Education, Health and Employment in Pakistan:
A Co-integration Analysis

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Abstract

Education and health both are essentials for development strategy of any economy. They also play vital role in enhancing productivity, economic growth and employment level. By providing equal opportunities of education and health to all citizens of any nation, all types of disparities can be eliminated. Considering the importance, the present study highlights some of the significant features of education and health in advancing employment level in the long run as well as in the short run. The analysis also incorporates the causality investigations based on VAR and VECM. Keeping in mind, the research uses time series data for the period from 1972 to 2010. With the aim of long run and short run estimates, we have taken Johansen Co-integration test and Vector Error Correction model respectively.

The long run results exhibit that educational expenditure, total enrollment, number of hospitals, health expenditure and gross fixed capital formation are momentous features in magnifying employment level in Pakistan. Speed of adjustment term suggests that short run variables are converging towards long run equilibrium by taking 7 percent annually adjustments. At the end, it is suggested that there should be more expenditure on education to promote enrollment at primary and professional levels by offering scholarships to students. For better health and education, Govt. should augment health expenditure as well.

Keywords: Educational Expenditure, Total Enrollment, Number of Hospital, Health Expenditure, Employment, Co-integration analysis, VAR & VECM based Causality.

1. Introduction

Education is central to the development strategy of an economy. It plays a vital role in human resource development. Educated human capital has been found to have strong and consistent positive effects on economic growth and employment of a country. It reflects substantial impact on the degree of social cohesion in a country. Equalization of education levels reduces the regional disparities. Like many other developing countries, the situation of education sector in Pakistan has not been very encouraging due to poverty and dismal economic situation in the country. Hence, it is necessary that the proportion of development spending on education must be increased. An extremely high portion of the education budget is spent on recurrent heads, mainly comprising of salaries in contrast to the meager amount spent on quality improvements, such as teacher's training, curriculum development, supervision, monitoring etc; therefore, additional funds must be allocated for the purpose. Good health is identified as a vital component of a good quality of life, and access to good health is recognized as a basic human need and a fundamental human right. A healthy population is more productive and efficient component of the society.

An increase of 4.0 percent in Pre-Primary enrolment (8.743 million) in 2009-10 over 2008-09 (8.434 million) has been observed during 2009-10, it is estimated to increase by 2.0 percent in 2010-11. A number of 157,360 Primary Schools with 466,451 Teachers are functional. An increase in middle enrolment (5.501 million) in 2009-10 over 2008- 09 (5.414 million) has been observed during 2009-10, it is estimated to increase by 0.4 percent in 2010-11. An increase in secondary enrolment (2.581 million) in 2009-10 over 2008-09 (2.556 million) has been observed during 2009-10. An enrolment of 1.257 million is estimated in 2010-11 against 1.165 million in 2009-10 and 1.07 million in 2008-09 whereas, 3,323 Higher Secondary Schools and Inter Colleges with 77,118 Teachers are functional. An enrolment of 1,105,307 is estimated in 2010- 11 in Higher Education over 935,596 in 2009-10. In order to boost-up higher education. Three new universities have been established during the year 2009-10 making the total number to 132 universities with 57,780 Teachers in both Private and Public Sectors.

Access to good health can contribute positively to the economic and social development of a country. Thus, key issues that impact the health status of people ought to be addressed through a diverse set of policy tools comprising short and long term measures to secure better health outcomes. The people of Pakistan have grown healthier over the past three decades. The vision for the health sector comprises a healthy population with sound health, enjoying good quality of life through the practice of a healthy life style. In order to achieve this vision, significant measures have been taken toward disease prevention, health promotion, greater coverage of immunization, family planning, and provision of female health worker services.

To maintain the expansion of health facilities, the financial allocation for the health sector has been increasing steadily. However, the massive floods of 2010 caused a significant downwards rationalization of health and nutrition expenditures which had to be diverted to the relief and rehabilitation effort. Total health expenditures (federal and provincial) declined from Rs. 79 billion in 2009-10 to Rs 42 billion in 2010-11.

The present study is having a prime importance due to few major reasons of low employment levels in Pakistan in which education and health are necessary to discuss in detail. For that purpose we have organized a study involving different aspects of education and health to trace out the effectiveness of health and education on employment in Pakistan. Apart from the introduction in section I, section II summarizes some empirical studies, section III describes some data and methodological issues, empirical findings of the study are interpreted in section IV. Lastly, some concluding remarks are given in section V.

