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The Changing Rates of Return to Education in India: Evidence from NSS Data

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THE CHANGING RATES OF RETURN TO EDUCATION IN INDIA: EVIDENCE FROM NSS DATA

Smrutirekha Singhari[1] and S Madheswaran[2]

Abstract

This paper estimates rates of return to education in India by gender, caste, religion and age cohorts using data for the period 1983 to 2011-12. We estimate standard Mincerian wage equations separately for regular and casual workers. To account for the possibility of sample selection bias in Multinomial logit, Lee Procedure is used. The findings of the study show that the overall rates of return to education for regular workers are the highest for diploma, followed by graduation and above degree, secondary education; the returns to higher secondary, graduation and above degree are rising, but primary education is falling over the years; rates of return to education are increasing across the age cohorts. For casual workers, overall returns to primary and middle education are positive; while returns to secondary and higher secondary education are negative. Using quantile regression method, we found that the effect of education is not the same across the wage distribution. Returns differ considerably within education groups across different quantiles of the wage distribution. For regular workers, overall returns to secondary education is rising across the quantiles; while returns to higher secondary, diploma, graduation and above degree follow an inverted U-shape pattern. For casual workers, overall returns to primary and middle education are rising across the quantiles.

Keywords: Returns to Education; Quantile Regression; India

JEL Classification: C13, I20, I21, J24, J31

1. Introduction

The positive correlation between education and earnings has been well documented all over the world (Psacharopoulos & Patrinos 2004). The development of human capital theory in the 1960s provides a theoretically powerful and viable framework to consider the personal characteristics of individuals as the determinants of their earnings and income distributions. The rate of return to schooling plays an important role in the determination of educational attainment and participation and ultimately on earnings received by workers in the labour market (Harmon & Walker 1995).

There is an extensive empirical literature on estimates of the rate of return to investment in education, covering both developed and developing countries. Most studies estimate the average (or mean) return to education, which may be interpreted as the return to additional schooling for an individual. Detailed observations on the pattern of returns across countries have been highlighted in the literature (see, for example, Psacharopoulos & Patrinos 2004). In particular, past average return to education estimates suggest that returns are higher in developing countries compared with the developed ones, with developing countries exhibiting higher returns to primary education, while returns to tertiary education are higher in developed countries. Worldwide average returns to schooling, as compiled from hundreds of studies, is about 10 percent (*Ibid.*), with considerable variation between

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developed and developing countries (higher in developing countries, at about 11 percent compared with about 7.5 percent for OECD countries).

Most of the studies reviewed by Psacharopoulos and Patrinos (2004) assumed that the schooling related earnings increment is constant across the wage distribution. The issue of dispersion of the returns to education is gaining momentum soon after the work of Card (1999) and Buchinsky (1994) who examine these phenomena, both theoretically and empirically. In particular, Card (1994) asked, 'Is the labour force reasonably well described by a constant return to education for all workers?'

In order to answer this question, recently an increasing number of studies investigate the pattern of returns to an additional year of education along the earnings distribution using quantile regression analysis. Estimation of returns to education using Ordinary Least Squares (OLS) disregards variation in the returns for workers in the same education group. On the other hand, quantile regression analysis, by allowing the return to vary within education groups can be used to measure inequality within groups, since quantile returns represent wage differential between individuals in the same education group but at different earnings quantiles.

This is the only national study which tries to estimate inequality in rates of return to education at different quantiles of wage distribution separately for gender, caste and religious groups. The empirical analysis has been done separately for regular and casual workers, because the characteristics of both types of workers significantly differ from each other. We also attempt to evaluate the changes in returns over a period of time from 1983 to 2011-12.

This paper is structured as follows. Section 2 summarizes the review of literature. Section 3 describes estimation issues. The sources of data and methodology are given in Sections 4 and 5. Section 6 provides empirical results; conclusion and policy implications are discussed in Section 7.

2. Brief Review of Literature

Psacharopoulos (1994) has done a comprehensive review of returns to education in developing and developed countries, which shows that the Private and social rate of return to education decline by the level of schooling; rates of return to education (RORE) are the highest for primary education, followed by secondary education. This conventional pattern is questioned by several studies, especially Bennell (1996a) for Sub-Saharan African countries; Siphambe (2000) for Botswana; Glewwe (1991) for Ghana; Sahn and Alderman (1988) for Malaysia; Moll (1996) for South Africa; Gindling *et al*. (1995) for Taiwan; and Hawley (2004) for Thailand.

If we look at the brief review of the estimates on RORE in India, volume of research evidence has been generated in the estimates on rates of return to education. National level estimates of private RORE made for urban India in 1960 by Nalla Gounden (1967) and Blaug, Layard, and Woodhall (1969) convincingly show that investing in education is profitable in India. Since then attempts have been made to estimate the returns to education primarily using small sample surveys for India. Notable among them are Husain (1967), Gounden (1967), Blaug (1972), Tilak (1987) and Kingdon (1999). It is commonly believed that labour market returns to education are the highest for the primary level of education and lower for subsequent levels. Conversely, Kingdon (1999) finds in her review of other empirical work on the returns to education that RORE tend to rise with education level. Duraisamy

(2002) found that RORE is the highest for secondary education; while recently Dutta (2006) and Agrawal (2011) found that RORE is the highest for graduate schooling. The changing pattern of returns to education given in Table 1 suggests that there is an incentive to acquire higher levels of education as returns to education is monotonically increasing with levels and it is more for higher education. There is considerable inequality in returns to education between male and female, lower caste and upper caste workers in India (see Duraisamy 2002; Madheswaran and Attewell 2007).

Some studies tried to estimate inequality in returns to education across quantiles of wage distribution in India. By using quantile regression method, P Duraisamy and M Duraisamy (2005) found that in 1993-94, the wage returns to primary, middle and secondary levels increase at the higher quantiles except for the top quantile (0.9) where it declines; whereas the returns to higher secondary, and technical diploma decline at the higher quantiles (beyond 0.25). It implies that omitted ability factor and education are complements at the primary, middle and secondary levels while for higher secondary and technical diploma, ability and education act as a substitute.

Unni and Sarkar (2013) made an attempt to estimate returns to education separately for formal and informal workers in India, particularly, labour market of Delhi and Ranchi, for the period 2009-10. They found that the returns increase with the level of education and that they are almost double in the formal sector. The results of quantile regression analysis show that the returns to education are significantly different across the wage distribution in the informal sector, but not in the formal sector. The returns to graduation degree remain almost constant throughout the wage distribution in the formal sector, but it varies in informal sector with return being higher at upper quantiles. This study suggests that the incentive to acquire human capital may decline because of entry barriers to upper segment of informal sector, and lack of access to quality education in India.

Agrawal (2012) is the only study that estimated returns to education for wage workers in India by using India Human Development Survey (2005) data. The study shows that returns to education significantly differ in rural and urban India. By applying quantile regression method, he found that returns to education are positive and rising across the quantiles of the wage distribution.

The contribution of present study is to estimate RORE by gender, age-cohorts, caste and religious groups over a period of time using a nationally representative survey data. There is lack of literature that extensively studied the issue of within group inequality rates of return to education in India. We try to estimate RORE across quantiles of the wage distribution by using quantile regression method.

Table 1: Private Rates of Return to Education by levels for Total Workers in India

(In percentage)

Author (s)	Primary	Middle	Secondary	Graduate
Blaug (1972)	16.5	14.0	10.4	8.7
Psacharopoulos (1973)*	24.7	19.2	-	14.3
Husain (1967)	-	-	4.8	12.0
Tilak (1987) unadjusted estimates	33.4	25.0	19.8	13.2
Tilak (1987) adjusted estimates	7.8	8.5	Negative**	6.8
Recent studies				
Duraisamy (2002) unadjusted estimates	7.9	7.4	17.3	11.7
Duraisamy (2002) adjusted estimates	7.8	7.4	17.7	12.7
Agrawal (2011)	5.5	6.1	12.2	15.9
Rani (2014)	1.3[a]	-	3.7[b]	15.4[c]
Author's calculation (Regular Workers) Standard Mincerian 1983	11.5	4.0	7.1[d]	10.0
Author's calculation 1993-94	8.1	3.6	9.3	7.1
Author's calculation 2004-05	15.1	5.2	12.0	12.6
Author's calculation 2011-12	9.3	5.2	10.2	11.5

Source: Rani (2014)

Notes: Rani (2014) has taken log hourly wage as dependent variable in wage equation.

* As quoted in World Bank Staff Working Paper, 1979, No. 327.

** Tilak (1987) did not report the actual returns.

[a] elementary education i.e. completed years of education between 1 and 8 years.

[b] secondary education i.e. completed years of education between 9 and 12 years.

[c] Higher education i.e. completed years of education with 13 years and above.

[d] Secondary education includes higher secondary education.

