Journal of Economics and Development Studies
March 2021, Vol. 9, No. 1, pp. 1-13
ISSN: 2334-2382 (Print), 2334-2390 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jeds.v9n1a1
URL: https://doi.org/10.15640/jeds.v9n1a1

Returns to Education: The Case of Nepal

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Abstract:

For many people in developing countries, education is one of the few hopes for social mobility. One of the key determinants of investment in education is its rate of returns. Yet, this key piece of information is missing in some developing countries. While correcting for sample selection bias, we estimate returns to education for Nepal - a low income country with poor educational attainments. Moreover, heterogeneity of returns to education in the labour market is explored using few sub-samples. Our estimates suggest that private returns to education are around 7 per cent for an additional year of schooling in Nepal and returns are higher for upper-secondary education level compared to the other levels. Interestingly, returns to education for females remain higher than that of for the men. Our findings are consistent with that of the previous studies on returns to schooling in Nepal as well as in other developing countries.

JEL classification: I20, J31, C21, O53

Key words: Returns to Education; Wage Differentials; Developing Countries; Nepal

1. Introduction

Education is a fundamental human right and a key ingredient in the process of development and poverty reduction strategies (Sen, 1989; 2000). It delivers private and social benefits motivating individuals, governments, and the other actors to invest in it. For instance, education not only enhances one's earning capacity but also fosters peace and stability in the society. A person without basic literacy and numeracy skills is most likely totraps in a vicious cycle of poverty. Skills gain through education strongly link with empowerment, cognitive well-being, and social stability.

According to literature, one of the key determinants of investment in education is its rate of returns (Becker, 1967; Mincer, 1974; Schultz, 1961). A comprehensive public knowledge on returns to education facilitates both individuals and public policy makers to make rational decisions in investing in education. Yet, this piece of knowledge lacks in many developing countries thereby witnessing, very often, under-investment in education. In the context of Nepal, as far as authors know, a limited number research studies are available on returns to education (Akanda, 2010; Lamichhane and Sawada, 2013; NGD, 2014). Nepal is characterized with high illiteracy rate, modest level of school enrollment, higher school dropouts, and significantgender gap in schooling[2]. In this backdrop, this study attempts to estimate private returns to education in the context of Nepal.

This study makes some important contribution to existing literature. First, it enriches the existing literature on returns to education in Nepal. As far as authors know the latest study has calculated rate of returns to education based on the Nepal Living Survey 1995/96. A number of changes have taken place both in the global economy as well as in the economy of Nepal during last two decades and certainly those changes may have affected returns to schooling. This makes it imperative to update estimates on returns to education in Nepal. This study employs data from the latest Nepal Labour Force Survey conducted in 2008. The Labour Force Survey is relatively richer in information related to labour market activities than the Living Standard Survey or the Annual Household Survey[3]. Second, this study explores heterogeneity in returns to education in the labour market.

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[2] According to World Development Indicators (2014), adult literacy rate is 57 (2004) and primary, secondary and tertiary school enrollment ratios are 98 per cent (2013), 66 per cent (2009), and 14 per cent (2009) respectively. According to Education Ministry of Nepal (2010) only 70 percent of the students enrolled in grade 1 make it to grade 6.

[3] According to the Central Beurau of Statistics of Nepal, the Labour Force Survey of Nepal is specifically designed to collect labour market information covering around 15,000 household units whereas the Living Standard Surveys and Annual Household Surveys are designed to collect mostly the information related to household level consumption and living condition. The sample size of the Living Standard Survey is 7,200 households and Annual Household Survey covers less than 3,000 households.

The return differentials are significant in determining wage differentials in an economy. Finally, this study employs an advanced methodology, multinomial logistic framework of Bourguignon et al. (2007), in correcting the sample selection bias where many previous studies, in the context of Nepal, neglected in addressing this issue[4].

Our estimates suggest that private returns to education are around 7 per cent in Nepal and returns are higher for upper-secondary education level compared to the other levels of education. Lower returns for undergraduate and postgraduate levels not only discourage students pursuing higher studies in Nepal but also may have become a push factor for skilled labourout-migration. Interestingly, private returns to education for females remain higher than that of for the men. This piece of information suggests that parents need allocating more resources for females' education. Our findings are consistent with previous returns to schooling calculations in Nepal as well as with estimates done elsewhere.

The paper is organized as follows. Section two briefly reviews some selected literature while the third section discusses about the methodology and data. In addition, it deals with some of the steps taken in transforming data for the regression analysis. Section four discusses regression outputs and identifies some important policy implications. The final section makes some concluding remarks.

