Does Education Enhance Economic Growth? Evidence from Pakistan

Shahzad Ahmad[1] Maria Shabir[2] Kashif Amin[3] Rabia Tanveer[4] Awis Muhammad[5]

[1]Assistant Professor, Department of Economics, Government Postgraduate College Samanabad, Faisalabad, Pakistan
[2]Institute of Agricultural and Resource Economics Faculty of Social Sciences, University of Agriculture,
Faisalabad Pakistan.
[3]North China Electric Power University,Beijing, China
[4]Department of Statistics, University of Sargodha, Sargodha, Pakistan
[5]North China Electric Power University,Beijing, China

Abstract- The research explores long-term and short-term co-integration relations between education and economic development in Pakistan using the ARDL model's boundary method, with annual data collected from 1979 to 2015. Our empirical findings show that the link between education and economic growth is negligible in Pakistan. The key findings are that the human capital has a positive relationship with Pakistan's development. Empirical results also reveal that these variables (Unemployment (UNR), growth of the population (PGR) and Indirect Tax (IDT)) have a negative effect on of GDP. Education has a positive and impressive impact on economic growth over a long period and is negligible in the short period. In this analysis, the variables are very significant. As a result of a rise in education of one percent, economic growth would be increased by 0,94 percent. ECM shows, a 40% rate of change a year. Our research, therefore, urges policymakers to prioritize the quality of education if it is possible that this education will promote economic growth.

Keywords: Education, ARDL, Economic Growth

1.INTRODUCTION

Education plays a vital role in the development of human capital. It increases individual productivity and efficiency, and creates skilled labor capable of leading the economy towards sustainable economic growth. The situation in the education sector in Pakistan is less than encouraging, like in many other developing countries. The low primary enrollment rates, large regional and sex disparities, lack of qualified teachers, lack of proper teaching material and poor physical infrastructure in schools suggest that this sector performs poorly. The situation of the education sector in Pakistan, like many other developing countries, is not particularly encouraging. During and subsequent independence, teachers were painfully shortage, laboratories were weak and poorly equipped, and curricula were not important today's needs. Among education and growth relationship, early role by [1] and much of the consequent writings generate by it, mention that investment in human resources, may possibly promote economic growth.

In Pakistan traditionally, the GDP growth rate is good, but, on the other hand they have not been capable of interpreting the level of human development and focusing on the provision of fundamental social necessities. The state of development is not helping the human development. [2]

One of the key drivers for economic growth is human capital. As a half of the population, women have a major impact on the community's development. The international community has noticed the problems of women so that legislation in this matter in recent decade has been implemented in order to stop discrimination against women and to ensure their participation in social areas. [3]. Female education has a major impact on the development of the country and the influence of social welfare results must be achieved. Education's social effect provides opportunities for social advantage. Education leads to economic growth, as described in modern economic theory. Education is a priority for their governments in developing countries, and they have fiscal policies that spend government revenue on their major education authorities. The governments always strive to achieve economic goals and to focus on the efficient allocation of resources [4].

Empirical research on the relationship between education and economic development is being carried out in the developed countries. Developing countries are emerging countries with a significant impact on the global economy. Economic growth is greatly influenced by the education sector in developing countries [5].

The involvement of women in the labor force is increasing worldwide. The proportion of women in jobs is higher from 41% in 1996 than before to 66% in 2012. [6].

Education is across the world, a prime device to prop up economic growth. It shows business a deep-seated role in mounting human capital and development by humanizing expertise, escalating capability and efficiency. Learning fetches payback for the entire public and for persons. The literacy of women is linked negatively to fertility and to higher marriage. In terms of education for women, they are married and give birth to children at an older age, which is the result of a drop in fertility rate. For a short time, the Iranian government has reorganized the educational system, as the results indicate a high female-marriage ratio, thereby raising the fertility rate.[7]. The low fertility rate ensures large population involvement in economic activities so that growth rates can be further enhanced. The HDI indicates that the relationship between fertility and growth rate has been positively adapted. [8].