Table 1 (Contd...): Private Rates of Return to Education for

Male Workers in India (in percentage): A Survey

Study	Year	Primary	Middle	Secondary	Graduate	Region
Dutta (2006) (regular workers) Augmented Mincerian	1983	3.3	2.4	5.3	9.0	India
	1993-94	2.1	1.7	4.3	9.2	
	1999-00	2.4	2.0	4.6	10.3	
Dutta (2006) (regular workers) Standard Mincerian	1983	8.1	3.4	6.0	10.0	
	1993-94	5.1	3.1	5.4	10.9	
	1999-00	5.6	3.5	6.1	12.3	
Author's calculation (Regular Workers) Standard Mincerian	1983	4.7	2.7	6.6[a]	10.2	
	1993-94	4.1	3.0	9.2	7.9	
	2004-05	5.9	4.6	10.6	12.3	
	2011-12	2.5	3.7	8.9	11.7	
Duraisamy (2002)	1983	6.1	7.1	13.2	12.2	
	1993-94	6.2	6.4	12.6	12.2	
Madheswaran (2011)	1983	7.0	8.1	11.7	15.5	
Madheswaran (2011) based on Duraisamy	1993-94	7.1	7.4	11.4	15.8	

Regions within India						
Banerjee & Knight (1985)	1975-76	2.4	-	6.9	11.4	Delhi (Urban)
Bennell (1995) citing Tilak (1987)	1978	9.9	-	3.2	7.0	Andhra Pradesh (rural)
Kingdon (1998)	1995	2.6[c]	4.9	17.6	18.2[b]	Lucknow (Urban Uttar Pradesh)
Kingdon and Unni (2001)[d]	1987-88	1.4[c]	6.9	14.2	9.6	Madhya Pradesh (Urban)
Unni (1996)[e]	1987-88	3.1	9.7	12.0	13.5	Madhya Pradesh (Urban)
		2.9	9.0	17.0	15.6	Tamil Nadu (Urban)
Kingdon and Unni (2001)	1987-88	1.1[c]	6.4	12.4	17.1	Tamil Nadu (Urban)
Santhapparaj (1997)[f]	1989	-0.9[c]	0.1[c]	0.2[c]	18.5	Madurai (urban Tamil Nadu)

Source: Dutta (2006), Madheswaran (2011)

Notes: for estimating returns to education, Duraisamy (2002), Kingdon (1998) has taken 5 years of primary education. Kingdon (1998) and Dutta (2006) have taken log hourly wage as dependent variable in wage equation. Santhapparaj (1997) has taken log monthly cash earnings as dependent variable in wage equation.

[a] Secondary education includes higher secondary education.

[b] Taken as the average of all returns to post-secondary levels of education.

[c] these rates are insignificantly different from zero.

[d] Kingdon and Unni (2001) do not report the rates of return to these education levels. Those reported in the table have been constructed from the coefficients of the wage equations on the education splines using their mapping of four, four, three, and three years of schooling at each of these levels.

[e] estimation based on 4 years of middle and graduation degree.

[f] Santhapparaj (1997) estimates include migrants and natives engaged in wage and self-employment.

Table 1(Contd...): Rates of Return to Higher Education in India- Earlier Studies: A Survey (Percentage)

Reference	Source	Description	Rate of Return	
			Social	Private
1950-54	Hussain (1967)	I Degree (General)	4.0	12.0
		II Degree (General)	3.0	10.0
		Higher (Professional)	3.0	9.0
1957	Harberger (1965)	Graduates & Post-Graduates	16.9	-
1960-61	Nalla Gounden (1967)	I Degree (General)	7.0	8.1
		Higher (Professional)	9.8	13.5
1960-61	Selowsky (1967)	I Degree (General)	11.6	-
		II Degree (General)	14.7	-

1960-61	Blaug *et al.* (1969)	I Degree (General)	8.9	10.4
		Higher (Professional)	12.5	15.5
		Engineering Diploma over Secondary	16.0-19.0	19.1-24.2
1964-65	Pandit (1972)	I Degree (General)	<5.0	9.2
		II Degree (General)	<5.0	6.7
		Higher (Professional)	<5.0	5.6
1965-66	Kothari (1967)	I Degree	10.0	14.0
		Higher (Professional)	22.0	25.0
1967-68	Goel (1975)	I Degree (General)	4.8	6.4
		II Degree (General)	8.6	11.7
1977-78	Tilak (1987)	Inter-Secondary	12.2	14.0
		I Degree-Intermediate	10.8	13.2
		II Degree-I Degree	10.3	11.5
		Higher (General)-Intermediate	8.5	9.0
		Higher (Professional)-Intermediate	12.5	14.9
1980-81	Debi (1988)	Under Graduate (Gen)-Secondary	14.6	17.9
		Graduate (Gen) – Secondary	20.0	25.8
		Graduate (General)-Under Graduate (General)	20.0	25.0
		Post-Graduate (General)-Graduate (General)	11.7	13.2
		Under Graduate (Prof.)-Sec	26.3	33.0
		Engineering-Secondary	13.0	16.6
		Engineering Graduate–Under Graduate General	10.4	12.8
		Medical-Secondary	13.9	16.7
		Medical Graduate-Under Graduate General	12.2	14.0
		Agriculture-Secondary	13.2	16.7
		Agriculture Graduate-Under Graduate General	10.6	12.9
1981	Madheswaran (1996) (Male Workers)	PhD vs PG	-	14.2
		PG vs UG	-	20.5
		UG vs Diploma	-	4.7

Source: Madheswaran (1996, 2011)

3. Estimating Returns to Education: Some Empirical Issues

The estimation of rates of return to education can be done using two different basic methods, such as (1) the “full” or “elaborate method” and (2) the “earnings function” method.

The elaborate method deals with the detailed age-earnings profile by levels of education. It calculates the discount rate that equates a stream of education benefits to the stream of education costs at a given point in time. The annual stream of benefits is measured by the earnings advantage of an individual with given educational level. In case of private rate of return calculation, the stream of costs consists of the forgone earnings of the individual while in school; and for social rate of return calculation, it is augmented by the true resource cost of schooling. The data on the cost of education is

rarely available, so we resort to earnings function method which includes indirect cost of education (Psacharopoulos 1994).

The estimation of private returns to education using the standard Mincer's semi-logarithmic specification suffers from following estimation issues. The restriction in sample used in analyzing wage functions may lead to sample selection bias. If working women are not a randomly selected sample of total female population then it is a case of 'selectivity bias' problem.

Another issue is with respect to omitted variable bias. The rates of return to education can be overstated due to bias arising from omitted variables, such as innate ability, family background and quality of schooling etc. The estimates of returns to education will be downward bias if schooling variable is measured with error (Heckman & Hotz 1986; Bennell 1996b; Card 1999). Griliches (1977) observation from National Longitudinal Survey data on young men in United States shows that in optimizing models, the 'ability bias' need not be positive. In this case, allowing ability, when schooling is treated symmetrically is subject to error of measurement and ability will be correlated to the disturbance term in earnings function. The problem of endogeneity of schooling can be solved through estimation of schooling coefficient using a simultaneous equation method. We have used levels of education as a proxy of schooling. Kingdon (1998) found that controlling for family background (father's education) significantly lower returns to education of women than that of men in India. Besides, household head with a graduation degree is associated with 40 percent wage advantage compared to an illiterate and below primary household head in India (Agrawal 2012). We have used standard Mincerian earnings function for estimation of RORE, because Psacharopoulos and Patrinos (2004) suggests that inclusion of occupation and other variables in the model captures the stealing part of the effect of education on earnings that comes from occupational mobility. Those who include occupation dummies in the earnings functions are interested in modeling earnings, not necessarily in evaluating rates of return to schooling, because the interpretation of schooling coefficient as Mincerian rate of return creates a problem here.

4. Sources of Data

The present study uses unit level data collected by National Sample Survey Organization (NSSO), India. The employment and unemployment surveys are conducted during 1983 (Jan 1983 to Dec 1983), 1993-94 (July 1993 to June 1994), 2004-05 (July 2004 to June 2005), 2011-12 (July 2011 to June 2012). These quinquennial rounds are referred to as 38th round, 50th round, 61st round and 68th round respectively. For more information on survey and sample design, see NSSO (2014).

The sample of individuals is divided into three mutually exclusive categories using current daily status: (i) non-wage earners (i.e., non-participants in the labour market, the self-employed and the unemployed), (ii) regular wage employment (iii) casual wage employment. The wage distribution is trimmed by 0.1 percent from the top and bottom tails, in order to get rid of outliers and potentially anomalous wages at the extreme ends of the distribution. The daily wage rate of workers is calculated taking into consideration the total wages in cash and kind receivable for the work done in the reference week by the total number of days reported working in wage work in that week. The wage data used in

the study is measured in rupees (Rs.) term. The survey has information on human capital, demographic, and job characteristics of workers.

The nominal daily wages are deflated to 2001 prices by using the official state-level monthly consumer price indices of agricultural labour (base year 1960) for rural wages and consumer price indices of industrial workers (base year 1982) for urban wages (Labour Bureau, various years). The Consumer Price index data is collected for states like Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. Our analysis used sample of wage workers of 15-65 age groups in these 18 major states of India.

