

THE LONG RUN AND SHORT RUN RELATIONSHIP BETWEEN POVERTY AND LITERACY RATE IN PAKISTAN

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Abstract

This study investigates the long and short run relationship between poverty and literacy rate in Pakistan. For this purpose, the time series data from 1971 to 2013 is used. The sources of this secondary data are World Bank Development Indicators. Augmented Dickey Fuller test is used to check the stationarity of data. Poverty and literacy rates are found stationary at first difference. Johansen co integration is used to trace the long run relationship between poverty and literacy rate in Pakistan. The results indicate that poverty is reduced by 0.75 per cent due to one per cent increase in the literacy rate. Moreover, short run relationship between poverty and literacy rate is investigated with VECM and found no relationship in the short run.

Keywords: Literacy Rate, Poverty, Economic Growth, Long Run, Short Run.

JEL Classification: Z000

Introduction

Education is very important to attain sustainable economic growth and development along with human resource development of any country. The developed nations of the world have paved the path of their development due to human development. The people in the society learn how to live together through education. Therefore, all individuals of the society have their basic right to get education. Especially the primary education is much important and it is the state responsibility to provide education at primary level. Every religion has laid stress on the importance of education and

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learning. Increasing literacy rate is the main area of concern and need of the present time. The definitions of literacy may vary from country to country. According to the most acceptable definition presented by UNESCO, adult literacy is defined as “The percentage of people from ages 15 to 24 years who can read and write a short and simple statement with understanding in their daily life” (UNESCO, 2014).

Education affects the growth in society both directly and indirectly. The direct effects include imparting of knowledge, skills and training that is linked to higher wages. The indirect or external effects include accomplishment of basic needs, higher levels of autonomous participation, greater utilization of health facilities, shelter, water and other basic necessities that help to achieve fertility, family abundance and health. This mechanism leads to reduce poverty level (Jeffery, 1996).

Many researchers highlighted the effect of education in accelerating economic growth. Poverty rate goes down with the increase in literacy rate. Poverty is more concentrated in illiterate households in developing nations (Graham, 2002). Similarly Tether (2005) found an inverse relationship exists between poverty and education in case of India. Lower literacy rate hinders progress in developing countries. This can be summarized by understanding that poverty is absent in educated households and its presence is noted in illiterate households. (Tether, 2005)

Poverty in general can be characterized in the context of income; although poverty reflected through income is not a comprehensive measure of the complex phenomenon of poverty. A study conducted by United Nations Development Program (UNDP, 2008) exposed that poverty in human is not only the income poverty but it also diagnosis the degree of shortages in living alternatives for prosperous life. Shortage of education is one of the noteworthy examples to reflect poverty of education. Therefore, poverty of education translates into a significant gauge of human poverty (Espen Dahl, 2009).

According to Arnall (2010), there are many indicators to measure poverty. Historical researches suggested that education is one of the most significant measures of poverty rate. Many researchers have concluded that the most important requirement is to enhance the quality and access to education. Recently, education is not the main area of concern for social, political and economic plans made by the policy makers of Pakistan, India and Bangladesh. But it is given secondary importance in South Asian development programs. They focus more on basic education that includes female, adult and basic education. Poverty cannot be eradicated completely from any country unless and until illiteracy rate of children is controlled (Arnall, 2010).

The objectives of the present study are to investigate the long and the short run relationship between poverty and literacy rate in Pakistan.

Theoretical Framework

In South Asia, more than 400 million people are categorized as poor and they constitute 40% of world's most deprived population. Due to illiteracy present in the human capital the pace of development is slowed down in SAARC region. Lack of access to education is the main factor contributing to the economic instability of the region. To get targets of Millennium Development Goals (MDGs), India, Pakistan and Bangladesh should pay more attention to education sector and take appropriate policy actions to achieve MDGs by the year 2015. (Schuartz, 2010). There are three major effects of poverty on education status. First effect is from the financial side, second is the social stress faced by the poor students and last is the deterioration of educational standards due to poverty. Broadly speaking, usually poor countries have lower literacy rates and at individual level also, the poor children have less access to quality education. Out of more than 6.5 million children, about 80% of them have never been to school in Pakistan (UNESCO, 2014). Economic and non-economic constraints of these high figures include child labour and gender discrimination in education. Incomplete knowledge of religion is also a major barrier to education particularly among females. Unfortunately Pakistan has the second highest number in the list of out of school children where more than 60 per cent population lies below national poverty line. It is evident that literacy and poverty have strong bidirectional relationship at individual and national level (Special, B, 2008).