2. Literature Review

The study of examining effectiveness of education and health on employment has been instituted at Primary and Secondary levels, in different times and in various countries. In the study, we have summarized few of them in this section.

Boadu (----) has seemed to make gender analysis that is to review the activities and responsibilities of men and women in Ghana. He also considers the socio-economic and demographic variables underlying gender disparities in education, health and labour force participation in Ghana. Ghana Demographic and Health Surveys (GDHS) are utilized for the years 1988 and 1993. Employing stepwise logistic regression, the study concludes that male household head and rural respondents are actively participating in labor force. Labor force participation is reduced by more age of household head and having schools at far distance.

Denny and Harmon (2000) have added to the small but growing body of micro-econometric evidence on the impact of education and training on the labour market outcomes of young adults. Annual survey of Irish school leavers is collected by the Economic and Social Research Institute for the Departments of Education, Science and Enterprise; Trade and Employment. They have estimated the results using Multinomial Logit model. Results exhibit that father professionalism; father employment and father intermediate education are the factors for increasing employment. Characteristics of Fathers like Farmer Occupation, Semi Skilled or Unskilled are reducing employment.

Mete and Schultz (2002) have assessed among elderly men and women that how their health status affects their labor force participation and whether the national expansion in health insurance in 1995 has encouraged earlier retirement? By employing survey of health and living status (SHLS) of middle aged and elderly in Taiwan for the years 1989, 1993

and 1996, they have determined that literate, married and educated persons are more participating in labor force participation. Aged persons are seen very few working as a labor force in Taiwan.

Pelkowsk and Berger (2004) have examined the effect of health problems on employment, annual hours worked and hourly wages. The study uses the Health and Retirement Study data. They conclude the health illness as a negative factor for employment.

Kalwij and Vermeulen (2005) have introduced the new SHARE data and shed some light on systematic differences in participation rates. They have also analyzed that how labour force participation of the elderly is affected by demographic and health related characteristics. They have gathered the sample of 12,237 of men and women aged 50 to 64. Results of Probit model suggest that labor force participation is increased by more education, couple households and due to having children. While severe health conditions are reducing labor force participation in Europe.

O'Higgins and Ivanov (2006) have looked at traditional skills as a source of employment opportunities for the Roma and they also have dealt with the role of different actors (individuals, businesses, the state) in increasing employment opportunities and thus reducing poverty. Survey 2002 has been used for data collection. Employing descriptive analysis technique, they find that education is reducing unemployment problems in the Roma.

Laplagne et al. (2007) have explored alternative methodologies to obtain estimates of the labour force participation effects of the health and education variables targeted by NRA. Household, Income and Labour Dynamics in Australia Survey has been used for the years 2001–04. Results of Multinomial Logit model exhibit that labor force participation is increased by the people aged (15 – 24), married households, degree education, having diploma/ certificate and more experience. Diabetes, unemployment history, cancer and age above 50 are the factors that are reducing labor force participation.

Villa (2010) develops and illustrates the conceptual and empirical knowledge on growth, employment and investment in Moldova. He gives emphasis on the empirical relationships between these variables and discusses some policy implications with regard to employment growth. This study gives the availability of data, focuses on the GDP, investment, consumption, exports, imports and FDI which can affect employment. Time period of 1994 – 2005 has been chosen and estimation is made possible using VAR model and Variance Decomposition function. He reports that investment growth, higher education growth, FDI growth, exports and GDP are significant factors for employment growth. On the other side, imports growth and consumption growth are reducing employment growth in the study area.

Faridi et al. (2010) have attempted to find out the effect of education and experience on the earnings of the students studying in the universities. They have collected data from two universities of Pakistan namely; University of the Punjab Lahore and Bahauddin Zakariya University, Multan. The sample consists on 200 students. Taking students' earning as dependent variable, results of ordinary least square method advocates that education and experience both are significantly in favor of higher earnings

Faridi et al. (2010) have explored the impact of education and health on employment. They have collected cross sectional data through field survey in the year (2008-2009). The estimation of regression model is done using Logistic model. The study explains experience, household size, urban location, education, married marital status, no. of dependents and male gender as having positive relationship with employment while poor health, assets and joint family system exhibit negative influence on employment.

Nanfosso and Akono (2010) have determined the impact of fertility and health on labour force participation in a simultaneous equations framework. Cross sectional data is collected through survey in Yaoundé and Douala for 2096 women aged 18 to 64 years. Female labor force participation is enhanced due to age, education and good health. While females having marital status single are less participation in labor force.