2. Literature Review

A number of theoretical models have attempted at explaining what determine investment in education (Becker, 1975; Mincer, 1974; Schultz, 1961). Under the human capital theory, education is primarily identified as an economic device similar to any other production factor. Hence, according to human capital theory, amount of investment is primarily determined by the rate of returns to education. According to Mincer (1974), decision to invest in human capital is similar to any other types of physical investment decisions because it can generate growth and personal well-being. As with any other investment decision, opportunity cost of engaging in studies (both forgone time, tuition and other expenses) is accepted in order to generate relatively a bigger monetary and non-monetary returns in the future. In narrower version of the human capital model, knowledge and skills are valued instrumentally, insofar as they contribute to increase productivity and hence, other things being equal, to higher earnings. However, the human capital model may be interpreted more broadly, to encompass learning that does not contribute to higher market earnings. A knowledge of, and capacity to appreciate, literature, for example, provides a future consumption stream not reflected in market earnings.

At the individual level, private return to education determines whether an additional year of schooling is a rational choice. A rational individual decides to school an additional year if the incremental income gain is bigger than that of the opportunity cost born by the individual for the additional year.

Literature on returns to education has exploded since Mincer's seminal work in 1974 (Mincer, 1974).Private returns to education have mostly been estimated based on the Mincer regression framework where log earnings is a linear function of years of schooling and years of work experience (Psacharapolous 1981; Psacharapolous and Patrinos, 2004; 2007; Heckman et. al. 2008). In subsequent studies, the Mincerian framework has been employed to estimate returns to education while controlling for additional labour market characteristics (Kuglerand and Psacharopoulos, 1985; Card and Krueger, 1992). Similarly, some studies have addressed the problem of edogeneity and corrected it using family background related information through instrumental variable regression approach (Card 1993; Cameron and Taber 2004; Cameron and Heckman 1998; Cameron and Taber 2004; Devereux and Fan 2011).Moreover, recent studies have addressed the issue of selection bias arising from individuals' decisions on labour force participation and have extended to calculate returns to education at different places in the wage distribution (Bagheri and Kara, 2005; Li et al., 2011).

Psacharopoulos and Patrions, (2004) reviewed empirical studies prior to 2000 and highlighted few stylized fact relating to returns to education. First, private returns to education are higher than that of social returns, partly due to public funding and inability to capture entire social benefits of education. Second, returns to schooling are higher in developing countries than in developed countries. Third, social returns to primary education arehigher than that of secondary and higher level of education rationalizing more public funds to guarantee primary education opportunities for all. Fourth, average rate of private returns to another year of schooling is around 10 per cent. A few studies attempted at estimating returns to education in Nepal (Akanda, 2010; Lamichhane and Sawada, 2013, NGD, 2014). Akanda, (2010), using Nepal Living Survey 1995/96, found returns to an additional year of schooling are around 6 per cent while the NGD (2014) report, prepared by the Government of Nepal in collaboration with the USA government, found that returns to an additional year of schooling are somewhere around 13 per cent.

[4] As far as the authors know, the only exception is Lamichhane and Sawada (2013). However, they estimated returns to education only for the disabled wage workers in the labor market of Nepal.

Both studies confined to traditional Ordinary Least Square estimates in calculating private returns to education. Lamichhane and Sawada (2013) estimated, for Nepal Living Standard Survey 2003/2004, returns to schooling for disabled workers. Addressing both the issues of endogeneity and sample selection bias, the authors found that returns to education for people with disabilities ranging from 19.4 to 33.2 per cent.

Existing studies on returns to education in Nepal largely confined to estimate returns to schooling at the mean of the wage distribution. In this study, it is expected that returns to education at different places of the wage distribution is estimated to examine to what extent, returns to schooling differ for a given education level but laying at different earning profiles. Similarly, earning function is estimated while correcting for the sample selection bias using a framework developed in recent years.

3. Econometric Strategy and Data

Econometric Specification

We estimate a variant of Mincerian equation to estimate returns to schooling while controlling for selected labour market characteristics.

$$Y_i = \delta + \mathrm{X_i}\beta + \epsilon_\mathrm{i}, \qquad \mathrm{i} = 1,2,\dots,\mathrm{n} \tag{1}$$

In eq. (1), Y is, log hourly wage, our dependent variable andX matrix consists of variables constructed on the basis of highest educational level completed namely; no schooling, primary, lower secondary, upper secondary, degree, postgraduate. Also X consists of other human capital variables (experience, experience square and vocational training), and some demographic variables (male and caste). Moreover, $\epsilon_\mathrm{i}$is error term and i stands for i[th] wage employee.

It is a well-known fact that nationally-representative samples are not selected on randombasis; rather, they are designed using stratified sampling techniques to reflect population characteristics. Hence, it is important to address the selection bias issue when estimating a behavioral relationship. Following discussion provides a brief note on the selection bias correcting approach adopted in this study. Essence of this illustration is based on Bourguignon et al.(2007, pp. 175-79).

