The Impact of Educational and Gender Inequality on Income Inequality in South Asia

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Abstract

This paper examines the impact of educational and gender inequality in education on income inequality in South Asian countries for the time period of 1980 to 2010. Random effect model (REM) and fixed effect model (FEM) are used for estimation. Using the concept of education Gini the study find that there exist a positive relationship between educational and income inequality. The results also indicate that gender inequality in education at primary and tertiary level has positive and significant impact on income inequality but gender inequality at secondary level has negative and significant impact on income inequality. On the other hand, gender inequality at primary and tertiary level of education has negative impact on per capita income, while at secondary level has positive impact. The results also confirm that there exist U shaped Kuznets curve for the relationship between average year of schooling and inequality in education.

1. Introduction

Income inequality has long been the most interesting and debating topic among the economists for its very clear impact on every field of economy. Increase in income inequalities is badly affected the development process of a country. Income inequality leads to increase in inequality in education between income classes that resulted in creating income inequality for the next generation (Addelbaki, 2012). According to Kuznets (1955) the inequality in income increase in the early stages of development and then reach at maximum but after some time or in the later stages of development inequality will generally declines. This inverted-U hypothesis which shows the relationship between income inequality and development is known as Kuznets curve.

Human capital matters to state's level income and its economic growth (Connolly, 2004). If the inequality in education is high in a country then the income inequality is expected to be high in that country. Policymakers are more interested in examining the impact of inequality in education on income inequality. Previous research highlights that the expansion of education is a major factor that increase the income level of people and help to reduce income inequality and there exist a positive relationship between the education and earning level of people or country (Addelbaki, 2012; Baye & Epo, 2013; Connolly, 2004; Ismail & Yussof, 2010). There are some studies that show that the more education and equal distribution of education among people plays a great role in reducing income inequality of a country (Gregorio & Lee, 2002; Lin, 2007). There is a growing literature on the negative relationship between gender inequality in education and income or growth level of country (Klasen, 2002; Baliamoune & Mcgillivrary, 2009; Klasen & Lamanna, 2009; Baliamoune & Mcgillivrary, 2015).

To remove the gender disparity at the primary and secondary level of education by 2005 and 2015 at all level of education is one of the Millennium Development Goals (MDG) set by United Nation (UNDP, 2000). The Gender inequality in education causes reduction in literacy rate (Summers, 1994; King, 1995). The investment in education can helps to resolve the problem of poverty and income inequality which support the development process of a country.

> "If we educate a boy, we educate one person. If we educate a girl, we educate a family and a whole nation." (Wolfensohn, 1995, p. 23-27).

In developing countries, female education plays a great role in reducing infant mortality and helps in improving the health of family and children as well as the quality and quantity of education of children. Moreover, female education is important to increase the labor productivity (Knowles et al., 2002).

According to the World Bank (2014) income inequality in South Asia is higher in richest countries and it has increased as countries become more developed. A country that has high per capita income is characterized by high income inequality. According to Asian Development Bank, in South Asia the enrolment ratio for secondary and tertiary education is very low and the regional literacy rate is approximately 62.4%. The students who belong to lower income class are less likely to complete their higher education in South Asian countries and it is a major problem especially in Nepal, Bangladesh and Sri Lanka. Access to higher education for female education is improving from 1990-2009 and it is approximately 57% in Sri Lanka and Bangladesh, however, in Pakistan the women participation rate in higher education is about one third while in India there is less progress in that period. According to the Global Gender Gap (2013) Pakistan is the second worst country in term of gender equality.

This study investigates the effect of educational inequality and gender inequality on income inequality in South Asian countries (Afghanistan, Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka). The specific objectives of this study are: to measure the impact of educational inequality at aggregate (total) and disaggregate (male and female) level on income inequality, to measure the impact of gender inequality on income inequality, and to test the Kuznets's inverted-U hypothesis concerning the relationship between inequality in education and average year of schooling.

The main contribution of this study is to examine whether the inequality in income increased or decreased due to increased or decreased in educational and gender inequality in South Asian countries. To our knowledge, no work has attempted to develop a measure of educational and gender inequality in South Asian countries. Various policy implications will be provided by this study to explore the importance of equal distribution of education to reduce income inequality in South Asian countries. The study uses the Marin and Psacharopoulos (1976) model of human

capital theory. Panel data techniques Random effect model (REM) and fixed effect model (FEM) are used for estimation.

2. Literature Review

2.1 Literature on Educational Inequality and Income Inequality

The inverted-U hypothesis is presented by Kuznets (1955) and predicts that how inequality increases first and then after reaching a point starts decreasing. The finding of the study shows that the inequality in income increases in the early stages of development and then reach at maximum but after some time or in the later stages of development the inequality in income will generally declines. This inverted-U hypothesis which shows the relationship between income inequality and development is known as Kuznets curve. Marin and Psacharopoulos (1976) explained the relationship between schooling and income distribution in United State. They found that there exit a positive relationship between inequality in education and inequality in income. They also indicate that due to increase in average year of schooling the income inequality decreased.

O'Neill (1995) examined the extent to which patterns of human capital convergence can account for observed pattern of inequality in income between countries during the time period of 1967 to 1985. The study also analyzes the income convergence over that time period. By using income variance, human and physical capital he found that in many developed countries the inequality in income will reduce due to increase in the education level. Thomas et al. (2001) investigate the relationship between average year of schooling and inequality in education over the time period of 1960 to 1990 for 85 countries. The study calculated the Gini index of education by direct and indirect methodology by using Lorenz curve. They also calculate the average year of schooling and standard deviation at seven level of education. By using random and fixed effect model they explained that the inequality in education decreased and there exist negative relationship between average year of schooling and inequality in education. Castello and Domenech (2002) using cross country regression explain the effect of human capital on economic growth during the time period of 1960 to 2000 and provide the new measure of human capital. The finding of study shows that inequality in human capital negatively affects the growth level of country. Moreover,

study also concludes that the human capital inequality is a better measure than the income inequality measures in the standard growth and investment estimation.

Gregorio and Lee (2002) investigate the relationship between education and inequality in income level during the time period of 1960 to 1990. The study used the seemingly unrelated regression (SUR) method. The finding of the study shows that higher level of education plays a very important role in reducing income inequality of a country. Equal distribution of education among population also plays a great role to reduce inequality in income level. Connolly (2004) examined the importance of human capital convergence across the states from 1880 to 1950 by using panel data. The study used the ordinary least square method and found that the human capital matters to state's income level and economic growth rate through technology diffusion. Jamal and Khan (2005) examined the inequalities in education at district level in Pakistan. A district education index (DEI) is used in this study to explain the performance of district in term of education. The results of the study show that there exist a low level of educational status and high level of inequality in education in Pakistan.

Zhang and Zhang (2005) explained the effects of increasing longevity on saving, education, fertility and growth during the time period of 1960 to 1989 for 75 countries. They used the ordinary least square method (OLS) and overlapping generation model to achieve the objective. The study show that the life expectancy has significant and positive impact on saving rate, secondary school enrollment and growth rate but it has negative impact on fertility. Mesa (2007) measured the degree of inequality in education in Philippine's for 16 regions and 78 provinces for the time period of 1960 to 2000. The study find that overall inequality in education is declined but not at regional and provinces level. By using decomposition analysis the study found that the inequality in educational attainment is more in poor provinces than non-poor provinces. The results also indicate that the inequality in education affect the average year of schooling, gross domestic regional products negatively but positively affect the income inequality and poverty gap. Lin (2007) described the effect of expansion of education and inequality in education on income inequality during the time period of 1973 to 2003. The results demonstrate that if the average of schooling increased than the inequality in education decreased. The increase in the average year of schooling and lower level of inequality in education will generate low level of inequality in income.

Pose and Tselios (2009) aimed to examine how the microeconomics changes in the distribution of human capital affect the income inequality of people during the time period of 1995 to 2000 for 102 regions of EU. They deal with the three different models of regression such as spatial, non-spatial and dynamic models. Results show that there exist a positive relationship between income per capita and income inequality as well as human capital endowment and inequality in income. The results also show that there exists a high level of inequality in education that is associated with the high level of inequality in income level of people. Other results indicate that the inequality in income level of people negatively affect the urbanization, agriculture, industry, female participation in labor force while the unemployment and strong financial sector affect the inequality in income positively. Ismail and Yussof (2010) analyze the role of human capital achievement on inequality in income in Malaysia. This analysis is based on 4003 household data. The results of the study confirms the pattern of distribution of income in Malaysia and all human capital variables plays significant role in determining the household income which reflect income inequality. Addelbaki (2012) described the causal link between inequality in education and income inequality in Bahrain during the time period of 1980 to 2006. The analysis is based on income and households expenditure survey. The finding of study concludes that there exist a positive correlation between the level of education and income level of family and inequality in education declined in Bahrain over this time period. Moreover, the study also concludes that income inequality leads to increase the education inequality between different income classes that resulted in creating the income inequality for the next generation.