5. Methodology of the study

Mincer (1974) showed that the human capital model generates an age-earnings profile of the following form:

$$\ln W_i = \beta_0 + \beta_{j1} S_{ji} + \beta_2 t_i + \beta_3 t_i^2 + u_i , \qquad i = 1.....N$$

Where, $\ln W_i$ is the natural logarithm of real daily wage rate, S_{ji} is the levels of education dummies, t_i is the age of workers, t_i^2 is the age square that captures the concavity of the age-earnings profile; since the data set don't provide information on years of schooling and labour market experience of the individual. We have introduced rural dummy in order to capture the rural-urban variation in wage rates.

The estimation of Mincerian earnings function for a sub-sample of workers leads to familiar sample selection bias problem. Lee (1983) developed the two stage procedure to correct for this source of selection bias in wage estimates. This procedure involves estimating the wage work participation equation and wage equation in a simultaneous equation framework. The multinomial logit model regression is used to estimate polychotomous choice equation in the first stage. The selection bias correction term estimated from this first stage is used as an additional explanatory variable in the second stage, in which the wage equation is estimated. Although the functional form restriction provides a statistical basis for identifying the wage equation, which requires a set of identifying variables that influence employment status but not wage. The exclusion restrictions included in this study are household size, the number of persons aged older than 65 years in the household, three dummy variables for whether the household has one child, two children, three or more children aged zero to four years (the omitted category is not having any children aged zero to four years).

The private rates of return to different levels of education are estimated by comparing the adjacent dummy variable coefficients. The average rate of return to each educational level, r_j, is estimated using following formula:

$$r_j = \frac{(\beta_j - \beta_{j-1})}{(Y_j - Y_{j-1})}$$

Where,

β_j is the coefficient of the earnings function.

$(\beta_j - \beta_{j-1})$ is the difference in coefficients between present and previous level of education.

Y_j is the number of years of schooling at the j^{th} level.

The rate of return to primary education is estimated as follows:

$$r_{prim} = \frac{(\beta_{prim})}{(Y_{prim})}$$

Where, Y_{prim} refers to years of schooling at the primary level.

We have taken 2 years rather than 5 years of schooling at primary level, because children younger than 10 years are neither expected to be in work full-time if not in school nor to earn average industry wage (Psacharopoulos 1987). We assume that the additional years of schooling over the previous year of schooling is 3 for middle education, 2 for secondary, higher secondary, diploma education, and 3 for graduation and above degree in India. For the period 1983, secondary education data include higher secondary education, so we have taken 4 years of secondary education.

5.1. Quantile Regression Method

The quantile regression method was introduced by Koenker and Bassett (1978). The equation of quantile regression in the form of a wage equation can be written as,

$$\ln w_i = x_i'\beta_\theta + u_{\theta i}, \quad Quant_\theta(\ln w_i \mid x_i) = x_i'\beta_\theta, \qquad (1)$$

Where $Quant_\theta(\ln w_i \mid x_i)$ denotes the conditional quantile of $\ln w_i$, i.e. conditional on the regressors vector x_i. It is assumed that $u_{\theta i}$, satisfies the quantile restriction $Quant_\theta(\ln w_i \mid x_i)$. The advantages of quantile regression over OLS are written below:

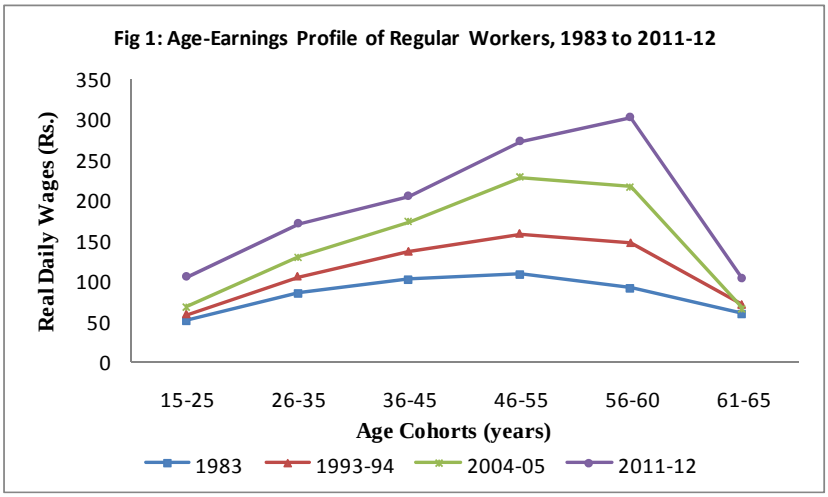
The estimated coefficient vector is not sensitive to outlier in dependent variable, as the objective function of quantile regression is a weighted sum of absolute deviations, which gives a robust measure of location. The quantile regression model helps to characterize the entire conditional wage distribution given a set of regressors. The solutions at distinct quantiles may be interpreted as differences in the response of the wage rate to changes in the regressors at various points in the conditional wage distribution. This paper does not address the issue of selectivity bias while estimating wage equation using quantile regression method.

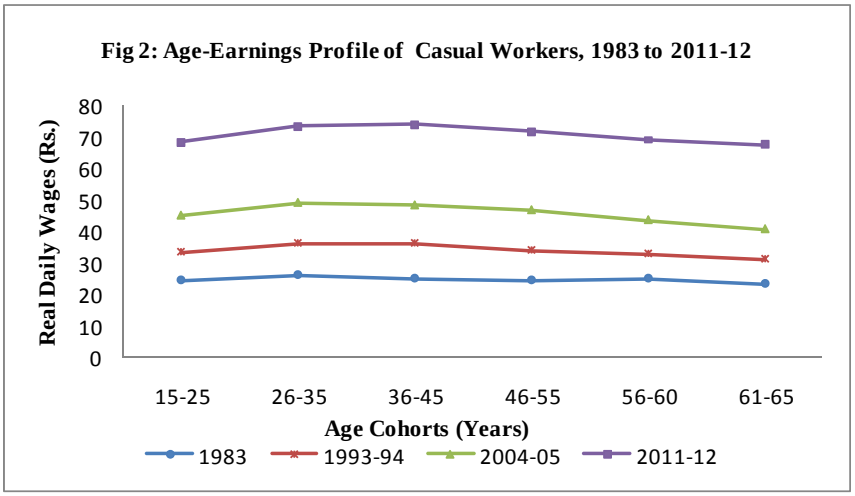
6. Empirical Results and Discussions

6.1. Descriptive Results

The evolution of wages over the life cycle is illustrated by the age-earnings profile given in figures 1 and 2. The age-earnings profiles of regular workers satisfy the theoretical argument of human capital. The age-earnings profiles of regular workers follow almost a concave shape. It means earnings typically

increase with age and starts declining at the retirement age i.e. after 60 years. The age-earnings profiles are steeper for higher level of education. It means the rate of increase and the rate of retardation of age -earnings profile is positively related to the level of skill. On the other hand, the age-earnings profiles of casual workers are almost flat. It shows that there is no incentive for casual workers towards human capital investment. The age-earnings profiles of both regular and casual workers are showing an upward shift over the years from 1983 to 2011-12.





The education–earnings profile of regular and casual workers is given in Table 2. The earnings of regular workers show an increase with level of education but it remain almost constant for casual workers. During 1983 to 2011-12, the average real daily wages of both regular and casual workers show an increase over the years. The increase in earnings of regular workers could be either due to productivity enhancing effect of education or education serves as a signal of a worker's innate ability. In this paper, we have not addressed the issue of education as a screening device.

Table 2: Education-Earnings Profile of Regular and Casual Workers, 1983 to 2011-12

Educational Level	1983	1993-94	2004-05	2011-12
Regular Workers				
Illiterate	41.58	54.61	59.97	78.21
Literate up to Below Primary	58.17	73.74	77.36	91.48
Primary	64.12	76.82	81.18	93.99
Middle	74.17	90.43	95.64	109.50
Secondary	104.00	123.65	136.69	147.24
Higher Secondary	-	133.81	163.35	176.51
Diploma	-	-	214.53	230.06
Graduate and above	152.25	196.30	266.70	324.27
Casual Workers				
Illiterate	22.34	30.93	40.93	63.98
Literate up to Below Primary	29.72	38.34	49.50	71.06
Primary	32.54	42.24	52.96	74.42
Middle	35.29	45.65	57.06	82.53
Secondary	38.51	45.19	57.11	81.47
Higher Secondary	-	43.40	53.69	78.27
Diploma	-	-	74.16	115.21
Graduate and above	60.23	50.03	64.05	89.64

Source: Author's Calculation.

6.2. Econometric Analysis

This section is devoted towards providing evidence on inequality in rates of return to education separately for gender, age-cohorts, caste, and religious groups. An attempt is made to give a detail discussion on estimates of RORE using mean-based method and quantile regression method.

6.2.1. Rates of Return to Education by Gender

We have used OLS method and Lee procedure for estimating selectivity uncorrected and corrected rates of return to education. In case of Lee (1983) procedure of selectivity correction using polychotomous choice models, both the wage and wage work participation equations are estimated in a simultaneous equation framework. The results are given in Tables 3 and 4.

