ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

Investment in Human Capital and Economic Growth in Jammu and Kashmir: Using a Granger Causality Approach

Javid Ahmad Khan[1] and Sarita Agrawal[2]

Section 1

1 Introduction

When discussing about the important determinants of economic growth and development in an international perspective, the average economist, or the World Bank, is likely to point to the important role of human capital development **(Enrich, 1996).** Human capital in its nature encompasses information, knowledge, skills, ideas and the individual's health. In the evolutionary system of economic growth technology may be the driver especially for the science base sector and advanced economies of the world but human capital certainly is the energy important to drive the vehicle of modern economic growth **(Becker, 2002).** Growth theorists have fundamentally various approaches in favor of human capital as an important component of economic development. Empirical as well as theoretical research has substantiated the fact that investment in human capital formation of an economy plays a fundamental role in improving the efficiency and productivity of human beings and through them the various factors that supplement and complement production process **(Barro and Salai-i-Martin, 1995)**. Mankiw and Howlit rightly had remarked the importance of human capital as a determinant of economic growth and the importance of human capital accumulation is unconditionally acknowledged in the existing exogenous and endogenous growth theories **(Mankiw et al. 1992, and Howitt. 2005**). The growing importance of human capital at policy level and its exclusion and inclusion of different components to relate it empirically with other variables such as economic growth makes it more complex and dynamic concept. Based on the development models and role of human capital in economic growth India after the time period of independence also struggled to increase the human capital. In this struggle some states of India succeeded but others failed to keep the pace. The government of India has already identified 373 districts as educationally backward out of which 11 districts are in the State of Jammu and Kashmir.

[1] Assistant professor Economics, Islamic University of Science and Technology, Kashmir Email: khanjavideco@gmail.com
[2] Sarita Agrawal, Professor Economics, Faculty of Social science, Central University of Gujarat.

Jammu and Kashmir, situated between 320 17′ N and 360 58′ N latitudes and 730 26′E and 800 30′ E longitudes, constitutes the northern most extremity of India. The state occupies 19th rank in population, with 125.41 lakh souls as per 2011 census. As per 2011 census, the population density in the state is 124 persons per sq. km of area as against density of 382 persons per sq. Km in India. The state ranks 8th among states/ UTs of the country in thin density of population **(Census 2011).** Sex ratio of 889 females per thousand males, places Jammu and Kashmir at 29th rank in the country. As per Census 2011, literacy rate of the state is 68.74% with 78.26% male literates and 58.01% female literates. The percentage of urban population to total population was 27.37 percent in 2011 compared to 24.81 percent in 2001 in the state (census 2011). The state of Jammu and Kashmir is one of the low per-capita income states of India. In terms of per capita income, its rank has never gone beyond 6th or 5th position in the Indian union. The Sectorial composition of the State income has undergone considerable changes over a period of time. Over the last five decades, the share of primary sector has declined steadily from 28.16% in 2004-05 to 17.83% in 2014-15 and the share of Secondary sector has declined from 28.13% in 2004-05 to 25.53% in 2014-15, while as the share of Services sector has substantially increased from 43.71% in 2004-05 to 56.64% in 2014-15. Besides other economic features the state has bulk of unemployed.

Going through the economic features of the Jammu and Kashmir this study is an effort to empirically investigate the long-run relationships and the causal links between human capital investment and economic growth in the state. The structure of the paper occupy the four sections. Section first provides introduction and survey of related studies. Section second provides data and methodology. Section third provides results and discussion and section four provides summary and conclusion.

1.1 Review of related studies

The human capital is the old concept in the historical evolution of the up gradation of the concept first ever try was laid down by was Sir William Petty. William believed that labour was the 'father of wealth' (later adopted by Karl Marx) and that a measure of its value should be included in the estimation of national wealth **(Petty, 1690).** Cantillon in an effort was more interested in discussing the costs of maintaining a slave and his offspring and failed to estimate the human capital or never tried to estimate **(Cantillon, 1755).** Smith's reasoning also highlighted why there are different remunerations between different occupations Smith to his best included the acquired and useful abilities of all the inhabitants or members of the society under the idea of capital **(Smith, 1776)**. Mill maintained a position similar to smith by arguing that because acquired abilities are costly and help to make men more productive, they must be treated as capital **(J.S. Mill, 1848).** Schultz, believed people by investing in themselves, can enlarge the range of choice available to them. It is one way free men can enhance their welfare. Schultz's argument was in line with the new approach taken to the rational choice of investing in human capital (**Schultz, 1961).** Nelson-Phelps hypothesis suggested that the rate

