

Human capital Development and Economic Growth in India

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ABSTRACT

Investment in Human capital is considered as one of most important pillars of economic growth in any economy. The purpose of the paper is to measure the effects of human capital on the economic growth of Indian economy. The measurement of human capital as the determinant of economic growth is analyzed and measured under the headings of education and health component of human capital. In order to measure the effect of the human capital on the growth of Indian economy we used three regressions models. The first regression model used captures the relation of education human capital with the growth. Model second is used to measure the health human capital and economic growth. Finally model third is used to measure the human capital and growth. In the third model both education and health human capitals are used as regressors for growth. The estimated coefficients revealed that the stock of education human capital contributes to economic growth positively and notably. The study concludes that investment in education increases the enrolment ratios and enrolment ratios affect the economy in positive and in significant way. Similarly it was found that there exists a positive relationship between health human capital and economic growth as well. The study explores revealed that investment in health increases the life expectancy that contributes to economic growth in remarkable and positive way. The Results thus confirmed the literature evidence that human capital has a remarkable impact on the economic growth of India.

1. Introduction

In an international perspective the major determinants of economic development as per the average economist, or the World Bank, is likely to point to the important role of human capital formation (Enrich, 1996). Human capital in nature encompasses knowledge, information, ideas, skills, and health of individuals. Technology may be the driver of present day modern economic growth especially for the science base sector and advanced economies of the world, but human capital is certainly the energy required to drive the vehicle of modern economic growth (Becker, 2002). Various growth theorists have various approaches to human capital as an important component of economic development. Both theoretical and empirical researches have proved the fact that investment in human capital formation of an economy plays a vital role in improving the efficiency and productivity of human beings, and through them the various factors that complement and supplement the production process (Barro and Salai-i-Martin, 1995). However what is still debatable is what factors should be considered as components of human capital. The exclusion and inclusion of different components of the human capital to relate it empirically with other variables such as growth makes it more complex and changing concept. Based on the development models and role of human capital India after independence also struggling for increasing the human capital particularly education component and health component.

Given the features of Indian economy this study empirically measures the effects of human capital development on the economic growth of Indian Economy. From the available literature right from Harrod Domar model till cross country studies which used Cobb-Douglas production function one can conclude that to estimate the effect of human capital on growth

either education human capital or health human capital as independent or both as independent and more weightage either to education or health proxy variables were attached. For the present study the effect is measured under three different sub-headings. First the model is laid down to estimate only the effect of education human capital second the methodology is set to measure only the effect of health human capital and third the effect of both on growth is measured. The whole methodology used is extension version of methodology used by Neagu to capture the effect of human capital on Romania economy (Neagu, 2012). The whole paper is divided into four sections. Section first is about introduction and review of related studies, section second provides the data and methodology. Section third provides the results and discussion and section fourth provides summary conclusion.

1.2 Review of related studies

The concept of human capital is not a new one. Perhaps the first attempt to define and measure what we now call human capital was Sir William Petty. He believed that labour was the 'father of wealth' and that a measure of its value should be included in the estimation of national wealth (Petty, 1690). Cantillon, was more interested in defining the costs of maintaining a slave and his offspring than in estimating the value created by human capital (Cantillon, 1755). Smith's principal aim was not to measure the 'value of the stock of human capital' but to understand the reasons why there are different remunerations between different occupations Smith included the acquired and useful abilities of all the inhabitants or members of the society under the idea of capital (Smith, 1776). Mill argues that because acquired abilities are costly and make men more productive, they must be treated as capital, thus taking up a position similar to that of Adam Smith (J.S. Mill,

1848). Marshall's conception of human capital is similar to Mill's: 'We may define personal wealth so as to include all those energies, faculties and habits which directly contribute to making people industrially efficient' (Alfred Marshall, 1890; quotations from the 1920 edition). 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 revealed that the major importance of the educational system to any labour market would depend on its ability to produce a literate, disciplined, flexible labour force via high quality education (Lucas, 1988). According to Romer, the bottom line is creation of new ideas is a direct function of human capital, which manifests in the form of knowledge. As a result investment in human capital led to growth in physical capital which in turn leads to economic growth (Romer, 1990). Levine and Renelt suggest that the regression that displays a positive relationship between human capital and economic growth are not robust to the inclusion of other relevant variables (Levine and Renelt, 1992). Jenkins confirmed the finding that investment in human capital increases productivity (Jenkins, 1995). Barro in his study revealed that an extra year of male upper-level schooling is associated with a 1.2 % increase in per capita GDP growth rate (Barro, 1997). 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 found human capital to be positively related with economic growth in Pakistan at 1% level of significance and at 5% level of significance in case of Sri-Lanka at secondary and higher secondary level respectively (Abbas, 2001). O'Mahony and de Boer in their work Britain's relative productivity performance: Updates to 1999, confirms that the UK continues to lag behind both Germany and France in terms of labour productivity, and this gap is primarily explained by differential rates of investment in both human and physical capital (O'Mahony and de Boer, 2002). Oketch in his study revealed that the high investment in physical capital and human capital is a sources of labour productivity growth in the medium term in African nations (Oketch, 2006). Abbas and Foreman-Peck, for estimating the effect of human capital on economic growth of Pakistan in the period 1961 to 2003 used the co-integration. The study found 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 physical capital investment has neither long-run nor short-run effect but the human capital investment has significant long-run effect on per capita GNP (Haldar and mallik, 2009). Mukherjee A.N predict that higher levels of schooling and better quality of workforce will lead to an increase in the growth rate, further strengthening the case for public expenditure on education (Mukherjee A.N, 2007).