To poor country akin to Pakistan, edification in learning act an important task in poverty attenuation and eliminating equally public and earning inequality. Education is very significant issue for human capital formation. Education can take part in augmenting growth, profits, society and human being, as well. Human capital accumulation through education is repeatedly connected with entrance to employment, and privileged proceeds. [5]
[9] Have documented more than one hundred promising the growth determinants, amongst these determinants education is an imperative element of development. The significant and frenziedly task of education cannot be unnoticed for economic growth. Education has a key job in construction of human capital formation and enhancing growth. Financiers are further attracted in that state, where there is charitable accumulation of human accumulation
Schooling has multidimensional impacts on the nation. It manipulates economic growth optimistically, as well as it condenses poverty also. The Pakistan's government has set an objective to move up literacy rate to 85% in next few years. Schooling of folks has an affirmative consequences on the growth of the economy. Education and growth are extremely positively interrelated with each other. The education segment in Pakistan has undergone from continual and stern less investment by the state, since the inception of Pakistan. Government spending on education currently is only 1.9% of national income, while UNESCO has decided that it should be minimum 4 percent of GDP.

Education formulates human resources dynamic, more respectful and encourages sound socio economic strategies. Education growth plays an imperative task, both in economic development and overall expansion course of action of the country also. It is clear, that education can show the way to economic growth with the cooperation of both public and private sector. The educational benefits for persons are in the form of superior employment scenario and privileged incomes.

Current study focuses on twine purposes (1) To inspect the impact of human being resources on economic growth of Pakistan (2) To trace out the association amid education and economic development in short period and in long period.

The remaining study is managed as chapter 2 provides the past studies. The following section discusses the theoretical and analytical analysis associated with this research. Section three explains a methodology of the analysis, while in section four of the paper the quantitative knowledge and findings are discussed. The paper is then summarized as policy recommendations in Section 5.

2. REVIEW OF LITERATURE

2.1 Theoretical review

Theoretical accreditation of neoclassical and endogenous growth theorists shows the importance of the contribution of human capital to the steadily dynamic economic growth. [10] notes that education plays a significant role in the economic development process, as human capital is a key factor in improving the economy's long-term competitiveness. Acquiring higher learning thus means more skilled and productive workers, fostering growth and development in turn. The human capital theory is specifically based on certain mechanisms by which education can have an impact on economic development, such as by increasing individual skills training and work experience, thus increasing employer market value and contributing to economic development and growth. Investments in human capital will also yield higher returns in the form of increased job prospects and higher earnings through higher productivity of labor in investment in human capital [10]
In particular, at least three mechanisms by which education can affect economic growth are illustrated in the theoretical growth literature. First, learning will increase the workforce's human capital, which increases labor productivity and thus transitional growth into a higher level of output equilibrium, as enhanced by neoclassical theories of growth [11].
Secondly, training will increase the economic potential and foster growth by promoting new awareness of new technologies, goods, and processing. Third, training can help disseminate and transmit the knowledge needed to understand and process new information and implement new techniques developed successfully by others that promote economic development once again [12]

2.2 Empirical Review

Several scholars have researched the empirical relationships between education and development through the configurations of dynamical growth theories. Some studies usually approximate growth equations that are augmented by school enrollment as an academic indicator and are regressed with further growth factors. A brief overview of some of the relevant literature is given in this section.

[13] uses the vector autoregression (VAR) modeling process to investigate the co-integration relations between education and economic growth in Zimbabwe from 1980 until 2008. The results indicated a positive relationship between education and economic development and the propagation of these positive effects through physical investment. Yet, [14] carried out a study on educational effects on economic growth in Turkey using the ARDL model used for data spans from 1923 to 2007 and the results indicated that the correlation between school enrolment and economic growth is important over the longer term. [1] demonstrates that growth is related positively to the initial average school age levels of males at secondary and higher levels, and is insignificantly associated with years of secondary, higher and male school education. In fact, the amount of education is positively related to economic growth. Nonetheless, for economic growth the effect of the performance of school is found to be more significant.

Rehme et al.,(2007)[15], underlines the dual role played by education in clarifying the relation between income inequality and economic growth. However, more education does not necessarily reduce inequality when the latter is evaluated by a Lorenz dominance criterion. The research shows that education simultaneously influencing growth and income inequality. Increased education first enhances productivity and then reduces inflation and disparity in revenue.[16] look into the profits of advanced schooling in economy growth of Pakistan during period of 1972 to 2008.To measure the economic growth, Cob-Douglas production function is used in the present study. By applying Cob-Douglas production they find, that the association among GDP and illuminating variables are nonlinear. It was examined the learning inclination, the tactics and confronts for advanced education, and its function in on the whole progress in the nation. The paper, as well exposed, that learned work vigor come into sight to considerably effect the economic growth. The outcomes of this paper established that the takings of advanced education have affirmative effect on development of Pakistan. Participation in advanced education and superior educational disbursement has a positive effect on GDP. [17] Investigated the task of advanced schooling in economic augmentation of Pakistan, by taking, yearly data during the time period 1972 to 2005. The co integration and causality techniques are used. The experimental investigation revealed; there is a lengthy period association amid growth and advanced learning. The empirical fallouts of causality check point out that here subsist a one sided causality operation from economy growth to advanced education and no other route of causality establish amid these variables.