Reza and Valeecha (2012) investigate the impact of education on economic growth of Pakistan during the time period of 1981 to 2010. The study used the ordinary least square method (OLS) for estimation process. The study shows that the in short run no relationship exist between education and growth level but in the long run education plays great role to increase the growth level of country. Ibourk and Amaghouss (2013) checked the impact of inequality in education on economic growth of MENA region during the time period of 1970 to 2010 for 15 countries. The study used the ordinary least square method and fixed effect model for estimation. The results show that the inequality in education declined in all countries and negatively affect economic growth. Moreover, they also show the validity of Kuznets curve in the field of education for all counties of MENA region. Baye and Epo (2013) investigate the impact of human capital endowment on the measured income inequality in Cameroon. The study used ordinary least

square method (OLS), two stage least square method (2SLS) and multi correspondence analysis method (MCA). The finding shows that the human capital endowment is important to reduce the inequality in income and it is positively correlated with the household economic wellbeing.

Stankova (2014) examined the convergence of educational attainment levels at seven level of education in the EU for the time period of 1950 to 2010. The study used the average year of schooling for population aged 25 and over for educational attainment variable at seven level of education. The study found that for all countries the average year of schooling is increased which shows the expansion of education over time. Sauer and Zagler (2014) described the relationship between the level of education, its distribution and economic development during the time period of 1950 to 2005 at five year interval. By using panel and generalized method of moments (GMM) they conclude that the education positively effects the growth while educational inequality negatively effects the growth. The results show that the inequality in education is good at low average level of schooling but it is harmful for country development at high average level of schooling.

2.2 Literature on Gender Inequality

Dollar and Gatti (1999) aimed to check the impact of gender inequality in education on income per capita and economic growth during the time period of 1975 to 1990 for 127 countries. The study used the ordinary least square method (OLS) and two least square methods (2SLS) for estimation. The results show that the female education is more important for economic growth, while there exist negative relationship between gender inequality in education and per capita income. Klasen (2002) investigates how gender inequality in education affects long-term economic growth during the time period 1960 to 1992. The finding of the study shows that by lowering the average level of human capital or education, gender inequality in education directly affects economic growth. Moreover, growth is affected indirectly through the impact of gender inequality in education on investment and population growth.

Knowles et al. (2002) described the effect of education of both male and female on labor productivity during the time period of 1960 to 1990. The study used the ordinary least square method (OLS) for estimation and examined the neoclassical growth model by including male and female education as an explanatory variable. They found that there exist a positive

relationship between education and female education. Moreover, to increase the labor productivity it is important to increase the education of female. Klasen and Lamanna (2009) investigate to what extent gender gaps in education and employment decrease the economic growth of country during the time period of 1960 to 2000. They found that the gender gaps in education and employment considerably reduce the growth level of a country. Gender gap in employment appear to have an increasing effect on growth differences between regions or areas, with the Middle East and North Africa, and South Asia suffering from very slow growth or progress in female employment.

Lutz and Mcgillivray (2009) checked the impact of gender inequality in education on economic growth of sub-Saharan Africa and Arab countries during the time period of 1974 to 2004 for 31 countries. By using panel data analysis and generalized method of moments (GMM) the study concludes that the negative impact of gender inequality on economic growth exist more in Arab countries than sub-Saharan countries. The results also show that interaction between gender inequality in education and trade openness has more and stronger impact on economic growth. Baliamoune and Macgillivrary (2015) examined the impact of gender inequality in education on per capita income. The time period used in this study for eight periods and average over three periods 1989 to 1992 and 2010 to 2012 for 41 countries. They used the data of sub-Saharan African, North African and Middle Eastern countries. By using fixed effect model and generalized method of moments they found that gender inequality in education at primary and secondary level of education effect the per capita income negatively.

3. Methodology and Data

3.1. The Model

According to the human capital theory, in labor market the income earned by an individual can be estimated as a function of number of year spent in schooling or education. The productivity of labor is increased in the labor market through education. The distribution or inequality in income or earning level of a person can arise, even though they get the same amount of education due to the other factor like quality of education and specialization when it comes to high level of education.

Following Marin and Psacharopoulos (1976), this study checks the impact of educational inequality on income inequality. In the work of Marin and Psacharopoulos (1976) the income level of a person with S year of schooling is expressed as:

$$\log Y_s = \log Y_o + \prod_{j=1}^{s} \log (1 + r_j) + u \quad \textbf{(1)}$$

Where, Y_s shows the income level of an individual and S represent the year of schooling, Y_o with zero schooling and r is the rate of return to the j^{th} year of schooling and u denotes the other factors that influence the income level of individuals.

In order to apply this equation for an individual with S year of schooling, one considers these two directions: the first one is that the all year of schooling for all individuals, the average rate of return is assumed to be constant. The second one is that for each individual the rate of return to the education is consider as random variable but it assumed as independent of S.

By using log (1+r) = r equation (1) can be written as:

$$\log Y_s = \log Y_o + rS + u \quad \textbf{(2)}$$

Taking variance on both sides of equation (2) and assuming that the r and S are not correlated with Y_o and error term, the income with the education can be expressed as a function of rate of return to education and the level of education:

$$\text{var} (\log Y_s) = \text{var} (rS) \quad \textbf{(3)}$$

When the rate of return and year of schooling are treated as random variables they enable to forecast about the impact of changes in the rate of return to the education and year of schooling. The right hand side of equation (3) depends on whether two variables (rate of return to the education and year of schooling) are independent or not. If the rate of return to education and year of schooling are independent random variables then the function can be approximated by:

$$\text{var} (\log Y_s) = r^2\text{var}(S) + S^2\text{var}(r) + \text{var} (S)\ \text{var}(r) \quad \textbf{(4)}$$

If the rate of return to the education and year of schooling are dependent then the function is approximately:

$$\text{var}(\log Y_s) = r^2\text{var}(S) + S^2\text{var}(r) + 2rS\,\text{cov}(r,S) \quad \textbf{(5)}$$

Since, all terms are positive on the right hand side of equation (4), one gets the prediction that if the rate of return and year of schooling are independent then increments in the level of education leads to increase in the inequality in the income level of individuals. Moreover, the expansion in the education can decrease the inequality in income if the covariance is negative between the rate of return to the education and year of schooling.

3.2. Econometric Model

In order to check the impact of educational inequality on income inequality this study estimates the following regression equation:

$$G_{it} = \alpha_o + \alpha_1 E_{(a)\,it} + \alpha_2\gamma_{it} + e_{it} \quad \textbf{(6)}$$

To investigate the impact of gender inequality in education on income inequality this study estimates the following regression equation:

$$G_{it} = \alpha_o + \alpha_1 E_{(g)\,it} + e_{it} \quad \textbf{(7)}$$

The study also checks the impact of gender inequality in education on per capita income. For this purpose the study estimates the following equation:

$$I_{it} = \alpha_o + \alpha_1 E_{(g)\,it} + e_{it} \quad \textbf{(8)}$$

Where, G is the Gini coefficient, E_a is the Gini index of educational inequality, E_g is the Gini index of gender inequality in education, γ is average year of schooling (at seven level), I is per capita GDP, i indicate the cross section, t stand for time period and e is error term.

Gini coefficient is most frequently used as a measure of income inequality in the literature. It measures inequality level of a country in income when the value of Gini coefficient is 0 it means there is perfect equality in the income level of country. When the value of Gini coefficient is 1 it means there is perfect inequality in the distribution of income in the country.

3.3. Panel Data Framework

The study used the panel data estimation because panel data framework reduce collinearity among the explanatory variables and give more efficient estimate. The main advantage over the cross-sectional and time series is that panel data control the heterogeneity. Panel data gives more informative results and it also controls the country-invariant or time-invariant variables. Two panel data techniques random effect model (REM) and fixed effect model (FEM) are used for estimation.

In general, when the number of cross-sectional units is smaller than the number of time series data then the fixed effect model is more preferable. The fixed effect model control the unobserved heterogeneity when it is constant with explanatory variables over time. The main assumption of fixed effect model is that the individual specific effect that is correlated to one or more explanatory variables. One important thing in fixed effect model is that the each country has its own intercept and it is different or time-invariant (Gujarati, 2003).Thus the fixed effect (FEM) model is

$$Gini_{it} = \beta_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it} \quad \textbf{(9)}$$

Where, i indicate the cross-sections and t stand for time period and e is error term with mean zero and variance σ^2. Dummy variables are introduced to shows the individual effects in fixed effect model.

