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Human Capital Determinants and Economic Growth in Jammu and Kashmir: An Empirical Analysis

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ABSTRACT

This study is an empirical investigation of human capital and economic growth in the union territory of Jammu and Kashmir, India. OLS regressions were used from 2000 to 2019 along with the Granger Causality Test from1985-86 to 2018-19 to estimate the long-run direction between the sample variables. It was found that there was a positive and significant impact of human capital on economic growth and divulged a long-run relationship with causal links between human capital investment and economic growth. A substantial amount of budgetary allocation for human capital development is a policy suggestion for the union territory of Jammu and Kashmir.

Keywords
Economic growth, Granger Causality test, human capital, regression.

JEL Codes
I15, I25, O1.

INTRODUCTION

Technology may be the driver of present-day modern economic growth, especially for the science base sector and advanced world economies. Still, human capital is undoubtedly the energy required to drive the vehicle of modern economic growth (Becker, 2002). One of the major determinants of economic development from an international perspective is the role of human capital (Gundlach, 1996). Human capital encompasses the knowledge, information, ideas, skills, and health of individuals. Growth theorists have numerous approaches to human capital as an important component of economic development. Theoretically and empirically, researchers have supplemented the fact that investment support in the human capital formation of a country or region fundamentally plays an important role in improving the efficiency and productivity of an economy (Barro & Salai-i-Martin, 1995; Romer, 1990). Human capital has been widely accepted as a determinant of economic growth, and its importance is acknowledged unconditionally in endogenous and exogenous growth theories. With the approach of neoclassical theory and proper utilisation of production function given by Cob-Douglas. It was found a positive and significant relationship between human capital and economic growth with accommodated support of the argument that investment in human capital increases productivity (Lucas, 1988; Levine & Renelt, 1992; Jenkins, 1995; Abbas, 2001; Nelson &Phelps, 1966). Other studies also revealed that an extra year of upper-level male schooling is associated with 1 to 3 per cent increase in the per capita GDP growth rate (Barro, 1997; Sianesi & Reenen, 2000). It has also been empirically found that the sources of labour productivity growth in the economies are due to high investment in both physical as well as human capital (O'Mahony & de Boer, 2002; Oketch, 2006; Abbas &

Foreman-Peck, 2007; Haldar & Mallik, 2009: Howitt, 2005). Similarly, higher levels of schooling and better workforce quality will increase the growth rate, and few studies further strengthen the case for public expenditure on education as an important source of growth (Mukherjee, 2007; Amin & Mattoo, 2003).

There is still a great divide on the most appropriate proxy variables of human capital, and the exclusion and inclusion of different proxy variables make it more dynamic conceptually. Based on different development paths, India also struggled to increase human capital. In this phase of the struggle, some states or Union Territories (UTs) of India succeeded, while others were botched. Following the data collected by the Government of India, 373 districts were identified as educationally backward, out of which 11 districts belong to the union territory of Jammu and Kashmir. The economy occupies 19th rank in population, with 125.41 lakh souls as per the 2011 census. There was 68.74 per cent literacy rate in the Union territory of Jammu and Kashmir, with 78.26 percent male literates and 58.01percent female literates according to the Census report of 2011. The percentage of the urban population to the total population was 27.37 per cent in 2011 compared to 24.81 per cent in 2001 (Registrar General and Census Commissioner, 2011).

The Union Territory of Jammu and Kashmir is one of India's low-income states/UTs. Regarding per capita income, its rank has never exceeded the 6th or 5th position in the Indian union. The economy's sectoral composition has undergone considerable changes over time (Sheik, 2010). It was noticed that the share of the primary sector declined from 28.16 per cent following the year 2004-05 to 16.05 per cent in 2018-19. The share of the secondary sector declined from 28.13 percent from 2004-05 to 27.88 per cent in 2018-19. The share of the services sector has increased from 43.71 per cent during 2004-05 to 55.92 per cent in 2018-19 (Directorate of Economics and Statistics, 2018-19).