[18], estimate the effect of schooling on economic growth of Pakistan foundation on statistical, model in which yearly data is used starting from1982 to 2008.The econometric technique of this study is foundation on the bivariate Vector Auto Regression (VAR) representation, Granger causality and unit root analysis. The experiential outcomes illustrate the proof of unidirectional causality among GDP and higher education in Romania. There is empirical confirmation of a long period association amid higher education and gross GDP per capita in Romania for the duration of the episode. One of another research study by [19] investigate the short-period and long-period association among school learning and development of Pakistan, applying yearly facts of real gross domestic product, real material capital, price rises and common school enrollment for the duration of 1970 to 2009. OLS method and unit root check is used in the paper. The outcomes of the paper established the continuation of direct association among school education and economy augmentation of Pakistan, together in the short-period and long-period. An inverse association among education [20] investigated that the role of education and poverty reduction .This paper uses the panel data for 40 developing countries between 1999 and 2007 and calculates the coefficients using the GLS methodology. First, it is concluded that income growth plays a moderately positive role in alleviating poverty, but that the distribution of the wealth does not play a key role in alleviating the deprivation of the sample overall.

[21] Determine the force of schooling on growth of Pakistan, foundation on econometric representation. Yearly data has been applied for the duration of 1981-2010 for economic analysis. The replica applied in the study is based on summative yield function. Co-efficient of education expenditure is positive that means that one % modification in education expenditures will carry on average 0.4% variation in real national income.

[20] Describes that nation cannot be developed without investing in education. This paper utilizes yearly facts on education, material resources, poverty and growth for the duration of 1971 to 2010 relating to Pakistan. Using OLS method and unit root test, they discover that education has positive and significantly effect on growth, just in the long-period. In the long-period, growth and poverty has significant and converse relationship. Poverty diminution and education ornamental plans are required to be espoused to increase the process of economic growth in the nation state. In order to investigate co-integration relations between education and economic growth in Greece over the period from 1960 to 2009. [22], apply the Vector Error Correction Model (VCEM). The research explores a positive connection between economic growth and the achievement of education. Using similar techniques for VECM modeling. The relationship between education and economic development for the Romanian economy between 1980 and 2013 is explored by [23] .The empirical results

indicate that education has a positive effect on economic growth in the long term. Another research study by [24] examine the role of learning in growth of Pakistan for the duration of 1971-2008. The study is pedestal on yearly facts. By applying OLS and Johnson co-integration test, as econometric techniques for data analysis, fallouts from Ordinary Least Square, illustrate that secondary education donates appreciably to real national income per capita in Pakistan. The elementary schooling as well has an effect on economic growth, positively. This paper recommended that having education a main concern in public plans, making stern struggle to globalize the basic education and disappointing the quit ratio, at every stage of education, to accomplish unrelenting economic expansion. However [25] examined that how human capital relates to economic growth in Pakistan. This paper provides a description of the role human capital plays in fostering growth in Pakistan, by the proxies of primary enrollment rates, birth rate, and infant mortality rates. The capital was used as fixed capital and one of the production factors. The result shows that health and education are the two main areas that need considerable attention. The allocation of a high proportion of GDP to these sectors will achieve that goal. In the similar way[26] presents the decision of the household in terms of education and the decision of the organization for technical learning in the second generation model of endogenous development and analyzes how schools and technology-specific training interact. All shows that why innovation and economic growth are influenced respectively, and how the portfolio balance of education and technology shifts in a more competitive economy. The key outcomes are as follows: First, schooling and technology-specific learning both have inverted U growth impacts. Second, education investment per labor required to maximize growth is always higher than the investment required to maximize profit. Third, with technology-specific training the optimum learning for growth optimization is being decreased. Fourthly, the schooling impact on technology-specific training has a ' U ' form, so that company-specific training will replace technology-specific training at the relatively low yet fairly complementary level of education at a higher level. Fifthly, the portfolio of the education mix changes to support schooling as the economy is more innovative

3. DATA AND METHODOLOGY

The historically yearly data for 35 years (1979 to 2013) is utilized. The data was used in this study were download from Handbook of statistics on Pakistan, International financial statistics (IFS) and Economic survey of Pakistan. To found the relationship between variables these software like, E-view, Micro Fit were used.

