Education and within Groups Earning Inequality in Pakistan

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Abstract

The present study focuses on identifying and estimating the extent of earning inequality due to increase in the level of education in Pakistan. Utilizing four rounds of household level surveys conducted at national level during 2001-2014, the study analyzes the effect of education on earning inequality within workers having same level of education. Quantile regression is employed to estimate and test earning inequality within workers having primary, secondary and tertiary education respectively. The results confirm that there is significant heterogeneity in the returns within each level of education. Such disparities are shown to be larger for workers at upper quantiles of the earnings distribution versus the lower counterpart. The results also show that within-group earning inequality is higher for workers with tertiary education than with secondary and primary education. Finally, the findings suggest that earning inequality does not remain same over time. These dynamic changes have enlarged lower as well as upper tail of earning distribution causing further income inequality in Pakistan. Therefore, these findings has identified that heterogeneity in the returns has very serious implication for distribution of income, general welfare and labor markets in Pakistan.

Keywords: human capital, education, earnings distribution, quantile regression

1. Introduction

Development of human capital is necessary for a country to have a knowledge-based economy. The importance of education as critical input for human development has been underlined by several economists in the literature on human capital (e.g., Becker, 1964; Mincer, 1974; Schultz, 1963). Education is recognized as one of the most significant investments in human capital. This investment improves mental ability of people and affects their productivity and hence earnings. Therefore, educational attainment plays

an important role in determining earning distribution in an economy (Gradstein & Justman, 1997; Gradstein et al., 2005; Rehme, 2002, 2007).

Identifying the factors that affect within group earning inequality is difficult, as there are many reasons why these workers earn differently. May be they have different levels of valuable unobservable skills- unobservable skills are more dispersed among workers. The productivity of a worker cannot be fully uncovered by his observable skills (Card, 1995). Therefore, earning of a worker has two parts; the value that market gives to his observed skills and earnings which come from his unobserved skills related to schooling quality, intrinsic ability, efforts etc. Earning inequality originates from both of these factors. Earning inequality is divided into two dimensions; due to differences in observable skills and differences in unobservable skills. Thus, the contribution of education toward earning inequality is twofold. Firstly, earning inequality that is related to the differences in observable skills (differences in returns from different levels of education) and secondly, earning inequality that is linked to the difference in unobservable skills- differences in returns within same level of education. The first is known as earning inequality between groups while second is within groups earning inequality.

Analyzing and identifying the underlying factors affecting earning distribution has been a hot debate among researchers and policy makers. The current literature on earning inequality underlines education as a contributing factor towards earning inequality (Battistón et al., 2014; Nakamura, 2013; Lemieux, 2006; Checchi, 2003; DeGregorio & Lee, 2002; Sylwester, 2000). Within group earning inequality - earning dispersion among workers having same level of schooling- is usually supposed to account for a lot of increase in overall income inequality. This study focuses on within group earning inequality due to education by employing quantile regression technique. It also evaluates whether earning inequality within educational groups has increased or decreased over the period 2001-14. This study shows that there is heterogeneity in the returns to each level of education. Within group earning inequality is higher within workers with tertiary education than with secondary and primary education and it did not remain constant over time. Moreover, these changes have enlarged both the tails of earning distribution. These findings have an important implication for income distribution and labour markets in Pakistan.

The present study contributes in the literature on within group inequality. This study investigates of within-group earning inequality and its estimate the changes overtime for primary, secondary and tertiary education groups. The within-group earning inequality is estimated by difference in returns to three educational groups using quantile regressions approach. The results of study highlights crucial role of education in changing the earnings structure of Pakistan.

The study is outlined as follows. Section two presents the empirical specification of earning function based on quantile regression utilized in this study. Section three describes four samples used in the analysis and discusses socioeconomic characteristics of working population. In section four, we report empirical results with a particular emphasis on the effect of primary, secondary and tertiary level of education upon different quantiles of earnings distribution and its evolution during 2001-14. Finally, section five concludes the study with some policy recommendations.