Consider a situation in which an individual makes a choice whether to participate in the labor market where each participant may select among *j* mutually exclusive alternatives. These alternatives could be (i) economically inactive, (ii) employed, and (iii) unemployed[5]. Let Y_j^* to be the utility attainable for an individual if he/she chooses alternative j. We can write the indirect utility function as:

$$Y_j^* = Z\gamma_\mathrm{j} + \epsilon_\mathrm{j}, \qquad \mathrm{j} = 1,2,\dots,\mathrm{J}, \tag{2}$$

where the matrix$Z$ represents a set of explanatory variables affecting employment alternatives, and ϵ_j is the error term. A rational individual compares the utility attainable from each alternative and selects the alternative s that gives him the highest benefits, that is:

$$Y_s^* > \max_{\mathrm{j}\neq\mathrm{s}}\left(\mathrm{Y_j^*}\right), \qquad \mathrm{s} \in (1,2,\dots,\mathrm{J}) \tag{3}$$

Assume the market wage in the s^{th} alternative is given by:

$$ln\mathrm{w_s} = X_s\beta_\mathrm{s} + \mathrm{u_s}, \tag{4}$$

whereX_s is a matrix of exogenous variables that determine the log wage (lnw_s), and the disturbance is a i.i.d. random variable with zero mean [E($u_s|X,Z$)=0] and a constant variance [V($u_s|X,Z$)=σ_s^2]. If there are unobserved characteristics that affect both individuals' choices and their earnings, it could be proved that the disturbance ϵ_j in eq. (1) and disturbance u_s in eq. (4) are correlated (Bourguignon et al., 2007).

As Hecman (1979) pointed out, the potential inconsistency requires a correction for selection bias when estimating a behavioral relationship such as eq. (1)[6]. Among them, Dubin and MaFadden (1984) (henceforth

[5] In this chapter, informal sector consists of self-employed and unpaid family workers. This is rather a narrow definition.

[6] There are a number of approaches in the literatures for correcting the selection bias problem (Dahl, 2002; Dubin and MaFedden, 1984; Lee, 1983).

DMF) approach is popular as well as relatively superior to the other methods (Bourguignon *et al.*, 2007). The DMF approach makes no assumption about the direction of the correlation and use multiple correction term to control for the self-selection in the s^{th} alternative as related to each other alternative. Hence the correlation between u_s and $(\epsilon_j - \epsilon_s)$ could be of different signs for different j. Similarly, the DMF approach identifies not only the direction of the selection bias, but also where the bias stems from, by linking the selection bias to the allocation of individuals to each alternative. Due to these reasons, this study employs the DMF approach for selection bias correction. According to DMF method, consistent estimates that are free from sample selection could be derived by estimation eq. (5).

$$lnw_s = X_s\beta_s + \sigma_s \frac{\sqrt{6}}{\pi} \sum_{j \neq s} r_j \left[\frac{p_j \ln(p_j)}{1 - p_j} + \ln(p_s) \right] + e_s \qquad (5)$$

where r_j is the correlation coefficient between disturbance u_s and ϵ_j, and e_s is a residual whose asymptotic mean is zero. Eq. (5) can be estimated in two steps. In the first-step, the polychotomous choice mode is estimated by the logit maximum likelihood method (eq. (2)). Let $\hat{p}_{j,}$ be the predicted probabilities for p_j, j=1,…,J. In the second step, we substitute $\hat{p}_{j,}$, j=1,…,J (the selectivity correction term) into eq. (5) and we then estimate the function by OLS. Since, this involve two-step procedure, the estimated standard errors may not be efficient. To correct it one can use the weighted estimation and bootstrap procedures to obtain robust standard errors. We estimate the eq. (1) in the form of eq. (5) and use the bootstrap method for obtaining the robust standard errors.

In addition, quantile regression approach is employed in exploring the heterogeneous nature of returns to education across wage distribution. Quantile regression approach is a direct extension of the standard OLS procedure; hence, its methodology is not discussed in this paper[7].

