

Impact of Education and Income Inequality on Poverty of Pakistan: An Econometric Analysis

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Abstract

Education helps to reduce the poverty by increasing the job opportunities and by increasing the productivity of labor. By providing the equitable quality education the long life learning opportunities can be provided to all. GDP Per capita is used as a proxy for measuring the poverty and education, life expectancy, labor force Participation rate, income inequality and female education is taken as independent variables. This study investigates the impact of education and income inequality on poverty of Pakistan by applying Autoregressive Distributive Lag (ARDL) approach of co-integration for the period 1985-2014. The findings of the study show that increase in education worsens poverty of Pakistan in the long run. The positive sign and significance of coefficient of income inequality also confirms long run relationship between income inequality and poverty in Pakistan.

Keywords: Poverty, Education, Income Inequality

Introduction

Poverty means that the people have lack of common necessities such as food, clothing, shelter, and safe drinking water, access to energy and all the basic facilities of good life. Poverty also includes that the people have lack of access to opportunities such as education and employment. The main asset of all the developing countries is human capital. For the sustainable socioeconomic development and for poverty alleviation the education and the training is the main factor for Human capital development (URT, 2007). Many research works show that there is the strong relationship between education and poverty alleviation. Education can be reduced the poverty in this way the educated people have more skills and their productivity is high and it will contribute in the alleviation of poverty

For the development of any country the education plays a vital role. The high literacy rate leads to economic, social, cultural and institution development. For achieving sustainable development and for increasing the labor productivity and efficiency of the markets the skilled and educated workers are needed. Like other developing countries, the Pakistan literacy rate is inadequate and the literacy rate is 58% which showings that still the 42% are unable to even read and write. Now a National Plan of Action for MDGs Acceleration Framework (MAF) 2013-16 is established for enhancing the progress towards education related goals and targets identified by MDG for 2015- 16 by Ministry of Federal Education & Professional Training. The MDG goal was target the 100% school enrollment of the children of grade 1-5 but in the 2013-14 the enrollment ratio is only 57%. The vision 2025 also focuses on the expansion in the level of education and to improve the quality of education by allocating the 4.00 percent of GDP to the education sector by 2018.

Besley and Burgess (2003) discuss the relationship between poverty, per capita income, and income inequality using regression estimation. Their findings confirm that increases in

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income per capita are associated with reductions in poverty. The study's outcome also illustrates the positive and significant association between income inequality and poverty. Bénabou (2003) examines the interactions between income inequality, technological choice, and redistributive policies or institutions. When technological or organizational form is endogenous, firms respond to greater human capital heterogeneity with more flexible technologies, further exacerbating income inequality." In this scenario, the existence of social contracts such as educational assistance for the poor could help greatly in reducing wage inequality.

Literature review

Janjua et al (2011), examine the role of education and income in poverty alleviation. The study uses the panel data for the 40 developing countries for the period 1999 to 2007. The variables which this study uses are poverty, per capita income, education and income inequality. The coefficients are estimated by the random effect generalized least square technique. The study has drawn mainly three conclusions. First, per capita income growth plays a positive role in alleviating poverty, Second, by reducing the income inequality the poverty can be reduced only in those countries which have higher per capita incomes. And thirdly, it concludes that education is the most important contributor to poverty reduction.

Chege et al, (2015), investigates to which extent the education system in Kenya has contributed positively or negatively in poverty alleviation and what challenges the Kenya has had in the long run. And the study examine that the relationship between education and poverty alleviation is not fruitful because in Kenya poverty levels still remain high. From the HDR report of 2013, Kenya is ranked at 145 which were the same as the rank of 2012, with a HDI value of 0.519 which has been rated as low human development (UNDP, 2013). It shows that in spite of the efforts to increase the rate of access to education and with over ten years of free primary school education (FPE), this is not contributing to poverty reduction. The study recommends that there is the need of educational reforms in curriculum and the way in which the education policies are implemented.

Aref (2011), show the contribution of rural education to poverty reduction in rural areas of Iran. The study used quantitative data to find out the barriers of education which are associated with poverty reduction. For collecting data from the local residents the focus group discussion was made. The data is collected from the staff of local education and school teachers, in 12 villages in Abadeh Tashk, Shiraz. According to the respondents' point of view it is concluded that barriers of education for poverty reduction included the Immigrations of rural educated people to urban areas, Lack of educational resource and curriculum, lack of suitable skill and knowledge, Lack of access to secondary school or high school, Lack of rural involvement; especially women in process of rural development.