2. Empirical Specifications and Literature Review

Following the Buchinsky (1994), the quantile regression earnings function can be written as follows:

$$Lnw_i = x_i'\beta_\theta + u_{\theta i} \ with \ Quant_\theta(Lnw_i|x_i) = x_i'\beta_\theta \ (i=1,........,n)$$

where x is the vector of explanatory variables and β_θ is the vector of parameters and u_θ is random error term. $Quant_\theta(Lnw_i|x_i)$ denotes the θth conditional quantile of **lnw**, given **x**.

Following the recent literature, the empirical model of earnings is specified as follows:

$$LnW_i = \alpha + \beta_{\theta 1}Edu + \beta_{\theta 2}Exp + \beta_{\theta 3}Expsq + \sum_i \delta_{\theta i}Z_i + u_{\theta i}$$

where, θ is quantile being analyzed, LnW is the natural log of monthly earnings for the ith individual, Edu is years of schooling in above equation. The extended Mincerian earnings function is used to estimate returns to different levels of education, by converting the continuous years of education variable into dummy variables. After including educational dummies the above equation takes the form:

$$LnW_i = \alpha + \beta_{\theta 1}primary + \beta_{\theta 2}\sec ondary + \beta_{\theta 3}tertiary + \beta_{\theta 4}Exp + \beta_{\theta 5}Expsq + \sum_i \delta_{\theta i}Z_i + u_{\theta i}$$

where primary, secondary and tertiary refer to dummy variables for primary, secondary and tertiary education. These educational dummy variables are defined as follows:

$$Primary = \begin{cases} x, 0 \le x \le 5 \\ 5, x > 5 \end{cases}, \qquad Sec ondary = \begin{cases} 0, x \le 5 \\ x-5, 5 < x \le 12, \\ 7, x > 12 \end{cases}$$

$$Tertiary = \begin{cases} 0, x < 12 \\ x-12, x \ge 12 \end{cases}$$

where, x is years of schooling of an individual. Exp is labor market experience, $Expsq$ is square of labor market experience and Z includes dummies for gender, marital status, region of residence, occupation and province of residence. The description of the variables is given in Table 1.

In the quantile regression framework, the coefficients at different quantiles show the effect of each level of education on the earnings for individuals having the same observable characteristics but are located at different parts of the earnings distribution due to earning ability.

Table 1: Definitions of Variables

Variables	Description
Educational Dummies*	
Primary Secondary Tertiary	= 1 if respondent completed 1 to 5 years of education and 0 otherwise = 1 if respondent completed 6 to 12 years of education and 0 otherwise = 1 if respondent completed 13 years of education or higher and 0 otherwise
Exp Expsq Gender Marital status	= age – years of schooling – 5 = square of Exp = 1 for male and 0 otherwise = 1 for currently married respondents and 0 otherwise
Region	=1 if respondent live in urban area and 0 otherwise
Province** Sind KPK Baluchistan	= 1 if respondent live in Sind province and 0 otherwise = 1 if respondent live in KPK province and 0 otherwise = 1 if respondent live in Baluchistan province and 0 otherwise
Occupational Dummies***	
Manager	=1 if Legislators and Senior Officers and Managers and 0 otherwise
Professional	=1 if Professionals and 0 otherwise
Technician	=1 if Technician and Associate Professionals and 0 otherwise
Clerk	=1 if Clerks and 0 otherwise
Service	=1 if Service Workers and Shop Market Sale Workers and 0 otherwise
Agriculture	=1 if Skilled Agriculture and Fishery Workers and 0 otherwise
Craft	=1 if Craft and Related Trade workers and 0 otherwise
Operator	=1 if Plant and Machine Operators and 0 otherwise
Elementary	=1 if Elementary (Unskilled) Occupations and 0 otherwise

*The respondent possesses no education is reference category.
**Punjab province is reference category.
*** Armed force employees are reference category.

2.1 Measure of Within Group Earning Inequality

Difference between the estimated coefficients at relevant conditional quantiles can be used as a measure of impact of a covariate on within-group earning inequality (Machado & Mata, 2001). For measuring impact of education on within-group earning inequality, difference of estimated coefficients of dummies for primary, secondary and tertiary education at the two extreme deciles (1st and 9th decile) have been used in the study.