Given these features of Jammu and Kashmir, the study tried to investigate the empirical effects of human capital determinants on its economic growth from 2000 to 2019. Secondly, to find the causality relationship between government expenditure on human capital and economic growth in the long run over the period 1985-2019. The necessary data were collected from different sources, including various reports of Economic surveys (Directorate of Economics and Statistics, 2011-12, 2012-13 and 2018-19), budgetary reports and Digests of Statistics collected from the Directorate of Economics and Statistics (2015).

METHODOLOGY

Considering the capital requirement for investment and rate of economic growth as dependent variables, three independent variables (population growth, technological progress and labour productivity growth were considered (Thirwall, 2000). Harrod-Domar's growth model represented the equation as.

$$G = \frac{S}{K} \quad (1)$$

Where:

G = Economic growth rate,

S = Capital accumulation rate,

K = Capital coefficient.

Another model of long-run growth was developed by Solow (1956). Many economists consider the Solow model fundamental for the economic growth literature (Todaro, 1985). The model explained how the population growth rate, savings rate and technological change influence the production level and economic growth. The starting point of the model is the aggregate production function with three factors of production and is based on the equation:

$$Y = f(K,L,T) \quad \ldots (2)$$

Where

Y = Economic output

K = Physical capital,

L = Labour,

T = Technology.

The basis of the model is the production function in per capita terms:

$$y = f(k) \quad \ldots\ldots\ldots\ldots (3)$$

Where: k = K /L is the capital stock per head,

y = Y/L is the output per head.

The extension of the model was done using standard Cobb-Douglas production function with labour, physical capital and human capital as input factors (Schultz, 1961, Ojha & Pradhan, 1987; Mankiw et al., 1992; Abbas & Mujahid-Mukhtar, 2000; Bernanke & Gurkaynak, 2001; O'Mahony & de Boer, 2002; Heckman, 2005; Oketch, 2006; Abbas & Foreman-Peck, 2007; Chi, 2008; Haldar & Mallik, 2009; Escosura & Roses, 2010; Qadri & Waheed, 2011; Zhang & Zhaung, 2011; Neagu,2012). Such an extended Cob-Douglas model is shown as;

$$Y_t = A_t K^a_t L^b_t H^b_t \quad (4)$$

Two concluding remarks were raised summarizing the above considerations. First, although researchers preferred the production function (Cobb-Douglas) to emphasize the role of education and health on economic growth, various regression models (cross-country) were frequently used. As dependent variables were used log

GDP, GDP per capita, log GDP per capita, and different independent variables used as proxy variables for humans included school enrolment rates, average years of schooling, literacy rate spending on education, public and private, drop-out rates, repetition rates, tests scores, constructed data sets, public and private expenditure on health (total, as percentage of GDP) life expectancy, infant mortality, mortality rates and healthy life years.

Second, the two main components of human capital (health and education) were incorporated only in the production model, never being introduced together in a regression model. This study used OLS methods for estimating the objectives of the study, taking such things under contemplation. To make the study more dynamic, we incorporated both components (education and health) and adjusted variables that capture both components as independent variables.

For education, human capital, the proxy variables used were gross enrolment ratios at the secondary level and gross enrolment ratios at the higher level, represented by X_1 and X_2 in equation five. The proxy variable for the health human capital included the availability of primary health care units and expenditure on health as the percentage share of GSDP represented by X_1 and X_2 in equation six. For the in-depth analysis, a new adjusted variable is created that makes the study different from the previous studies. It would represent the enrolment ratios at the primary level multiplied by health expenditure as the percentage of GSDP of J&K. This variable represents the education indicator adjusted for health. Thus, health is an essential factor determining the returns from education and characterised by X_1 in estimation equation seven. Another variable represents life expectancy as a proxy variable for health human capital by X_2 in equation seven. The equations are described as under:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (5)$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (6)$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (6)$$

Bi-variate Granger Causality test

In order to check the association and direction of the taken variables in the long-run, this study utilised the Granger Causality test. Under this test, any causality relationship between human capital and economic growth would be known. This econometric test is preceded by the stationarity of the data and the co-integration test on the variables employed.