Awan (2011), estimate the impact of education on poverty reduction in Pakistan. The data is taken from the Household Integrated Economic Survey for the year 1998-99 to 2001-02 which is calculated by the Federal Bureau of Statistics. A logistic regression model is used for this data, the probability of an individual being poor is taken as the dependent variable and a set of educational levels, experience and gender are used as independent variables. The dummy variable is used for the dependent variable which have the value of 1 and 0. If person is poor then for this individual the value is 1 and for non-poor the value is 0. It is found that experience and education has a negative relation with the poverty. The study also concludes that a male person reduces the risk of poverty more as compared to the female.

Pervez (2014), studied the long run and short run linkages between education and poverty reduction in Pakistan by using time series annually data for the year 1977 to 2006. The data is taken from the Economic survey of Pakistan, World Development indicator, Food and Agriculture Organization and Handbook of Statistics State Bank of Pakistan. The study

took poverty as dependent variable and life expectancy, literacy, gross enrollment secondary as the dependent variables. The study used Augmented Dickey-Fuller (ADF), causality and Johansen co integration test for the long run relationship between the variables. The results show that Literacy rate and Gross Enrollment (Secondary) has negative while life Expectancy has positive impact on poverty. The study suggested that Government should focus on the quantity and quality of education.

Chaudhry (2009), present the brief explanation of the project BRDP (Bahawalpur Rural Development Project) started by Asia Development Bank in Southern Punjab by emphasizing on poverty determinants. The primary data is collected by the household survey of 120 households. Poverty is taken as explained variable whereas Size of the household, Dependency ratio, Educational level of the household, Female-male ratio (Members), Female-male ratio (Workers), Participation rate, Age of the household, Population of livestock per household, physical assets of household, Persons per room among the household and production of households for markets as explanatory variables. A Logit regression model is used to analyze the factors affecting rural poverty alleviation. The results show that rural poverty can be reduced by decreasing the household size, persons per room, dependency ratio, improving education, more female labor force participation, higher household participation rate, improving assets and household's access to market. The government should provide basic infrastructure and market access facilities in remote areas of Pakistan.

Niazi, estimated the contribution of education in the multidimensional poverty in Punjab, in both regions urban & rural. For the multidimensional poverty three dimensions like education, health, housing & services were taken on the basis of Household Integrated Economic Survey (HIES) and Pakistan Social & Living Standard Measurement Survey (PSLM) for the year 1998-99 to 2007-08. Education is measured as the literacy rate. The data shows that the incidence of multidimensional poverty was higher in rural area as compare to urban during the period of 1998-99 to 2007-08. The overall results show the significant role of the education along with gender equality, institutional innovations, provision of basic facilities, improvements in the schooling, hospitals, banks, post offices, in the reduction of the poverty.

Patrick G et al (2014), finds out the poverty reduction statistics of the Province of Zamboanga del Norte from 2000 to 2009. Poverty is taken as the dependent variables and participation rate, cohort survival rate, completion rate, and dropout rate and enrolment, number of graduates, teaching staff, and non-teaching staff and the Technical Education and Skills Development Authority (TESDA) in terms of enrolment, are taken as the independent variables. The results indicate that the province still registered poverty incidence of 52.9 percent in 2009 which showed that more than 50 percent of its households were still living below poverty line. The study also exposed that poverty reduction statistics did not strongly link to the educational services in the province.

Lacour, et al (2011), examined that Poverty directly affects academic achievements of the students due to the lack of availability of the resources. The Resources can include financial, emotional, mental, spiritual, and physical resources. The study concluded that the factors which are affecting the student achievement are including income, source of income, and the mother's education level. The study suggested that in order to achieve high performance in academics, instructional techniques and policies which are implemented at the classroom, school, district, and government levels can help to close the achievement gap between the poorer and non-poorer.

Mtey, et al (2013), discusses the role of education in poverty reduction in Tanzania. It argues that education is an important means for poverty reduction. To substantiate its arguments, the article draws from relevant theoretical and empirical literature. From the literature a link between education and poverty reduction is established. The article concludes

by emphasizing on the significance and the need for proper management of education in order to make it an effective tool for poverty reduction in Tanzania.