Human capital theory links literacy and poverty in agreement that poverty is reduced by education or education can help in the betterment of status financially and otherwise also. Millennium Development Goals (MDGs) includes education for all and poverty reduction both due to their immense importance. No nation can progress without removing poverty and illiteracy from the country. Intuitive logic, empirical and theoretical reasons establish strong relationship between poverty and literacy and its roots are partly in the neo-classical human capital theory (Schultz, 1961). It is well accepted phenomenon that greater prevalence of poverty is found among illiterate and less educated households. Therefore, poverty is due to low level of education and consequently prevalence of poverty lead to low level of education and low level of human capital. In this scenario poverty is considered both cause and consequence of low levels of human capital. Under these conditions, household welfare is not maximized. The type of relationships among household welfare, their capital stocks and investment in further education are important to explain intergenerational transmission of poverty and literacy. Therefore, to link poverty with literacy is significant to policy-makers to improve education and curtail poverty for sustainable development (Colclough, 1994).

Literature Review

Afzal et al. (2012) explained education as a multidimensional procedure of development. Not only it accelerates the economic development but also shrinks the poverty and increases the productivity. Poverty is significantly related to economic growth and education of the country. They utilized time series data of Pakistan on poverty, education, physical capital and economic growth from

1971-72 to 2009-10. The ARDL was used for estimation. The positive and significant short run as well as long run relationship was found between physical capital and economic growth. Education was found to have significant positive association with economic growth in the long-run only. While it was found that poverty in the long run has negative relation with economic growth. Bi-directional causality between poverty and economic growth, education and economic growth, and between poverty and education was found with the help of Granger Causality Test. The study recommended pro-poor growth in education and suggested that strategies which will help to reduce poverty and enhance education may be implemented to achieve economic growth in Pakistan.

A Riaz (2011) estimated the poverty variables and their impact on education and unemployment. Annual data from 1974-2009 was included in the research. Methodology involved bonds testing co integration approach to find the long as well as the short run association among variables. The findings showed strong impact of independent variables over the poverty in the long and also in the short run for Pakistan. They further concluded a positive impact of education over poverty and inverse relation between education and unemployment. The growth of country reduced in the long and also in the short run. Inflation rate was found to be insignificant in the research.

Sattar (2012) analyzed the educational structure of Pakistan by undertaking sociological observations including the adult literacy cost of learning, squat enrolment rate, urban rural disparities, lack of concerns of parents and huge drop out ratio. She analyzed the schools associated with BISE Multan, Pakistan. Both secondary and primary data was taken from Human Development Centre (HDC), Economic survey of Pakistan and by interviews respectively. It was concluded that decentralized management, assessment system and expensive education are a major element that affects the basis of education sector in the country. She recommended sufficient organizational facilities, strong strategies, equity and consistency in educational sector, strong and plentiful involvement of stakeholders to decrease damaging effects of the variables.

Hassan and Ahmed (2008) found education impacts upon economic well-being in Sub-Saharan Africa. They employed different variables to measure education. The variables included literacy rates, human capital measure (product of life expectancy at birth) and primary and secondary enrolment rates of learning. Time series data of 31 years over the period 1975-2005 was collected using the secondary sources like databanks on CD-ROM of World Banks in Africa, World Banks World development indicators, internet associated data banks and United Nations. Pooled panel data regression and Panel data fix effect method were the techniques that were employed in the study. They concluded that growth rates of GDP per capita have direct relationship with all the human capital variables. On the other hand, the direct and important association among the variables of growth and human capital showed that education only is not a determinant of growth. There was a strong evidence of relationship between these variables. They suggested that access to education is more important villages as compared to the cities. The result did not highlight this difference. Further they stated that past studies confirmed that investment in general education was more important as compared to vocational education.