García-Gomez et al. (2011) have circumvented the health reporting problem and exploited health variation that is arguably exogenous to trends in Labour market outcomes by virtue of being unexpected. They have identified from unscheduled and urgent hospital admissions of individuals aged between 18 and 64 who had not been admitted in the previous year. By using registered admissions and conditioning on employment at the time of admission, they have avoided problems of reverse causality. They have utilized the tax records (RIO), the hospital discharge register (LMR),

the Cause-of-Death register (DO), and the Municipality Register (GBA) for the years 1998-2005. The results suggest the hospitalization, health shock and disability as negatively affecting employment.

Bradley et al. (2011) studied how men's dependence on their own employer for health insurance affects labor supply responses. They have made use of Health and Retirement Study (HRS) from 1996 to 2008. Using linear probability model, they have explored the health shock as negatively influencing employment.

Chen and Chang (2011) have contributed to the literature by empirically examining whether and how people consider stochastic health condition when making labor supply and saving decisions. Panel Study of Family Dynamics (PSFD) has been used for the years 2003–2005 in the study. Labor force participation is directly affected by gender Male, Married marital status, college education, high school education and no of children. On the other side, bad health, sickness and age are negatively contributing to labor force participation.

Hafeez et al. (2011) have explored some socio economic and demographic factors forcing students to have job. Cross sectional data is collected in 2009 from two universities of the Punjab province. In their study, respondents are male students of University of the Punjab, Lahore, Pakistan and Bahauddin Zakariya University, Multan, Pakistan. Sample of 346 respondents are gathered through Multistage Simple random sampling technique. Logistic regression method is used for the estimation of model. Education, Joint family system, family size and married marital status of students enforce them to participate in economic activity. Students' participation in economic activity is decreased by more fathers' income, pocket money and rural areas.

3. Model Specification, Data Sources and Methodology

3.1 Model Specification

The present study is aimed at investigating the affect of education and health on employment in Pakistan. For that purpose, our employment model is specified with log – log transformation as follows;

$$LEMP = \gamma + \lambda_1 LEDX + \lambda_2 LHLX + \lambda_3 LGCF + \lambda_4 LHOS + \lambda_5 LTEN + \mu_i$$

Where,

LEMP = Log of Employed Labor force

LEDX = Log of government expenditure on Education

HLX = Log of government expenditure on Health

LGCF = Log of Gross Fixed Capital Formation

LHOS = Log of number of hospitals

LTEN = Log of total enrollment in Education.

γ is intercept term, $\lambda's$ are slope coefficients and μ_i is error term of regression model.

3.2 Nature, Hypothesis and Sources of Data

The variables may be described as; employed labor force is the number of employed persons out of total civilian labor force in millions, government expenditure on health and education is taken in million rupees, gross fixed capital formation is also taken in million rupees as a proxy of investment. For health facility, we have taken number of hospitals in Pakistan and for educational achievement, total enrollment is utilized. All the explanatory variables are expected to be positively related to employment in Pakistan.

There are various sources available for data collection in Pakistan. Many authors have used different sources for data collection. Data on the above mentioned variables have been collected through sources like Pakistan Economic Survey 2010 – 2011, Handbook of statistics on Pakistan Economy 2010, World Bank Data (Website), and International Financial Statistics 2009.

3.2 Methodological Discussion

For estimating the values of coefficients for policy making, the study employs *Ordinary least square method* and the results are given in the table A1. In the results we have found that R^2 is greater than Durbin-Watson Statistics (D-W). This is the indication of spurious results and it also gives misleading results of the regression. Spurious results mean there is problem of stationary in our time series variables that should be examined using any of the unit root tests.

Table A1: Dependent Variable (LEMP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	7.16	1.98	3.61	0.00
LEDX	-0.16	0.04	-3.53	0.00
LHLX	0.03	0.04	0.77	0.44
LHOS	-1.50	0.45	-3.32	0.00
LGCF	0.57	0.08	6.53	0.00
LTEN	0.03	0.18	0.18	0.85
R-squared	0.94	**F-statistic**		104.15
Adjusted R-squared	0.93	**Prob (F-statistic)**		0.00
S.E. of regression	0.10	**Durbin-Watson stat**		0.83

3.2.1 Johansen's Cointegration test

E-Views statistical package gives us facility to apply unit root test for examining stationary of variables. If all the variables are integrated of order 1 or I (1), we may be able to apply Johansen Co-integration test for reliable long run estimates and Vector Error Correction model for short run analysis.

