DISCUSSION

1. Estimated Returns to education based on number of schooling years: Pooled OLS estimation

The returns to education are reported in Table 5.1. The OLS estimated returns to education shows that an extra year of schooling increases an hourly real wage by around 9% and it is statistically significant at 1% level. This result is similar to what Himaz & Aturupane (2012) have found for Sir Lanka. The estimates also show an experience as one of the important contributors to earnings, with every year of work experience adding approximately5% in earnings for Bhutanese workers. This result is realistic and consistent with what is normally observed in Bhutan i.e. the workers with same years of schooling employed in the same job but with different years of work experience have different levels of earning. The returns to a lifetime experience of individuals (proxied by experience squared) appear to be negative suggesting the diminishing returns of experience as the years of experience increase.

Regarding the returns to education for gender, male returns exceed female returns by around 6% and this result is in sharp contrast to what Peet, Fink, & Fawzi (2015) have found for 25 developing countries and in contrast to what Warunsiri & McNown (2010) have found for Thailand. The differences in returns to education for male and female workers clearly reflects the still-existence of traditional female low paying culture in Bhutan. Unexpectedly, the returns to education for rural workers is considerably higher than urban workers and the differences is statistically significant at 1% level. This result irrefutably defends educational return differences as not the cause of rural to urban migration in Bhutan. In fact, this result is similar to what Peet et al. (2015) have found for Ethiopia and similar to what McMahon (1987)have found in most of the developing countries of Africa.

Besides, the earnings of divorced workers are 8% higher than that of the married ones whereas the single workers earn 3% less than their married counterparts.

The nature of employment and the levels of skills do not seem to play any significant roles in explaining the earnings variations in Bhutan. Additionally, the industry in which the workers are employed does not appear to have any influence on the wages in Bhutan either.

Table 5.1: Estimated returns to education (schooling years)

	Pooled regression
VARIABLES	lnhr_realw
yrs_edu	0.0921***
	(0.00116)
exp	0.0458***

	(0.00155)
exp_sq	-0.000516***
	(2.73e-05)
male	0.0570***
	(0.0111)
rural	0.535***
	(0.0185)
divorce2	0.0848***
	(0.0243)
single3	-0.0338**
	(0.0143)
skill1	-0.00750
	(0.0164)
skill3	-0.00671
	(0.0188)
skill4	0.00721
	(0.0138)
reg1	0.000297
	(0.0200)
fam_wkr3	0.00345
	(0.0251)
own_act4	0.00154
	(0.0215)
agri1	-0.0263
	(0.0202)
inds2	-0.0183
	(0.0164)
Constant	1.799***
	(0.0346)
Observations	24,414
R-squared	0.299

Note: Robust standard errors in parentheses
***** p<0.01, ** p<0.05, * p<0.1**

2. Estimated Returns to education based on qualification: Pooled OLS estimation

The estimated returns for levels of schooling are reported in Table 5.2. As expected, the result shows that the returns to primary education is 81% less than higher secondary educationand it is statistically significant at 1%. The returns to lower secondary education tends to be less than higher secondary education by around 42%. Furthermore, the returns to bachelor's degree and above areconsiderably higher than higher secondary education with the difference of approximately 43%. It is worth pointing out that the returns to education for Bhutanese workers increases rather exponentiallyas they climb on to higher ladder along the education profile. For instance, the difference in returns between primary school graduates and non-educated workers is 24.4%, i.e. a year at primary schooling provides 4% increase in earnings.[6] At the lower secondary level, a year of schooling yields 9.5%[7] whereas an extra year at higher secondary level and bachelor's degree improves earnings by 21.2% and 14.3%respectively.Our empirical findings indicate that although those with the bachelor's or more advanced degrees earn more than other groups, the returns to education at the higher secondary level seems to be highest at 21.2% per a schooling year, confirming the non-linearity of returns to education at different education level.

The rest of the results regarding gender, experience, area of residence and marital status are consistent with the results in Table 5.1 above.

Table 5.2. Estimated returns to education (qualification)

	Pooled regression
VARIABLES	Lnhr_realw
no_edu1	-1.049***
	(0.0180)
pry_edu2	-0.805***
	(0.0201)
low_edu3	-0.424***
	(0.0139)
bac_abv5	0.431***
	(0.0141)
Exp	0.0472***
	(0.00159)
exp_sq	-0.000568***
	(2.81e-05)
male	0.0680***
	(0.0111)
rural	0.556***
	(0.0186)
divorce2	0.0773***
	(0.0243)
single3	-0.0332**
	(0.0142)
skill1	-0.0111
	(0.0163)
skill3	-0.00965
	(0.0186)
skill4	0.00349
	(0.0137)
reg1	-0.00380
	(0.0199)
fam_wkr3	-0.000147
	(0.0250)
own_act4	-0.00315
	(0.0215)
agri1	-0.0210

[6] No_edu1 – higher_sec = - 1.049, Pry_edu2 – higher_sec = -0.805. The difference between Pry_edu2 and no_edu1 = 0.244 or 24.4%. Primary education lasts 6 years so the yearly returns is 4%.

[7] Pry_edu2 – higher_sec = - 0.805, low_edu3 – high_sec = -0.424. The difference between Pry_edu2 and low_edu3 = 0.381 or 38.1%. Lower secondary school takes 4 additional years hence the returns is 9.5% per year.

	(0.0201)
inds2	-0.0187
	(0.0163)
Constant	2.908***
	(0.0307)
Observations	24,414
R-squared	0.306

Note: Robust standard errors in parentheses
***** p<0.01, ** p<0.05, * p<0.1**

CONCLUSION

This paper investigates the private rate of returns to schooling for Bhutanese workers using pooled regression models. With the empirical findings obtained in this study, we can conclude that schooling largely and significantly explains the variation in real earnings. Indeed, this result firmly encourages Bhutanese workers to pursue higher levels of schooling as higher levels of schooling is closely linked with higher earnings.

It has been found that male workers earn more than females, ceteris paribus, indicating some degree of discrimination against females. Surprisingly, the earnings of rural workers exceed that of their urban counterparts, possibly owing to additional allowances offered to rural workers such as high-altitude allowance, difficulty allowance, and scarcity allowance. These results provide numerous policy implications to the government when government make educational investment decisions and while setting priorities related to the education sector.Broadly, the nature of employment, levels of skill, and major industry under which individuals were employed do not play any significant roles in determining earning variations in Bhutan.

The result showing higher private returns to schooling not only benefit the individual Bhutanese workers, but it has also high potential to induce greater social returns due to the spillover of positive externalities of schooling. Thus, the further research is needed for better understanding about the social rate of returns to schooling in Bhutan.

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