3. 1 Expression of Variables

They are as:-

1: LGDP is dependent variable. Real GDP is included, as a surrogate for economy growth; the nominal GDP was converted into actual GDP by dividing, nominal GDP (market price) with CPI.

2: LHC (Human capital) Primary educate enrollment ratio (PSER) is exercised as alternate for HC. PSER was divided with total population in millions, to convert it into ratio form then multiplying by 100, it was converted into percentage form and after it log was taken of this variable.

3: LUNR (Unemployment rate) is taken as percentage form and taken from Hand book of statistics and WDI (world development indicator).

4: LPGR (population growth rate) is taken as percentage form and taken from Hand book of statistics and WDI (world development indicator).

5: LIDT (indirect taxes) is taken in million forms and it was divided by GDP (market price) to make it into percentage form. It was multiplied with 100 and log of this variable was taken.

3.2 Unit roots and PP test

It is important to check unit roots before estimating an ARDL co-integration model. This is an important step to consider because the ARDL method can be used only if the models are not combined in order higher than I (2) all series of variables. Therefore it implies that it is beneficial to combine variables I(0) and I(1). The ADF test was the most frequently used root unit test in the literature.

$$yt = \beta D_t + \Phi Y_{t-1} + \sum^{p}_{j=1} \alpha_j \Delta Y_{t-j} + \mu \text{----------(1)}$$

Where is the first operator of differences?. D is a deterministic phenomenon and et well-preserved term for disruption.

From regression (1) the null root hypothesis of this unit is formulated as H0: $\Phi = 0$, and the alternative of an otherwise stationary process is tested in this null hypothesis. The second root test in our analysis is the root test PP module. According to [27] Phillips (1988), the PP test addresses the problem that time series system data generation might have an

autocorrelation order higher than is agreed in the test equation so Dickey-Fuller test statistics are invalidated. Therefore, in spite of the unknown autocorrelation and heteroscedasticity in the destructive phase of the test formula, the PP test statistics are more reliable [27] (Phillips, 1988).

$$yt = \beta D_t + \Phi yt-1 \text{----------(2).}$$

3.3 ARDL

To find out the association amid growth and taxation, there would require a logical method for experimental investigation. ARDL has numerous benefits as compared to Johansen technique. As described above, our choice of econometric modeling consists of the ARDL model of [28]. Similar to other cointegration approaches, the ARDL approach has numerous advantages.

By addition, the ARDL does not assume that all the variables under study must be implemented in the same order, unlike any other co-integration strategy. It means that, irrespective of whether the underlying repressors are implemented in order I(1), order zero I(0) or are partially integrated, the ARDL method can be used. Second, while other methods of co-integration are prone to sample size, even if the sample size is small, the ARDL test can also be used. Third even when certain of the repressors are endogenous, the methodology of ARDL generally provides objective estimates of the long-term model and reliable t statistics.

The F-statistics is tested in comparison to the non-standard critical limit values reported in [29]. If the F calculated figure exceeds the upper critical limit value, the non-integrative hypothesis will be rejected. If the measured F-statistic falls below the critically low limit point, the zero co-integration hypothesis is not refuted. The test is considered to be in conclusion when the computed F-statistics fall between the critical low and upper bound values.

3.4 Empirical specifications

Representation is administered on bases of ARDL practice. Gross domestic product (GDP) applied as dependent variable, Human capital (HC) exercised as independent variable, while Unemployment rate (UNR), Population growth rate (PGR) and Indirect taxes (IDT) were used as supplementary variables.

Equation for the model is as

$$GDP = \beta_O + \beta_1 HC + \beta_2 UNR + \beta_3 PGR + \beta_4 IDT + \varepsilon_t \text{.....(1)}$$

This equation is transformed into log type as:

$$LnGDP = \beta_O + \beta_1 LnHC + \beta_2 LnUNR + \beta_3 LnPGR + \beta_4 LnIDT + \varepsilon_t \text{.....(2)}$$

It's a category of double log representation. Human capital, unemployment rate, population rate and Indirect taxes are motivators of economy growth and ε_t is error phrase. To come across co integration association amid variables the subsequent ARDL equation is planned as next.