Random effect model is also known as the error component model (ECM). The main difference between the fixed and random effect model is the intercept term. In fixed effect model every country has its own intercept but in random effect model the intercept term represent the mean value of cross-sectional intercepts. The error term of random effect model shows the random deviation of individual intercepts from the mean value of intercept. The main assumption of the random effect model is that the individual error term is not correlated with the explanatory variables. Moreover, when the number of cross-sectional units is greater than the number of time series data then the random effect model is more preferable. One important benefit of using random effect model is that it provides more degree of freedom than the fixed effect model (Gujarati, 2003). Thus the random effect model (REM) is:

$$Gini_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + u_{it} \quad \textbf{(10)}$$

In random effect model the term u_{it} consist of two components that is cross-section or individual specific and both time series and cross-section error components. In general we called it idiosyncratic term because it varies over time and cross-sections (Gujarati, 2003).

3.4. Measure of Educational Inequality

In many previous researches they have used the Gini coefficient as a measure of inequality in income as well as for education. Gini coefficient for education is similar to Gini coefficient for income that is used for the income inequality measure ranges from 0 (perfect equality) to 1 (perfect inequality). Thomas et al., (2001) calculated the Gini index for education by using the data of educational attainment level and year of schooling at seven level of education for 85 countries. Lin (2007) also used the concept of education Gini to measure the education inequality at seven level of education for Taiwan during the time period of 1973 to 2003. Castello and Domenech (2002) calculate the education Gini and the distribution of education by quintiles for 108 countries with the help of Barro and Lee (2001) dataset. Sauer and Zagler (2014) compute the education Gini index for 134 countries at seven level of education by the using the educational attainment dataset of Barro and Lee (2013).

This study also used the concept of Gini index of education to describe the impact of inequality in education on income inequality. For this we use the percentage of population aged from 15 and over for each attainment level of education. The attainment level of education is divided into seven groups i.e. no schooling, partial primary, complete primary, partial secondary, complete secondary, and partial tertiary and complete tertiary.

To calculate the average year of schooling for seven different level of education we used the following formula:

$$\text{Average Year of Schooling} = \gamma = \sum_{i=1}^{7} P_i Y_i \qquad \textbf{(11)}$$

Where, γ indicate the average year of schooling, P_i shows that the percentage of population who aged 15 and over with level of education, Y_i shows the year of schooling for an individual with education level.

We used Thomas et al., (2001) formula to calculate the educational inequality for each level of education in term of women, men and total educational inequality as follow:

$$\text{Gini Education} = E_a = \left(\frac{1}{\gamma}\right) \sum_{i=2}^{7} \sum_{j=1}^{i-1} P_i \left| Y_i - Y_j \right| P_j \qquad \textbf{(12)}$$

Where, E_a is Gini index of educational inequality, γ is average year of schooling for the concerned population, P_i and P_j are proportion of population for different level of education, Y_i and Y_j are years of schooling at different attainment level of education, n is number of different stages of education.

This study used the following formula to calculate the year of schooling at seven level of education:

i. No schooling: $y_1 = 0$
ii. Partial-Primary level of schooling: $y_2 = y_1 + 0.5C_p = 0.5C_p$
iii. Complete-Primary level of schooling: $y_3 = y_1 + C_p = C_p$
iv. Partial-Secondary level of schooling: $y_4 = y_3 + 0.5C_s = C_p + 0.5C_s$
v. Complete-Secondary level of schooling: $y_5 = y_3 + C_s = C_p + C_s$
vi. Partial-Tertiary level of schooling: $y_6 = y_5 + 0.5C_t = C_p + C_s + 0.5C_t$
vii. Complete-Tertiary level of schooling: $y_7 = y_5 + C_t = C_p + C_s + C_t$

Where, C_p, C_s and C_t are the cycle of Primary, Secondary and Tertiary level of education.

3.5. Measure of Gender Inequality

Baliamoune and Mcgillivrary (2015), Dollar and Gatti, (1999) and Lantican *et al.,* (1996) used the gap between male and female education enrolment as a measure for gender inequality in education. This study measure the gender inequality in education by difference between male and female enrolment as a proportion of male enrolment i.e.

$$E_g = (M - F)/M \qquad \textbf{(13)}$$

This study measure the gender inequality in education at six level of education i.e. partial primary, complete primary, partial secondary, complete secondary, partial tertiary and complete tertiary.

3.6. Kuznets Curve of Education Approach

This study tests the Kuznets curve hypothesis for South Asian countries in the field of education. Following Ibourk and Amaghouss (2013) to test the relationship between educational inequality and average year of schooling the Kuznets's inverted-U curve specification is given by:

$$E_i = a_o + b\gamma_{it} + c\gamma_{it}^2 + e_{it} \quad \textbf{(14)}$$

Where, E_i shows the measure of inequality in education, γ is average year of schooling, e_{it} is error term.

This study add the average year of schooling and its square in order to check the existence of Kuznets's inverted-U curve for the relationship between average year of schooling and inequality in education which shows that the inequality in education increases, decreases or remain constant over the period of time.

The study calculates the standard deviation of schooling for South Asian countries by using the following formula:

$$s = \sqrt{\sum_{i=1}^{7} P_i(Y_i - \gamma)^2} \quad \textbf{(15)}$$

Where, P_i is proportion of population for different level of education, Y_i is year of schooling at different attainment level of education, γ is average year of schooling.

3.7. Data

Data is collected for the following six South Asian countries i.e. Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka, however, the data of Afghanistan is not available so, we drop it from the analysis. The data of the percentage of male, female and total population aged from 15 and over for each attainment level of education is obtained from Barro and Lee (2013). Income inequality data is collected from World Development Indicators and World Income Inequality Databases. Data on cycle of schooling at primary, secondary and tertiary level is collected from Psacharopoulos and Arriagada (1986). The data on per capita GDP in current US dollars for all countries is collected from the World Development Indicators.

4. Results

4.1. The Impact of Educational Inequality on Income Inequality

The study measure the inequality in education by Gini index of education that explains how inequality in education increases or decreases overtime. The figure 4.1 shows the trends of inequality in education in the South Asian countries for the time period of 1980 to 2010. It is obvious from the figure, in 1980 the inequality in education is very high in all countries of South Asia but in Maldives the inequality in education is not so high in that period. After that period the inequality in education is declining for all countries of South Asia from 1980 to 2010.

The decreasing trend of inequality in education shows that there is expansion in education in that region. For example, the figure 4.1 shows that the inequality in education of Bangladesh decreases from 0.8 to 0.6, it means that there is increase in education over 30 year. Similarly, the inequality in education of India also declining from 0.77 to 0.56 and it shows that the education is also increased here. For Pakistan the inequality in education decreases from 0.86 to 0.66 and for Sri-Lanka it decreases from 0.40 to 0.23. Maldives and Nepal also shows rapid improvement in the education and the inequality in education decline from 0.64 to 0.48 for Maldives and 0.90 to 0.63 for Nepal.

Figure 4.1: Trend of Educational Inequality of South Asian Countries

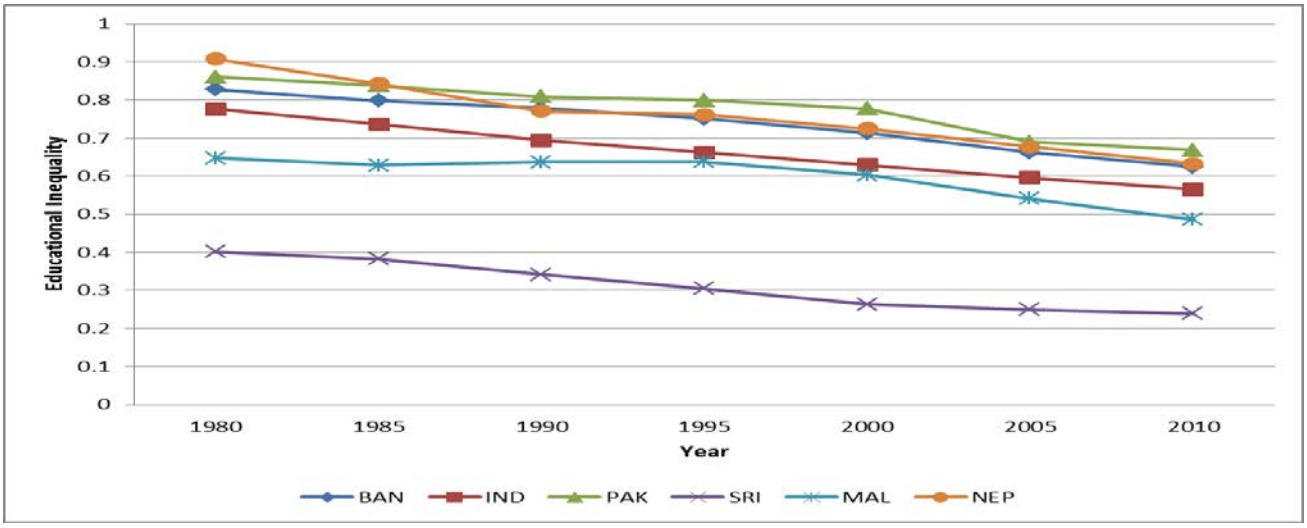


Figure 4.2 represents the trend of average year of schooling for South Asian countries in the time period of 1980 to 2010. It is clear from the figure that the average year of schooling is increasing