Data and Data Transformation

We use data from the Nepal Labour Force Survey 2008 (LFS-2008) conducted by the Central *Bureau of Statistics* of Nepal. The LFS-2008 consists of 76,208 observations. We restrict our sample to non-agricultural wage employees because many agricultural wage employees in developing countries receive payments both in cash and kinds (Deshingker and Farrington, 2006)[8]. Following literature, sample is further restricted to wage employees who are in the age group of 15-65 and whose usual hours of work per week in the main occupation is at least 20, but not more than 70 per week (Gunawardana, 2005).The hourly wage rate is calculated by dividing the monthly wage by usual hours of work per week into average number of weeks per month[9]. Key explanatory variables in the Mincerian wage equation are the schooling and experience. We calculate number of years of schooling as well as six dummies representing the highest educational level completed by a given employee. These groups include; (a) no schooling, (b) primary, (c) lower secondary (d) upper secondary, (e) degree, and (f) postgraduate. Following literature, potential work experience of an employee is calculated by subtracting years of schooling pulse six years from his/her age (Card, 1999). Moreover, few dummy variables are created for caste (5 dummies), gender, and vocational training receipt. Finally, following Daly and Valletta (2005), using log hourly wages, the sample was trimmed, 1 per cent from both bottom and top of the wage distribution, to remove outliers.

4. Estimation and Discussion

Table 1 reports some sample characteristics. Our final sample consists of information relating 5,914 wage employees working in the non-agriculture sector in 2008. Nearly 62 per cent of total paid employees are below 35 years indicating Nepal still inherits relatively a young workforce. Similarly, just over 50 per cent of total employees belong to Chhetri, Brahaman (Hill), and Newari while around 2 per cent of the total belongs to the lowest caste called Kami. In terms of gender, male accounts for around 75 per cent and 80 per cent of employees are married.

According to Table 1, nearly 16 per cent of the total paid employees have at least a degree while around 19 per cent of the total is without formal education. Also nearly 20 per cent of the total paid employees in the non-agricultural sector have undergone some formal vocational training[10].

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[7] Interested readers could refer to Koenker and Hallock (2001) for a theoretical discussion while Buchinsky (1994) for a proper empirical guide.

[8] Valuing kinds received by farmers is quite difficult given limited information on marketable values on agricultural products.

[9] The literature assumes 4.2 weeks per months (Daouli, et al., 2013). Daily wages are multiplied by the no of days work for calculating monthly wages for daily wage earners.

[10] In terms of industry-wise distribution, nearly 32 per cent of the total employ in Public Administration, Education & health sub-sector followed by nearly 20 per cent in the Manufacturing sector. Financial sector employs nearly 3 per cent of the total paid employees. Nearly 27 per cent of the paid employees belong into the occupational category of Craftsmen followed by 18

Table 1:**Sample Characteristics**

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Log hourly wage	5613	3.19	0.73	0.83	5.12
Years of schooling	5914	8.04	5.36	0.00	18.00
Potential experience	5914	19.67	12.58	0.00	59.00
Age	5914	33.63	11.12	15.00	65.00
Gender (Male=1)	5914	0.76	0.43	0.00	1.00
Caste					
Chchtri	5914	0.14	0.34	0.00	1.00
Brahman Hill	5914	0.18	0.39	0.00	1.00
Newar	5914	0.17	0.38	0.00	1.00
Kami	5914	0.02	0.14	0.00	1.00
Other	5914	0.49	0.50	0.00	1.00
Ethnicity (Nepalese = 1)	5914	0.98	0.14	0.00	1.00
Marital Status (Single = 1)	5914	0.21	0.41	0.00	1.00
Education Level					
No Schooling	5914	0.19	0.39	0.00	1.00
Primary	5914	0.17	0.37	0.00	1.00
Lower Secondary	5914	0.22	0.41	0.00	1.00
Upper Secondary	5914	0.27	0.44	0.00	1.00
Degree	5914	0.11	0.31	0.00	1.00
Postgraduate	5914	0.05	0.23	0.00	1.00
Vocational Training Received	5914	0.20	0.40	0.00	1.00

Source: Authors' calculation based on LFS-2008

Mincer (1974) specified a log-linear function in estimating returns to education where log wage is a linear function of no of years of schooling and potential experience and its square. This basic formulation has been extended and modified in a number of ways by addressing important concerns in subsequent years (Heckman, et al., 2003). Among them, non-linearity between wage and years of schooling has been incorporated into Mincerian function by two main ways, (a) either by introducing polynomial of schooling or (b) by introducing dummies representing different educational levels (Kharbanda, 2012). In this study, we stick to second method, where we employ five educational dummies to estimate rate of returns at different level of education.

Table 2: **Returns to Schooling in Nepal**

Dependent variable: log of hourly wages		
	Model 1A	**Model 1B**
Constant	1.782***	0.658
	(0.056)	(0.523)
Education (years of schooling)	0.082***	0.070***
	(0.002)	(0.008)
Potential experience	0.040***	0.057***
	(0.002)	(0.012)
Potential experience square	-0.0004***	-0.0005***
	(0.00004)	(0.0001)
Vocational Training (=1 if received)	0.070**	0.064**
	(0.020)	(0.022)
Gender (=1 if male)	0.231***	0.534**

per cent of Elementary workers. The shares of Managers and Professionals are 2 per cent and 13 per cent respectively in the sample. It is important to note that nearly two-third of total paid employees is informal workers. In many developing countries, informal workforce account for a significant share of the workforce[10]. For instance, the share of informal workforce in Sri Lanka is around 62 per cent (DCS, 2012).