3.5 Co integration Analysis

The untrue supposition for the over stated log type equation is devised, like under, demonstrate no long period connection

$$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0 \text{.....(3)}$$

The substitute supposition was illustrated as LR association.

$$\mathbf{H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0 \text{.....(4)}}$$

Economy growth is practiced via the equation stated beneath (equation 5)

$$DLnGDP_t = \beta_0 + \sum_{i=1}^{1} \beta_{1i} DLnGDP_{t-i} + \sum_{i=1}^{1} \beta_{2i} DLnHC_{t-i} + \sum_{i=1}^{1} \beta_{3i} DLnUNR_{t-i} + \sum_{i=1}^{1} \beta_{4i} DLnPGR_{t-i}$$
$$+ \lambda_5 LnIDT_{t-1} + \mu_t \text{.....(5)}$$

3.6 Variable Addition Test OR Error Correction Mechanism and ECM Model

If two variables are co integrated in the elongated period, next after that stride the error correction device may be applied to inspect the small period dynamics amid variables. Error correction representation was originally engaged by [30] as well as subsequent to this presented by [29] Engle as well as Granger. ECM brings together the stationary lengthy period steadiness affiliation of co integrated time chain through its vivacious small period unevenness.

The terms of error correction are supposed to be within an interval (0,-1). Some exceptional cases may be between -1 and -2 where a coefficient can be permitted. Incidentally, significant negative error correction terms indicate that the regressand variable is responsible for the long-running causality.

Once co integration is recognized and confirmed, after that; a next juncture, the lag classify of the variables is preferred by way of Akaike information principle or Schwarz Bayesian principle or Hanan Quinn principle .Once the lag classify is established, the elongated period coefficients of the replica would be projected and after that the error correction mock-up, would as well be estimated. In concerned paper the ARDL method is exercised for examination the elongated period connection of the variables and later the error correction model is anticipated.

The terms having summation sign illustrate, the error modification dynamics, even as lambda symbol indicate elongated period involvement.

The subsequent ECM sculpts in ARDL structure is employed to make a stab at the short period connection amid dependent and self-regulating variables.

Common equation in Error Correction shape is précised as

$$DLnGDP_t = \beta_0 + \sum_{i=1}^{1} \beta_{1i} DLnGDP_{t-i} + \sum_{i=1}^{1} \beta_{2i} DLnHC_{t-i} + \sum_{i=1}^{1} \beta_{3i} DLnUNR_{t-i}$$

$$+ \sum_{i=1}^{1} \beta_{4i} DLnPGR_{t-i} + \sum_{i=1}^{1} \beta_{5i} DLnIDT_{t-i} + \alpha ECM_{t-i} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The error correction representation outcomes specify the rapidity of modification backside to long period disequilibria subsequent to a undersized period shock. The ECM assimilates the short period coefficient by means of the long period coefficient exclusive of trailing long period in turn. Further steadiness check is applied.

4. EMPIRICAL RESULTS AND DEBATE

4.1 ADF and PP Test

The yearly facts are employed, in the research work, to guesstimate the education and economy growth association. Table 1, illustrates outcomes, by intercept and trend, whilst table 2, illustrates outcomes as well as intercept however no trend.

Table 1: Upshot of ADF and PP including intercept along with trend

Variables	ADF Level	ADF Diff	PP Level	PP Diff	OI	Outcome
LGDP	-1.481	-5.390	-1.488	-5.390	I(1)	Stationary
L HC	-1.753	-5.290	-1.899	-5.290	I(1)	Stationary
LUNR	-1.655	-7.930	-1.655	-7.930	I(1)	Stationary
LPGR	0.455	- 4.089	- 0.003	-2.854	I(1)	Stationary
LIDT	-1.184	- 6.515	-1.168	- 6.470	I(1)	Stationary

ADF Critical Values		PP Critical Values	
1%	-3.639	1%	-3.646
5%	-2.951	5%	-2.954
10%	-2.614	10%	-2.615

As mentioned previously, the ARDL approach is an essential step in our empirical experiments only for time series, which are mixing I(0) and I(1) variables and therefore for unit root analysis. The results are mixed in the time series stages, as can be seen from the reports: with the ADF test statics the unit root null hypothesis is totally rejected for stability.