Cooray (2009) investigated the impact of worth of education and years of schooling on GDP. He used cross sectional methodology from underdeveloped and developing countries and included dummy variables in the research. The results suggested that total school life expectancy when calculated by enrollment rate was found to have significant impact. On the other hand, the government spending on education had indirect effects on the betterment in educational quality. The author recommended that policy makers should focus on the training courses of teachers, increasing school life expectancy, reducing pupil-teacher ratios and test based appraisal system to accelerate economic growth (Cooray A. V, 2009).

Mursa (2007) found positive association between level of education and employment level. It was found that the main reason of unemployment were lack of abilities, education, skills and awareness. He stated that economic growth was directly related to education because it enhanced productivity. He concluded that less educated work force were not preferred by employers because of lack of knowledge and skills. It was concluded that more qualified employees had cooperative benefits over less educated ones and they were offered high salaries and compensation packages by the employers. They concluded that many organizations preferred high qualified people as they were more knowledgeable and higher qualification increased the probability of employment.

Abbas (2008) examined the effect of education level on income in Pakistan. He took cross sectional data of Pakistan for the years 1998-2004. Under education was considered as a temporary phenomenon. The results concluded a correlation between work experience and level of education which stated that more qualified people had little experience. It was further concluded that male workers had higher salaries when measured with the help of mean and mode index as compared to the female workers that means more qualified male workers had comparative advantage over the others in the job market of Pakistan.

Okubal (2005) examined the role of Government spending on education, economic development and human capital. He took secondary data from Uganda and applied econometric techniques like Error Correction Method (ECM), Cointegration and time series modeling. Human capital was measured by average years of education. The results concluded a direct and significant association among the variables in long run and also in the short run. The author recommended that increased government spending on education sector would enhance the educational quality. He further recommended that private sector should be encouraged to invest in the educational sector to contribute in the pace of economic development.

Data and Methodology

This research study presents the long and the short run relationship between poverty and literacy rate in Pakistan. The data consists of adult literacy rate above 15 years of age and population below national poverty line (all measured in percentage) of Pakistan is used in the study. Poverty rate

in this study served as dependent variable while adult literacy rate is taken as independent variable. Secondary data is taken for the period of forty three years i.e. 1971 – 2013 from World Development Indicator (WDI). The data is checked for stationarity and later on Johansen co integration test, VECM and Wald Test are applied.

Stationary and Non Stationary Series

Firstly, test of stationarity of the time series data is carried out. If the mean, variance and co variance of time series are constant over time then it is known as stationary. The time series data properties can be investigated as its stationarity using the Dicky-Fuller unit root test. Unit root test can be used to test the stationarity of any process. Consider the following three different kinds of random walk process:

$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t$ Y_t is random-walk.

$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \varepsilon_t$ Y_t is random-walk with drift.

$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \varepsilon_t$ Y_t is random-walk with drift and trend.

Where ' t ' represents the time or trend variable. In all the above cases, the null hypothesis is that there is a unit root, $\delta = 0$, $\delta = \rho - 1$, it means that there is a unit root and there is non-stationarity in time series. Alternate hypothesis is $\delta < 0$, i.e. time series is stationary. The probability of alternate hypothesis i.e. $\delta > 0$ is cancelled out. It is due to it $\rho > 1$ which is not possible (Dickey & Fuller, 1979).

The monumental work on checking for a unit root in times series data has been done by Dickey and Fuller (Dickey & Fuller 1979). It is continuity of Dickey Fuller (DF) test based upon the assumption that error term is uncorrelated. ADF test is used by augmenting the lag value of the dependent variable to remove the autocorrelation if exist. Then ADF test consists of estimating the following equation.

$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \dots + \delta_{p-1} \Delta y_{t-p} + \varepsilon_t \dots \dots \dots (1)$

Here α is constant and β is time trend coefficient while p is lag order of autoregressive process. Applying $\alpha = 0$ and $\beta = 0$ refers to estimating random walk, while $\beta = 0$ refers to estimating random walk model with drift.