These differences are called residual inequalities of earning after controlling other factors by regression models (Budria, 2010).

2.3 Data Sources

Data from one round of the Pakistan Integrated Household Survey (PIHS) for period 2001-02 and three rounds of the Pakistan Social and Living Standards Measurement (PSLM) Survey for period 2005-06, 2007-08 and 2013-14 have been used for the analysis.

3. Data and Sample Statistics

The study uses four sets of household survey data. These data supply comprehensive information on characteristics of working population. Keeping in view the standard definition of labor force, only individuals ranging from age 15 to 65 are kept in the samples. These samples are described in Table 2, which documents a number of changes in Pakistani labor market which have occurred over time.

Table 2: Socio-Economic Characteristics of Respondents

	2001	**2005**	**2007**	**2014**
Income(in Rupees)	4881	6408	6810	7205
Years of schooling	5.06	5.42	5.66	5.86
Experience	25.87	25.46	25.60	25.70
Gender				
Male	91%	88%	89%	87%
Female	9%	12%	11%	13%
Marital status				
Married	72%	71%	72%	72.4%
Unmarried	28%	29%	28%	27.6%
Region				
Urban	42%	43%	43%	43.5%
Rural	58%	57%	57%	56.5%
Province				
Punjab	40%	42%	42%	43%
Sind	29%	27%	26%	26%
KPK	17%	18%	18%	17%
Baluchistan	14%	13%	14%	14%

The average monthly income increased from Rs. 4881 to Rs. 7205, which shows a 48% increase in monthly income during this period. The monthly income has been adjusted for inflation using the Consumer Price Index with 2000-01 as the base year. During this period, the education of workers increased marginally from an average of 5.06 years of schooling to 5.86. Data used for the study do not contain direct information on labor market experience. Therefore, as used in earlier studies (e.g. Hyder, 2007; Dutta, 2006;

Nasir, 2000; Nasir & Mehmood, 1998; Ashraf & Ashraf, 1993) the measure of potential experience is defined as age minus years of schooling minus 5. Thus, approximation of experience reflects the joint valuation of age and schooling. As depicted in Table 2, average experience of the workers remained almost same over the time. The composition of labor force has changed to some extent; the proportion of female has increased from 9 % in 2001 to 13% in 2014. Most of the workers are married (72%) in the samples. The share of workers having urban background has increased slightly over the time from 42% to 43%. The distribution of labor force remained almost unchanged for Baluchistan and KPK over the time. For Punjab, it has increased by 3% while for Sind it has decreased by the same percentage.

The differences in earnings are directly related to variations in required physical and mental abilities of the workers for the occupation. Therefore, the choice of occupation reflects skills of the individuals. To see the relationship between choice of occupation and skills in terms of education, the average year of schooling of worker by occupation is presented in Table 3.

Table 3: Average Years of Education of Workers by Occupations Overtime

Occupations	**2001**	**2005**	**2007**	**2014**
Manager	10.92	12.57	13.15	13.61
Professional	12.46	12.89	13.06	13.43
Technician	10.87	10.83	10.94	11.07
Clerk	11.16	10.86	11.20	11.52
Service	5.65	6.08	6.11	6.13
Operator	4.70	5.16	5.13	5.25
Craft	4.55	4.55	5.05	5.10
Elementary	2.97	3.31	3.51	3.90
Agriculture	2.66	3.08	3.21	3.50

Average year of schooling is the highest for managers in 2007 and 2014 whereas average year of schooling for professionals is highest in 2001 and 2005. The average education of skilled agriculture and fisheries workers is the lowest as compared to other occupations in all the years. Elementary, agriculture, craft and operator occupations mainly absorbed primary school level workers whereas managers, professionals, technicians and clerks have higher average education. As the information in the table confirms that the occupations paying higher payoff are the occupations with skilled employees and vice versa. Therefore, the occupation of workers is associated with the level of education of the workers. The descriptive analysis of four samples used in our study suggests a direct link between choice of occupation and education.