Johansen Co-integration technique requires initially few steps to proceed further for values of coefficients.

- First step of Johansen Co-integration technique is to confirm that all the variables (Dependent and Explanatory) are stationary at first difference.
- At second step, we need to examine appropriate lag length using Schwarz Information Criterion.
- Third step involves the application of Trace Statistics and Maximum Eigen Statistics for long run co-integrating relationship among variables.
- Values of long run coefficients may be examined at fourth step.
- For short run dynamics, Vector error correction model may be applied after confirmation of long run relationships and also we check sign of error correction term (Preferable significant as well) at fifth step.

3.2.2 Granger Causality test

Multivariate Causality analysis may be conducted using VAR and VECM based Granger Causality tests. For both the granger causality tests, there is preliminary condition that long run co-integrating relationships among variables must hold. Then on the basis of probability values of Chi-Square tests, we can determine the direction of causality among variables. It is necessary that probability value of sum of Chi-Square test must be less than 0.10 for significant results of granger causality.

4. Discussion on Empirical Findings

4.1 Johansen's Cointegration test

This section discusses the empirical findings of the study regarding health, education and employment. According to the nature of variables, the study follows Johansen Co-integration technique for estimation. The preliminary step of Johansen requires the examination of order of integration for all the variables. Taking that intension, the study employs DF-GLS unit root test and confirms that order of integration for all the variables is 1 or all the variables are stationary at 1st difference (Tables 1 & 2). This intimates us to proceed further for the estimation of long run results.

Table 1: DF – GLS Unit Root Test at Level

VARIABLES	INCLUDING	TEST STATISTICS	CONCLUSION
LEMP	Intercept	0.69	----
	Intercept and Trend	-1.85	----
LEDX	Intercept	0.64	----
	Intercept and Trend	-1.84	----
LHLX`	Intercept	0.23	----
	Intercept and Trend	-2.81	----
LGCF	Intercept	0.25	----
	Intercept and Trend	-2.20	----
LHOS	Intercept	-0.75	----
	Intercept and Trend	-2.75	----
LTEN	Intercept	0.39	----
	Intercept and Trend	-2.02	----
Critical Values			
Level of Significance	**1% level**	**5% level**	**10% level**
Intercept	-2.63	-1.95	-1.61
Intercept and Trend	-3.77	-3.19	-2.89

Table 2: DF – GLS Unit Root Test at 1st Difference

VARIABLES	INCLUDING	TEST STATISTICS	CONCLUSION
LEMP	Intercept	-4.26	I(1)
	Intercept and Trend	-4.36	I(1)
LEDX	Intercept	-0.78	----
	Intercept and Trend	-7.10	I(1)
LHLX`	Intercept	-9.13	I(1)
	Intercept and Trend	-9.41	I(1)
LGCF	Intercept	-3.89	I(1)
	Intercept and Trend	-4.20	I(1)
LHOS	Intercept	-1.74	----
	Intercept and Trend	-6.83	I(1)
LTEN	Intercept	-9.48	I(1)
	Intercept and Trend	-9.55	I(1)
Critical Values			
Level of Significance	**1% level**	**5% level**	**10% level**
Intercept	-2.63	-1.95	-1.61
Intercept and Trend	-3.77	-3.19	-2.89

Table 3 reports us about the selection of lag length. We have followed Schwarz Information Criterion for lag length selection and have selected '1' as an appropriate lag.

Table 3: Lag Length Selection

Lag Lengths	Schwarz Information Criterion
0	-2.76
1	-10.24*
2	-9.15
3	-10.09

Note: * indicates lag order selected by the criterion

Long run relationship may be observed using trace statistic and maximum eigen statistic. Table 4 gives an idea about co-integration relationships. The probability values illustrate that we are able to reject the Null Hypothesis that there are at most 5 co-integrating relationships and confirm that there are 6 co-integrating relationships.