The estimates of wage work participation equation show that education increases the likelihood of being in regular work but it reduces the likelihood of being in casual work. Both age and age square variables are statistically significant. Holding other variables constant, rural people's likelihood of being in regular work is negative, but it is positive for casual work. Household demographic characteristics or exclusion restrictions, such as household size, number of elderly aged 65 years and above, and children in the household are likely to play a role in individual's choice about labour force participation and type of employment undertaken. For instance, in households with large number of dependents, working-age adults (especially women) are more likely to seek and accept flexible forms of work such as self-employment, informal or casual employment rather than wage work (Kingdon & Theopold 2008). The coefficients of exclusion restrictions are found to be statistically significant for

male irrespective of employment status; the coefficients of household size and old dummy are of expected sign i.e. negative; the coefficients of one child, two children and three or more children are positive. On the other hand, for female regular workers, the coefficients of household size, one and two children dummy are negative and significant, but the coefficient of old dummy is positive and significant.

The estimates of the wage equations show that the coefficients of both age and age square variables are statistically significant irrespective of gender and employment status. The results are consistent with human capital theory and a priori expectations. The effect of age is positive and age square is negative exhibiting the nonlinear pattern of age-earnings profile. As per the conventional wisdom, the coefficients of level of education dummy are positive and significant for regular workers irrespective of gender. The contribution of graduation and above degree to earnings is the highest and the marginal wage effect of education is monotonically increasing in education level for regular workers but not for casual workers. The base category for the education dummy variables is that of those workers who are illiterate, or literate up to below primary education. The earnings of workers in rural areas are lower than their urban counterparts irrespective of gender and employment status.

Table 3: Estimates of Wage Work Participation Equation using Multinomial Logit Model Regression by Gender, 2011-12

Variables	Male				Female			
	Regular Worker		Casual Worker		Regular Worker		Casual Worker	
	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat
Age	0.27	70.58	0.15	43.59	0.22	29.46	0.11	17.01
Age Sq	-0.00	-67.16	-0.00	-47.36	-0.00	-27.94	-0.00	-18.85
Primary	0.43	13.13	-0.29	-12.95	0.19	3.53	-0.53	-13.25
Middle	0.54	19.44	-0.75	-34.84	0.22	4.45	-0.97	-22.91
Secondary	0.72	26.03	-1.36	-52.05	0.47	9.57	-1.62	-26.19
HSC	0.85	28.63	-2.11	-53.31	0.85	16.56	-2.48	-22.02
Diploma	1.73	38.21	-1.88	-20.7	2.70	37.4	-1.50	-6.43
Grad and above	1.60	59.47	-2.98	-45.97	2.04	50.16	-3.10	-17.61
Rural	-0.86	-55.08	0.20	11.68	-0.65	-22.57	0.62	19.25
HH size	-0.13	-33.05	-0.10	-24.73	-0.14	-18.53	-0.21	-28.32
Old dummy	-0.07	-2.9	-0.11	-4.22	0.14	3.64	0.03	0.64
One child dummy	0.16	7.73	0.18	8.67	-0.14	-3.65	-0.08	-2.2
Two children dummy	0.28	8.67	0.28	9.4	-0.12	-1.77	0.11	2.13
Three or more children dummy	0.56	8.48	0.28	4.59	0.03	0.19	-0.12	-0.83
Intercept	-6.00	-77.82	-2.65	-39.3	-6.49	-44.49	-3.47	-26.84
Log Likelihood	-106988.81				-45867.536			
Pseudo R square	0.14				0.13			
Total Observations	143533				136885			

Note: base category of dependent variable is non-wage earners.

Source: Author's Calculation

Table 4: Estimates of Wage Equation by Employment Status & Gender, 2011-12

Variables	Male				Female			
	Regular Workers		Casual Workers		Regular Workers		Casual Workers	
	Coeff.	z-stats	Coeff.	z-stats	Coeff.	z-stats	Coeff.	z-stats
Age	0.05	10.63	0.03	11.03	0.05	6.23	0.02	6.09
Age Sq	-0.00	-5.06	-0.00	-8.06	-0.00	-3.71	-0.00	-5.61
Primary	0.05	1.72	0.08	5.55	0.18	3.93	0.06	4.31
Middle	0.16	7.85	0.17	6.98	0.42	10.22	0.12	6.42
Secondary	0.34	13.67	0.17	4.17	0.77	21.84	0.08	2.19
HSC	0.51	18.86	0.11	1.63	1.02	15.25	0.16	4.43
Diploma	0.67	18.8	0.46	7.2	1.25	11.38	0.50	5.97
Grad and above	0.86	23.89	0.16	1.59	1.43	17.11	0.57	4.07
Rural	-0.00	-0.2	-0.10	-8.65	-0.16	-6.52	-0.06	-3.09
Selection bias correction term	0.26	7.22	0.01	0.14	0.23	3.07	0.10	3.97
Constant	3.58	27.01	3.69	34.65	2.77	8	3.79	47.71
Sigma	0.62	13.04	0.23	41.67	0.97	3.82	0.26	12.25
rho	0.33	9.94	0.02	0.14	0.24	5.08	0.19	4.3

Note: Dependent variable is the natural logarithm of real daily wage

Source: Author's calculation.

Table 5: Selectivity Uncorrected and Corrected Rates of Return to Education by Gender, 2011-12

	Uncorrected			Corrected		
	Person	Male	Female	Person	Male	Female
Regular Workers						
Primary	12.4	5.3	10.3	9.3	2.5	9.2
Middle	6.1	4.5	8.3	5.2	3.7	8.0
Secondary	11.7	10.5	18.7	10.2	8.9	17.5
Higher Secondary	10.0	9.7	14.2	8.7	8.6	12.5
Diploma	23.5	22.6	35.0	15.9	16.6	23.6
Graduate and above	14.6	14.6	17.7	11.5	11.7	13.6
Casual Workers						
Primary	6.7	3.9	1.9	6.4	3.9	2.9
Middle	3.2	2.9	1.5	2.6	2.9	2.1
Secondary	0.0	-0.2	-3.1	-1.3	-0.1	-1.9
Higher Secondary	-2.1	-3.1	2.5	-3.7	-3.0	4.0
Diploma	14.9	14.5	20.8	13.8	14.6	20.9
Graduate and above	2.7	1.7	12.8	1.4	1.8	13.5

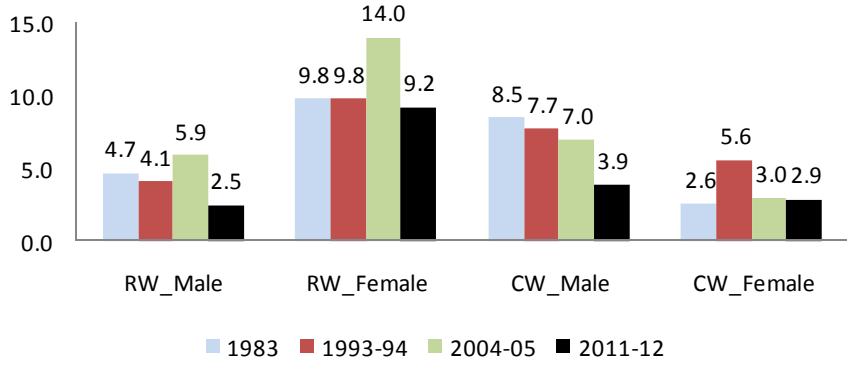
Source: Author's Calculation.

The selectivity uncorrected and corrected RORE estimated from the education coefficients of wage regression are given in Table 5. The coefficients of selection bias correction term and rho are significant irrespective of gender and employment status except for male casual workers.

For regular workers, the selectivity corrected RORE are found to be lower than the selectivity uncorrected RORE. Besides, the rate of return to diploma is the highest, followed by graduation and above degree and secondary education in 2011-12; the similar pattern of RORE is observed for male; while for female, rate of return to diploma is the highest, followed by secondary education and graduation and above degree. This finding is contradictory to Duraisamy (2002) study, which shows that, in general, return per year at the secondary level is the highest.

The conventional pattern stated by Psacharopoulos (1994) doesn't necessarily hold in India due to lower and declining return to primary education over the years as shown in figure 3. It could be due to poor quality of primary education in India. This kind of pattern of rates of return to education has implication for public policy. A recent report by Pratham (2012) shows that only 57.5 percent and 46.5 percent students in the Standard III and V can read the Standard I text book or more and can do subtraction or more respectively in rural India.

Fig 3: Rate of Return to Primary Education for Regular Workers (RW) and Casual Workers (CW) by Gender, 1983 to 2011-12



During 1993-94 to 2011-12, the rate of return to higher secondary education has increased from 4.3 percent to 8.7 percent; while that of graduation and above degree has increased from 7.1 percent to 11.5 percent. However, from 2004-05 to 2011-12, return to graduate and above degree has shown a decline. Likewise, the rate of return to diploma has declined from 19.2 percent in 2004-05 to 15.9 percent in 2011-12. Newell and Reilly (1999) study on transitional economies shows that during the 1990s, there was an increase in private rates of return to education after a period of labour market reforms.