in all countries. In 1980, the average year of schooling is high in Maldives (7.0) and Sri Lanka (10) and the average year of schooling in other countries is Nepal (1.2), Pakistan (3.14), Bangladesh (3.21), and India (2.6) in that period. The increasing trend of average year of schooling from 1980 to 2010 shows that on average, the people of these countries received more education in this time period. In Maldives, the average year of schooling first increase then decrease and after some time it also shows increasing trend.

Figure 4.2: Trend of Average Year of Schooling of South Asian Countries

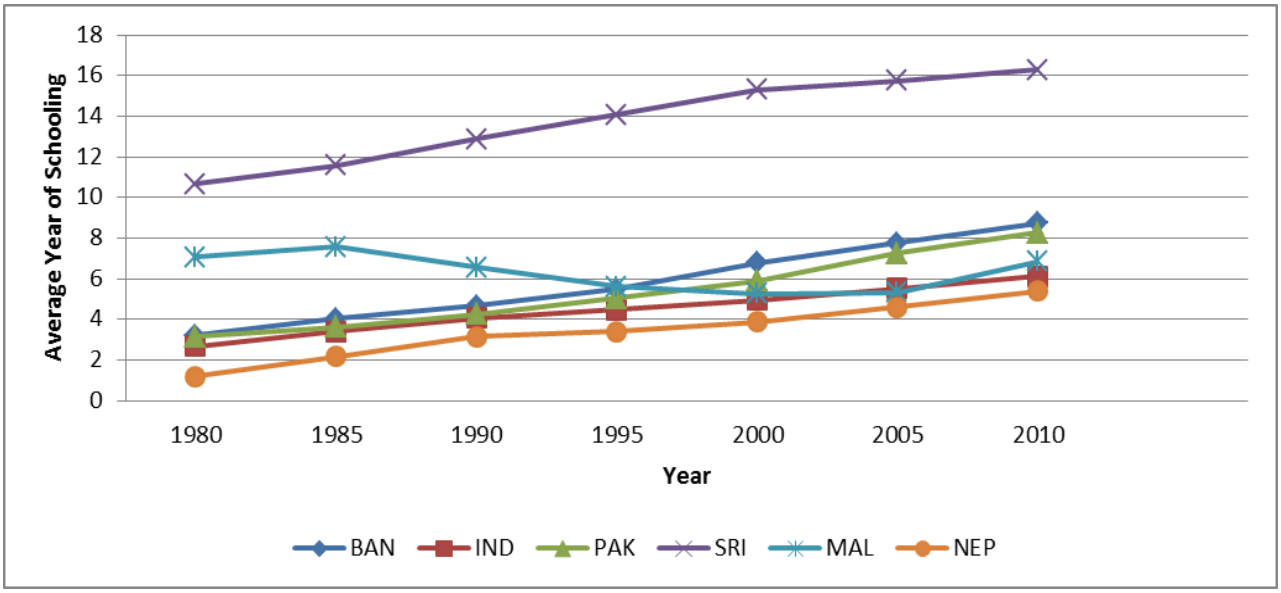


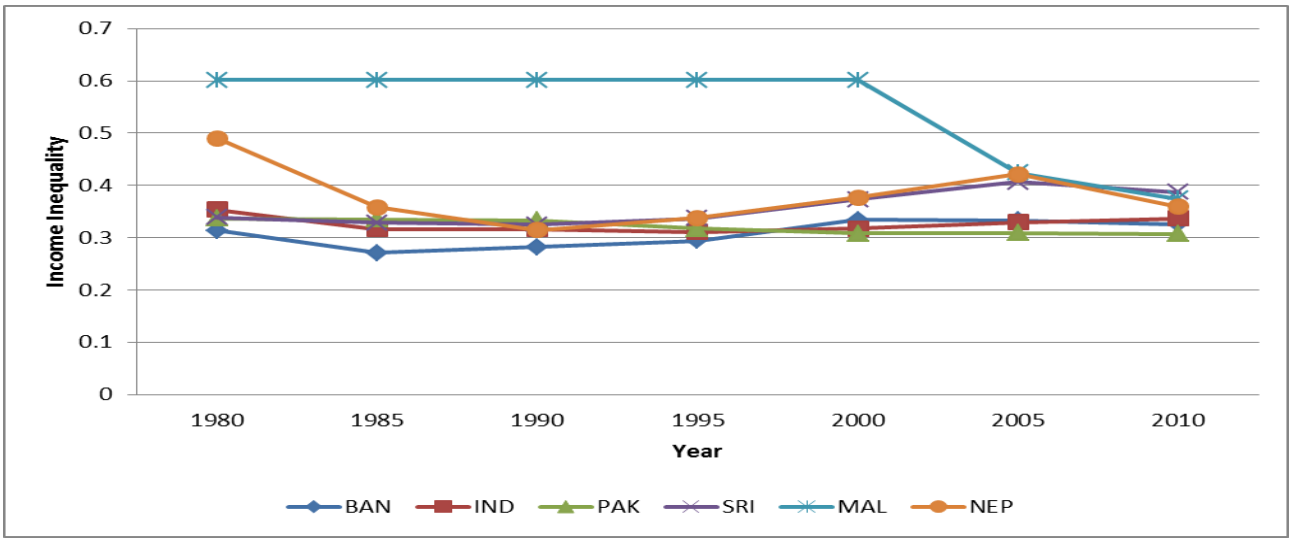
Figure 4.3 shows the trend of income inequality in South Asian countries in the time period of 1980 to 2010. The study measure the inequality in income by Gini coefficient. The data on income inequality is not available for all years and for all countries. The data of income inequality used in the study has some missing observation. By following Harron and Jamal (2006) in order to fill the missing observations the study adopted the method of interpolation to interpolate the missing observation of Gini coefficient for all countries.

The value of Gini lies between 0 and 1, when the value of G is 1 it means there is perfect inequality and when the value of G is 0 it means there is perfect equality in income. In fact, in 1980 the inequality in income is very high in Maldives and Nepal while the other countries of South Asia are also faces inequality in income but not so high. For example, in that period the values of Gini coefficient in all countries are following: Maldives (0.60), Nepal (0.49), Pakistan

(0.33), Sri Lanka (0.33), India (0.35) and Bangladesh (0.31). After that, the inequality in income decreased or increased in some countries of South Asia over time.

From 1980 to 2010 the inequality in income in India decrease from 0.35 to 0.33, for Pakistan it decline from 0.33 to 0.30, for Maldives it decline from 0.60 to 0.37 and for Nepal it drop from 0.49 to 0.35. For Bangladesh and Sri-Lanka the income inequality increases from 0.31 to 0.32 and for Sri-Lanka it increases from 0.33 to 0.38.

Figure 4.3: Trend of Income Inequality of South Asian Countries



The empirical analysis starts with investigating the impact of educational inequality on the income inequality in South Asian countries for the time period of 1980 to 2010. The study used the random and fixed effect model for estimation. The dependent variable is income inequality that is measured by Gini coefficient and the independent variables are Gini index of education that measured the educational inequality (at seven level of education) and average year of schooling (at seven level of education).