at which the gap between the technology frontier and the current level of productivity is closed depends on the level of human capital (**Nelson and Phelps, 1966).** Lucas agreed the ability to produce a literate, disciplined, flexible labour force via high quality education is the major importance of the educational system to any labour market (**Lucas, 1988).** According to Romer, investment in human capital is responsible factor for the growth in physical capital which in turn leads to overall economic growth (**Romer, 1990**). Sianesi and Van Reenen estimated concluded that an overall 1% increase in school enrolment rates leads to an increase in GDP per capita growth of between 1 and 3% (**Sianesi and Van Reenen, 2000). Abbas** in his study found a positive impact of human capital on Pakistan and srilanka at 1 pecent and 5 percent level of significance (**Abbas, 2001).** Abbas and Foreman-Peck in their research use the co-integration technique for estimating the effect of human capital on economic growth of Pakistan in the period 1961 to 2003. They highlighted an increasing return to physical and human capital specially in case of investing in health sector (**Abbas and Foreman-Peck, 2007).** Haldar and mallik suggest that the human capital investment has significant long-run effect on per capita GNP (**Haldar and mallik, 2009).** Mukherjee A.N highlighted that increasing levels of schooling and increment in the quality of workforce will dramatically lead to increase growth rate (**Mukherjee A.N, 2007).**

Section 2

Data and Methodology

This study investigates the dynamics of relationship in between human capital development and economic growth economy using the annual data for the time period 1975-76 to 2011-12. The three variables considered for this are expenditure on education, expenditure on health as percentage of GSDP (independent variables) and (PSDP) per capita state domestic product as dependent variable. All the variables have been taken in natural logarithmic forms to avoid problem of heteroscedasticity.

2.1 Econometric Methodology

This study employed the Granger Causality methodology to determine the direction of causality between government expenditure on human capital development (as measured by proxy variables including expenditure on education and expenditure on health) and per-capita domestic product as a proxy variable for economic growth. This econometric test is preceded with the stationary and co-integration test on the variables employed in the study.

2.2 Specification of model:

A simple functional model is presented thus:

$$Y = f\,(HE, EE) \text{ ---------- } (1)$$

In an econometric format:

$$Y_t = \beta_o + \beta_1 HE_t + \beta_2 EE_t + \mu_t \text{ ---------- } (2)$$

ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

Where:

Yt is per-capita State domestic product
HE is total expenditure on health as percentage of GSDP
EE is total expenditure on education as percentage of GSDP
β_o is the constant term, β_1 is coefficient of health expenditure, β_2 is coefficient of expenditure on education, 't' is the time trend, and 'μ' is the random error term.

2.3 Estimation Technique

Before conducting Granger causality tests, variable must be found stationary individually or if both the variables are non-stationary, they must be co-integrated. This means that the test for stationary and the co-integration test must precede the Granger.

2.4 Unit root test

The very first step involved in this empirical analysis of time series data is to ascertain the nature of data (Stationary or non-stationary). For this, as a preliminary we take the graphic view of three series. To further verify this we make use of Augmented Dicky Fuller test (ADF). This test is based upon analysis of following three different forms of regression for three variables under consideration. The three forms are,

With drift

$$\Delta EE = \boldsymbol{\beta_1} + \boldsymbol{\beta_3 EE_{t-1}} + \sum_{i=1}^{i=m} \boldsymbol{\alpha_i}\, \Delta \boldsymbol{EE_{t-i}} + \boldsymbol{\varepsilon_t} \quad \text{..... (3)}$$

With constant and trend:

$$\Delta EE = \boldsymbol{\beta_1} + \boldsymbol{\beta_2}\, \boldsymbol{t} + \boldsymbol{\beta_3 EE_{t-1}} + \sum_{i=1}^{i=m} \boldsymbol{\alpha_i}\, \Delta \boldsymbol{EE_{t-i}} + \boldsymbol{\varepsilon_t} \quad \text{..... (4)}$$

Without drift and trend:

$$\Delta EE = \boldsymbol{\beta_3 EE_{t-1}} + \sum_{i=1}^{i=m} \boldsymbol{\alpha_i}\, \Delta \boldsymbol{EE_{t-i}} + \boldsymbol{\varepsilon_t} \quad \text{.....(5)}$$

Same three forms are followed in case of PS and HE variables
In all the three cases hypothesis is
Null; Ho: $\beta_3 = 0$ (Unit root is present or series is non -stationary)
Alternate ; H1: $\beta_3 < 0$ (No unit root)

Decision rule:

If computed τ statistic is more negative than ADF critical values, reject Ho implying series is stationary.