Table 2: Outcome of ADF and PP together with Intercept plus Trend

Variables	ADF Level	ADF Diff	PP Level	ADF Diff	OI	Results
L GDP	-1.726	-5.566	-1.836	-5.566	I(1)	Stationary
L HC	-1.199	-4.936	-1.191	-6.765	I(1)	Stationary
L UNR	-2.379	-7.839	-2.223	-7.768	I(1)	Stationary
L PGR	-0.299	-4.033	-2.675	-2.678	I(1)	Stationary
L IDT	-1.447	-6.619	-1.612	-6.577	I(1)	Stationary

ADF Critical Values		PP Critical Values	
1%	-4.323	1%	-4.262
5%	-3.548	5%	-3.548
10%	-3.225	10%	-3.209

4.2 Diagnostic Test Results

Diagnostic test is very important for correct specification of the model. The diagnostic test computed by ARDL based on Akaike Information Criterion. The result of table 3 indicates that the entire diagnostic tests are insignificant in LM version and in F version. So the empirical finding of the study will be correct and specification of the model is also right.

Table 3: Diagnostic Tests

Test Data	LM Description	F-Description
A: Serial Association	2.0634[0.151]	F(1,24)= 1.6008 [0.218]
B:Functional Structure	0.3557[0.985]	F(1,24)= .2583 [0.987]
C: Normality	1.3378[0.512]	Not applicable
D: Heteroscedasticity	1.5143[0.218]	F (1,31)= 1.4909 [0.231]

A: Lagrange Multiplier check of Residual Sequential Association
B: Ramsey's Reset analysis by means of the square of the fitted facts
C: Foundation on a check of Skewness and kurtosis of Residuals
D: Foundation on the Regression of Squared Residuals on Squared fitted facts

Table 4: ARDL (1, 1, 1, 0, 0) Model foundationed on Schwarz Bayesian principle

Regressors	Coefficients	Stan Error	T-Ratio	Probability
LnHC	0.948	0.176	5.370	0.000
LnUNR	-0.554	0.098	-5.601	0.000

LnPGR	-1.481	0.140	-10.562	0.000
LnIDT	-0.595	0.199	-2.980	0.006
C	12.565	0.682	18.423	0.000

Note:-Investigator utilized Micro-fit 4.1 Student edition for evaluation

The estimated results in Table 4 mentioned above show that the variable of Human Capital, Unemployment rate, Population Growth rate and Indirect Taxes are highly significant in long run. HC has the positive relationship with Economic Growth and UNR, PGR and IDT have negative relationship with Economic Growth. Owing to one % modification in human capital (HC) the economy growth will raise by 0.94 % in the long period. If one percent change in Unemployment rate (UNR) happens, then economic growth will decrease by -0.55 percent.

Table 5: Outcomes of ARDL (1, 1, 1, 0, 0) selected pedestal on Schwarz Bayesian Principle

Regressors	Coefficients	Stan Errors	T-Ratios	Probability
DLnHCP	0.154	0.104	1.482	0.150
DLnUNR	-0.103	0.047	-2.164	0.039
DLnPGR	-0.103	0.167	-3.570	0.001
DLnIDT	-0.241	0.070	-3.426	0.002
DC	5.085	1.051	4.835	0.000
ECM(-1)	-0.404	0.087	-4.637	0.000

The outcome of ECM, the basis of the Schwarz Bayesian method, was stated in table 5.The coefficient of ECM is momentous and has right negative sign. The worth of ECM coefficient is -0.40469 with T-ratio of -4.6378. The ECM coefficient confirms the pace of modification and in the long period involvement among education and economy growth. ECM coefficient indicates, with the intention of 40 percent modification would take happened in the long period disequilibrium in twelve months, owing to once distress in the short period.

Table 6: Result of ARDL (1, 1, 1, 0, 0) preferred on Schwarz Bayesian Criterion

R^2	**0.58**	**AdjR^2**	**0.46**
S.E of Reg.	0.029	F-Statistics	6.94(0.00)
RSS	0.021	AIC	66.22
D.W statistics	2.20	SBC	60.24
	Durbin's h Test	-0.691	

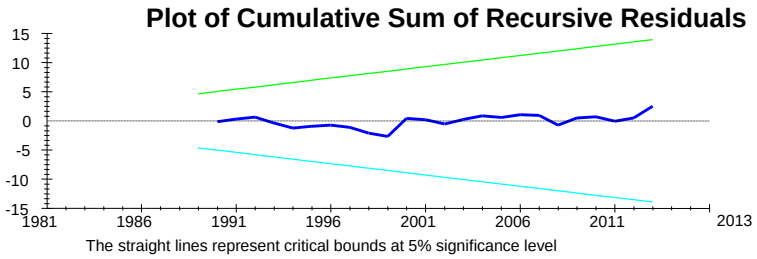
Note: Worth of Durbin's h test should fall amid +1.96 to –1.96

In table 6 the worth of R^2 is 0.58, while of adjusted R square's value is 0.46. Durbin Watson's worth of 2.2 shows no autocorrelation. Durbin's h-statistics is as well employed, to verify autocorrelation. For the nonexistence of autocorrelation this test's value should lie down amid +1.96 to –1.96. Here its value is -0.691, shows no autocorrelation.