Table 4: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of Co-integrating Equations	Eigen value	Trace Statistic	Critical Value	Probabilities
None *	0.82	173.92	103.84	0.00
At most 1 *	0.57	110.20	76.97	0.00
At most 2 *	0.46	78.22	54.07	0.00
At most 3 *	0.45	55.14	35.19	0.00
At most 4 *	0.38	32.80	20.26	0.00
At most 5 *	0.33	14.84	9.16	0.00
Unrestricted Co-integration Rank Test (Maximum Eigen value)				
Hypothesized No. of Co-integrating Equations	Eigen value	Max-Eigen Statistic	Critical Value	Probabilities
None *	0.82	63.71	40.95	0.00
At most 1	0.57	31.98	34.80	0.10
At most 2	0.46	23.07	28.58	0.21
At most 3 *	0.45	22.34	22.29	0.04
At most 4 *	0.38	17.95	15.89	0.02
At most 5 *	0.33	14.84	9.16	0.00

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

4.2 Long run Dynamics

Table 5 declares the Johansen Co-integration results where 1st, 2nd, 3rd, and 4th columns are respectively denoting names of variables, values of coefficients, standard errors and t-statistics. These results indicate the relationship among health, education and employment in Pakistan for the period from 1972 to 2010 in the long run. The study has found the positive relationship among govt. expenditure on health and employment. This variable is statistically significant as well at 5 percent level. The results indicate that when government will allocate more expenditure for the improvement of health, the better health conditions of people will definitely lead to more employment in Pakistan. Economically, we can say that 1 percent increase in health expenditure by the government will lead to 0.15 percent increase in employment in the long run on the average.

Coming to the other variable that is government expenditure on education, it suggests that the relationship is statistically significant and also increasing employment level in Pakistan. On the average, effect of educational expenditure are visible and we can say that if government increases its expenditure to improve education by 10 percent, so impact on employment will be of 2 percent in the long run. The reason of positive is very simple and economically justifiable; it proposes that education is the major sector of an economy, if it is improved so any country may have good results. It is the source of Human Resource Development and ultimately of higher employment.

With regards to number of hospitals in Pakistan, the study demonstrates that having more hospitals in the society show better health facilities. If health facilities are provided to everyone, it will lead to healthy nation. Healthy nation can actively participate in every economic activity and of course it is the reason of higher employment rates. The variable number of hospitals is having positive sign with statistically significant coefficient value at 1 percent level. If 1 percent number of hospitals will increase, employment will lead to 3.19 percent. We have found more elastic effect on employment in terms of number of hospitals.

Investment (Gross Fixed Capital Formation) has always been a source of higher employment levels in Pakistan. Investment in new projects physically creates new employment opportunities among people. Gross Fixed Capital Formation is having positive and significant coefficient value indicating that employment will be enhanced by 38 percent due to 100 percent more gross fixed capital formation on the average in the long run.

Total enrollment in Education is highly significant with employment in Pakistan at 1 percent level of significance. The coefficient is positive as well with more elastic value 2.60. It explains that due to 1 percent rise in total enrollment in education, the employment of Pakistan will be enhanced by 2.60 percent in the long run on the average. Enrollment of more students in schools, colleges, professional institutions, and universities will be possibility of higher literacy rate and ultimately more citizens will be employed in different fields of life.

Table 5: Johansen Co integration Results (Employment)

Variables	Coefficients	Standard Errors	T - Stats
Govt. Expenditures on Health	0.15	0.07	2.12**
Govt. Expenditure on Education	0.20	0.08	2.54*
Number of Hospitals	3.19	0.70	4.51*
Gross Fixed Capital Formation	0.38	0.14	2.72*
Total Enrollment in Education	2.60	0.34	7.43*
Constant	-0.39	2.77	-0.14

Note: All the variables are statistically significant at 5 percent level except constant. *, ** show significant at 1 and 5 percent respectively.

3.3 Short run Dynamics

The study also employs vector error correction model for short run dynamics. T-statistic greater than 1.80 indicates the significance of variables in table 6. We have found negative significant error correction term which is known as speed of adjustment term for employment model. It suggests that due to disturbance in the short run, our equilibrium will be restored by taking 7 percent annual adjustments. Speed of adjustment term is negative for other models such as health expenditure, number of hospitals, investment, enrollment and educational expenditure. These models are explaining long run convergence due to any fluctuations in the short run.