Table 4.1: Educational Inequality and Income Inequality by Using Fixed and Random Effect Model

Variables	Fixed Effect Model	Random Effect Model
C	-0.4464 (0.1539)	-0.3625 (0.1545)
Educational Inequality	0.8976 (0.1698)*	0.8021 (0.1645)*
Average Year of Schooling	0.0372 (0.0076)*	0.0338 (0.0074)*
R Square	0.86	0.36

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

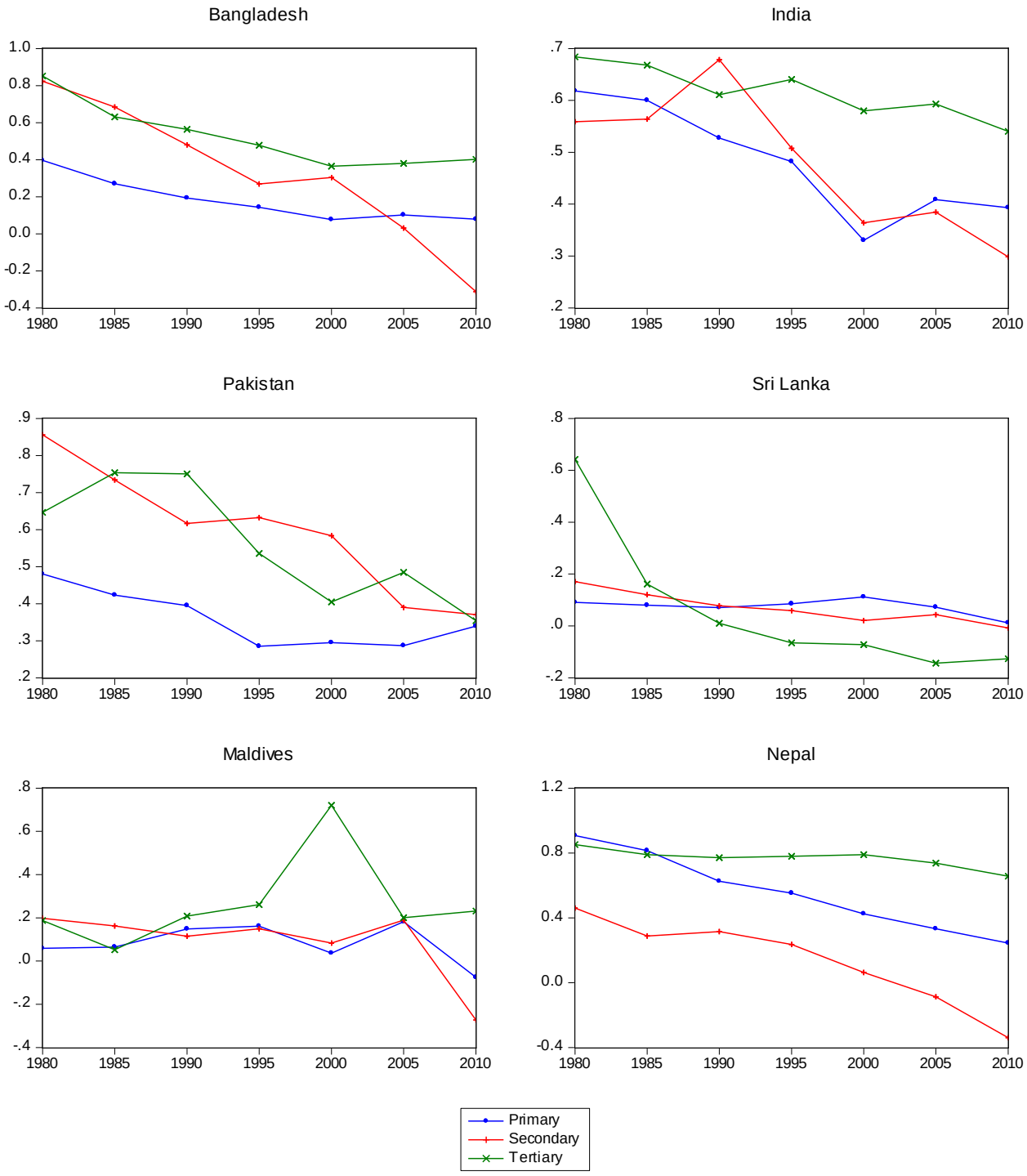
Table 4.1 shows that the estimated coefficient of educational inequality has a positive and statistically significant impact on income inequality. The results are consistent with the finding of Marin and Psacharopoulos (1976), Pose and Tselios (2009), Gregorio and Lee (2002), and Park (1996). There exist theoretical consistency of educational inequality and income inequality relationship. It means that the equal distribution of education is more important to increase the income level of country because if education is not equally distributed among the people then a big part of profit retained by well educated people leads to create huge inequality in the income. The estimated coefficient of average year of schooling shows the positive and statistically significant impact on the income inequality. The results about educational inequality and income inequality by using fixed effect model are better than the random effect model because the value of R square obtained from the fixed effect model is greater than the random effect model.

4.2. The Impact of Gender Inequality in Education on Income Inequality and Per Capita Income

The figure 4.4 explains the condition of gender inequality in education in South Asian during the time period of 1980 to 2010. In 1980 the gender inequality in primary, secondary and tertiary level of education is high in every country of South Asia but the gender inequality in education is not so high in Maldives in that period. After that period the gender inequality in education at primary, secondary and tertiary level of education is declined in all the countries but the situation in Maldives is quite different. The gender inequality in education at tertiary level is increased and decreased in Maldives over time.

The decrease in gender inequality shows that the unequal distribution of education in male and female becomes equal in all countries of South Asia from 1980 to 2010. From 1980 to 2010 in Bangladesh the gender inequality at primary, secondary and tertiary level of education is decreased. In India, Nepal and Pakistan the gender inequality in education at primary and tertiary level of education is also decreased. In Sri Lanka, the primary and secondary level of gender inequality in education is slightly decreased but at tertiary level it decreased rapidly over time. In Maldives the gender inequality in education at tertiary level is increased but at primary and secondary level of education decreased from 1980 to 2010.

Figure 4.4: Trend of Gender Inequality at Primary, Secondary and Tertiary level Education



The study estimates the impact of gender inequality in education on income inequality by using fixed effect model. To measure the gender inequality in education the study used the difference

between male and female enrolment in different level of education. For this purpose the study used the income inequality as a dependent variable and the independent variable is Gini index of gender inequality in education at six level of education.

Table 4.2: Income Inequality and Gender Inequality by Using Fixed Effect Model

Variables	Fixed Effect Model
C	0.3114 (0.0379)
Partial Primary	-0.8659 (0.2112)*
Complete Primary	0.7649 (0.1910)*
Partial Secondary	0.4348 (0.2205)**
Complete Secondary	-0.1965 (0.1053)***
Partial Tertiary	-0.3742 (0.1732)**
Complete Tertiary	0.2820 (0.1217)**
R Square	0.84

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

Table 4.2 indicates that the coefficient of complete primary level and complete tertiary level of education are positive and statistically significant, suggesting a positive association between complete primary level of education, tertiary level of education and income inequality. While the estimated coefficient of partial secondary level of education is also positive but statistically insignificant, suggesting that its association with income inequality is not so strong.

The results are consistent with the theoretical reasoning of these variables. Because household's spending on education of children will be biased in favor of education of boy but if a girl is more intelligent than boy then the investment on girl education is considered as wastage of money. Therefore, the unequal distribution of education among boys and girls increase the income inequality. On the other hand, the coefficients of partial primary level of education and partial tertiary level of education are negative and statistically significant, suggesting a negative association between gender inequality and income. Only complete secondary level of education variable is show negative and statistically insignificant impact on income inequality. In order to

estimate the impact of gender inequality in education at different level of education on per capita income the study used the dependent variable is per capita income and independent variable is gender inequality in education (table 4.3).

Table 4.3: Gender Inequality in Education and Per Capita Income by using Fixed Effect Model

Variables	Fixed Effect Model
C	1955.231 (334.9997)
Partial Primary	14865.65 (1863.317)*
Complete Primary	-12644.80 (1685.847)*
Partial Secondary	-1428.495 (1945.952)
Complete Secondary	356.0220 (929.4794)
Partial Tertiary	-893.9585 (1528.599)
Complete Tertiary	-849.1174 (1074.158)
R Square	0.88

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

The results of table 4.3 indicate that the coefficient of primary level of education is negative and statistically significant. The results are consistent with theoretical reasoning of this variable. It means that increase in gender inequality at primary level of education will decrease the per capita income. The coefficient of complete secondary is positive and coefficient of tertiary level of education is negative but both variables show the insignificant impact on the per capita income. The result about primary education is consistent with the finding of Baliamoune and Macgillivrary (2015).

4.2.1. The Impact of Gender Inequality in Education on Educational Inequality

The study estimates the impact of gender inequality in education on educational inequality in South Asian countries by using fixed and random effect model. The dependent variable is educational inequality and independent variable is gender inequality in primary, secondary and tertiary level of education.