Suitable Lag Length

After establishing the stationarity of the variables, VAR model can be estimated in order to find the number of lags in the model. According to Akaike Information Criterion (AIC), Final Prediction Error (FPE), Hannan-Quinn information criterion (HQ) and Sequential modified LR test statistics lag (1, 2) is appropriate for model. Moreover, our study model with lag (1, 2) also goes through from all the diagnostic checking and satisfies all stability conditions. Before the estimation of VECM model, number of co integration equations has to be determined.

Johansen Cointegration Test

Co integration among the variables can be found out by using different methods available in literature. Augmented Engle Granger (AEG) and Engle Granger (EG) tests are used in case of two variables. Two variables are said to be co integrated if the estimated error term is stationary at level according to EG and AEG tests. However, for estimation of long run relationship among poverty and literacy rate, Johansen co integration test is used which shows long run relationship among variables based upon maximum eigen value and trace test. Johansen explained two tests for testing co integration. These tests are: maximum eigen value test (λ -max) and the trace test. The λ -max test is given as:

λ -max $[H1(r-1) | H1(r)] = -T \log(1 - \lambda_r)$ for $r = 0, 1, 2, \dots, p-1$. The null hypothesis is that there are r co integrating relations against alternative hypothesis of $r+1$ relation. The trace test is given as: λ trace $[H1(r) | H0] = -T \sum_{i=r+1}^p \log(1 - \lambda_i)$. Here in this test null hypothesis is that $\lambda_i = 0$ against the alternative hypothesis that it is not zero. Therefore, the only first r eigen values are non-zero. It is more appropriate to use trace test as it is found that trace test is robust to skewness and excess kurtosis. This test is also adjustable for degrees of freedom in case small samples. T in the trace statistics may be replaced by $T-nk$ according to Reimers (1992).

Error Correction Model

To explain short run relationship between poverty and literacy rate, error correction model is used. The error correction mechanism is represented as: $\Delta y_t = \alpha + \beta \Delta x_t + \gamma(x_{t-1} - y_{t-1}) + u_t - (1)$ where $\Delta x_t = x_t - x_{t-1}$ and γ shows the error correction term and it is the speed of adjustment due to deviations from long run equilibrium which are corrected in the short run. This error correction specification explains the change in dependent variable is linked to the change in independent variable or may be more than one independent variables (as in our case, we have only one independent variable i.e. the literacy rate) as well as the error term of the previous period. This is represented as: $(x_{t-1} - y_{t-1})$. This representation shows short run relationship among variables. Error correction models are used to estimate

Short run effects of X on Y

Long run effects of X on Y and

Speed at which Y come back to equilibrium in short run after a deviation in long run.

In equation (1), when $y_t = y_{t-1} = y$ and $x_t = x_{t-1} = x$, the long run static solution is attained. This solution is given as: $y = x + \alpha / \gamma$.

Results and Discussion

All the variables poverty (P) and literacy rate (L) got stationary at first difference with trend and intercept. DP is the first difference of poverty and DL is the first difference of literacy rate. The results with first difference are given table 1.

Table 1

Results of Unit Root Test

Variables	Critical Values	t-Statistics	Prob.
DP	-3.53	-6.156	0.000
DL	-3.53	-5.339	0.001

It is concluded that poverty and literacy rates are stationary at first difference. Therefore, the order of co integration is 1 i.e. both poverty and literacy are stationary at the same order. To find out long run relationship between the variables, Johansen co integration test is used. The table 2 and table 3 show the results of co integration.

Table 2

Unrestricted Co integration Rank Test (Trace)

No. of CE	Eigen values	Trace Statistics	Critical Values	Prob.**
None*	0.271	16.510	15.495	0.035
At most 1*	0.092	3.864	3.841	0.049

Note: * denotes rejection of the hypothesis at the 0.05 level and

** MacKinnon-Haug-Michelis (1999) p-values.

Therefore, trace test indicates two co integrating equation at 0.05 per cent significance level.