On the other hand, for casual workers, rate of return to primary and middle education are found to be positive; while it is negative for secondary and higher secondary education.

There is significant inequality in rates of return to education between male and female. In regular labour market, both the selectivity corrected and uncorrected RORE for female are higher than that of male irrespective of level of education; while in casual labour market, the RORE for female are lower than that of male up to secondary education.

6.2.2. Rates of Return to Education across Quantiles of Wage Distribution by Gender

We have estimated quantile regression at different quantiles of the wage distribution, particular at Q10, Q25, Q50, Q75 and Q90. The F test statistics show that the null hypothesis of equality of education coefficients is rejected at 1 percent level of significance for both regular and casual workers except at graduation and above degree for casual workers. This may be because of fewer samples of casual workers with graduation and above degree.

We found that for regular workers, the value of primary, middle and secondary education coefficients is declining across the quantiles of the wage distribution; while it follows an inverted-U shape pattern for higher secondary, diploma, and graduation and above degree except at Q10 for higher secondary education. There is significant difference in contribution of education to earnings across the quantiles of the wage distribution for both male and female. The value of education coefficient for male is rising across the quantiles except at Q90 irrespective of level of education; the similar pattern is observed for higher secondary and graduation and above degree education for female; while the coefficient of secondary education is rising across the quantiles of the wage distribution for female.

The wage dispersions estimated from the education coefficients shows substantial inequality in earnings across the quantiles of the wage distribution. The wage dispersions between Q75-Q25 and Q90-Q10 found to be positive for male irrespective of level of education; while for female, wage dispersions between Q75-Q25 is positive except for middle education and wage dispersions between Q90-Q10 is positive for secondary and above level education except for diploma. This positive wage dispersion implies the contribution of education to earnings is higher at upper quantile than at lower quantiles of the wage distribution.

The RORE are estimated from the education coefficients of quantile regression. We found that for regular workers, rate of return to secondary education is rising across the quantiles of the wage distribution except at Q90; while for higher secondary education, diploma, and graduation and above degree, RORE follow an inverted U-shape pattern across the quantiles of the wage distribution. The inverted U-shape pattern of returns with respect to education level shows that the highest paid highly educated workers possess lower returns than their lower paid counterparts. This finding of lower return to graduation and above degree at upper quantile is consistent with study of Blom, Nielsen and Verner (2001) for Brazil and Agrawal (2012) for India.

Similarly, for male, the rate of return to primary education is rising up to Q70 and then it declines; likewise, rate of return to secondary education is rising across the quantiles; similarly rate of return to higher secondary education follows an inverted U-shape pattern. On the other hand, for female, the rate of return to secondary education is rising across the quantiles of the wage distribution; while rate of return to higher secondary education is rising up to Q70 and then it declines; and rates of return to diploma, graduation and above degree follow an inverted U-shape pattern.

Based on the available literature, like Hartog *et al.* (2001), Machado and Mata (2001) for Portugal; Falaris (2008) for Panama; Martins and Pereira (2004) for many European countries; Tansel and Bodur (2012) for Turkey, we predict that returns to education increases across the quantiles of

wage distribution. Our findings support this pattern only for secondary education for regular workers, and primary and middle education for casual workers. The rising RORE across the wage quantiles suggest that education is relatively more valued for highly paid jobs. As a result, it has a positive impact on wage inequality (Agrawal 2012). This may be due to 'complementarity' between ability and education; if persons with higher ability earn more the returns to those in the top deciles of the wage distribution would be higher (Harmon, Oosterbeek & Walker 2003). If the residuals in the wage regressions are interpreted as unobserved ability and returns increase across quantiles of the wage distribution, this indicates that schooling and ability are complements in enhancing worker productivity (Mwabu & Schultz 1996).

During 2004-05 to 2011-12, the rate of return to primary education for both regular and casual workers is declining across the quantiles of the wage distribution. The rate of return to middle education for casual workers shows a rising trend over the years across the quantiles of the wage distribution. In addition to this, the rate of return to higher secondary education for regular workers is rising; similar trend is observed for graduation and above degree except at Q10; while the rate of return to diploma is falling at the lower quantiles of the wage distribution such as Q10 and Q25 and at mean.

This higher and increasing return to higher secondary and above level education for regular workers may be attributed to the rapid industrialization in the country in recent years which might have led to increased demand for highly qualified and technical persons, which does not match with its supply. This may be responsible for the rising wage inequality between skilled and unskilled workers in the past decade (Duraisamy 2002; Agrawal 2012; Ramaswamy & Agrawal 2012).

It is observed that rate of return to female education is not only higher at mean but also at different quantiles of the wage distribution. This finding is consistent with Aslam (2005) study for Pakistan, Tansel (2010) for Turkey, Unni (1996) and Duraisamy (2002) for India. This higher return to investment in women education relative to men is due to lower opportunity cost of women's education (Psacharopoulos 2006). Madheswaran (1996) has suggested following reasons for higher returns to female education than that of male. Firstly, there might be gender differences in the private, risk-free interest cost of resources to invest in schooling. Second, the estimation of returns to education using Mincerian earnings function does not incorporate other costs of education that may differ by gender. Thirdly, there might be risk aversion on the part of providers of the resources for schooling investments and gender differences in the dispersion of expected returns to schooling even though the expected rates of return did not differ by gender, so that risk premia differ by gender.

It is important to note that the contribution of education on gender wage gap is less, because men's superior educational endowment than women is largely offset/cancelled by the effect of men's lower returns to education than women's (Kingdon & Unni 2001).

Table 7: Estimates of Quantile Regression of Male and Female Regular Workers, 2011-12

Variables	Q10		Q25		Q50 (Median)		Q75		Q90	
	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats
Male										
Age	0.08	20.76	0.07	18.36	0.06	18.77	0.07	23.05	0.07	17.67
Age Sq	-0.00	-16.02	-0.00	-11.76	-0.00	-9.25	-0.00	-12.95	-0.00	-10.3
Primary	0.07	2.62	0.09	3.97	0.12	5.18	0.13	5.34	0.08	2.75
Middle	0.19	8.49	0.22	11.23	0.24	12.6	0.26	11.64	0.21	7.82
Secondary	0.34	13.94	0.39	20.31	0.46	23.98	0.51	24.08	0.47	17.48
HSC	0.41	14.51	0.56	23.19	0.71	33.14	0.74	33.5	0.66	24.61
Diploma	0.69	17.19	0.89	24.52	0.94	37.22	0.96	36.78	0.86	24.95
Grad and above	0.76	27.93	1.09	49.69	1.19	69	1.14	58.55	1.07	42.49
Rural	-0.16	-10.69	-0.10	-7.95	-0.07	-6.86	-0.09	-8.94	-0.12	-10.02
constant	2.03	27.78	2.37	33.4	2.80	46.44	3.05	56.38	3.47	47.87
R –squared	0.38		0.39		0.39		0.39		0.39	
Total Observation	25471									
Female										
Age	0.08	8.11	0.07	7.17	0.08	10.06	0.06	7.39	0.07	7.57
Age Sq	-0.00	-6.43	-0.00	-5	-0.00	-7.22	-0.00	-4.16	-0.00	-4.48
Primary	0.17	2.86	0.12	2.27	0.25	5.29	0.22	3.96	0.14	1.91
Middle	0.42	7.21	0.44	9.82	0.44	9.8	0.41	8.02	0.39	5.54
Secondary	0.71	12.2	0.75	16.92	0.76	16.35	0.93	14.99	0.96	14.37
HSC	0.81	14.24	0.96	15.65	1.09	17.02	1.34	27.44	1.22	20.17
Diploma	1.39	15.65	1.49	16.36	1.68	28.18	1.60	34.22	1.38	21.18
Grad and above	1.33	26.67	1.47	30.48	1.78	47.95	1.81	52.5	1.65	31.82
Rural	-0.24	-7.15	-0.26	-8.39	-0.22	-7.64	-0.17	-6.01	-0.19	-6.72
constant	1.08	5.69	1.65	9.43	1.79	11.82	2.54	16.48	2.89	18.84
R –squared	0.42		0.43		0.43		0.42		0.42	
Total Observation	6429									

Note: Robust standard error is estimated by using Machado & Silva (2000) test for heteroscedasticity.