In an Econometric format

$$Y_t = \beta_0 + \beta_1 HE_t + \beta_2 EE_t + \mu_t \quad (8)$$

Where, Y_t (as the proxy variable for growth) is per-capita State domestic product, *HE* is the total expenditure on health as a percentage of GSDP, *EE* is the total expenditure on education as a percentage of GSDP, β_o is the constant term, β_2 is the coefficient of expenditure on education, 't' is the time trend, and 'μ' is the random error term. Before conducting Granger causality tests, the variable must be found stationary individually, or if both variables are non-stationary, they must be co-integrated. It means that the stationary and the co-integration test must precede the Granger.

Unit Root Test

The first step 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. The Augmented Dicky Fuller test (ADF) was used to verify this further. This test was based on analysing the following three forms of regression for three variables under consideration. The three forms are,

With drift

$$\Delta EE = \beta_1 + \beta_3 EE_{t-1} + \Sigma^{i=m}_{i=1} \alpha_i \Delta EE_{t-i} + \varepsilon_t \quad (9)$$

With constant and trend

$$:\Delta EE = \beta_1 + \beta_2 t + \beta_3 EE_{t-1} + \Sigma^{i=m}_{i=1} \alpha_i \Delta EE_{t-i} + \varepsilon_t \quad (10)$$

Without drift and trend:

$$\Delta EE = \beta_3 EE_{t-1} + \Sigma^{i=m}_{i=1} \alpha_i \Delta EE_{t-i} + \varepsilon_t \quad (11)$$

The same three forms are followed in the case of Y_t and *HE* variables

In all three cases hypothesis will remain as;

Ho: $\beta_3 = 0$……. (Unit root is present or series is non - stationary)

H1: $\beta_3 < 0$ …… (No unit root)

Decision Rule

If the computed τ statistic is more negative than ADF critical values, reject Ho, implying the 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 to the first differences of two variables labelled as DEE, DHE and DY_t. To check their stationary, the regressions equations to be estimated would be as

$$D^2EE = \beta_1 + \beta_2 t + \beta_3 DEE_{t-1} + \Sigma^{i=m}_{i=1} \alpha_i D^2EE_{t-i} + \varepsilon_t \quad (12)$$

For the other two variables, equations will resemble similarly to equation 12.

Co-integration Test

The Engel-Granger (EG) Co-integration and the Co-integration Regression Durbin-Watson (CRDW) tests were used to examine the presence of long-run relationships between these variables. For the EG test, the Unit root test was performed on the residuals obtained from regressions shown in equations 13 and 14.

$$Yt = \alpha + \beta (HE) + U1 \quad (13)$$

$Yt = \alpha + \beta (EE) + U2$ ..... (13)

Engel Granger test on U1 and U2 was applied as per the following two regression equations of 15 and 16.

$\Delta U1_t = \rho U1_{t-1}$ ..... (15)

$\Delta U2_t = \rho U2_{t-1}$ ..... (16)

RESULTS AND DISCUSSION

The results of three regression models are presented in (Tables 1, 2 and 3). The estimated regression coefficients indicated that the stock of education (human capital) contributed positively to the economic growth of Jammu and Kashmir (Table 1). The education component (human capital) affected the growth significantly, and both variables were statistically significant. Thus, it supported the results that education, human capital had a positive and significant impact on the economic growth of the union territory. In order to increase the economic growth in Jammu and Kashmir, the results confirmed that more thrust should be on education. The study is consistent with the previous findings of scholars regarding the education component of human capital and economic growth as dependent variables (Abbas & Foreman-Peck, 2007; Haldar & Mallik, 2009; Mukherjee, 2007; Amin & Mattoo, 2003).