4. Results

4.1 Effect of Education on Earnings by Education Levels

This section presents the estimated results of equation having educational dummies of three categories of education; primary, secondary and tertiary as specified in above equation. The earning function has been estimated at nine deciles, which are denoted by

$\theta=0.1$, $\theta=0.2$, $\theta=0.3$, $\theta=0.4$, $\theta=0.5$, $\theta=0.6$, $\theta=0.7$, $\theta=0.8$, $\theta=0.9$. For the sake of brevity, the study discusses only the impact of primary, secondary and tertiary education upon the distribution of the log of the monthly earnings for four years as it is the focus of the study. The coefficients of primary, secondary and tertiary education in the earning equations and their respective t-statistics are presented in Table 4 to Table 6. These coefficients are interpreted as returns to each level of education at different quantiles of earning distribution. The effect of each level of education on earnings is positive and statistically significant at each of the quantiles analyzed in all the years.

The returns to primary education tend to increase in 2005 and 2007 as the quantile number increases and the same holds for 2001 after 0.2 quantile. Conversely, the pattern is considerably different in 2014; the returns are unstable across all quantiles. The returns to secondary education increase with the quantile numbers in 2007 and same holds for 2005 after 0.2 quantile. In 2001, returns indicate a cut until 0.5 quantile and then increase afterwards while in 2014 returns are unstable up till 0.5 quantile and then increase afterwards. The returns to tertiary education increase with the quantile numbers in 2005 and 2007. In 2014, returns reveal a decline until 0.3 quantile and then increase afterwards and the same is evident for 2001. These results are in line with Hartog et al. (2001) for Portugal.

The pattern of superior returns as level of education becomes higher is also confirmed by the OLS results in all years. This result supports the findings of previous studies done for Pakistan (Ashraf & Ashraf, 1993; Aslam, 2007; Guisinger, Henderson & Scully, 1984; Hamdani, 1977; Haque, 1977; Khan & Irfan, 1985; Nasir & Nazli, 2002; Shabbir, 1991, 1994; Shabbir & Khan, 1991).

Table 4: Estimated Coefficients of Primary Education of QR and OLS, 2001-14

Quantiles	2001	2005	2007	2014
$\theta=0.1$	0.163* (6.71)	0.133* (5.27)	0.147* (5.46)	0.182* (7.21)
$\theta=0.2$	0.154* (9.65)	0.135* (9.30)	0.172* (9.74)	0.161* (6.21)
$\theta=0.3$	0.155* (15.86)	0.151* (11.02)	0.188* (12.70)	0.179* (8.13)
$\theta=0.4$	0.163* (13.43)	0.151* (12.15)	0.191* (12.05)	0.159* (8.43)
$\theta=0.5$	0.168* (14.47)	0.165* (15.32)	0.209* (16.33)	0.174* (15.66)
$\theta=0.6$	0.185* (16.18)	0.187* (17.04)	0.222* (13.85)	0.185* (12.55)
$\theta=0.7$	0.200* (19.77)	0.194* (17.74)	0.221* (16.08)	0.179* (13.97)
$\theta=0.8$	0.202* (16.12)	0.192* (12.46)	0.235* (14.12)	0.320* (10.84)
$\theta=0.9$	0.239* (11.40)	0.219* (13.79)	0.257* (12.47)	0.171* (8.27)
OLS	0.191* (15.13)	0.175* (12.74)	0.220* (16.74)	0.174* (11.83)

Note: t-statistics are in parentheses; * significant at 1%

Table 5: Estimated Coefficients of Secondary Education of QR and OLS, 2001-14

Quantiles	2001	2005	2007	2014
θ=0.1	0.464* (25.65)	0.384* (13.12)	0.379* (18.75)	0.437* (16.82)
θ=0.2	0.458* (25.04)	0.364* (18.05)	0.423* (28.78)	0.415* (21.21)
θ=0.3	0.439* (33.89)	0.390* (23.33)	0.442* (35.95)	0.427* (22.92)
θ=0.4	0.438* (33.84)	0.397* (26.90)	0.452* (41.12)	0.419* (23.71)
θ=0.5	0.438* (44.13)	0.423* (31.15)	0.471* (46.56)	0.425* (23.54)
θ=0.6	0.455* (35.25)	0.454* (39.88)	0.492* (40.71)	0.445* (27.03)
θ=0.7	0.476* (31.06)	0.485* (34.33)	0.507* (47.61)	0.449* (23.70)
θ=0.8	0.489* (28.84)	0.519* (31.98)	0.542* (35.52)	0.468* (26.36)
θ=0.9	0.534* (24.72)	0.600* (19.84)	0.564* (25.37)	0.592* (26.20)
OLS	0.487* (39.81)	0.466* (35.75)	0.519* (42.36)	0.451* (31.77)

