



Measuring the Contribution of Education: New Evidence from Economic Growth Empirics of Pakistan

Dr. Farhana Nosheen, Assistant Professor, Department of Economics, Govt. Associate College for Women, Muzaffrabad Multan. Higher Education Department, Punjab Pakistan.

Saba Akbar, Lecturer, Department of Economics, Govt. Associate College for Women, Choti Zareen, Dera Ghazi Khan. Higher Education Department, Punjab Pakistan.

Nazia Nasir, Research Scholar, Department of Economics, The Women University Multan, Pakistan.

Dr. Hina Ali*, Assistant Professor Department of Economics, The Women University Multan, Pakistan.
hinaali@wum.edu.pk

ABSTRACT-In this study, we examine the education effects on economic growth in Pakistan. Secondary data from the period of 1989-2020 is used. Results implied that education is necessary for economic growth which contains self-confidence, skills of the workforce, knowledge which have significant effects on development and growth. By using the two variables as Literacy and GDP this study is using vector Autoregressive model (VAR). This study is using the Granger Causality test considering lag lengths 2, 3, and 4 to estimate the model. According to the result in 2 and 3 lengths, no relationship is found between Literacy rate and GDP. In the lag length, 4 literacy rate causes GDP, but the probability in the third result was 0.04 which was less than 0.05.

Keywords: Education; Economic Growth; Literacy rate; Pakistan

I. INTRODUCTION

Education plays a key role in both development and growth. To gather together an economy, education is an indispensable part of a country. In developing countries like Pakistan education is paving the way for progress. Education is the only way to accelerate economic growth moreover it also increases self-assurance attentiveness and makes the labor force more skilled that is an essential condition for development and growth.

Pakistan is a developing country. We have a large population and minimum sources in all fields of life. Education facilities are poor in all respects. In Pakistan, we have a low literacy rate education means only to educate somehow to get a good job. There are different categories and levels in the system of education here in Pakistan. These are four levels of the education system. primary, middle, secondary, and others. In the Primary school system, there are grades 1 to 5. To measure education level primary school enrollments are the best means. Only 86% of children complete their primary education in Pakistan. In grades 5 to 8 middle school enrollment lies in Pakistan. Because of child labor, the percentage of middle school enrollment at the middle level decreased in Pakistan.

High school enrollment grades 9 to 10 in Pakistan. High school enrollment is also called secondary education and passing the national examination is necessary at this stage. Because of this process, at the national level enrollment of students is recorded. Between high school enrollment and GDP, there is a positive relation. GDP is also increasing in the economy as an increase in high school enrollment.

The Literacy rate means how many people can read, write their names. The literacy rate is an important part of the education sector. With the help of the literacy rate, the level of education can be easily measured. Two variables will be used in this study GDP and Literacy rate. But the performance and progress of the education sector in Pakistan is very low, as well as no good achievement of the education department due to low Pakistan's government spending on the education sector. Only 2% of expenditures are made by Pakistan's government in the education sector. Because of less investment in the education sector, the education level is very low in Pakistan.

II. LITERATURE REVIEW

The effects of education on economic growth have been shown in this study. For this purpose time, series data of Pakistan will be used. This study shows the theoretical and empirical analysis between education and economic growth. This study shows the changes that occur in the training of teachers, school enrollment, level of employment, economic growth, human capital formation due to changes in education infrastructure.

Memon (2007) observed the challenges, issues, and problems of education in Pakistan. According to this paper the development of people in respect of spiritually, mentally, and socially is the purpose of education. But as compared to developing and developed countries the participation of the education sector in economic growth is very low in Pakistan. In 1996-1997 only 2.61% financing budget was fixed for education. Memon says the teachers are very important in a country and can do the work for the betterment of the education system. But the untrained teachers, low investment in the education sector, poor infrastructure of the education department are the main issues in the education sector's development. Afzal *et al.* (2010) found the effects of school education on growth in the short run and long run. He used different variables such as GDP, school enrollment, inflation, and physical capital. In this model, the most important model was Autoregressive Distributed Lag Model (ARDL). Then he used the Time series data of Pakistan from 1970-2010 by applying the OLS method. These showed a positive relationship between all variables.