Table 1. Education human capital results

Particulars	Coefficient	Standard errors	t-value
intercept	1597.5	3170.697	0.504
$\ln X_1$	366.29	115.264	3.178**
$\ln X_2$	471.888	148.695	3.174**

Source: Authors calculation. ** Significant at 5 per cent level.
X_1: Gross enrolment at the secondary level.
X_2: Gross enrolment at a higher level.

Table 2. Health human capital results

Particulars	Coefficient	Standard errors	t-value
Intercept	-49618.8	6503.182	-7.630
$\ln X_1$	175.748	22.111	7.948**
$\ln X_2$	1854.418	2099.732	0.883*

Source: Authors calculation.
*****and *Significant at 5 and 10 per cent levels.***
X1: Primary health care units.
X2: Expenditure on health, per cent share of GSDP.

Table 3. Human capital and growth results

Particulars	Coefficient	Standard errors	t-value
Intercept	-110659.9	6974.449	15.866
$\ln X_1$	1759.63	104.410	16.853**
$\ln X_2$	106.271	37.871	2.806**

Source: Authors calculation.
*****Significant at 5 per cent level.***
X_1: Adjusted variable, primary enrolments multiplied by expenditure on health.
X_2: Life expectancy.

Regarding the composition of health (human capital), the availability of the primary health centres was statistically significant, as presented in Table 2. The estimated coefficients showed that both were positively contributing to economic growth. The increasing thrust for future gains in terms of economic growth must be accompanied by enhancing the health component of human capital. The health sector must be improved by increasing the base and was strongly recommended as a policy implication of the study.

The adjusted variable used to capture human capital's impact on growth is represented in Table 3. Both independent variables influence significantly the economic growth. The adjusted variable was positive and significant. The estimated coefficient of life expectancy showed a positive and significant impact. In the short-run, the three estimated equations were inconsistent with the earlier studies and supported the argument that human capital is a crucial factor in economic growth (Mukherjee, 2007; Amin & Mattoo, 2003).

For the long-run analysis, the priority remained to check the data feasibility. The results exhibited in Figures 1, 2 and 3 indicated that the three series (per-capita income, expenditure on education and health) at levels were not maintaining a constant mean and seemed to follow an upward trend. However, the first differences of all the three series fluctuated around the non-zero mean (Figures 4, 5 and 6). Therefore, it was clear that all three variables in level form were non-stationary, and were stationary at the first difference. All results were acceptable at a one per cent level of significance. Further,

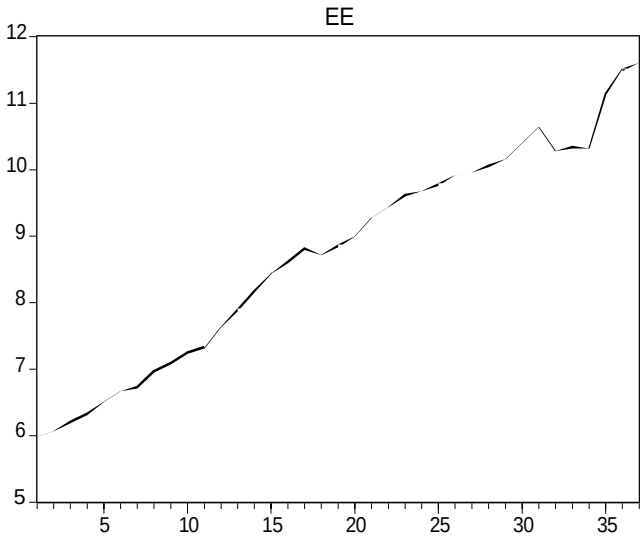

Figure 1. Expenditure on education

Table 4. ADF test result

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

Source: Authors calculation.
*****Significant at 5 per cent level.***

these results hold in all forms of the ADF test, and lag length was chosen as per AIC criteria (Table 4). The cointegration is represented in Table 5 and depicted a significant result.