Note: t-statistics are in parentheses; * significant at 1%

Table 6: Estimated Coefficients of Tertiary Education of QR and OLS, 2001-14

Quantiles	2001	2005	2007	2014
θ=0.1	0.941* (22.32)	0.800* (21.45)	0.802* (23.46)	0.823* (19.51)
θ=0.2	0.899* (26.17)	0.830* (29.43)	0.855* (34.16)	0.829* (23.20)
θ=0.3	0.871* (40.69)	0.860* (35.54)	0.858* (46.12)	0.825* (24.91)
θ=0.4	0.886* (37.07)	0.895* (30.10)	0.875* (41.70)	0.831* (34.54)
θ=0.5	0.906* (41.34)	0.920* (35.82)	0.924* (49.57)	0.862* (39.91)
θ=0.6	0.955* (34.57)	0.983* (43.89)	0.978* (50.18)	0.913* (45.17)
θ=0.7	1.011* (34.69)	1.030* (30.97)	1.014* (36.21)	0.938* (40.10)
θ=0.8	1.052* (32.22)	1.087* (37.41)	1.073* (41.04)	0.993* (40.42)
θ=0.9	1.114* (33.50)	1.220* (30.17)	1.142* (29.76)	1.199* (28.58)
OLS	1.026* (49.84)	0.996* (46.20)	1.014* (49.53)	0.940* (40.01)

Note: t-statistics are in parentheses; * significant at 1%

Changes in the returns to education for different levels of education over time can be observed from the tables. During 2001-2005, downward changes occur in returns to primary at all quantiles except at 0.5 quantile. There is an increase in returns at all quantiles during 2005-07. The returns to primary education decreased considerably from 2007 to 2014 at all quantiles except 0.1 and 0.9 quantile and same is true for secondary and tertiary education.

During 2001-05, returns decrease noticeably until median and the difference vanishes at 0.6 quantile then returns increase afterword. For the period 2005-07, returns are higher in 2005 at 0.1 and 0.9 quantile but an upward change apparently takes place as we move toward higher quantiles up to 0.8 quantile. The pattern of changes during 2001-05 reveals that the returns are higher in 2001 than in 2005 at lower quantiles but an upward shift is apparent from nearly 0.4 quantile in 2005 over 2001. For the period 2005-07, returns are higher in 2007 than in 2005 until 0.3 quantile while returns are identical at median of the distribution however; higher returns are obvious after 0.6 quantile for 2005 over 2007. This implies that returns to tertiary education have decreased for the upper part of the distribution during the 2005-07. This may be attributed to increase in supply of university graduates in labor market during this period.

In many countries increasing returns have been documented by various studies, for example Biagetti and Scicchitano (2011); Bargain et al. (2009) for India and China; Patrinos and Sakellariou (2006) for Venezuela; Fiszbein and Patrinos (2005) for Argentina; Fersterer and Winter-Ebmer (2003) for Austria; Lin and Orazem (2003) for Taiwan; Wambugu (2002) for Kenya; Gonzalez and Miles (2001) for Uruguay; Bushinsky (1998) for USA.

4.2 Education and Earning Inequality

Following Machado and Mata (2001) for measuring impact of education on within group earning inequality, the difference of estimated coefficients of education at the two extreme deciles (1st and 9th decile) have been used in the study. These differences are presented in Table 7. These results reveal that education has a positive effect on within group earning dispersion. This finding tends to support the notion of Machado and Mata (2005), which is known as the 'inequality increasing effect' of education.