Table 4.4: Gender and Educational Inequality by Using Fixed and Random Effect Model

Variables	Fixed Effect Model	Random Effect Model
C	0.4967 (0.0213)	0.4810 (0.0311)
Primary	0.1891 (0.0746)*	0.2039 (0.0670)*
Secondary	0.1578 (0.0453)*	0.1478 (0.0411)*
Tertiary	0.0974 (0.0392)*	0.1281 (0.0375)*
R Square	0.96	0.73

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

In Table 4.4 the result of fixed effect model and random effect model shows that there exist positive relationship between the inequality in education and gender inequality in education. It means that the unequal distribution of education among boys and girls leads to increase the inequality in education. The results are consistent with the finding of Thomas et al, 2001. The value of R square obtained from fixed and random effect model is 0.96 and 0.73.

4.2.2. Impact of Different Attainment Level of Education on Income Inequality

In order to estimates the impact of different attainment level of education on income inequality in South Asian countries the study used the income inequality as dependent variable and independent variables are primary level of education, secondary level of education and tertiary level of education (table 4.5).

Table 4.5: Income Inequality and Attainment Level by using Fixed Effect Model

Variables	Fixed Effect Model	Random Effect Model
C	0.3865 (0.0341)	0.4092 (0.0375)
Primary	-0.3516 (0.1706)**	-0.4304 (0.1625)*
Secondary	0.4439 (0.1459)*	0.4102 (0.1199)*
Tertiary	-1.3003 (0.6157)**	-1.5837 (0.5761)*
R Square	0.82	0.31

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

Table 4.5 present the estimated coefficient of primary and tertiary level of education shows negative but significant impact on the income inequality. The results support the negative relationship between primary level of education, tertiary level of education and income inequality. Theoretically, education plays a major role to increase the income level of country through knowledge and it helps to reduce income inequality. The countries with more education or more educated and skilled people have more abilities to make development everywhere. The estimated coefficient of secondary level of education shows that due to increase in the secondary level of education the income inequality also increase and results are statistically significant. The value of R square is very high by using fixed effect model it means that the model is good fit.

4.2.3. The Impact of Educational Inequality on Per Capita Income

The figure 4.5 shows the relationship between inequality in education and per capita income for the time period of 1980 to 2010. The horizontal axis measures the per capita income and vertical axis measure the inequality in education that is measured by Gini index of education. The figures show that the inequality in education decreases due to increase in the income level.

By using random and fixed effect model the study estimate the impact of inequality in education at different level of education on per capita income. The study used the per capita income as dependent variable and independent variable is inequality in education (table 4.6).

Table 4.6: Educational Inequality and Per Capita Income by Using Fixed and Random Effect Model

Variables	Fixed Effect Model	Random Effect Model
C	4579.029 (1025.799)	3184.174 (802.2645)
Education Inequality	-6044.206 (1590.408)*	-3869.110 (1173.842)*
R Square	0.55	0.20

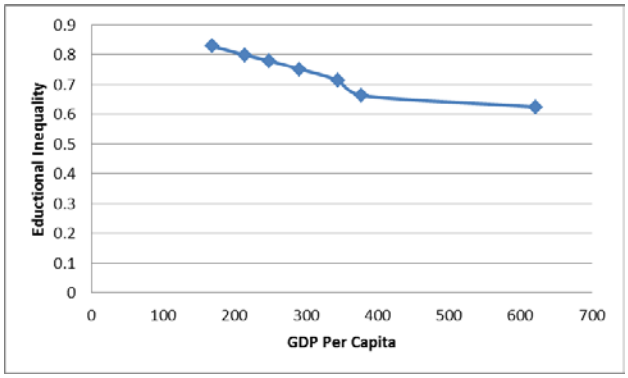
Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

Table 4.6 indicates that the estimated coefficient of Gini index of education is negative and statistically significant impact on the income level. The results support the negative relationships between educational inequality and per capita income. The negative coefficient of educational inequality explains that if inequality in education increases in country it has bad impact on income level of country because when people are not well educated than they don't have ability

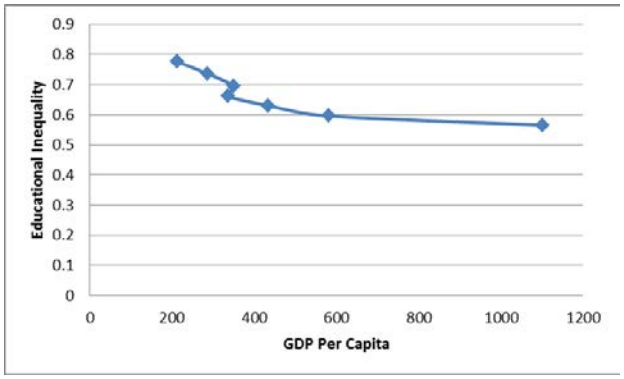
to increase their living standard or per capita income. On the other hand the well educated people have more skills and ability to increase its productivity or income level of country. The value of R square is 0.55 it means that the model is partially good fit but value obtained by using random effect model is 0.20 it means that the model is not good fit.