There is a bivariate causality in the case of health expenditure and per-capita income as. While as in the case of expenditure on education, causality runs from expenditure on education to per-capita income (Table 6). It could be inferred from the above discussion that increasing expenditures on health and education will improve the domestic product figures in the long-run. From the analysis is, it is evident when the income of the increases, then there would be a definite desire to educate the children. This analysis forms the most important part of the study that remains in contrast to a few previous studies. Given the resource balance, this study postulated that the adjustment mechanism and market absorption for employment remains important in having fruits from skill. The study indicated that growth and income increase can help people to make the diverse choice and desire to impart education. The justification for the increasing impact was maintained for the entire period. In the whole period, the thrust of the economy was on education. The life expectancy had increased much faster in the state than in the other states of the country. In order to stimulate the economic growth in Jammu and Kashmir, it was imperative to support the development of tertiary education and investments in quality.

A stronger connection between tertiary educations with research and development was needed to stimulate the component of scientific research in academic activities. Higher education must be integrated with the industrial sector to make it job oriented. Primary health care must be increased in the areas where it was missing

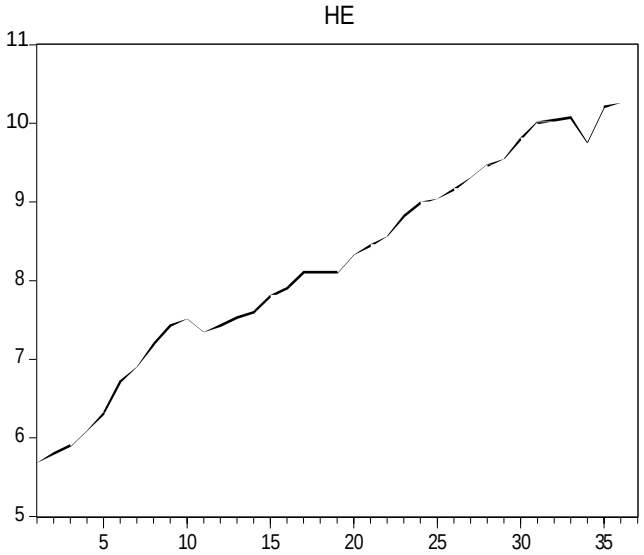

Figure 2. Expenditure on health

Table 5. Co-integration statistics

Residual	t-value	p-value	Result
U1	-2.3604**	0.01	Stationary
U2	-1.9262**	0.05	Stationary

Source: Authors calculation.
*****Significant at 5 per cent level.***

Table 6. Granger causality: Direction of relation

Direction of relation	F-value	p-value
PS does not Granger cause HE	3.971**	0.054
HE does not Granger cause PS	3.266NS	0.079
EE does not Granger cause PS	4.209**	0.048
PS does not Granger cause EE	0.128NS	0.722

Source: Authors calculation.
*****Significant at 5 per cent level.***
NS: Non-significant.

because increasing primary health care would lead to an increase in the productivity of the economy. A substantial amount of government budgetary allocation should be diverted toward developing human capital.