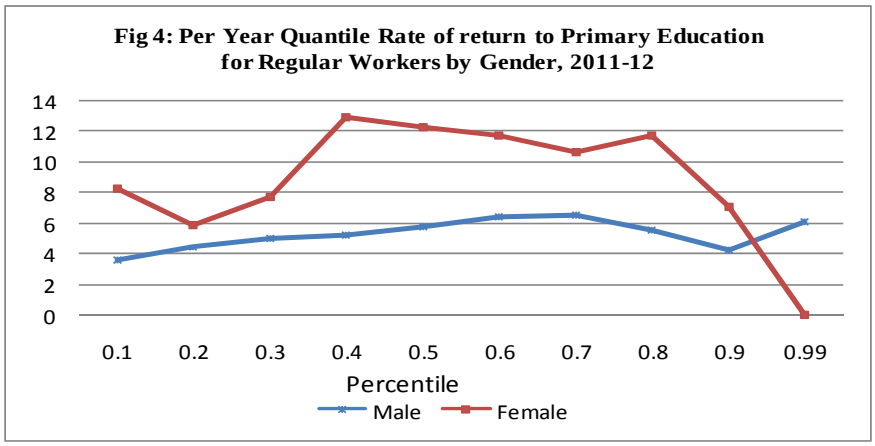


Fig 4: Per Year Quantile Rate of return to Primary Education for Regular Workers by Gender, 2011-12
14
12
10
8
6
4
2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

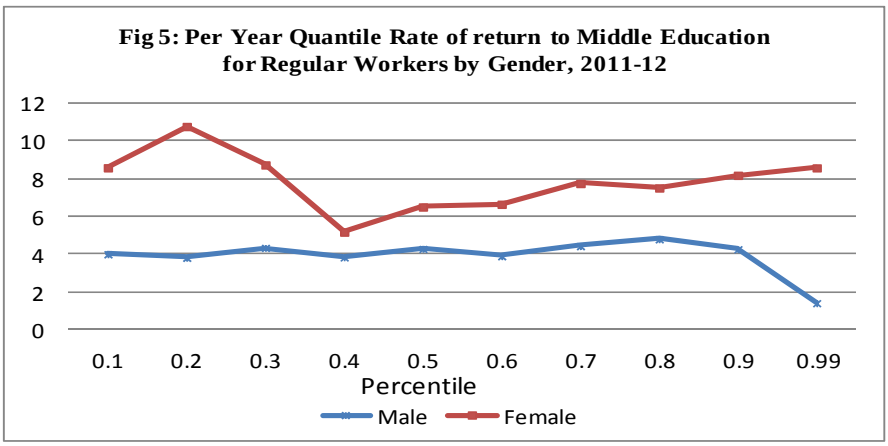


Fig 5: Per Year Quantile Rate of return to Middle Education for Regular Workers by Gender, 2011-12
12
10
8
6
4
2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

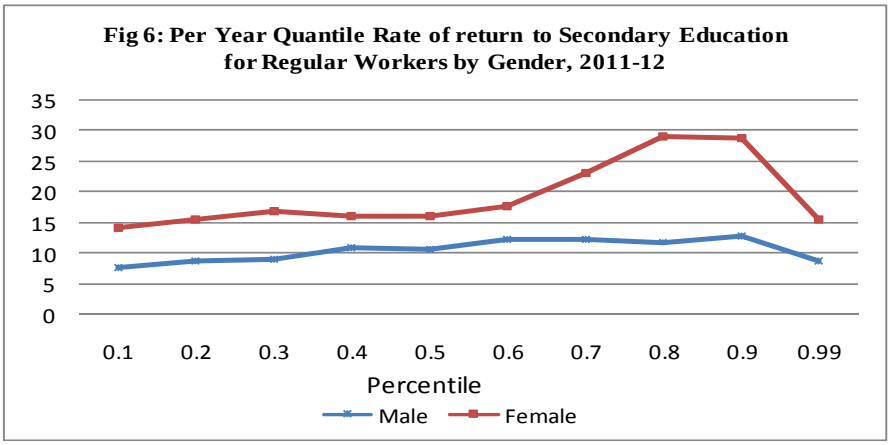


Fig 6: Per Year Quantile Rate of return to Secondary Education for Regular Workers by Gender, 2011-12
35
30
25
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

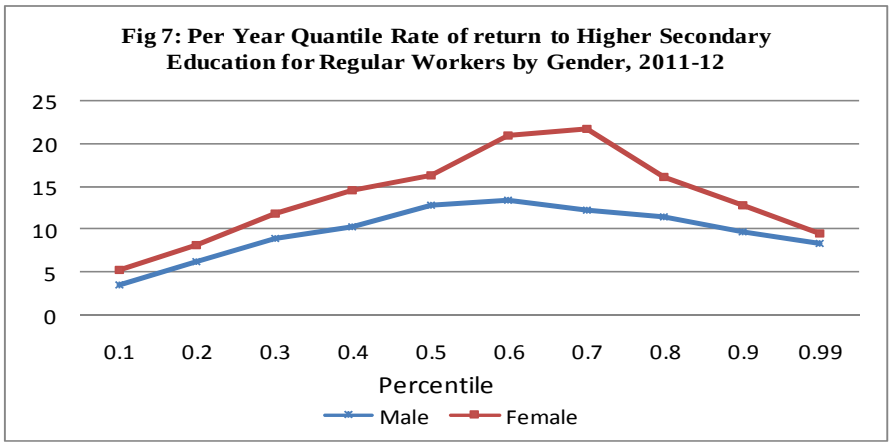


Fig 7: Per Year Quantile Rate of return to Higher Secondary Education for Regular Workers by Gender, 2011-12
25
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

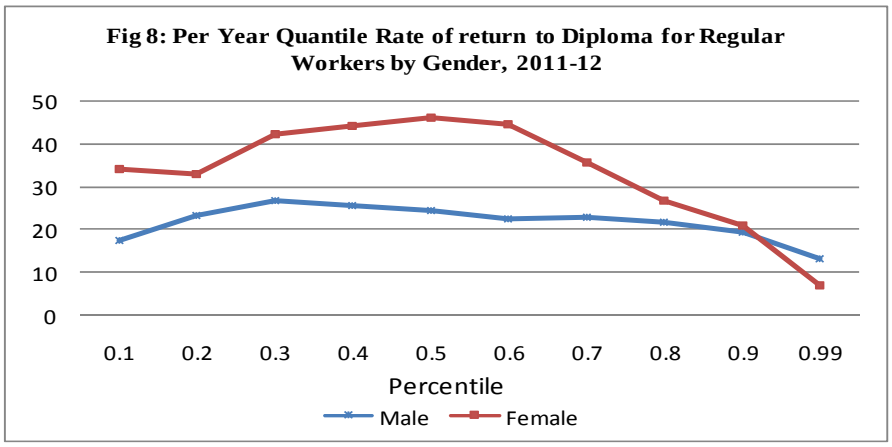


Fig 8: Per Year Quantile Rate of return to Diploma for Regular Workers by Gender, 2011-12
50
40
30
20
10
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

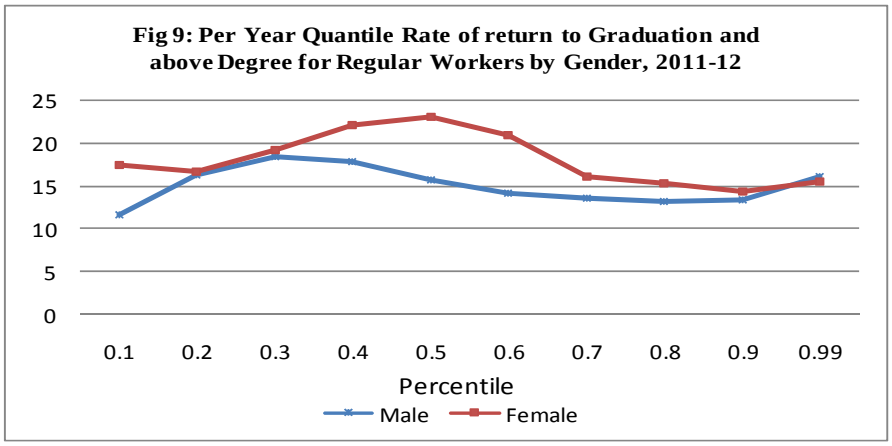


Fig 9: Per Year Quantile Rate of return to Graduation and above Degree for Regular Workers by Gender, 2011-12
25
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.99
Percentile
Male
Female

6.2.3 Rates of Return to Education (RORE) by Age Cohorts

We have estimated RORE at different age cohorts, because the availability and quality of schooling vary over a period of time and hence different cohorts of the sample may have gone through schooling of different quality. To account for this differential effect of quality, RORE are estimated separately for three age groups – 15-29, 30-44 and 45-65 (Duraisamy 2002).

We found that in 2011-12, the RORE for regular workers are increasing across the age cohorts. The rate of return to graduation and above degree is the highest for younger cohort (15-29); while rate of return to diploma is the highest for age cohorts 30-44 and 45-65. During 1993-94 to 2011-12, the rates of return to higher secondary, diploma and graduation and above degree are rising over the years for age cohort 45-65; while the rate of return to diploma is declining over the years from 2004-05 to 2011-12 for age cohorts 15-29 and 30-44.

On the other hand, for casual workers, the return to primary education is increasing across the age cohorts, while it is declining for secondary, higher secondary and above degree in 2011-12.