Figure 4.5: Relationship between Educational Inequality and Per Capita GDP

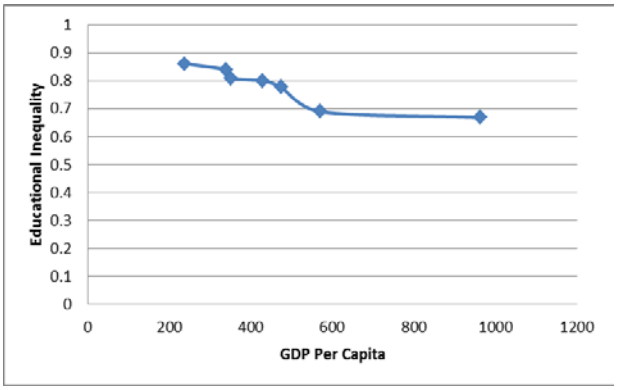
Bangladesh



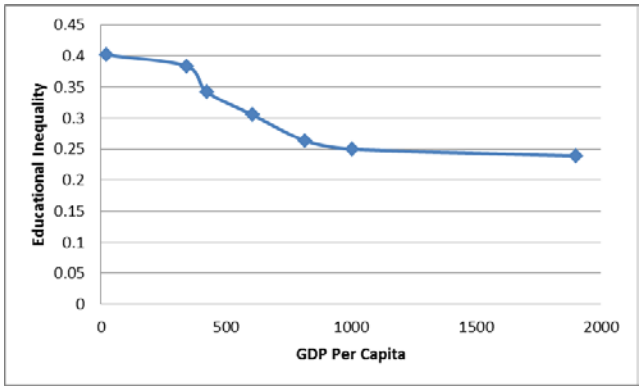
India



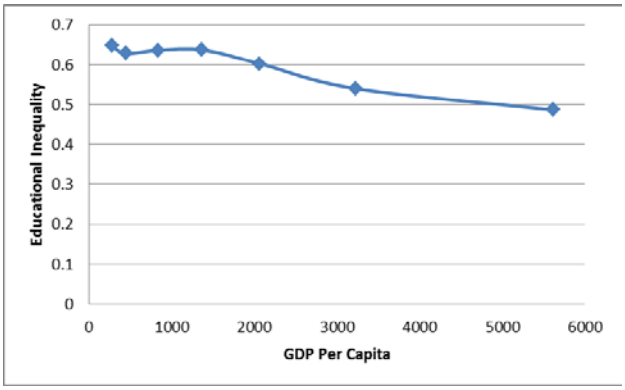
Pakistan



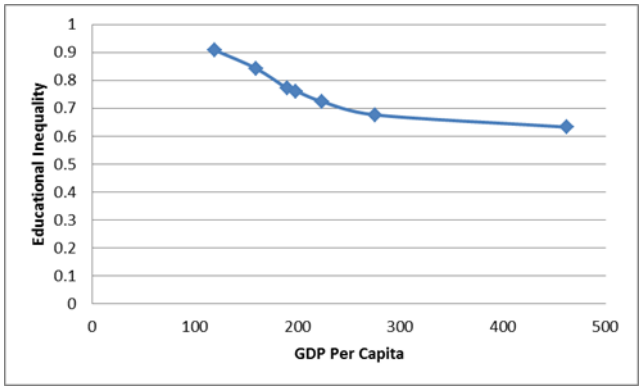
Sri Lanka



Maldives



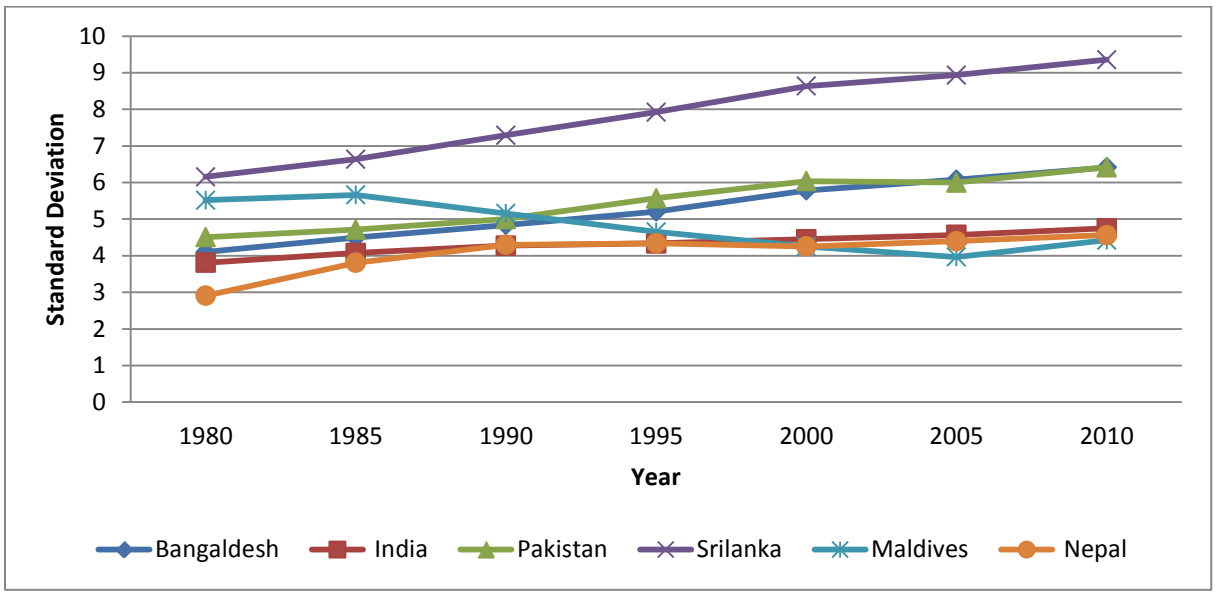
Nepal



4.3. Kuznets Curve of Education Approach

The study used the standard deviation of schooling to measure the dispersion of schooling distribution. The greater the standard deviation of schooling means that the more spread of educational attainment. The smaller standard deviation of schooling shows that the less spread of educational attainment. The figure 4.6 shows the trend of standard deviation of schooling within the time period of 1980 to 2010 of South Asian countries. The trend of standard deviation of schooling is rissing for almost all countries. The standard deviation of schooling for Pakistan, Bangladesh and Sri-Lanka is rising over the time period and showing that the inequality in education is decreased and there is more spread of educational attainment. For India and Nepal the standard deviation of schooling first increases, for some period it becomes stable and then incresases. Only for Maldives the standard deviation of schooling is U shaped curve, first decreases and rising after some time.

Figure 4.6: Trend of Standard Deviation of South Asian Countries



In order to capture the shape of kuznet curve in the field of education the study adds the average year of schooling and its square term as independent variables and Gini index of educational inequality as a dependent variable (table 4.7). In Table 4.7 the results of fixed effect model shows that there exist non-linear relationship between them. The estimated coefficient of average year schooling explain that the inequality in education decreases due to increase in the average

year of schooling and results are statistically significant but the sqaure of average year of schooling shows positive and statistically significant impact on the inequality in education. Similarly, by using random effect model the estimated coefficient of average year of schooling shows negative and statistically significant impact on the educational inequality but the square term of average year of schooling shows positive and statistically insignificant impact on the educational inequality.

Table 4.7: Educational Inequality and Average Year of Schooling by Using FEM & REM

Variables	Fixed Effect Model	Random Effect Model
C	0.9365 (0.0319)	0.9398 (0.0443)
Average Year of Schooling	-0.0540 (0.0081)*	-0.0537 (0.0080)*
Average Year of Schooling^2	0.0010 (0.0004)**	0.0009 (0.0004)**
R Square	0.96	0.78

Note: Standard error is reported in parenthesis. *, ** and *** indicates 1%, 5% and 10% level of significance.

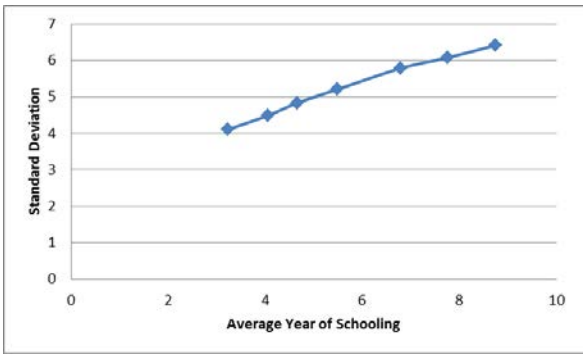
Theoretically, the inverted-U hypothesis represent that inequality in education first increases and then reach at maximum but after some time inequality will gradually decline but results are contradicting with theorical reasoning. The results indicate that there exists U shaped kuznets curve because square term of average year of schooling has positive sign it means that the inequality in education first decrease and then increases. These results are may be because of poor education system in South Asian countries. The results about the existence of kuznets curve by using fixed effect model are better than the random effect model because the value of R square is greater with fixed effect model.

4.3.1. Standard Deviation Vs Average Year of Schooling

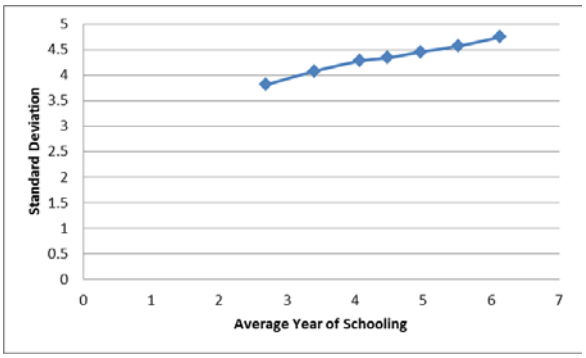
The horizontal axis measure the average year of schooling and vertical axis measure the inequality in education or standard deviation in figure 4.7. From 1980 to 2010 the figures represent the shape of Kuznets curve in the field of education. These Kuznets curves show that the inequality in education decreases due to increase in the average year of schooling and the spread of educational attainment increased in all countries. The curves show that there exists non-linear relationship between inequality in education and average year of schooling.

Figure 4.7: Relationship between Average Year of Schooling and Standard Deviation

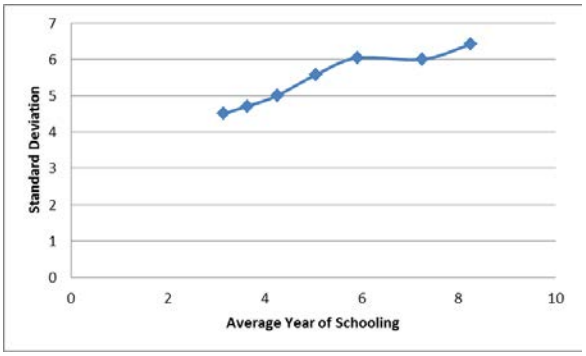
Bangladesh



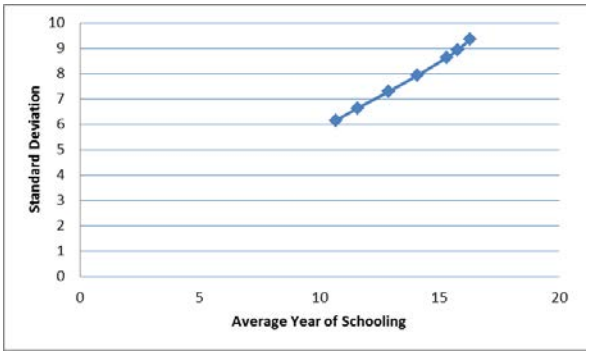
India



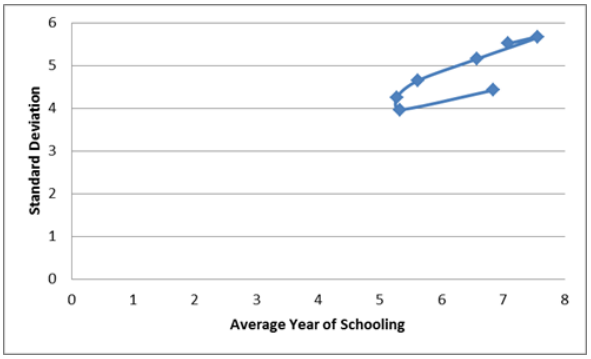
Pakistan



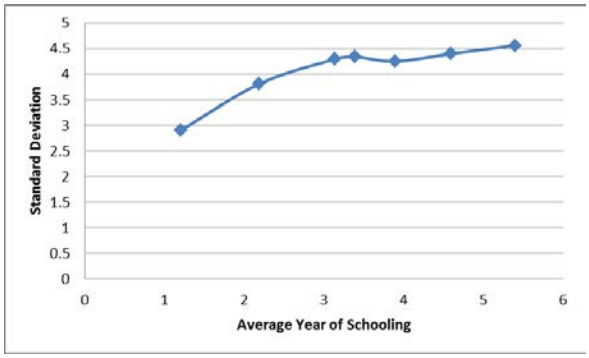
Sri Lanka



Maldives



Nepal



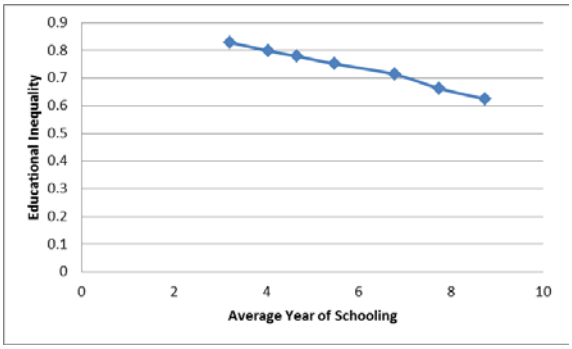
4.3.2. Gini Index of Education vs. Average Year of Schooling