2. Data and Methodology

We used three regression models to measure the effect of the human capital on the growth of Indian economy. The first

regression model used in the study is to captures the relation of education human capital with the growth. Model second is used to calculate correlation coefficients to measure the health human capital and economic growth association. Finally model third is used to measure the human capital and growth. Data is collected from various sources which includes World Bank database as well. The various proxy variables used to capture the effect of education human capital includes gross enrollment ratios at primary and higher level and expenditure on education. Similarly the various proxy variables to capture the effect of health human capital include life expectancy, Per-capita expenditure on health, infant mortality and expenditure on health as the percentage of GDP. Per-capita GDP as the dependent variable is used as a proxy variable for growth.

2.1 Model first: Education human capital and growth estimation

First the education component of human capital is estimated. For education human capital the proxy variables to estimate are gross enrollment ratios at primary level and gross enrollment ratios at higher level. The proxy variable for economic growth used is per-capita GDP. We expect the regression coefficients to be positive and OLS method is used for estimation. The respective equation for the education human capital as an explanatory variable and economic growth as explained variable is below.

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon(1)$$

where Y is the economic output (the dependent variable), expressed by GDP per capita x_1 and x_2 are the two forms of education human capital (independent variables) expressed by gross enrollment ratio at higher and gross enrollment ratio at primary level ε -standard error. The B_1 and B_2 are two coefficients.

Model 2: Health human capital and economic growth estimation

Another separate estimation made is estimation of parameters of health human capital. The proxy variables used for health human capital are per-capita expenditure on health and its correlation with life expectancy. The correlation of mortality and economic growth for 2000-2013 is worked as well. The simple rule of thumb is that we expect a positive association between expenditure on health and life expectancy and a negative association between the infant mortality and GDP per-capita.

1.5 Model 3 Human capital and economic growth estimation

In this model we measure the effects of the human capital on the economic growth by analyzing how the two components of the human capital

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon (2)$$

where Y is the economic output (the dependent variable), expressed by GDP per capita x_1 and x_2 are the two forms of human capital (independent variables) expressed by educational capital (expenditure on education as percentage of GDP) and, respectively, health capital, expressed by the life

expectancy; ϵ -standard error. The B_1 and B_2 are two coefficients.

3. Results and discussion

In this section the results of the estimated models are presented. The results are presented under the three headings of education human capital and economic growth, health human capital and economic growth and human capital and economic growth in Jammu and Kashmir.

3.1 Education Human capital and economic growth

Here model first of regression is presented. The explained variable is economic growth and explanatory variables are enrolment rates at higher education level and at primary level. The results of applying the regression model table 1 shows that the model of human capital is statistically validated (the significance F is lower than 0.05- the significance level).

According to the results presented in the table 1, we could explain the evolution of GDP per capita in proportion of 95% through the dynamic of the stock of human capital in the economy, considering all other factors as constant.

It can be seen from the estimated coefficients that both are positive indicated that the stock of education human capital contributes to economic growth positively. A one unit increase in the X_1 (expressing higher education trained) will increase the GDP per-capita with 50.65 units and a one unit increase in the X_2 (expressing primary enrolment) will increase GDP per-capita with 15.63 units. The more important fact is both the variables are statistically significant and hence confirms the results that education human capital had positive and a significant impact on the economic growth of Indian economy. The estimated equation is

$$y = -1442.23 + 50.65X_1 + 15.63 X_2$$

Table 1 Education Human Capital Results Summary

| | coefficient | Se | t |
|-----------|-------------|--------|---------------------------|
| intercept | -1424.23 | 418.84 | -3.44 |
| b1 | 50.65 | 5.94 | 8.49 significant at five |
| b2 | 15.63 | 4.634 | 3.370 significant at five |

Model Summary

| Model summary | |
|---------------|------|
| R square | .953 |

F value 161.998 significant at five

3.2 Health human capital and economic growth

Correlation coefficient between Infant mortality and per-capita income remains at (-.980) and is highly correlated negatively and that we expect from the decreasing mortality that economic growth can develop. The correlation coefficient between the life expectancy and per capita expenditure on health in the country by public sector is (.970) and found highly significant and positively correlated. So our analysis expected results revealed that life expectancy is increasing with the increase in the expenditure on health and growth increased with the every decrease in the mortality based on such analysis we can conclude that increase expenditure leads to increase in the

life expectancy and which in turn can increase the economic growth in the country. Furthermore it can be safely concluded that expenditure on health effects positively economic growth if not directly but is working in the vicious circle means increased expenditure leads to increase the life expectancy which indirectly means the decrease in the mortality rates and hence increase in the economic growth. So under this heading we can safely recommend that the increase in the budgetary allocation in the country towards health sector in the economy can accelerate the economic growth.