	(0.020)	(0.170)
Caste effect	Yes	Yes
R square	0.367	-
No of Observations	5613	5613
Selection bias correction terms (Multinomial logit model)		
Employed		0.242
		(0.176)
Unemployed		-4.844**
		(1.927)
Inactive		0.272
		(0.190)

Note: ** and *** denote that the estimated coefficient is statistically significant at 5% and 1% respectively. Each model was corrected for heterokedasiticity and standard errors reported in parentheses are heteroskedasticity-*robust standard errors.*

Table 2 reportsthe estimated coefficients where our education variable is number of years of schooling. Model (1) in Table 2 reports estimated coefficients, using OLS procedure, before correcting for sample selection bias. Accordingly, average rate of returns to an additional year of schooling in Nepal is around 8 per cent. However, as literature has immensely shown, this estimate could be under- or over-estimated if our sample is drawn non-randomly (Heckman, et al., 2003). Nationally representative samples, such as Labour Force Survey, are not drawn on random basis; rather, stratified sampling techniques are used to guarantee that the sample properly represents the population features. Hence, it is imperative to correct for the sample selection bias in order to avoid any over- or under-estimation with respect to estimated coefficients[11]. As outlined in the methodology section, we employed multinomial logistic framework in addressing the issue of sample selection bias and second-stage regression results along with Mill ratios attached to first-stage regression are reported under model (1B) in Table 2.

According to model 1A, the estimated coefficient of schooling is 0.08 where as in model 1B, same is 0.070. More importantly, the estimated coefficient of schooling is statistically significant in both models. The difference in magnitude suggests that the OLS has over-estimated the schooling coefficient due to sample selection bias. The estimated coefficient of schooling in model B suggests that average private returns to an additional year of schooling in Nepal are around 7 per cent. There at least two previous studies that estimated returns to education in Nepal. Akalanda (2010) estimated rate of returns to education as 6 per cent while NGD (2014) estimated it as 13 per cent. Both these studies used data from the Living Standard Survey of Nepal. Yet, Akalanda (2010) estimated based on 1995/96 LSS of Nepal while NGD (2014) utilized 2010/11 LSS of Nepal.As a result, the difference between the two estimates could be attributed to two different time period to which estimates refer. The existing differences between previous estimates and our estimate could be attributed to different data sources and time periods.

International comparison shows that the estimated average rate of returns fall in line with the estimates of the countries with similar level of income. For instance, after reviewing a number of studies published on returns to education, Psacharopoulos and Patrinos (2004) summarize that average private returns to education for low income countries are around 10.9 per cent whereas this average for Asian countries are somewhere around 9.9 per cent. Recent studies in some South Asian countries suggest that the private returns to an additional year of schooling range from 5 to 9 per cent (Kharbanda, 2012; Agrawal, 2011). Using Household Income & Expenditure Survey of 1999-2000, Asadullah (2005) found that the average private returns to an additional year of schooling in Bangladesh are around 7 per cent. A number of studies have estimated returns to education in recent years in India and, according to those estimates, the private returns to an additional year of schooling are somewhere around 7 to 9 per cent.

Forinstance, using employment and unemployment survey of 2004-05, Kharbanda(2012) found that private returns to an additional year of schooling are 9 per cent. Similarly, Agrawal (2011), for the data ofIndia Human Development Survey of 2005, found that the private returns are around 8 per cent. Himaz and Aturupane (2012), using Labour Force Survey data for the period of 1997-2008 and applying a pseudo-panel approach, found an additional year of schooling would increase monthly earning by around 5 per cent for males in Sri Lanka. Hence, it could be concluded that our findings are largely consistent with these global and regional estimates.

[11]The bias exists due to a flaw in the sample selection process, where a subset of the data is systematically excluded due to a particular attribute. The exclusion of the subset can produce distorted results.

In subsequent literature, some authors have constructed the standard Mincerian wage function as a quadratic function of schooling to capture the non-linearity with respect to log earnings and schooling found in the empirical literature (Card, 1999). This non-linearity relationship could also be captured by introducing dummy variables constructed based on the highest educational level completed (Kharbanda, 2012). Adding to that, Mincer (1997) suggests that log earnings may be a convex or a concave function of schooling. Empirical work done by Deschenes (2001) suggests a rise in convexity between the log of earnings and schooling in 1980's and 1990's compared to 1970's.