The horizontal axis measure the average year of schooling and vertical axis measure the inequality in education (figure 4.8). The study used Gini index of education as a measure of inequality in education to explain the relationship between inequality in education and average year of schooling. The figures show that there exists linear relationship between educational

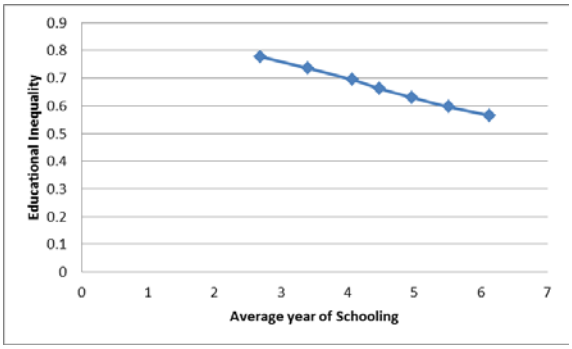
inequality and average year of schooling in all countries except Maldives. The shapes of curve explain that due to increase in the average year of schooling the inequality in education decreases because when people both male and female received more or equal distribution of education the inequality in education will decline. Every figure shows the invalidity of Kuznets curve in almost every country of South Asia.

Figure 4.8: Relationship between Average Year of Schooling and Standard Deviation

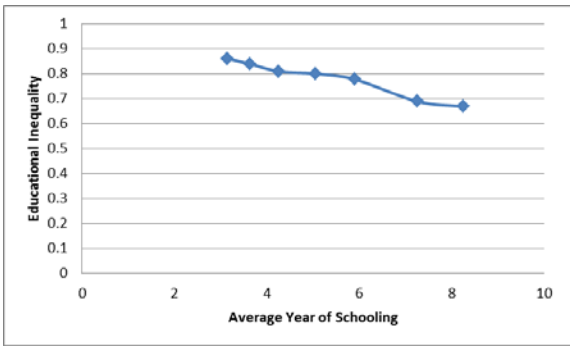
Bangladesh



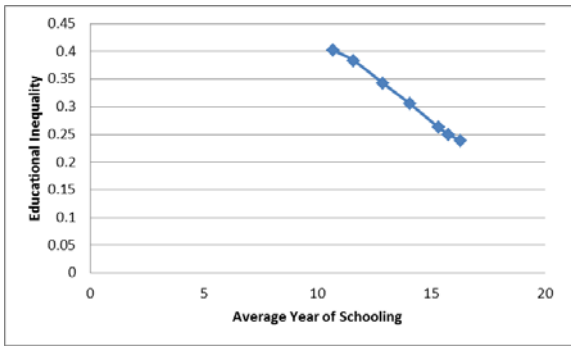
India



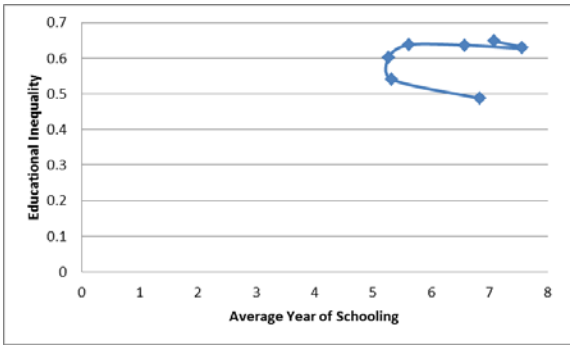
Pakistan



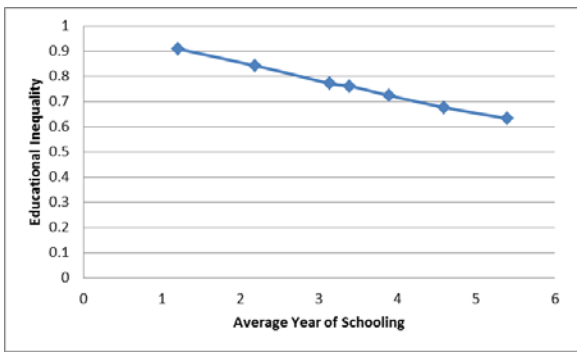
Sri Lanka



Maldives



Nepal



5. Conclusion and Policy Recommendation

The present study investigates the impact of educational and gender inequality in education on income inequality in South Asian countries. The study also tests the Kuznets's inverted-U hypothesis concerning the relationship between educational inequality and average year of schooling for all countries. For this purpose the study used the time period of 1980 to 2010. However, the study excluded Afghanistan from the South Asian region due to the non-availability of data on income inequality.

The study has adopted the Marin and Psacharopoulos (1976) human capital model and adds distribution of schooling as inequality in education and gender inequality in education. Panel data techniques random effect model (REM) and fixed effect model (FEM) used for estimation. The study considered the results of fixed effect model are more preferable because when the number of cross-sectional units is smaller than the number of time series data then the fixed effect model is used.

The trend of educational inequality explains the inequality in education decline during the time period of 1980 to 2010. The average year of schooling shows increasing trend over 30 year. The trend of income inequality suggests that there is increase or decrease in the inequality in the income level of countries. Moreover, the trend of standard deviation shows the wide spread in educational attainment in all countries. The study also represents the existence of Kuznets's curve graphically for all countries. There exist non-linear relationship between standard deviation and average year of schooling and linear relationship between educational inequality and average year of schooling in almost all countries of South Asia.

In panel analysis the results of fixed effect model concludes that the inequality in education and average year of schooling has positive and significant impact on income inequality in all countries of South Asia. The results about gender inequality suggest that there exist positive relationship between gender inequality in primary level of education, gender inequality in tertiary level of education and income inequality. Gender inequality in secondary level of education has inverse relationship with income inequality. Similarly, there exist direct relationship between gender inequality in secondary level of education, gender inequality in tertiary level of education and per capita income. But the gender inequality in primary level of

education has indirect relationship with per capita income. Moreover, there exist positive relationship between educational inequality and gender inequality at primary, secondary and tertiary level of education. Primary and tertiary attainment level of education has negative and secondary has positive and significant impact on the income inequality. There exist inverse relationship between educational inequality and per capita income but it has significant impact on the per capita income of all countries. The empirical results of Kuznets curves show that there exist U shaped curve because the square term of average year of schooling shows positive but statistically significant impact on the educational inequality.

In order to remove educational inequality, income inequality and gender inequality in education the following recommendations are important. Along with the expansion of education it is necessary to spread equal distribution of education. It is recommended on the basis of results that equal access of education should be the major objective in the government policies. Government should have to spend more on all level of education. Therefore, it is necessary to make better the conditions of educational institutes and remove disparities because disparities in educational institutes cause the disparities in the skills of people or students, income level and their professional opportunities.

South Asian countries have to invest more in educational system because the people who live in the poor area they have less chances to get quality education due to the shortage of resources. Therefore, they do not get good job to earn money this thing creates income gap among the classes. So, government has to provide free education in poor region and also make employment program to reduce the income and educational inequality. To remove income inequality in the country it is important to improve the governance profile. Because income inequality can be reduced by redistribution, through taxes and it can also remove by reducing the gap in pre-tax incomes.

To remove gender inequality in education it is necessary to build more schools especially for girls because education for women is not considered a good thing especially in rural areas. Due to unequal distribution of education, women enjoy the less opportunities of employment. Government has to provide different online education courses for women. Promoting more education for girls helps to decrease the fertility rate as well as child mortality rate.

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