Table 6: Selectivity Corrected Rates of Return to Education for Regular Workers by Age Cohorts

Age Cohort/Educational Level	1983	1993-94	2004-05	2011-12
Age Cohort 15-29				
Primary	5.3	1.7	3.0	1.7
Middle	2.9	2.5	1.2	2.3
Secondary	5.7	7.9	4.5	6.8
Higher Secondary	NA	7.6	5.1	5.4
Diploma	NA	NA	10.1	5.7
Graduate and above	7.4	5.2	9.8	9.7
Age Cohort 30-44				
Primary	11.4	8.6	11.9	1.7
Middle	3.0	4.6	6.2	5.9
Secondary	6.3	9.2	11.6	8.8
Higher Secondary	NA	4.0	7.9	10.6
Diploma	NA	NA	22.4	17.3
Graduate and above	10.3	7.5	12.4	9.6
Age Cohort 45-65				
Primary	13.5	19.2	27.3	22.6
Middle	4.9	6.7	11.0	9.2
Secondary	7.3	13.8	23.8	22.1
Higher Secondary	NA	3.2	10.0	15.1
Diploma	NA	NA	25.9	35.7
Graduate and above	11.6	10.2	13.6	17.3

Source: Author's Calculation.

6.2.4. Rates of Return to Education by Caste

The labour markets in India have historically been organized along caste lines. Discrimination against SCs/STs is quite rampant in terms of their access to educational opportunities and employment in labour market. The wages paid to SCs/STs are considerably lower than their counterparts. The interesting observation from Table 8 is that in regular labour market, the RORE are higher for STs than that of forward castes at all levels except at graduation and above degree. The RORE for SCs is higher than that of forward castes at primary, secondary, and diploma level. The rate of return to secondary education for SCs is showing a rising trend across quantiles except at Q90; and return to secondary education for SCs is higher than that of forward castes at upper quantiles. This implies that there is an under investment in education of lower caste people in India. Hence, it can also be argued that the system of reservation policies for SCs/STs influenced positively. But return to graduation and above degree is lower for SCs/STs than forward castes. Similarly, the RORE for OBCs is lower than that of forward castes except at middle education. This pattern of lower return to OBCs than forward castes is consistent with Madheswaran and Attewell (2007) study. The rate of return to primary education for OBCs is showing a declining trend across quantiles; whereas the rate of return to higher secondary education for OBCs is rising across the quantiles except at Q90. On the other hand, the rates of return to primary and middle education are positive for casual workers across wage quantiles irrespective of caste affiliation.

We have not reported the estimates of selectivity corrected rates of return to education by caste, because the selection bias correction term found to be insignificant for SCs, STs.

Table 8: Selectivity Uncorrected per Year Quantile Rates of Return to Education for Regular Workers by Caste, 2011-12

	Q10	Q25	Q50 (Median)	Q75	Q90	OLS
ST						
Primary	25.8	20.1	21.0	11.3	-0.9	14.9
Middle	1.9	6.4	6.1	7.7	11.3	7.1
Secondary	20.9	20.4	22.8	19.2	6.8	18.1
Higher Secondary	14.8	10.1	8.3	10.0	11.0	10.6
Diploma	22.2	32.1	23.4	21.9	25.8	25.2
Graduate and above	2.9	13.6	8.8	7.4	9.2	8.6
SC						
Primary	22.4	16.2	13.7	9.2	9.7	13.8
Middle	6.0	4.9	4.2	4.5	2.7	5.5
Secondary	8.1	9.2	12.8	15.5	14.8	12.4
Higher Secondary	7.2	7.1	10.1	9.8	8.4	8.5
Diploma	27.2	26.6	27.8	22.8	20.3	25.7
Graduate and above	10.5	15.1	14.8	12.9	13.0	13.5
OBC						
Primary	15.8	12.8	9.9	8.9	4.4	10.1
Middle	6.4	5.6	6.0	5.5	6.5	6.4
Secondary	7.7	8.9	9.6	9.0	9.7	9.5
Higher Secondary	3.7	5.8	10.9	12.7	12.2	9.5
Diploma	17.9	24.3	25.9	23.6	20.8	22.9
Graduate and above	9.5	16.4	17.3	14.7	13.0	14.7
Forward Castes/Others						
Primary	16.0	16.0	12.4	12.6	8.7	12.9
Middle	9.6	4.5	4.1	4.1	4.8	5.6
Secondary	9.2	10.7	12.5	14.5	13.8	11.9
Higher Secondary	4.0	7.1	14.8	11.9	9.4	10.2
Diploma	18.8	27.0	27.8	22.6	18.2	24.1
Graduate and above	11.6	18.3	15.9	13.1	13.7	15.0

Source: Author's Calculation.

6.2.5. Rates of Return to Education by Religion

The inequality in returns to education among religious groups is clearly seen from Table 9. In regular labour market, the RORE for Hindu is highest for diploma, followed by graduation and above degree and primary education; the rates of return to higher secondary, diploma, graduation and above degree for Hindus follow an inverted 'U-shape' pattern across the quantiles of the wage distribution. The rates of return to middle and secondary education for Muslim are higher than that of Hindu and ORM; so higher education fetches lower return to Muslim. Besides, returns to higher secondary and graduation and above degree for Muslim follow an inverted 'U-shape' pattern across the quantiles of the wage distribution. The rate of return to primary education is lower for Muslim and ORM than Hindus. The rate

of return to primary education is declining across the wage quantiles in almost all religious groups except at Q90 for ORM. The rate of return to graduation and above degree is following an inverted 'U-shape' pattern for ORM. On the other hand, for casual workers, the rates of return to primary and middle education are positive across the quantiles of the wage distribution irrespective of religion.

We have not reported the estimates of selectivity corrected rates of return to education by religion, because the selection bias correction term found to be insignificant for Muslim.

Table 9: Selectivity Uncorrected per Year Quantile Rates of Return to Education for Regular Workers by Religion, 2011-12

	Q10	Q25	Q50 (Median)	Q75	Q90	OLS
Hindu						
Primary	18.3	15.8	14.3	11.3	6.7	13.5
Middle	6.8	5.0	4.5	4.0	4.6	5.3
Secondary	10.8	10.4	12.1	13.5	12.6	11.8
Higher Secondary	4.4	8.6	13.0	11.8	11.0	10.6
Diploma	20.2	28.1	27.8	23.8	20.9	25.4
Graduate and above	11.6	17.0	16.3	14.2	14.2	14.8
Muslim						
Primary	14.6	9.5	7.1	6.4	4.9	8.1
Middle	9.1	8.4	8.5	10.5	9.4	9.1
Secondary	7.7	11.9	12.5	11.1	12.3	12.7
Higher Secondary	-1.8	1.5	13.0	11.0	7.6	6.4
Diploma	13.2	13.2	12.3	15.0	12.1	12.2
Graduate and above	6.2	16.9	13.2	11.2	10.9	12.0
ORM						
Primary	18.5	11.7	9.1	7.3	12.6	10.9
Middle	10.1	8.8	6.3	7.6	5.2	8.8
Secondary	7.3	6.5	11.5	18.5	17.2	10.3
Higher Secondary	7.8	4.6	6.4	6.9	9.4	7.1
Diploma	15.6	23.8	18.0	12.6	21.4	18.1
Graduate and above	10.3	18.3	20.4	14.6	13.4	16.8

Note: ORM denotes Other Religious Minorities including Christianity, Sikhism, Jainism, Buddhism, Zoroastrianism and others.

Source: Author's Calculation

7. Conclusions and Policy Implications

Estimates of returns to education are often used to inform education policy decisions on the allocation of public investment on different levels of education. We found that the overall returns to education for regular workers are the highest for diploma, followed by graduation and above degree, secondary education. The rate of return to primary education is lower than other levels and it is declining across the quantiles of the wage distribution. The finding of relatively low returns to lower level education does not necessarily imply that educational policy in India should not emphasize on primary schooling. Primary education serves as necessary inputs to higher levels of education and as such it is necessary to understand the reasons for low returns rather than simply directing public investment according to the highest rates of return (Rani 2014). The basic reason for the lower return to primary education is its lower quality. On the other hand, the pattern of returns rising with the education level could exacerbate wage inequality. The increasing return to higher education indicates that there is room for the government to shift some of the costs of acquiring higher education to individuals. There is need for public investment to improve the quality of primary schooling in India.

Using quantile regression method, we found that the effect of education is not the same across the wage distribution. Returns differ considerably within education groups across different quantiles of the wage distribution. For regular workers, overall returns to secondary education are rising across the quantiles. This implies education and ability are complementary at the secondary level of education. The returns to higher secondary, diploma, graduation and above degree follow an inverted U-shape pattern. This implies returns to lower income quantiles are higher than the upper quantiles of the wage distribution.

Given the extremely unequal distribution of returns to higher education across gender, caste and religious groups, the policy option suggested is for a differential fee in higher education. In response to such inequitable distribution, Atkinson (1995) and Sen (1995) establish the need for targeting of government expenditures towards the poor. The theoretical rationales for targeting extend to both equity and efficiency. According to Sen (1995), “the more accurate a subsidy in fact is in reaching the poor, the less the wastage, and less it costs to achieve the desired objective”. However, the political question concerns the actual feasibility and acceptability of aiming public policy towards particular deprived groups. The political economy of targeting has to be concerned not just with the economic problems of selection, information and incentives but also with the political support for, and feasibility of, aiming public policy specifically at removing the deprivation of particular groups (Rani 2014). Now the 11th and 12th five-year plans emphasise more on inclusive growth as the economic growth during the reforming period has not resulted in redistribution of income. In this debate, measures to improve equality of education opportunity deserve special attention. Hence, it is argued for differential treatment of the deprived sections both socially and economically.