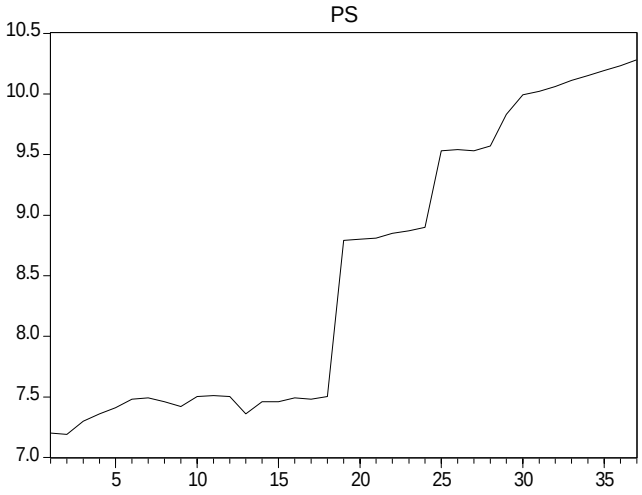

Figure 3. Per capita income

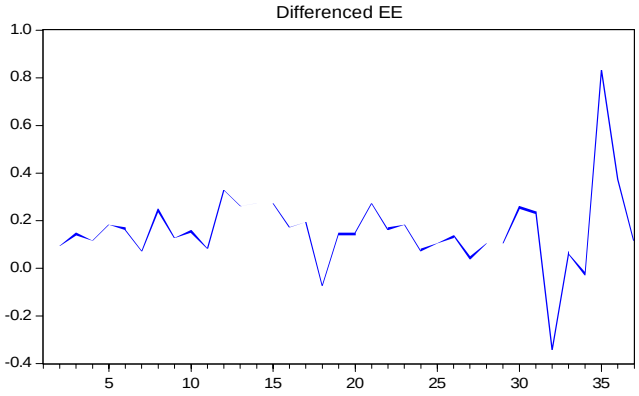

Figure 4. Expenditure on education (Difference)

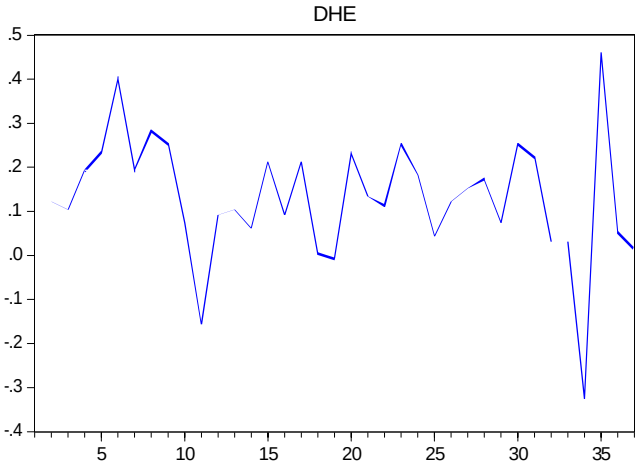

Figure 5. Expenditure on health (Difference)

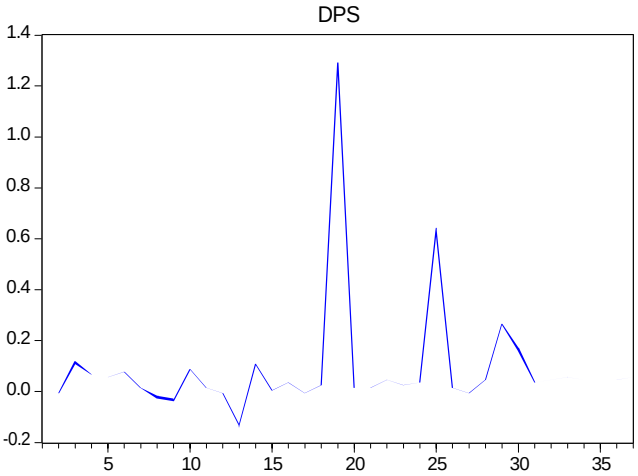

Figure 6. Per capita income (Difference)

CONCLUSIONS

The study mainly focussed to empirically investigate the relationship between human capital and economic growth in the context of Jammu and Kashmir. OLS models, along with unit root and co-integration tests, were used. A positive and significant impact of human capital formation was observed on the economic growth of Jammu and Kashmir. It was also found that there happens to be a long-run relationship and causal links between human capital investment and economic development. Besides, a bivariate causality occurred between expenditure on health and per-capita income, while causality ran from expenditure on education to per capita income. The study indicated that growth and income increase could help people to make the diverse choice and desire to impart education. Therefore, a substantial amount of budgetary allocation for human capital development is strongly endorsed for the union territory of Jammu and Kashmir.

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