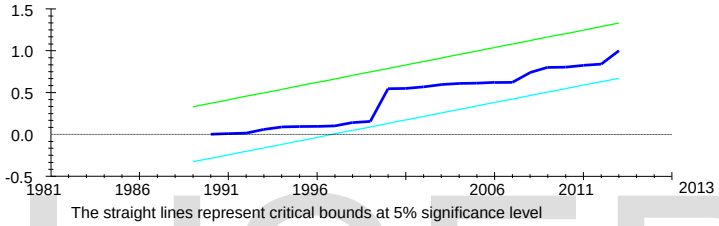
5.2 Stability of the Model

Diagram of CUSUM proved that its line stay behind the critical five percent perimeter and CUSUMSQ data did not outdo the critical margins. These diagrams illustrate the steadfastness of long period coefficients and steadiness of long period connection connecting higher education and economy growth.

Graph 5.1 Charts of CUSUM and CUSUMSQ



Graph 5.2 Charts of CUSUM and CUSUMSQ



5. Findings and Conclusion

The study's main purpose was to detect a long and short-term association between education and economic growth during the period between 1979 and 2013. The ARDL methodology was used to estimate the long and short relation between the variables for co-integration. The main findings are that that schooling has constructive effect on economy growth of Pakistan. Schooling has affirmative and momentous effect on growth, in long period, whilst it is insignificant in short period. Owing to one % raise in overall taxes, economy growth would increase by 0.94 %. ECM coefficient of overall taxes shows 40 % pace of modification in a year. Our research results show that if we are to boost economic growth, it is necessary to increase the level of education.

6. Policy Recommendations

Study suggest following recommendation to develop the education structure of Pakistan. The study results confirm that educations have positive effect on growth. So literacy rate must be increased. The literacy rate is about 58 percent in Pakistan that is very stumpy as judge against too rich countries, where this rate has reached to 100 percent, like America, Japan, Germany, France and many others developed countries in the world. Our education system is out dated and backward. It is needed to make a lot of changes

in our education system to acquire the object of higher economic growth, during educational transformation. So our study recommends the following suggestion to enhance the level. Research outcome showed that schooling have affirmative effect on economic growth with literacy rate of 58%. So expenditures on education must be increased to enhance economic growth as a whole.

According to research outcome the literacy rate should be increased to enhance economic growth. Presently the share of education expenditures are less than two percent of GDP in budget, this is very less funding. It should be at least five percent of GDP of Pakistan. Our results further emphasize the importance of public expenditure to improve economic growth, and a large part of the government's budget is well-known to be spent on education. Our study now suggests that policy must concentrate on deeper basic educational problems, such as improved education quality. To suggest a way forward for future research, we urge academics to investigate for country whether such investment has led to the development of economic growth in the sense of government spending on education.