References

Agrawal, T (2012). Return to Education in India: Some Recent Evidence. *Journal of Quantitative Economics*, 10 (2): 131-51.

Aslam, M (2006). Rates of Return to Education by Gender in Pakistan. Working Paper GPRG-WPS-064, Department of Economics, University of Oxford.

Bennell, P (1996a). Rates of Return to Education: Does the Conventional Pattern Prevail in Sub-Saharan Africa?. *World Development,* 24 (1): 183-99.

Bennell, P (1996b). Using and Abusing Rates of Return: A Critique of the World Bank's 1995 Education Sector Review. *International Journal of Educational Development,* 16 (3): 235-48.

Blom, A, L Nielsen, L H and Verner, D (2001). Education, Earnings and Inequality in Brazil, 1982-1998: Implications for Education Policy. *Peabody Journal of Education,* 76 (3/4): 180-221.

Buchinsky (1994). Changes in the US Wage Structure 1963-1987: Application of Quantile Regression. *Econometrica,* 62 (2): 405-58.

Card, D (1994). Earnings, Schooling and Ability Revisited. Working Paper No. 4832, Cambridge, MA: National Bureau of Economic Research.

Card, D (1999). The Causal Effect of Education on Earnings. In Orley Ashenfelter and David Card (eds), *Handbook of Labour Economics*. Amsterdam: North-Holland.

Duraisamy, P and Duraisamy, M (2005). Regional Difference in Wage Premia and Return to Education by Gender in India. *The Indian journal of Labour Economics*, 48 (2): 334-47.

Duraisamy, P (2002). Changes in Returns to Education in India, 1983–94: By Gender, Age Cohort and Location. *Economics of Education Review,* 21 (6): 609-22.

Dutta, P V (2006). Returns to Education: New Evidence for India, 1983–1999. *Education Economics,* 14 (4): 431-51.

Falaris, E M (2008). A Quantile Regression Analysis of Wages in Panama. *Review of Development Economics*, 12 (3): 498-514.

Gindling, T H *et al* (1995). Changing Returns to Education in Taiwan: 1978–91. *World Development,* 23 (2): 343-56.

Glewwe, P (1991). Schooling, Skills and the Returns to Government Investments in Education: An Exploration using Data from Ghana. Working Paper No. 76, Living Standards Measurement Study, World Bank.

Griliches, Z (1977). Estimating the Return to Schooling: Some Econometric Problems. *Econometrica*, 45 (1): 1-22.

Harmon C and Walker I (1995). Estimates of the Economic Return to Schooling for the United Kingdom. *The American Economic Review*, 85 (5): 1278-86.

Harmon, C, Oosterbeek, H and Walker I (2003). The Returns to Education: Microeconomics. *Journal of Economic Surveys,* 17 (2): 115-55.

Hartog, J, Pereira, P T and Vieira, J A C (2001). Changing Return to Education in Portugal during the 1980s and Early 1990s: OLS and Quantile Regression Estimators. *Applied Economics*, 33 (8): 1021-37.

Hawley, J D (2004). Changing Returns to Education in Times of Prosperity and Crisis, Thailand 1985–1998. *Economics of Education Review,* 23 (3): 273-86.

Heckman, J and Hotz, V (1986). An Investigation of the Labour Market Earnings of Panamanian Males: Evaluating the Sources of Inequality. *Journal of Human Resources,* 21 (4): 507-42.

Kingdon, G G and Theopold N (2008). Do Returns to Education Matter to Schooling Participation? Evidence from India. *Education Economics,* 16 (4): 329-50.

Koenker, R and Bassett, G (1978). Regression Quantiles. *Econometrica,* 46 (1): 33-50.

Labour Bureau (various years). *Indian Labour Statistics.* Government of India.

Lee, L-F (1983). Generalised Econometric Models with Selectivity. *Econometrica,* 51 (2): 507-12.

Machado, J A F and Mata J (2001). Earning Functions in Portugal 1982-994: Evidence from Quantile Regressions. *Empirical Economics*, 26 (1): 115-34.

Machado, J A F and Santos Silva, J M C (2000). Glejser's Test Revisited. *Journal of Econometrics*, 97 (1): 189-202.

Madheswaran, S (1996). Econometric Analyses of Labour Market for Scientists in India. Unpublished PhD Thesis. University of Madras, Madras.

Madheswaran, S and Attewell P (2007). Caste Discrimination in the Indian Urban Labour Market: Evidence from the National Sample Survey. *Economic and Political Weekly,* 42 (41): 4146-53.

Madheswaran, S (2011). *Caste Discrimination in the Urban Labour Market: Methodological Developments and Empirical Evidence - India*. Project Report, Bangalore: Institute for Social and Economic Change.

Martins, P S and Pereira P T (2004). Does Education reduce Wage Inequality? Quantile Regressions Evidence from 16 Countries. *Labour Economics*, 11 (3): 355-71.

Mincer, J (1974). *Schooling, Experience and Earnings.* New York: National Bureau of Economic Research.

Moll, P G (1996). The Collapse of Primary Schooling Returns in South Africa 1960–90. *Oxford Bulletin of Economics and Statistics*, 58 (1): 185-209.

Mwabu, G and Schultz T P (2000). Wage Premiums for Education and Location of South African Workers, by Gender and Race. *Economic Development and Cultural Change,* 48 (2): 307-34.

National Sample Survey Organization (2014). Employment and Unemployment Situation in India. NSS 68th Round, 2011-12, Report No. 554, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.

Pratham (2012). *Annual Status of Education Report (Rural) 2011.* Pratham, New Delhi.

Psacharopoulos, G (1987). *Earnings and Education in Brazil: Evidence from the 1980 Census*. Discussion Paper, Report No. EDT90, Research Division, Washington, DC: World Bank.

Psacharopoulos, G (1994). Returns to Investment in Education: A Global Update. *World Development,* 22 (9): 1325-43.

Psacharopoulos, G and Patrions H A (2004). Return to Investment in Education: A Further Update. *Education Economics*, 12 (2): 111-34.

Psacharopoulos (2006). The Value of Investment in Education: Theory, Evidence and Policy. *Journal of Education Finance*, 32 (2): 113-36.

Rani P G (2014). Disparities in Earnings and Education in India. *Cogent Economics and Finance*, 2: 941510. Retrieved from http://dx.doi.org/10.1080/23322039.2014.941510

Sahn, D and Alderman, H (1988). The Effects of Human Capital on Wages and the Determinants of Labour Supply in a Developing Country. *Journal of Development Economics,* 29 (2): 157-83.

Siphambe, H K (2000). Rates of Return to Education in Botswana. *Economics of Education Review,* 19 (3): 291-300.

Tansel, A (2010). Changing Returns to Education for Men and Women in a Developing Country: Turkey, 1994-2005. Working Paper, Department of Economics, Middle-East Technical University and IZA, Germany.

Tansel, A and Bodur F B (2012). Wage Inequality and Returns to Education in Turkey: A Quantile Regression Analysis. *Review of Development Economics,* 16 (1): 107-21.

Unni J and Sarkar S (2013). Wages and Informal Labour Markets in India: Whither Premiums on Human CapitalIinvestments?. *The Indian Journal of Labour Economics*, 56 (4): 525-43.

Unni, J (1996). Return to Education by Gender among Wage Employees in Urban India. *Journal of Educational Planning and Administration*, 10 (2): 153-72.

Appendix

Table A1: Descriptive Statistics of Variables used in Standard Earnings Function (2011-12)

Variables	Description of Variables	Regular Workers		Casual Workers	
		Mean	Standard Deviation	Mean	Standard Deviation
Daily Wage	Real Daily Wage (base 2001=100) in Rupees	202.80	190.15	80.02	46.34
Ln_real Wage	Natural Logarithm of real daily wage (in Rupees)	4.91	0.92	4.25	0.52
Age	Age in Years	37.13	11.14	35.97	12.13
Age Sq	Age Square (in years)	1502.69	865.36	1440.80	943.32
Primary	If the worker has completed primary education =1;0 otherwise	0.08	0.27	0.17	0.38
Middle	If the worker has completed middle school =1;0 otherwise	0.14	0.35	0.19	0.39
Secondary	If the worker has completed secondary school=1;0 otherwise	0.16	0.37	0.09	0.29
HSC	If the worker has completed higher secondary school=1;0 otherwise	0.13	0.34	0.03	0.17
Diploma	If the worker has completed diploma =1;0 otherwise	0.05	0.22	0.01	0.07
Grad and above	If the worker has completed graduate and above degree=1;0 otherwise	0.31	0.46	0.01	0.10
Rural	If the worker is working in rural areas=1;0 otherwise	0.39	0.49	0.75	0.43

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