Table 3

Unrestricted Co integration Rank Test (Maximum EigenValue)

No. of CE	Eigen values	Max Eigen statistics	Critical Values	Prob.**
None	0.271	12.646	14.264	0.088
At most 1*	0.092	3.864	3.841	0.049

Note: * denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values.

Therefore, maximum eigen value test indicates one co integrating equation at the 0.05 percent level of significance in table 3.

Johansen approach of co integration is applied to find the number of co integration relationships on the basis of trace statistics and max eigen values. Trace statistics max eigen values are estimated to determine the number of co integrated vector in the model. The null hypothesis is H_0 : There is no co integration among variables. The first column is the number of co integration relations under the null hypothesis, the second column is the ordered Eigen values of the model, the third column is the test statistics and the last two columns are the 5% critical values. If p value is lower than 5% or critical value is less than t-stats then as per rule H_0 is rejected.

From the table 2, trace statistics 16.5 is greater than the critical value 15.4 with p value 0.03. This result shows only one co integration equation at 1% level of significance. Since p value is lower than 5% and trace statistics is greater than critical value so H_0 is rejected. It means that there is co integration among variables that shows long run relationship between poverty and literacy rate. The results of co integration suggest one co integrating equation keeping in view the trace test as well as maximum eigen value test.

The Johansen long run equation is given in table 4.

Table 4
Johansen's LR Equation

P	L
1.00	0.759
	(0.072)

Table 4 provides the normalized co integrating coefficients and their standard errors are given in parentheses. The estimate shows significant long run relationship between poverty and literacy rate and shows that both variables move in opposite direction. The normalized equation can be rewritten as: $P = 0.759L$. It shows literacy may be changed by 0.759 per cent due to one per cent increase in the poverty rate. To find the short run relationship among poverty and literacy, VECM is applied

$$\Delta P_t = \alpha_0 + \alpha_1 \Delta L_t + \alpha_2 U_{t-1} + E_t$$

$$\Delta P_t = -0.17 - 0.75797 \Delta L_t - 0.1246 U_{t-1} + E_t$$

Lag (1, 1) is appropriate lag length. Error correction has good signs. And AR root model shows model stability. So the table satisfies VAR is stable.

Table 5
VECM Results

Error Correction	D(P)	T STATS
CointEq1	-0.125	-2.211
R ²	0.183	
Adj. R ²	0.115	

The table 5 shows the results of VECM. The dependent variable in the short run is the difference of poverty and is denoted by D(P). The estimated coefficients are not significant. Therefore, we reject the short run relationship among poverty and adult literacy rate. In the short run, literacy has no impact upon the poverty reduction.

Conclusion and Recommendations

The study investigates the short and long run relationship between poverty and literacy rate in Pakistan. The data of poverty and adult literacy rate for the period from 1971 to 2013 is used in the study. The stationarity of time series variables was checked with the help of Augmented Dicky Fuller unit test. The variables were stationary at first difference. The long run relationship was checked with Johansen co integration techniques. The result show the long run relationship between poverty and literacy rate and explain that poverty can be reduced by 0.759 per cent by increasing one per cent literacy rate in the country. Furthermore, ECM explains the short run relationship between poverty and literacy rate in Pakistan. The results show no short run relationship between two variables. The findings of research study suggested that public as well as private sector should pay due attention on the short as well as long run solutions of poverty elimination. The study recommends pro-poor growth and also education in Pakistan. As there is clear evidence that education can lesson poverty but it is just one of various factors that hinder the availability of education. In order to decrease poverty rate it is important not only to enhance access to education but also to highlight the importance of education. Poverty is just one of the basic factors restraining learning through education. Education is critical for poverty reduction and improvement in standard of living. The interdependency between the variables suggest that policies should be formulated that would enhance education and literacy rate in the country for long lasting. Millions of children start school but finally drop out. In Pakistan countries, School systems are continuously underfunded and they lack sufficient funds so they are unsuccessful in providing better facilities. Expenditure on education is crucial for economic growth and ultimately poverty reduction in the country. Education helps in Poverty reduction and economic growth individually as well as collectively. Also poverty reduction plans are more effective if the beneficiaries are more educated.

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