Table 3:**Determinants of Wages in Nepal**

Dependent variable: log of hourly wages		
	Model 2A	**Model 2B**
Constant	1.905***	0.445
	0.057	3.011
Primary	0.192***	0.110**
	0.028	0.041
Lower secondary	0.399***	0.192**
	0.029	0.073
Upper secondary	0.823***	0.514***
	0.028	0.106
Degree	1.197***	0.750***
	0.034	0.151
Postgraduate	1.487***	0.959***
	0.04	0.184
Potential experience	0.04	0.066**
	0.002	0.022
Potential experience square	-0.0005***	-0.0007***
	0.00004	0.00007
Vocational Training (=1 if received)	0.061	0.057***
	0.019	0.018
Gender (=1 if male)	0.256***	0.503**
	0.02	0.232
Caste	Yes	Yes
R Square	0.392	-
No of observations	5613	5613
Selection bias correction terms (Multinomial logit model)		
Employed		0.136
		0.427
Unemployed		-9.552**
		2.34
Inactive		0.796
		3.299

Note: ** and *** denote that the estimated coefficient is statistically significant at 5% and 1% respectively.Each model was corrected for heterokedasiticity issues and standard errors reported in parentheses are heteroskedasticity-*robust standard errors.*

Moreover, a number of studies have found that there is 'sheepskin' effect in the job market implying that wages rises faster with extra years of education when the extra year also conveys a certificate[12].Some previous studies on rate of returns to education have overcome this issue of non-linearity by incorporating some polynomial terms for schooling while the others have introduced dummy variables representing different education level to wage function (Kharbanda, 2012).

[12] This is one of the hypotheses constructed on the basis of screening theories of education. Accordingly, a certificate received after completing a certain level of schooling make a bigger impact on wages. As a result, rate of returns to an additional year of schooling are significantly higher for a 'certificate year' – year in which certificated is received - than that of for a 'normal schooling year'.

In this study, we introduce five dummy variables to capture highest education level completed by an employee. The estimated results are reported in Table 2 where model 2A refers to OLS estimates without correcting for the sample selection bias and the estimated coefficients of model 2B are corrected for the above issue. In both models, the estimated coefficients of dummy variables representing different education levels are statistically significant at conventional level of significance.

Similarly, it could be noted that the relative size of the estimates tend to increase over higher education levels. For instance, according to model 2B, hourly wage rate of an employee completed just primary education is 11 per cent higher than that of an identical employee not schooled at all. In the labour market of Nepal, an hourly wage rate of a professional degree holder is 96 per cent higher over an identical wage employee with zero formal education. It is also clear that earning differentials are quite significant across different educational levels.

According to literature, the rate of returns to each education level could be calculated using the estimated coefficients of dummy variables representing different educational levels (Card, 1999). Table4 reports rate of returns to education calculated based on Table 2 and the information related to number of years of required schooling to complete each education level[13].

Table 4:**Returns to Education**

Education level	***Model 2A'***	***Model 2B'***
Primary	4%	2%
Lower secondary	3%	2%
Upper secondary	24%	16%
Degree	12%	8%
Postgraduate	12%	8%

Note: Returns to education for a particular education level is calculated as follows. $\tau_i = \left[\left(\hat{b}_i - \hat{b}_j\right)/\Delta Y\right] * 100$. where is the rate of return andIt's the particular education level for which the rate of return is calculated (i> j is also assumed). In the above equation, $\hat{b}_i \; and \; \hat{b}_j$ refer to the estimated coefficients attached to educational level i and j respectively and ΔY is the distance, in years, between the two education level. Rate of returns to primary education is calculated just by dividing the estimated coefficient for primary education by the no of years required to complete it.

According to our estimates, private rate of returns to education remain relatively low for primary and secondary education (see Table 4). Nevertheless, returns to upper secondary education reach 16 per cent indicating an additional year spent for completing upper secondary education is highly rewarded in the labour market.

In contrast, returns to an additional year spent for graduate and postgraduate level education remain relatively lower than that of the higher secondary. We presume that this may partly be dueexisting labour demand conditions in the economy. One possible explanation may be that the lower returns to an additional year of undergraduate and postgraduate studies are due to lower demand for such set of skills.

Given the structure of the economy of Nepal, it could be expected that demand for 'advanced' skills produced by undergraduate and postgraduate studies remain relatively less attractive compared to 'intermediate-level' skills inherit in upper secondary education[14]. At least partly reflecting this low returns to undergraduate and postgraduate studies, Nepal has in recent years witnessed a significant level of brain-drain[15].

[13] According to Nepalese education system, no of years of schooling required to complete primary education is 5 years – from Grade 1 to Grade 5, while 5 years are required to complete lower secondary education – from Grade 6 to Grade 10. Students could complete upper secondary by schooling 2 more years – completing Grade 11 to Grade 12. In Nepal, a Bachelor degree takes 3-4 years while Master/MPhil/PhD degrees need 2-4 years.