Table 6: Vector Error Correction Model

Independent Variables	Dependent Variables					
	D(LEMP)	D(LHLX)	D(LHOS)	D(LGCF)	D(LTEN)	D(LEDX)
Error Correction Term	-0.07 [-1.99]	-0.29 [-0.84]	-0.02 [-1.32]	-0.07 [-1.11]	-0.28 [-4.06]	-0.49 [-4.87]
D(LEMP(-1))	0.42 [2.71]	0.79 [0.51]	-0.02 [-0.30]	0.28 [0.96]	0.25 [0.81]	1.08 [2.39]
D(LHLX(-1))	-0.01 [-0.47]	-0.39 [-2.39]	-0.01 [-0.82]	0.03 [0.94]	-0.03 [-0.79]	0.07 [1.54]
D(LHOS(-1))	-0.04 [-0.10]	7.45 [1.78]	0.05 [0.31]	1.48 [1.88]	-1.65 [-1.99]	2.46 [2.02]
D(LGCF(-1))	0.04 [0.61]	0.09 [0.13]	0.06 [1.97]	0.53 [4.04]	0.41 [2.95]	1.23 [6.06]
D(LTEN(-1))	0.08 [1.06]	-0.32 [-0.43]	0.03 [1.02]	-0.10 [-0.71]	-0.12 [-0.85]	-0.78 [-3.64]
D(LEDX(-1))	0.05 [1.03]	-0.01 [-0.00]	0.02 [1.12]	0.10 [1.21]	0.05 [0.56]	-0.48 [-3.72]

Note: Values without brackets show coefficients and values in square brackets show t – statistics for respective variables.

3.4 Granger Causality Tests

Table 7 shows the results of multivariate VAR based Granger Causality. The results indicate that granger causality runs from educational expenditure and gross fixed capital formation to employment and from number of hospitals to total enrollment in education. Granger causality is also found from employment and number of hospitals to gross fixed capital formation.

Table 7: VAR Based Granger Causality

Dependent Variables	Independent Variables						All
	LEMP	LHLX	LHOS	LTEN	LEDX	LGCF	
LEMP	---	0.59	0.71	0.26	0.00	0.06	0.10
LHLX	0.21	---	0.24	0.85	0.48	0.81	0.00
LHOS	0.26	0.44	---	0.25	0.42	0.51	0.27
LTEN	0.94	0.66	0.02	---	0.69	0.15	0.00
LEDX	0.47	0.74	0.35	0.91	---	0.14	0.00
LGCF	0.00	0.50	0.02	0.77	0.56	---	0.03

Note: Values written in above table shows probability values of Chi-square tests. "All" shows probability values of sum of Chi-square tests.

Short run Granger causality is examined using VECM based causality test given in table 8. In which we have come to the conclusion that gross fixed capital formation granger cause number of hospitals. Number of hospitals and gross fixed capital formation do granger cause total enrollment in education. Employment, number of hospitals, total enrollment in education and gross fixed capital formation do granger cause government expenditure on education in Pakistan in the short run. Lastly, short run causality is found from number of hospitals to gross fixed capital formation.

Table 8: VECM Based Causality

Dependent Variables	Independent Variables						All
	D(LEMP)	D(LHLX)	D(LHOS)	D(LTEN)	D(LEDX)	D(LGCF)	
D(LEMP)	---	0.63	0.91	0.28	0.30	0.54	0.44
D(LHLX)	0.60	---	0.07	0.66	0.99	0.89	0.32
D(LHOS)	0.75	0.41	---	0.30	0.26	0.04	0.03
D(LTEN)	0.41	0.42	0.04	---	0.57	0.00	0.00
D(LEDX)	0.01	0.12	0.04	0.00	---	0.00	0.00
D(LGCF)	0.33	0.34	0.05	0.47	0.22	---	0.06

Note: Values written in above table shows probability values of Chi-square tests. "All" shows probability values of sum of Chi-square tests.

5. Concluding Remarks

The results of the study exhibit that education and health both are important variables for higher employment rates in Pakistan. Unit root test shows that all the explanatory and dependent variable is stationary at 1st different that is preliminary condition for applying Johansen Co-integration test. After that a number of steps are followed that are to select lag length using Schwarz information criterion, to find long run co-integrating relationships using Trace and Maximum Eigen Statistics and to examine values of coefficients.

Long run results suggest that government expenditure on education and health; investment, total enrollment in education and number of hospitals are the significant factors those are inducing employment in Pakistan. Whenever there will be more allocation in expenditure on education and health, it will prepare healthy and educated nation in the economy that would be cause of incremental employment rates in Pakistan. In the short run, we have found that speed of adjustment term is negative that is indication of convergence towards long run equilibrium. Due to any short run disturbance, there would be 7 percent annual adjustment towards long run equilibrium on the average.