If computed τ statistic is not more negative than ADF critical values, accept Ho implying that series is non -stationary.

Having obtained these results same test is applied on first differences of two variables labelled as $DEE,\ DHE\ and\ DPS$ .To check their stationarity the regressions equations to be estimated will be as

$$\boldsymbol{D^2 EE} = \boldsymbol{\beta_1} + \boldsymbol{\beta_2}\, \boldsymbol{t} + \boldsymbol{\beta_3 DEE_{t-1}} + \sum_{i=1}^{i=m} \boldsymbol{\alpha_i}\, \boldsymbol{D^2 EE_{t-i}} + \boldsymbol{\varepsilon_t} \quad \text{.....} \quad \textbf{(6)}$$

For other two variables equations will be formed accordingly.

ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

2.5 Co-integration test

To examine the presence of long run equilibrium relationship between these variables we make use of Engel-Granger (EG) co-integration test and Co-integration Regression Durbin –Watson (CRDW) Test. For EG test we perform Unit root test on the residuals obtained from regressions

$$PS = \alpha + \beta(HE) + U1 \quad \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

$$PS = \alpha + \beta(EE) + U2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

On applying the Engel Granger test upon U1 and U2 which involves the following two regressions

$$\Delta U1_t = \rho U1_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

$$\Delta U2_t = \rho U2_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

We obtained results which are furnished in table 2. Since we are working on residuals intercept and trend are ignored in above equations.

2.6 Bi-variate Granger causality test

We would like to know if there exists any causality relationship between two variables. For this we use granger causality test. The rough idea behind this test is that time does not move backward, i.e., if event A happens before event B then there is possibility that B is causing A. The econometrician Edward Leaner prefers the term Precedence to causality of this nature while Francis Diebold prefers to call it predictive causality.

Section 3

Results and Discussion

3.1 Unit root test

The very first step involved in this empirical analysis of time series data is to ascertain the nature of data (Stationary or non -stationary). For this, as a preliminary we take the graphic view of three series. From the graphs [fig. 1, fig 2 and fig. 3] it is clear that three series ,at levels , are not maintaining a constant mean and seem to follow an upward trend. However, first differences of all the three series [fig. 4, fig. 5 and fig. 6] fluctuate around non- zero mean.

To further verify this we make use of Augmented Dicky Fuller test (ADF).This test is based upon analysis of following three different forms of regression for three variables under consideration. Results of ADF test for all three variables at level and first difference are summarized in [Table 1]

From results it is clear that all the three variables in level form are non -stationary but they turn out to be stationary at first difference. All results are acceptable at 1% level

ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

of significance. Further these results hold in all forms of ADF test lag length was chosen as per AIC criteria.

3.2 Co-integration test

To examine the presence of long run equilibrium relationship between these variables we make use of Engel-Granger (EG) co-integration test and Co-integration Regression Durbin –Watson (CRDW) Test. We obtained results which are furnished in [Table 2]. Since we are working on residuals intercept and trend are ignored in above equations.

Since residuals appear to be stationary in their level form there exists a long run equilibrium relationship between the two variables and infers the regressions involving these variables will have the meaningful coefficient estimates.

3.3 Bi-variate Granger causality test

Since co-integration analysis ascertained the existence of long run relationship between expenditures on education and health and per-capita state domestic product, we would like to know if there exists any causality relationship between two variables. For this we use granger causality test. The results of Granger causality test are presented in [Table 3].

From the results it is clear that in case of expenditure on health and per-capita domestic product (PS) there exists bivariate causality while in case of expenditure on education causality runs from EE to PS. In view of above results, it can be inferred that increasing expenditures on health and education will improve the domestic product figures in the long run.