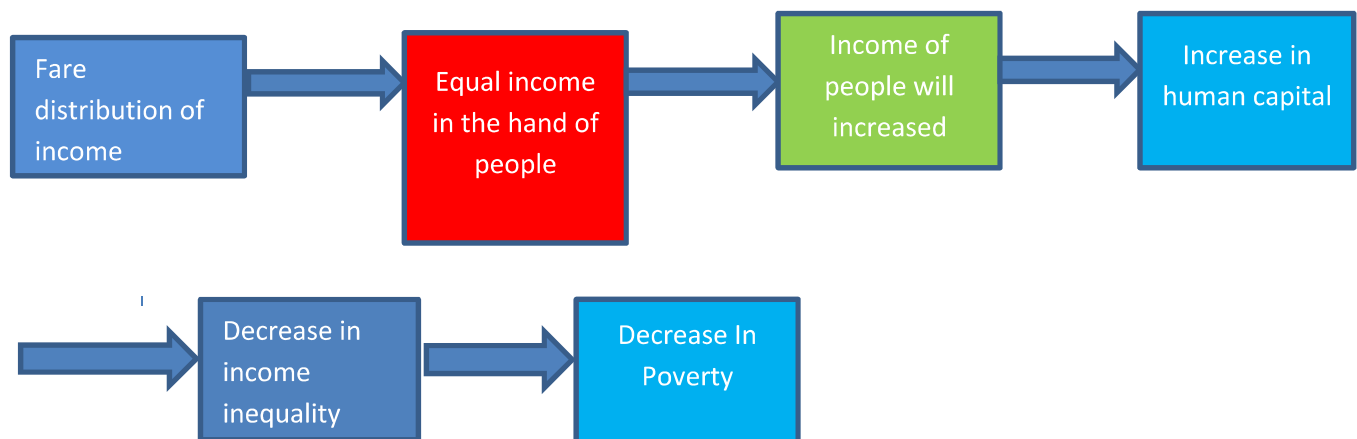
Njong (2010), evaluate the effect of different levels of education of the employed individuals as determinants of poverty in Cameroon. The data for this study come from the 2001 Cameroonian Household Survey obtainable from the National Institute of Statistics. A sample-selectivity corrected logistic regression model is estimated based on the cross-sectional data, with the probability of an individual being poor as the dependent variable and a set of educational levels and experience as explanatory variables. The results depict that improvement in experience and educational attainments reduce the probability of being poor of the employed individual. On the gender side the study concludes that a male's educational level is more poverty reducing than a female counterpart.

Kiani (2011), examine the effects of some of the key macroeconomic variables on Pakistan's economic growth during 1980-2007 taking four different education levels including students enrollment at the university level as a ratio to total employed labor force. It concludes that there is strong evidence that the cognitive skills of the population-rather than mere school attainment-are powerfully related to individual earnings, to the distribution of income, and to economic growth. University education does not play a significant role in poverty alleviation. The magnitude of change needed makes it clear that closing the economic gap with industrial countries will require major structural changes in schooling institutions.

Theoretical linkages

The main contribution of Education is that it provides the awareness to the people about their employment. The educated peoples are aware about their skills and capabilities. And the educated peoples are more conscious about their health and they have better health which increased their productivity. The increase in productivity will leads to increase in their income and the poverty will be reduced.

Impact of income inequality on poverty:



Source: Theoretical channel from Besley and Burgess (2003).

Data and Methodology

As in the previous chapter study presents the theoretical link between dependent and independent variable. This chapter we will discuss variable construction, data sources and also discusses estimation strategy. At the first step study represents the definitions of the variables that are included in the model.

Main variables that are included in the study on the basis of data availability are as follows: Dependent variable is poverty which is proxied by GDP per capita income. On the other hand, independent variables are education, income inequality, labor force participation, life expectancy and female education. Definitions of the selected variables are given below:

Independent variables

Income Inequality (GINI Index):

Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

Life expectancy at birth, total (years)

Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Gross enrollment ratio

Total enrollment in primary education, regardless of age, expressed as a percentage of the population of official primary education age. GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition.