Table 7: The Impact of Education on Earning Inequality: ($\theta=0.9 - \theta=0.1$)

	2001	2005	2007	2014
Level of Education				
Primary	0.075	0.087	0.110	0.138
Secondary	0.071	0.215	0.186	0.175
Tertiary	0.172	0.421	0.340	0.376

Source: Author`s own calculation from Tables 4-6

For primary education, the difference in the returns between 0.9 and 0.1 quantile is 7.5, 8.7, 11.0 and 13.8 percentage points while for secondary education it is 7.0, 21.5, 18.6 and 17.5 percentage points in 2001, 2005, 2007 and 2014, respectively. For tertiary education, this difference is 17.2, 42.1, 34.0 and 37.6 percentage points in 2001, 2005, 2007 and 2014, respectively. In case of primary education, the within group earnings inequality increased from 2001 to 2014 while it widened unexpectedly from the 2007 to

2014. However, this amount of inequality is lower as compared to secondary and tertiary education groups in each year. The within group earnings inequality is highest in 2005 except for primary education. Within group earning inequality is higher within the individuals with tertiary education than within the individuals with secondary and primary education in all years. This supports theory of Arrow (1973), who argues that the role of education as screening device is more pronounce in case of tertiary education. These results support to Skill-Biased Technical Change theory and are in line with the findings of Budria and Pereira (2010) for Norway, Italy and Greece that education contributed towards within-group earning inequality. Increase in within-group inequality by education is also observed by Patrinos, Radao and Sakellariou (2009) for Latin American countries; Lemieux (2006) for USA; Martins and Pereira (2004) for Ireland, Portugal, Spain, Netherlands, Sweden, United Kingdom; Machado and Mata (2001) for Portugal; Gosling, Machin and Meghir (2000) for UK. The authors who hold an opposing view that education has a declining effect on within group earning inequality include Tansel and Bircan (2010) for Turkey; Bargain, Bhaumik, Chakrabarty and Zhao (2009) for India and China; Budria and Pereira (2010) for Portugal and Sweden; Pereira and Martins (2004) for Greece.

We may advance some explanations that account for differences in returns to education. One of the main explanations for this is related to skills. An individual who is located at upper quantiles of earning distribution has more skills. These skills consist of ability, better academic qualifications and other unobservable characteristics which affect productivity. When these favorable skills complement with education they earn more than those who have less skill with the same level of education. Another explanation that can be advanced is differences in quality of schooling. It may be the case that individuals who are located at the bottom of earning distribution are those who benefited from poor schooling quality and vice versa. Finally, field of study may be another driving force for within group earning inequality. It is possible that workers who are at the bottom of the distribution are those who were engaged in the field of study that attract less interest in labor market. This is likely to be more prevalent at tertiary level of education because there is more variety in educational paths.

4.3 Changes in Earning Inequality

Changes in earning inequality that have taken place are presented in Table 8. The second and third columns report changes in OLS returns and the difference ($\theta=0.9$ - $\theta=0.1$), respectively. Last two columns report changes in returns at 0.9 and 0.1 quantile respectively. Although our main focus is on earning inequality within education levels but we briefly discuss changes in average returns over time. The average returns to all the levels of education have increased. This increase in returns is higher in case of tertiary level of education as compared to primary and secondary levels, which contributed in earning inequality. Therefore, this increase in average returns has contributed in earning inequality between three education groups.

Table 8: Changes in Earning Inequality Overtime

	ΔOLS	Δ(θ=.9- θ=.1)	Δθ=0.9	Δθ=0.1
Primary	0.046	0.063	0.081	-0.034
Secondary	0.068	0.094	0.058	-0.058
Tertiary	0.074	0.204	0.085	-0.118

The earning inequality did not remain constant within the education groups over time. An increase in the difference (θ=0.9 - θ=0.1) corresponds to increase in earning inequality within education groups over time. The results in table reveal that earning inequality rose within all educational levels. The change in difference for tertiary education is highest among all educational levels. For secondary level education, within group earning inequality increased but this change is less as compared to tertiary level of education. The difference for primary level education rose markedly which shows that earning inequality in this group is not constant. These findings are consistent with the evidence provided by Tansel and Bircan (2010) for Turkey; Budria and Pereira (2010) for Norway, Greece and Italy and this tendency contrasts with the results of Hartog, Pereira and Vieira (2001) for Portugal.