[14] In 2012-13, agriculture accounted for 35 percent of value-added in the GDP and Industrial value-added remained around 15 per cent (manufacturing activities accounted for 6 per cent of GDP). According to Living Standard Survey of Nepal 2012-13, nearly 66.5 per cent of total employed people engage in the agriculture sector.

[15] According to CBS (2014), in the 2001 census, 762,181 persons were reported to be absent. The figure went up to 1,921,494, more than doubled in 2011.

Table 5: **Returns to Education by Sub-Sample**

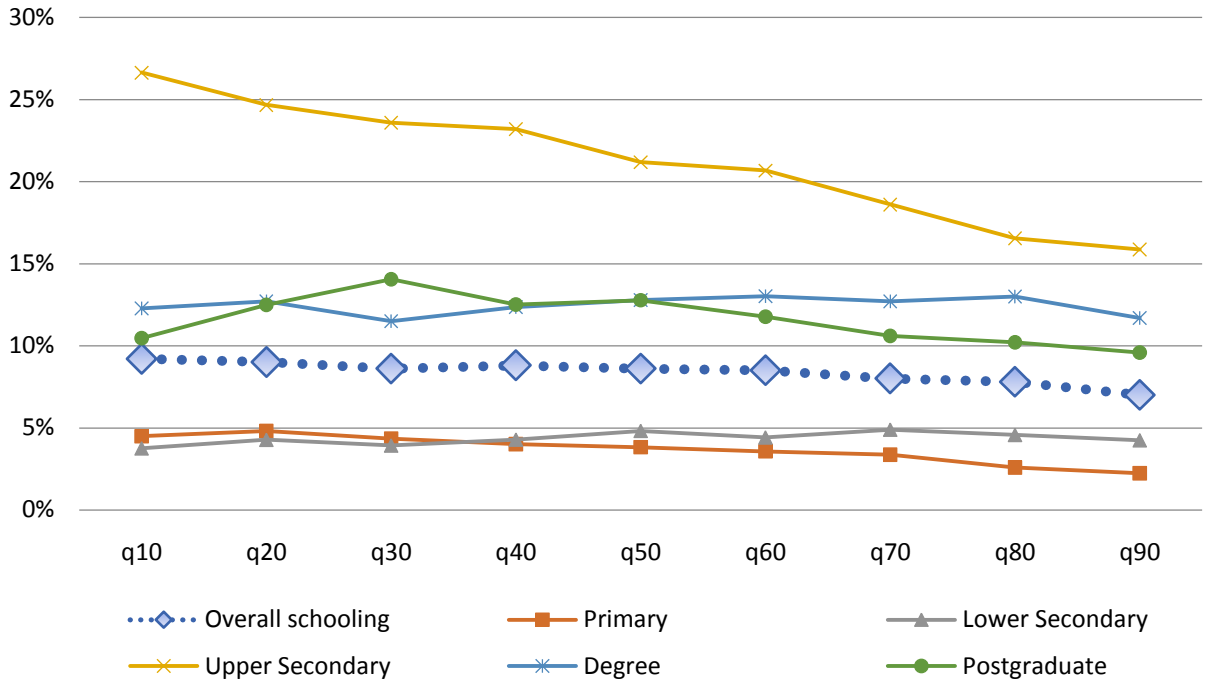
	Employment Sector		***Employment Status***		***Gender***	
	Public	*Private*	*Formal*	*Informal*	*Male*	*Female*
Schooling	0.075***	0.075***	0.077***	0.061***	0.077***	0.103***
	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)
By education level						
Primary	1%	3%	1%	3%	3%	4%
Lower Secondary	1%	4%	4%	2%	4%	7%
Upper Secondary	18%	19%	17%	18%	20%	24%
Degree	13%	13%	12%	10%	13%	13%
Postgraduate	7%	14%	8%	15%	11%	14%

Note: See the information given below Table 4 for rate of returns calculation for education level.

Estimates on rate of returns to education along the line of gender, employment (private vs. public) and employment status (formal vs. informal) are reported in Table 5. Interesting, size of the estimated coefficients remain almost the same for both public and private employees. Nevertheless, rate of returns calculated for education levels reveal that, for certain categories, the returns are higher for private sector employees compared to that of public sector employees. This is especially true with respect to returns to education for postgraduate studies. One possibility for this scenario is that private sector firms pay relatively higher for attracting and keeping postgraduate qualified employees who otherwise migrate. Similarly, it is also possible that monthly wage of a senior officer in the public sector is a fraction of the entire remuneration package received.