School enrollment female

Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

Dependent variable

GDP per capita

GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Data

The objective of this study is to empirically investigate the impact of education and income inequality in Pakistan. Data is collected from WDI and economic survey of Pakistan. Data period that is covered in the study ranges from 1985-2014. Data period and variables are selected on the basis of data availability.

Results and Discussion

Augmented Dickey Fuller Test of Unit Root

The dickey fuller test may create a problem of autocorrelation, to avoid from this problem the augmented dickey fuller test is used. The augmented dickey fuller model has three equations. Equation 1 have the intercept only, equation 2 have the trend and intercept and the third equation have neither the trend nor the intercept.

In Eviews there are the three different categories for ADF model.

$$\Delta Y_t = B_1 + ZY_{t-1} + a_i + e_t \quad (\text{intercept only})$$

$$\Delta Y_t = B_1 + B_2t + ZY_{t-1} + a_i + e_t \quad (\text{intercept and trend})$$

$$\Delta Y_t = ZY_{t-1} + a_i + e_t \quad (\text{no trend and no intercept})$$

The null hypothesis of the model is that if the variable has the unit root then it means that the data is non-stationary otherwise the data will be stationary.

H_0 variable is non-stationary or got unit root.

H_1 variable is stationary or have not unit root.

Table 2: Augmented Dickey Fuller Test

Variable	At level				At first difference			
	Intercept		Trend and Intercept		Intercept		Trend and Intercept	
	Test Statistics				Test Statistics			
GDP	-0.2388	(0.922)	-2.5558	(0.301)	-3.0849	(0.039)**	-3.0306	(0.142)
GER	-0.5967	(0.856)	-2.1123	(0.517)	-5.5785	(0.0001)***	-5.5013	(0.0006)***
GINI	-2.6654	(0.092)	-4.7849	(0.003)***	-7.9154	(0.000)***	-7.7610	(0.000)***
LFP	-1.5966	(0.471)	-2.5119	(0.320)	-5.5140	(0.0001)***	-5.4294	(0.0007)***
LIFEXP	-1.8318	(0.356)	-3.6172	(0.047)**	-2.0355	(0.270)	-1.8982	(0.621)
FEDU	-0.4359	(0.889)	-2.1642	(0.490)	-4.5023	(0.001)***	-4.4191	(0.008)***

The parenthesis shows the probability values of all the variables. The asterisks *** and ** indicate stationarity at 1%, 5% and level of significance respectively.

In the table the income inequality and health is stationary at level and GDP per capita, education, labor force participation and female education is stationary at 1st difference.

ARDL model

When some variables are integrated of order I(1) and some variables are integrated at level then we can apply the ARDL test. The ARDL test is also known as Bound test. GDP per capita is the dependent variable in the model and the equation of the model will be:

GDP per capita = $b_1 + b_2 \text{gini index} + b_3 \text{life expectancy} + b_4 \text{female education} + b_5 \text{gross enrollment} + b_6 \text{labor force participation}$

Table 3: Lag order Selection

Lag Order	Hannan-Quinn criterion	Akaike Information Criterion	Schwarz Information Criterion
1	8.016079	7.826990	8.445514
2	8.031468	7.871469	8.394835

It shows that the Akaike Information Criterion (AIC) and Hannan-Quinn criterion (HQ) are suggesting 1 lag as optimal lag length while Schwarz Information Criterion (SIC) reports 2 lags as optimal value.

Table 4: Bound Test for CO-integration

Dependent variable GDPPC			
Pesran et al.(2001)			
Critical Values	Lower bound Values	Upper bound Values	F-Statistic
1%	3.41	4.68	15.337
5%	2.62	3.79	
10%	2.26	3.35	

According to the bound testing approach, presented by Pesran et al. (2001) a positive conclusive inference about the presence of co-integration relationship can be drawn only if the calculated value of F-statistics lies above the upper limit of its tabulated values. If this value lies below the lower limit the null hypothesis of no co-integration is accepted. While if the calculated value remains between the upper and lower limit the results will be declared inconclusive. The results of above table shows that the calculated F-statistics is greater than upper and lower limits of tabulated F-values at 1percent,5percent and 10 percent level of significance which confirms the presence of co-integration among the variables in the model.

In the next step long run relationship is estimated by applying the Ordinary Least Square (OLS) and results are reported below.