Changes in returns to education are not homogenous across segments (at upper and lower parts) of the earning distribution for all the levels of education. The figures reported in table show that over the time, changes at lower part (Δθ=0.1) of earning distribution are negative. It implies that there has been a deterioration of returns to all levels of education earned by individuals in low paid jobs. This deterioration of returns is high for tertiary education as compared to secondary and primary level of education. Falling returns at lower quantile of earning distribution may be due to over-education; when workers are more qualified than the job requirement (Dolton & Vignoles, 1997; Fersterer & Winter-Ebmer, 2003; Sicherman, 1991). It suggests that lower ability workers with higher education have entered in labor market during the period under study. This evidence is consistent with Budria and Pereira (2010) for France, Portugal and Sweden. However, changes at upper part (Δθ=0.9) of the earnings distribution are positive. This change in returns to tertiary education is highest as compared to secondary and primary level. The returns to all levels of education at highest quantile have increased and these changes have enlarged lower as well as upper tail of earning distribution over the time. These asymmetric changes have contributed in rising inequality in Pakistan.

Although changes in within groups earning inequality reveal that education has contributed in enhancing the inequality during 2001-14. However, an inter-temporal analysis can make the picture clearer that the trend of earning inequality is increasing or decreasing between the time periods. Inter-temporal changes in the difference (θ=0.9 - θ=0.1) have been reported in Table 9. Within group inequality has grown during all periods within primary educated workers. Within group inequality narrowed from 2005 to 2007 for secondary and tertiary education while it widened surprisingly from 2001 to 2005.

Table 9: Inter-temporal Changes in Earning Inequality Δ(θ=0.9 − θ=0.1)

	2001-05	**2005-07**	**2007-14**
Primary	0.012	0.023	0.028
Secondary	0.144	-0.029	0.011
Tertiary	0.249	-0.081	0.036

This inter-temporal analysis shows that the effect of education on earning inequality is mix; during the first and third period it raised earning inequality while during the second period it reduced earning inequality. It does not confirm that in education it will increase or decrease income inequality in the long run. For this purpose, evidence on relationship between education and income inequality in the long run is required. The analysis in this study investigates effect of investment in education on earnings and earning inequality at four points in time or in static manner.

5. Conclusion and Policy Recommendations

The objective of the study is to conduct an analysis on the relationship between education and within groups earning inequality and its evaluation from 2001 to 2014. It is ascertain that education played a role in increasing within group earning inequality. Particularly, within group earning inequality is larger within workers with tertiary education than within secondary and primary education groups. Moreover, earning inequality did not remain constant within the education groups over the time. Inter-temporal analysis shows that within group inequality has grown within workers having primary education during 2001-2014. Effect of education on earning inequality is mix for workers having secondary and tertiary education during 2001-2014. Within group inequality reduced during 2005-07 for these workers and it widened surprisingly from 2001 to 2005. During 2007-14, it widened to some extent again within workers with secondary and tertiary education.

The policy recommendations should be treated as suggestive as much more remains to be done in this area of research. It is imperative to design the policies that will ensure a uniform distribution of educational opportunities and their multiplication according to the needs of society. It can be done by correcting regional imbalances in the distribution of educational facilities coupled with minimum schooling legislation. It is also pertinent to make sure that the educational programs are useful and their benefits are being distributed equitably.

Another policy issue is relevant to multiple education system in Pakistan. In fact, education policies are largely formulated and maintained around the issues of achievement of literacy and enrollment targets rather addressing the issues of this apartheid nature of education system that leads to several economic imbalances. It is equally important to emphasize on these issues in education policy.

Last but not the least, education system requires a thorough view and particularly, the amendment of current curriculum to improve quality of education at all levels. Curriculum should be reviewed in order to make it more relevant to the needs of job market.

This study has many extensions that are left to further research, for example, it remains to be unstated that how is education playing its role in changing earnings inequality. We

also leave a systematic investigation of long run relationship between education and earnings inequality to future research as the present study does not validate that education will increase or decrease income inequality in the long run. Moreover, it is equally important to study the factors other than education that cause the within group earnings inequality.

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