Awan (2011) analyzed the role of education on the growth of the economy in Pakistan by using the Vector Autoregressive (VAR) Model. The annual time series data from 1971-2020 is used. Then they used Augmented Dickey-Fuller and OLS technique for making the series stationary. According to the results, there was a significant effect of education on the growth of the economy but because of economical problems, negative effects exist. Akhtar (2012) focused that employment depends on the labor force. The labor force is affected by the quality and quantity of education. In Pakistan due to less investment in the education sector employment level is very low. The school enrollment was high in a government school in 2002 but the level of education in a government school was very poor. Because the education department does not hire experienced teachers. Ali, Chaudhry and Farooq (2012) showed the effects of human capital formation on economic growth. The paper explained skills of human beings should be developed for developing countries. Natural resources can never be utilized effectively without human capital formation. They used Durbin Watson (DW) Test. Then by using Pakistan's data during 1972-2011 the OLS method was used. According to these results, there was a positive effect of human capital formation on the growth of the economy.

Klimova *et al.*, (2016) analyzed the mutual effects of secondary education and the growth of their economy in the developing countries of the world. The findings of this paper revealed the truth that when we improve and promote human capital poverty is reduced. And it paved the way toward economic growth and development. In this study, it is concluded that it does not mean that a higher number of schools and teachers does not mean higher will be the growth of the economy, but the quality of education was necessary. Moreover trained teachers produce good citizens. The result was obtained from the Johanson Co-integration methodology. It is found that there was a negative relationship between school enrollment and the growth of the economy and also an inverse relationship between the number of teachers and economic growth. It has resulted that only hiring more teachers was not good for growth but on the other hand training process of teachers was found better. And it is also found that there was a positive relationship between the number of schools and growth.

Kiani and Adiq (2013) focused that education essential for the growth of the economy. Education increases skills of workforce awareness and confidence which is a necessary condition for development and growth. The paper mentioned the four levels of education in Pakistan as primary education, secondary education, higher education, and other school enrollment by using data from 1982-2010. The OLS method was used in this study. The result showed education level was not improving over time that's why there was a gap between GDP growth rate and education and gradually GDP growth rate was increasing. Government should motivate the students to enroll in school, should generate a balance between GDP and growth, and also investing policies in the education sector should improve. So this study showed different relationships among economic growth, education, primary and secondary school enrollment, labor for participation, poverty, unemployment, and human capital formation. According to the results, there occur sometimes positive effects and sometimes negative effects of education on the growth of the economy.

Ullah, Khan and Ullah (2014) by using Pakistan's data they explain the effect of health and education on growth and employment and the result of HDI shows that in 2005 health and education ratio was 0.536 in Pakistan. They used comprehensive statistical and econometrics Techniques. The result showed the positive effects of human capital and the growth of the economy. Klimova *et al.*, (2016) analyzed the mutual effects of secondary education and the growth of their economy in the developing countries of the world. The findings of this paper revealed the truth that when we improve and promote human capital poverty is reduced. And it paved the way toward economic growth and development. In this study, it is concluded that it does not mean that a higher number of schools and teachers does not mean higher will be the growth of the economy, but the quality of education was necessary. Moreover trained teachers produce good citizens. The result was obtained from the Johanson Co-integration methodology. It is found

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Charowe (2021) analyzed that education is helpful in economic growth as well as in the short-run period and long-run by using Error Correction Model. They used the data by using OLS techniques to check the hypothesis. The result shows that in the short Run there is no effect of education on growth but in long run, there is a valid effect of education on economic growth.

III. DATA AND METHODOLOGY

This study is based on a theoretical and conceptual framework to show the effects of different variables in a model. The model consisted of two variables literacy rate and GDP which explained the effect of education on GDP in Pakistan.