Table 5: Estimated Long Run Coefficients using the ARDL Approach

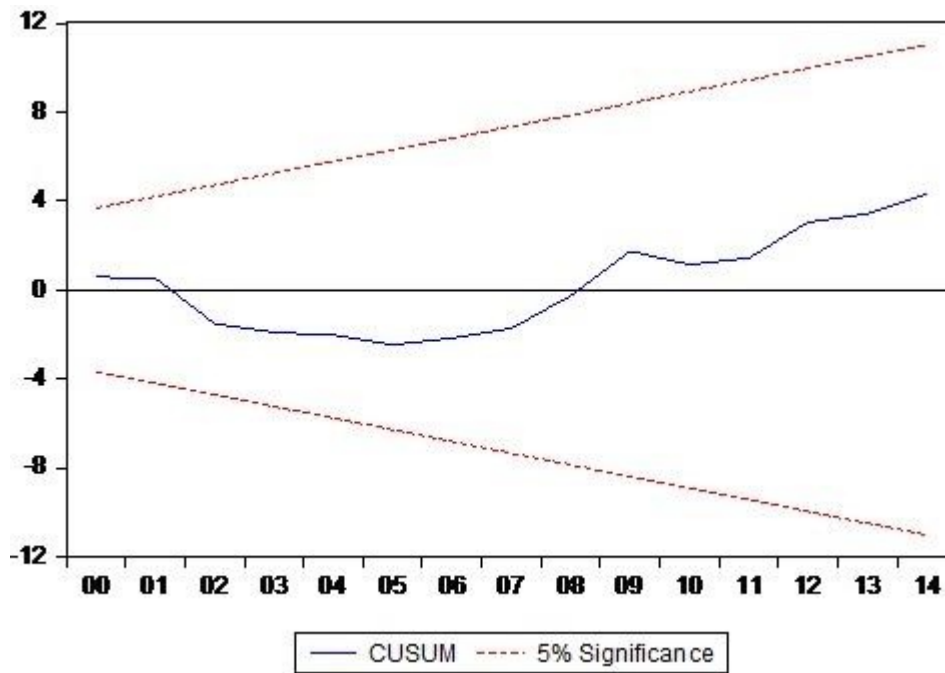
Variables	Coefficients	t-Values	Probability
C	-3277.513	-4.157510	0.0008
GDP(-1)	-0.194571	-1.440951	0.1701
GER(-1)	-2.342957	-2.057047	0.0575
GINI(-1)	10.35177	2.268177	0.0385
LFP(-1)	-2.841240	-0.883716	0.3908
LIFEXP(-1)	54.69342	4.159906	0.0008
SCHOOLENROLFEMALE(-1)	-5.978514	-3.703618	0.0021

Diagnostic Test

R-squared	0.75
Adjusted R-squared	0.56
Durbin-Watson stat	2.07
B-G LM test(prob)	0.44
F-staitistic	15.33795
Prob(F-staitistic)	0.0014

Stability test

To check the stability of the model the cusum test is applied on the model which shows that the blue line is within the two red lines which shows that the model is stable.



The analysis of above reported results shows that there exists negative and significant relationship in education and poverty in long run. Furthermore, it is also examined that income inequality and poverty has the positive and significant relationship in the long run. To check the goodness of the model diagnostic tests are carried out which include stability test, BreuschGodfrey LM test. The statistics reported above are showing that the model has no correlation and model is stable.

Conclusion and Policy Recommendations

Pakistan literacy rate is inadequate and the literacy rate is 58% which showings that still the 42% are unable to even read and write. it means that half of the population of Pakistan is still in the position that they cannot even read or write their name with understanding. If in an economy there are more uneducated people then they cannot achieve the decent standard of living and the dependency ratio will be increased in the economy. And if there is the more income inequality which means that the richer is going to richer and poorer is going to poorer then as a result the poverty in the country will increase. This study investigates the impact education and income inequality in Pakistan by applying Autoregressive Distributive Lag (ARDL) approach of co-integration for the period 1985- 2014. The findings of the study show that education worsens poverty in the long run. The positive sign and significance of coefficient of gini index shows that as the income inequality increased the poverty also increased in the country. The policy recommendations based on the findings of the study are that as in the result the female education worsens the poverty, so the government should pay attention on the education of the female. Further, female labour force participation should be especially increased by skill enhancement programs, financial empowerment and creating social acceptability for female workers.

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