Fig1 Expenditure on Education (at Level)

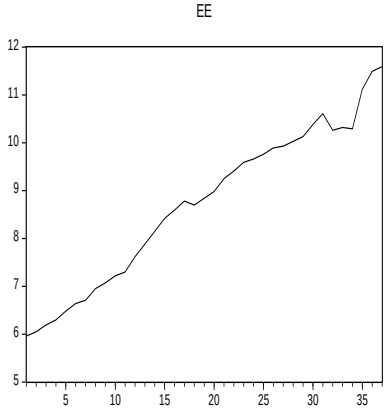
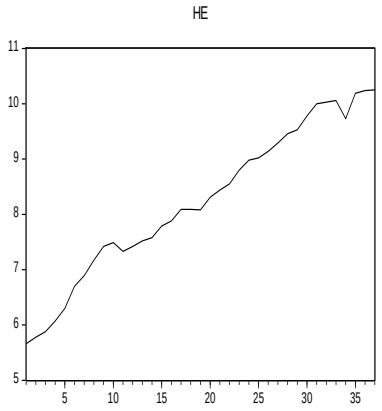


Fig. 2 Expenditure on Health (at Level)



ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

Fig 3 Per-capita Income (at Level)

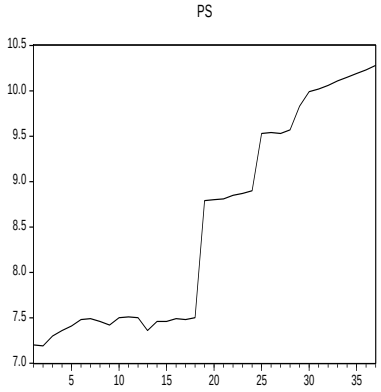


Fig 4 Expenditure on Education (at Difference)

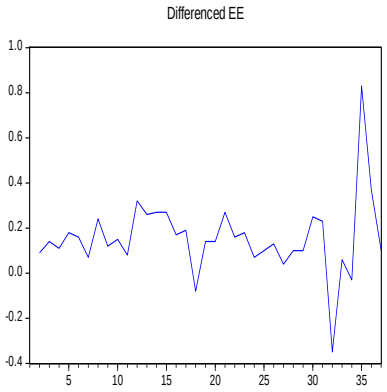


Fig 5 Expenditure on Health (at Difference)

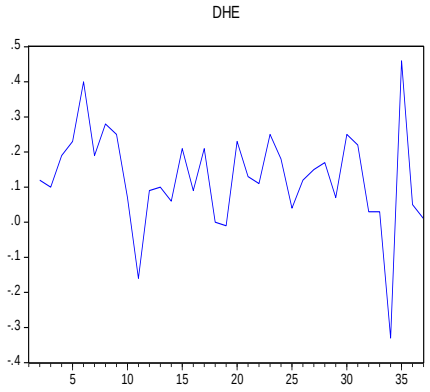


Fig 6 Per-capita Income (at Difference)

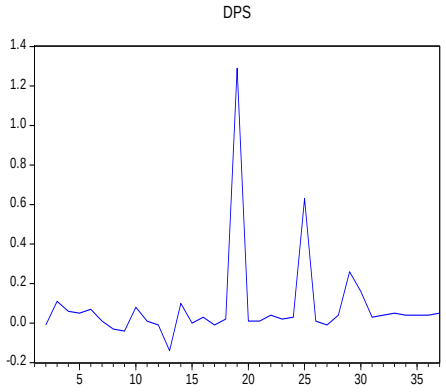


Table 1 Augmented Dicky Fuller test (ADF)

Variables	Level				First Difference				Order
	Intercept	P Value	Intercept and trend	P Value	Intercept	P Value	Intercept and trend	P Value	
PS	-0.1969	0.93	-2.2028	0.47	-6.1717	0.00	-6.1115	0.0001	I(1)
HE	-1.5245	0.51	-2.3180	0.41	-6.0120	0.00	-6.2181	0.0001	I(1)
EE	-1.4729	0.53	-0.7954	0.95	-6.0996	0.00	-6.3444	0.000	I(1)

ISSN (Print Version) 0975-3931
ISSN (On Line Version) 2278-1277

Table 2 Co-integration stat.

Null hypothesis: Residual is non -stationary			
Residual	T statistic	P value	Result
U1	-2.3604	0.01	Stationary
U2	-1.9262	0.05	Stationary

Table 3 Granger causality: Direction of Relation

	F Statistic	Probability
PS does not Granger cause HE	3.971	0.054
HE does not Granger cause PS	3.266	0.079
EE does not Granger cause PS	4.209	0.048
PS does not Granger cause EE	0.128	0.722

Section 4

Summary and conclusion

The study was an effort to empirically investigate the long-run relationships and the causal links between human capital investment and economic growth in Jammu and Kashmir using the annual data for the time period 1975-76 to 2011-12. A simple model was laid down to determine the direction of causality between expenditure on health, expenditure on education and per-capita state domestic product by using the granger causality test. This econometric test is preceded with the stationary and co-integration test on the variables employed in the study. The results revealed that all the three variables in level form were non- stationary but they turn out to be stationary at first difference. All results are acceptable at 1% level of significance. Further these results hold in all forms of ADF test and the lag length was chosen as per AIC criteria.