Generally, in most developing countries including Nepal, public sector workers are entitled to many other non-monetary privileges. Pascharopoulos and Patrino (1994) found that the global averages on returns to education are higher for employees working in the private sector than that of the public sector. The estimated coefficient of schooling indicates that returns to education are higher for formal wage employees compared to that of informal employees. Park and Qu (2012), for the case of urban China, found that returns to education for an employee in the informal sector are about 4 per cent lesser than that of the employee in the formal sector. Similarly, Herrera-Idárraga *et al.* (2013) found that returns to education of informal employment are half of that of the formal employment in Colombia. Nevertheless, the returns are significantly higher for postgraduate qualified informal employees compared to an identical employees working in the formal sector. One possibility for this is that, as the literature has found, highly qualified employees could be attracted to informal employment only by paying relatively higher wage rate than paid at the formal sector. The main reason for this is the risk associated with informal labour market arrangements. Interestingly, returns to education for females are higher than that of for male. For instance, an additional year of schooling increases the hourly wage rate by 8 per cent for males while female's hourly wage rate is increased by 10 per cent. Similarly, our estimates for education levels suggest that returns to each education level are for females than that of the male. A number of factors could explain possible reason for this behavior. First, it is possible to assume that women decide to stay in the labour market are highly productive, hence, earning more. It could be argued that chances are high that working women decide to stay at home, especially in a country like Nepal, if they are poorly paid. Hence, those who remain are the ones who are highly productive and well paid in the labour market. In that event, it is natural to expect that returns to education for females are relatively higher than that of males. Our findings are broadly consistent with that of the Pascharopoulos and Patrino (2004). Updating global patterns on returns to education, Pascharopoulos and Patrino (2004) found that, other than for the case of primary education, returns to education for female remain higher than that of males.

Figure 1: **Quantile Returns to Education (for an additional year)**



Source: Constructed based on authors' estimation.

We extend our returns to education calculation beyond Ordinary Least Square mean estimate by performing quantile regression at each decile at log hourly wage distribution. The estimated results for overall schooling variable and each education level are graphed in Figure 1. One of the reasons for this extension, as often cited in the literature, is to explore whether returns to education vary across the wage distribution (Staneva et al., 2010; Machado, and Mata, 2001). According to our estimates, returns to overall schooling as well as for education levels decline when moving to upper deciles of the log hourly wage distribution. A number of previous studies have found similar results (Staneva et al., 2010; Harmon, et al., 2010; and Fasih et al., 2012). For instance, Staneva, et al., (2010) found that returns to schooling decline reaching upper deciles in Russia.

Similarly, Harmon at al., (2010) found that, for the case of Greece and Germany, average returns to education for employees at the 90thdecile are relatively lower than that of for the 10thdecile of the wage distribution[16]. Interestingly, Fasih et al. (2012) found countries belonging to different continents or sub-continents show some peculiar patterns with respect to returns to education along the wage distribution. For instance, their study found that returns to education increase across the wage distribution for many Latin American and African countries whereas the returns decline across the wage distribution for many Asian countries[17]. In that sense, our findings consistent with what observed in other Asian countries. However, it is imperative to undertake further research in order to determine what cause for this decline.

5. Conclusion

Education plays a key role in economic development by being an input to as well as output of development. On that basis, it has become a social ladder for millions of people living both in developed and developing countries. Especially for poor people, education is the only hope for social mobility in developing countries. One of the key determinants of investment in education is its rate of returns. Yet, this key piece of information is missing in many developing countries.

[16] For Greece, returns to education for 10th and 90thdeciles were 6.5 and 5.4 per cent respectively in 1974. For the same country, yet for the year of 1994, these two figures were 7.5 and 5.6 per cent respectively. According to Harmon et al., (200), similar patterns could be witnessed with respect to Germany.

[17] According to Fasih et al. (2012), quantile schooling returns decline for countries such as China, Mongolia, Indonesia, Philippines, Thailand, Vietnam, and Pakistan.

This study made an attempt to fill this gap in the context of Nepal, a low income country with poor educational attainments. We, using Labour Force Survey of Nepal (2008) and correcting for sample selection bias, estimated returns to education for overall schooling as well as for different levels of education. In addition, we also explored heterogeneity of returns to education in the labour market.

Our estimates suggest that private returns to education are around 7 per cent for an additional year of schooling in Nepal and returns are higher for upper-secondary education level compared to the other levels of education. Lower returns for undergraduate and postgraduate levels of education not only discourage student pursuing higher studies but also may have become a push factor for outmigration. Interestingly, returns to education for females remain higher than that of for the men. This piece of information suggests that parents allocate more resources for females' education. Our findings are consistent with previous studies on returns to education in Nepal as well as in other developing countries.

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