References

1. Barro, R. J. "Human capital and grouth in cross-country grouth regressions." Swedish Economic Policy Review 6, no. 2 (1999).
2. Husain, Fazal, Muhammad Ali Qasim, and Khalid Hameed Sheikh. "Analysis of public expenditure on education in Pakistan." (2003): 771-780.
3. Hassan, Syeda Anam, and Nazish Rafaz. "The role of female education in economic growth of Pakistan: A time series analysis from 1990-2016." International journal of innovation and economic development 3, no. 5 (2017): 83-93.
4. Muktdair-Al-Mukit, Dewan. "Public expenditure on education and economic growth: the case of Bangladesh." International Journal of Applied Research in Business, Administration & Economics 1 (2012): 10-8.
5. Mallick, Lingaraj, Pradeep Kumar Das, and Kalandi Charan Pradhan. "Impact of educational expenditure on economic growth in major Asian countries: Evidence from econometric analysis." Theoretical & Applied Economics 23, no. 2 (2016).
6. World Bank. Dahlman, Carl and Utz, Anuja. Indian and the Knowledge Economy: Leveraging Strengths and Opportunities. Washington DC, (2012).
7. Saadat, S., S. Chowdhury, and A. Mehryar. "Fertility Decline in the Islamic Republic of Iran 1980–2006: A Case Study." Institute for Research on Planning and Development, Tehran, Iran (2010).
8. Fox, Jonathan, Sebastian Klüsener, and Mikko Myrskylä. "Is a positive relationship between fertility and economic development emerging at the sub-national regional level? Theoretical considerations and evidence from Europe." European Journal of Population 35, no. 3 (2019): 487-518.
9. Latif, Amna. "A critical analysis of school enrollment and literacy rates of girls and women in Pakistan." Educational Studies 45, no. 5 (2009): 424-439.
10. Hoeffler, Anke E. "The augmented Solow model and the African growth debate." Oxford Bulletin of Economics and Statistics 64, no. 2 (2002): 135-158.
11. Mankiw, N. Gregory, David Romer, and David N. Weil. "A contribution to the empirics of economic growth." The quarterly journal of economics 107, no. 2 (1992): 407-437.
12. Benhabib, Jess, and Mark M. Spiegel. "The role of human capital in economic development evidence from aggregate cross-country data." Journal of Monetary economics 34, no. 2 (1994): 143-173.
13. Zivengwa "Investigating the causal relationship between education and economic growth in Zimbabwe", Global Journal of Management and Business Research, (2006),12(8), 1-13.
14. Beskaya A., Savas F. and Samiloglu, "Education and Income Relationship in Turkey." The Economics and Finance Letters 3, no. 1 (2010): 8-12.
15. Rehme, Günther. "Education, economic growth and measured income inequality." Economica 74, no. 295 (2007): 493-514.
16. Aziz, Babar, Tasneem Khan, and Shumaila Aziz. "Impact of higher education on economic growth of Pakistan." (2008): 15-29
17. Chaudhary, Amatul R., Asim Iqbal, and Syed Yasir Mahmood Gillani. "The nexus between higher education and economic growth: An empirical investigation for Pakistan." Pakistan Journal of Commerce and Social Sciences (PJCSS) 3 (2009): 1-9.
18. Dănăcică, Daniela-Emanuela, Lucian Belaşcu, and Livia Ilie. "The interactive causality between higher education and economic growth in Romania." International Review of Business Research Papers 6, no. 4 (2010): 491-500.
19. Afzal, Muhammad, Muhammad Shahid Farooq, Hafiz Khalil Ahmad, Ishrat Begum, and M. Abdul Quddus. "Relationship between school education and economic growth in Pakistan: ARDL bounds testing approach to cointegration." Pakistan Economic and Social Review (2010): 39-60.
20. Janjua, Pervez Zamurrad, and Usman Ahmed Kamal. "The role of education and income in poverty alleviation." (2011).
21. Reza, Asghar, and Suman Valeecha. "Impact of education on economic growth of Pakistan: Econometric analysis." IOSR Journal of Business and Management 5, no. 4 (2012): 20-27.
22. Pegkas, Panagiotis, and Constantinos Tsamadias. "Does higher education affect economic growth? The case of Greece." International Economic Journal 28, no. 3 (2014): 425-444.

23. Mincer, Jacob. 1974. Schooling Experience and Earnings. New York: NBER.(Mincer, Jacob. "Education, experience, and the distribution of earnings and employment: an overview." In Education, income, and human behavior, pp. 71-94. NBER, 1975.)
24. Khan, Jangraiz, Naeem Ur Rehman Khattak Khattak, and Amir Khan. "Human capital-economic growth nexus: A causality analysis for Pakistan." (2015): 279-290.
25. Afridi, Ahad Hassan. "Human capital and economic growth of Pakistan." Business & Economic Review 8, no. 1 (2016): 77-86.
26. Kim, Sang Choon, and Bong-Ho Choi. "Schooling, Technology-specific Training and Economic Growth: a Theoretical Approach in a Model of Endogenous Innovation." The Journal of the Korea Contents Association 17, no. 5 (2017): 285-304.)
27. Phillips, Peter CB, and Pierre Perron. "Testing for a unit root in time series regression." Biometrika 75, no. 2 (1988): 335-346.
28. Pesaran, M. Hashem, Yongcheol Shin, and Richard J. Smith. "Bounds testing approaches to the analysis of level relationships." Journal of applied econometrics 16, no. 3 (2001): 289-326.
29. Engle, Robert F., and Clive WJ Granger. "Co-integration and error correction: representation, estimation, and testing." Econometrica: journal of the Econometric Society (1987): 251-276.
30. Alogoskoufis, George, and Ron Smith. "On error correction models: specification, interpretation, estimation." Journal of Economic Surveys 5, no. 1 (1991): 97-128.