Causality results are very interesting in our analysis. VAR based Granger Causality results show that causality runs from investment and educational expenditure towards employment. Direction of causality is from number of hospitals to total enrollment; from number of hospitals and employment to investment. According to VECM based Granger causality, it moves from investment to number of hospitals; from investment, total enrollment, number of hospitals and employment to educational expenditure by government in the short run. Short run causality also runs from number of hospitals to investment.

On the basis of results, it is suggested that government should increase the proportion of expenditure on health and education because these two factors are most favorable for the economy in terms of growth rates and employment level. Higher investment will directly lead to higher employment rates while number of hospitals and higher enrollment rates in education both play vital role in enhancing employment. Government should simultaneously concentrate on all these variables to attain its macroeconomic objectives.

References

Asteriou, D. (2006). Applied Econometrics A modern approach using Eviews and Microfit. Palgrave Macmillan.

Boadu, E. A. (----). Gender Disparities in Education, Health, and Labour Force Participation in Ghana.

Bradley, C. J., Neumark, D. and Motika, M. I. (2011). The Effects Of Health Shocks On Employment And Health Insurance: The Role Of Employer-Provided Health Insurance. *NBER Working Paper Series*, WP – 17223, 1 – 21.

Chen, C. M. and Chang, K. L. (2011). Estimating the Effect of Stochastic Health on Employment, Hours of Work, and Saving Decisions. *African Journal of Business Management*, 5(2), 455 – 463.

Engle, R. F. and Granger, C. W. J. (1987). Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55, 251 – 276.

Faridi, M. Z., Hussain, S. and Bashir, F. (2010). Impact of Education on Students' Earnings: A Case of Public Sector Universities in Pakistan. *International Research Journal of Finance and Economics*, 42, 170 – 177.

Faridi, M. Z., Malik, S. and Ahmad, R. I. (2010). Impact of Education and Health on Employment in Pakistan: A Case Study. *European Journal of Economics, Finance and Administrative Sciences*, 18, 58 – 68.

García-Gomez, P., Kippersluis, H. V., Donnell, O. O. and Doorslaer, E. V. (2011). Effects of Health on Own and Spousal Employment and Income using Acute Hospital Admissions. *Tinbergen Institute Discussion Paper*, 143/3, 1 – 45.

Government of Pakistan, (2010). Pakistan Economic Survey, Ministry of Finance, Pakistan.

Government of Pakistan, (2010). Handbook of Statistics on Pakistan Economy. State bank of Pakistan.

Johansen, S. (1988). Statistical Analysis of Cointegrating Vectors. *Journal of Economic Dynamics and Control*, 12, 231-54.

Johansen, S. and Juselius, K. (1990). Maximum Likelihood Estimation and Inferences on Cointegration – with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2), 169 – 210.

Kalwij, A. and Vermeulen, F. (2005). Labour Force Participation of the Elderly in Europe: The Importance of Being Healthy. *IZA Discussion Paper No. 1887*, 1 – 28.

Denny, K. J. and Harmon, C. P. (2000). The Impact of Education and Training on the Labour Market Experiences of Young Adults. *The Institute for Fiscal Studies*, WP 00/08, 1 – 16.

Laplagne, P., Glover, M. and Shomos, A. (2007). Effects of Health and Education on Labour Force Participation. *Staff Working Paper*, 1 – 84.

Mete, C. and Schultz, T. P. (2002). Health and Labor Force Participation Of The Elderly In Taiwan. *Center Discussion Paper No. 846*, 3 – 46.

Nanfosso, R. A. T. and Akono, C. M. Z. (2010). Fertility, Health and Female Labour Force Participation in Urban Cameroon. *International Business Research*, 03(2), 136 – 156.

O'Higgins, N. and Ivanov, A. (2006). Education and Employment Opportunities for the Roma. *Comparative Economic Studies*, 48, 6 – 19.

Pelkowsk, J. M. and Berger M. C. (2004). The impact of health on employment, wages, and hours worked over the life cycle. *The Quarterly Review of Economics and Finance*, 44(1), 101 – 121.

Rehman, H., Bashir, F. and Nasim, I. (2011). Students' Involvement in Economic Activity During Their Studies: A Case Study of Pakistan. *International Journal of Business and Social Science*, 2(14), 199 – 206.

Villa, S. (2010). Exploring the linkages between investment and employment in Moldova: A time-series analysis. *Employment Working Paper No. 52*, 1 – 81.