Model specification

To estimate the effect of education on economic growth the Vector Autoregressive Model (VAR) has been analyzed by using the Granger Causality Test, the model discussed the relationship between Literacy rate and GDP. To estimate the model 2,3 and 4 lag lengths were used.

$$LR_t = \alpha_0 + \sum_{i=1}^p \alpha_i LR_{t-i} + \sum_{i=1}^p \beta_i Y_{t-i} + \mu_i$$

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{i=1}^p \beta_i LR_{t-i} + \mu_i$$

Where, LR = Literacy Rate, Y = Gross Domestic product

Two variables dependent and independent discussed in this model. A dependent variable changes due to a change in the independent variable. The relationship among the variables was discussed.

Gross Domestic Product

By definition, GDP is the market value of all final goods and services produced in a country in a year with the help of its domestic resources. GDP has two types 1) Nominal GDP 2) Real GDP. Real GDP remains constant while nominal GDP never remains constant. The education sector has an important role to increase GDP. In this study, there is a positive effect between GDP and education.

Literacy Rate

The literacy rate is a tool to estimate the education level. Literacy means how many people can write or read their names. The literacy rate helps us to check the education level of any country. There is sometimes a positive or sometimes negative relationship between literacy rate and GDP because we cannot measure the education level only with the help of the literacy rate. After all, literate persons are not those who read or write their names.

Data source

The data are collected from 1989 to 2020. The data were obtained from Pakistan's Economic Survey, State Bank of Pakistan, Hand Book on Statistics, and Pakistan Bureau of Statistics. This study consisted of a secondary source of data.

IV. RESULTS AND DISCUSSIONS

Table 1: Pairwise Granger Causality Test

Lags 2	Obs	F-Statistic	Probability
Null Hypothesis:			
Y does not Granger Cause LR	29	0.07201	0.81069
LR does not Granger Cause Y		2.56547	0.08506

Source: Authors Calculations.

In lag length 2 the Granger Causality Test is used. The probability has been showing that the results are insignificant because the probability is 0.81 which is more than 0.05 and accept H_0 it shows no effect of GDP on literacy rate. The second probability is also greater than 0.05 which is 0.08 it also means LR does not cause Y. According to the results, we accept H_0 and reject H_1 .

Table 2: Pairwise Granger Causality Tests

Lags: 3	Obs	F-Statistic	Probability
Null Hypothesis:			
Y does not Granger Cause LR	28	0.02826	0.88208
LR does not Granger Cause Y		2.37645	0.09980

Source: Authors Calculations.

The Granger Causality Test is used in lag length 3. According to probability, the results are insignificant because the probability result is 0.88 which is more than 0.05, and accept Ho. It means GDP does not affect the literacy rate. The other probability is 0.099 which is also more than 0.05 means there is no effect of LR on Y. So Ho is accepted in both cases and rejected H₁.

Table 3: PairWise Granger Causality Tests

Lags:4	Obs	F-Statistic	Probability
Null Hypothesis:			
LR does not Granger Cause Y	28	2.23012	0.04237
Y does not Granger Cause LR		0.27451	0.84300

Source: Authors Calculations.

In lag length 4 the result is obtained by using Granger Causality Test. According to the probability, the result is significant because the probability is less than 0.05 which is 0.04, and accepted H₁. It shows the effect of LR on GDP. The second probability is greater than 0.05 which is 0.84. It means Y does not cause LR. Here we accept Ho and rejected H₁. In the first result, we accept H₁ but in the second case, we accept Ho.

V. CONCLUSION

In this study, we use the Pakistani time-series data from 1989-2020. The main purpose of the study is to explain the education effects on growth and development. According to this study, Education is the main element to explain the development level and education level of a country. Two variables as Literacy rate and GDP are discussed in the study. The study has used the Vector Autoregressive model (VAR). To check the relationship between GDP and rate of literacy the Granger Causality test has been used in lag lengths 2, 3 and 4. But in lag 2, 3 there was no relationship between literacy rate, GDP in Pakistan but in lag 4 there was a positive relationship between GDP and literacy rate because the probability was 0.03 which is less than 0.05. But the second result at lag length 4 is greater than 0.05. It means the relationship between GDP and literacy rate exists. This study shows that investment in the education sector in Pakistan is low. The investment in the education sector is only 2%. Therefore literacy rate cause GDP but GDP does not cause literacy rate. To develop the education sector the Government should improve investment policies of education and also appointed experienced teachers.

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