Following the findings in case of expenditure on health and per-capita domestic product their exists bivariate causality while in case of expenditure on education causality runs from expenditure on education to per-capita domestic product**.**

In view of above results it can be inferred that increasing expenditures on health and education will improve the state domestic product figures in the long run**.** From the

analysis its clear when income of population increases then there would be a definite desire to educate the children. Following the findings the study recommends that increased amount of government budgetary allocation should be fully directed towards the educational and health sector. It is better to provide the citizen with substantial amount of education with good health which in turn will improve their choice to command more goods and services.

References:

Abbas Q. (2001), "Endogenous Growth and Human Capital", A Comparative Study of Pakistan and Sri-Lanka", The Pakistan Development Review, Part 2 (Winter 2001) pp.987-1007.

Abbas Q and Foreman-Peek, J. (2007), "Human Capital and Economic Growth in Pakistan 1960-2003",Cardiff Economics working papers No. E 2007/22.

Barro R. J. and Sala-i-Martin, X. (1995), Economic Growth, MIT press. NewYork, McGraw-Hill.

Becker G.S. (2002), "The Age of Human Capital", In: Lazear, E.P (2002) Education in the Twenty-First Century. Hoover Institution Press.

Gundlach Erich. (1996), "Human capital and economic development: A macroeconomic assessment", Kiel working papers, Working paper No, 778.

Howitt, P. (2005), "Health, Human Capital and Economic Growth: A Schumpeterian perspective",Seminar paper for Pan American Health Organization www.brown.edu/Departments/Economics/Faculty/Peter_Howitt

J&K Economic Survey, Directorate of Economics & Statistics, J&K, Issues of 2011-12, 2012-13, 2013-14 and 2014- 15 Vol 1.

Lucas, R. E, (1988), "On the Mechanics of Economic Development", Journal of Monetary Economics, Vol. 22, pp. 3-42.

Mankiw, N.Gregory; David Romer, and David N. Well.(1992), "A Contribution to the Empirics of Economic Growth", Quarterly Journal of Economics, Vol.107, pp. 407-437.

Mill, J.S. (1848), Principles of Political Economy, with Some of Their Applications to Social Philosophy, Longmans, London (Reprinted 1926).

Mukherjee A 2007 Public Expenditure on Education: A Review of Selected Issues and Evidence", Working paper 1, from financing Human Development, National Institute of Public Finance and Policy.

Neagu, O. (2012), Measuring the Effects of Human Capital on Growth in the case of Romania, Economics and Applied Informatics, Vol. No. 1.

Nelson, R.and Phelps. E.S. (1966), "Investment in Humans, Technological Diffusion,and Economic Growth",. American Economic Review, Vol.56 pp.69- 75.

Petty, W (1690). Political Arithmetic or a Discourse Concerning the Extent and Value of Lands, People, Buildings. Reprinted in C.H. Hull (1899) The Economic Writings of Sir William Petty, Cambridge University Press. Cambridge

Romer P. (1990), "Endogenous Technological Change", Journal of Political Economy, Vol. 98 No. 5, p. S71-S10.

Schultz, Theodore W. (1961), "Investment in Human Capital", The American Economic Review, vol. 51 No.1, pp. 1-17.

Sianesi, B.; Van Reenen, J. 2000 The returns to education: a review of the macro-economic literature‟ London: CEE – Centre for the Economics of Education (LSE), 2000 (Discussion paper, DP 6).

Smith, A. (1776), An Inquiry into the Nature and Causes of the Wealth of Nations, In R.H. Campbell, A.S. Skinner and W.B. Todd (1976) The Glasgow Edition of the Works and Correspondence of Adam Smith, Oxford University Press, Oxford, (Vol. II).

Sushil Kumar Haldar and Girijasankar Mallik. (2009), "Does Human Capital Cause Economic Growth? A Case Study of India", International Journal of Economic Sciences and Applied Research, Vol. 3 No.1, pp. 7