3.3 Human capital (Both education and health) and economic growth

The estimated results are provided in the table 2 respectively. The major findings revealed that a proportion of 90% of the GDP per capita dynamics can be explained by the variance of the two independent variables. The validity of the model is confirmed by the fact that the Significance F is lower than the significance level of 5%.

The estimated coefficient of the life expectancy denoted by X_1 indicates that an extra unit increase in the life expectancy would increase the GDP per-capita by 174.509 units. Another component of the education human capital represented by government expenditure on education denoted with X_2 , indicates when there is one unit change in the expenditure on health GDP per-capita increased at 48.912 units.

But not both independent variables have a significant influence on GDP per capita. Only the life expectancy can be concluded from p-value that it has significant impact. Our analysis doesn't indicates expenditure component as significant although positively effects the economy of the country. The possible reasons are three fold. One the expenditure on education is extremely low in the country. Increasing more expenditure on education can bring a dramatic change in the growth of the country. Second the relation for the education and economic growth may be bi directional hence opens the front to conduct an independent relationship in the long run. Third may be the possibility of data. The estimated equation is:

$$y = -10568.622 + 174.509 X_1 + 48.912 X_2$$

The results thus confirmed the literature evidence that human capital has a significant impact on the economic growth.

Table 2 Human capital and growth combine

| | coefficient | se | t |
|-----------|-------------|----------|---------------------------|
| intercept | -10568.622 | 1032.778 | -3.44 |
| b1 | 174.509 | 15.066 | 11.60 significant at five |
| b2 | 48.912 | 71.030 | .689 not significant |

Model Summary

| Model summary | |
|---------------|------|
| R square | .901 |

F value 67.513 significant at five

4. Summary and conclusion

The study attempts to measure human capital effects on the economic growth of India. The measurement of human capital

as the determinant of economic growth was analyzed and measured under the headings of education and health component of human capital. Econometric methods were used to measure the effect. Data for the time period 1995-96 to 2013-14 was used for all variables estimated in regression. The measurement was made with the regression models and OLS method was used to estimate the coefficients. Besides the regression, the correlation coefficients were calculated to know the exact linkage between the variables. In the model first economic growth was used as an independent variable and education human capital as independent variable was used. For economic growth the proxy variable used was per-capita GDP and for education human capital gross enrollment ratios for primary and higher level were taken as proxy variables. The second model was to calculate the association between the health human capital and economic growth. In this model the correlation between Per-capita expenditure on health as percentage of GDP and life expectancy was calculated. In the same model correlation was carried out for Mortality and per-capita GDP. Finally the third model was used to measure effect of overall human capital on economic growth. In the third model per-capita GDP was used as proxy variable for growth and expenditure on education as percentage of GDP and life expectancy were used as proxy variables for human capital. The major findings are presented below.

First, as expected, we found a powerful effect of educational attainment on economic output. We could explain the evolution of GDP per capita in proportion of 95% through the dynamic of the stock of human capital in the economy, considering all other factors as constant.

The estimated coefficients both were positive which indicated that the stock of education human capital contributes to economic growth positively. The more important fact was both the variables were statistically significant and hence confirms the results that education human capital had positive and a significant impact on the economic growth. The results of applying the regression model show that the model of human capital is statistically validated.

Second, separate estimation was made for estimation of parameters of health human capital. The correlation between life expectancy and per-capita expenditure was calculated and the coefficient was highly positive and found highly significant. Another correlation coefficient was estimated between the GDP

per-capita and infant mortality where the calculated coefficient was highly negative thus confirmed the result that expenditure on health leads to increase the life expectancy which means increasing in the growth in India.

Third, the human capital, in its two components, has a strong effect on the economic output. The major findings revealed that a proportion of 90% of the GDP per capita dynamics can be explained by the variance of the two independent variables. The validity of the model is confirmed by the fact that the Significance F is lower than the significance level of 5%. The estimated coefficient of the life expectancy denoted by X_1 indicates that an extra unit increase in the life expectancy would increase the GDP per-capita by 174.509 units. Another component of the education human capital represented by government expenditure on education denoted with X_2 , indicates when there is one unit change in the expenditure GDP per-capita increased at 48.912 units.

But not both independent variables have a significant influence on GDP per capita. Only the life expectancy can be concluded from p-value that it has significant impact. Our analysis doesn't indicate expenditure component as significant although positively effects the economy of the country. The reason justified for this turned three first the expenditure is low in per-capita terms second in long run the relation turns from growth to education expenditure as confirmed by many scholars and third may be the reason related to data. The results thus confirmed the literature evidence that human capital has a significant impact on the economic growth.

5. Policy Recommendations

Quality of education increment, expenditure on education should be increased and the incentives to halt the dropout rates is strongly recommended. Effectiveness of supplying the skill oriented educated youth must be matched with the need of demand that can be carried out to increase the standard of the education in the country.

An increase in the investment in health care will lead to the raise of life expectancy. Moreover, policy measures are needed to carefully monitor the efficiency and the effectiveness of the public spending in health.

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