THE IMPACT OF HUMAN CAPITAL ON ECONOMIC GROWTH IN PAKISTAN

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Introduction

Human capital plays an important role in the sustainable economic development of a country. Its role in the economic progress cannot be overemphasized. The development of human capital is a fundamental pre-requisite for the transformation of socio-economic and political conditions of a country. This fact is also recognized by growth economists that among the fundamental factors accountable for the extraordinary performance of most of the developed and developing economies are a remarkable devotion to human capital development. This has been attained by the inhabitants of those countries mainly due to improved know-how, talent and ability obtained by way of education. Growth economists have emphasized on the fact that difference of socio-economic development between the developed and underdeveloped countries of the world is not due to natural resources, gifts and the accumulation of physical capital but due to quantity and quality of human capital.

Growth theories suggest the important role of human capital for economic development. In economic literature human capital has been defined by including education, health, training migration etc. and all types of investment that improve and develop a person’s efficiency. Growth economists paid consideration to education for analyzing its impact on economic growth while ignoring health capital. In the recent times they have also considered health as a component of human capital and tried to calculate the association between health and economic growth.

Education and health are the two components of human capital which make an individual more creative and productive. Education is a

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powerful instrument enhancing earnings of people and economic growth. It plays an important role in shaping the ways to become skilled.

There is a two way relationship between health and economic growth. Health and other forms of physical capital increase the per capita GDP, by increasing the productivity of labor and other resources (Akram, 2008). According to Fogel (1994), during 1790 to 1980 one third of UK GDP was the result of improvement in health and particularly improvement in food, public health and medical facilities.

Many studies have been conducted to find the relationship between health and economic growth, both analytically and empirically. The findings of these studies show that health has a strong, positive and significant impact on economic growth. Several other research studies also found that economic growth improves the quality of health. According to Afzal (2010) education has multidimensional impact on the economy, on one side it increases economic growth and on the other it reduces poverty. It creates a peaceful political and social environment that attracts investment. The role of education in building an efficient and effective labor force is well recognized. It has a positive and basic role in the development of a nation.

Good health improves both mental and physical capacities and hence labor productivity. A higher labor supply, improved skills that result from increased access to education and training, and capital formation, through higher saving, are ways in which health can contribute to economic growth (WHO, 2001).

Seebens and Wobs, (2003) noted that prosperity and progress of a country depends upon the state of economy and the state of economy depends upon the productivity of labor, which in-turn depends upon education and health of labor.

Since partition, Pakistan has been facing financial crunches. Low revenues together with increased defense and debt servicing expenditures, the government has very small funds to spend on expansion programs particularly on Education and Health sectors. There are very little facilities available to the citizens of Pakistan especially to the people living in rural areas. Health spending as percentage of GDP remained 0.5% to 0.8% during 1970-2010. In fiscal year 2009-10, health spending was only 0.7 % of GDP, which is very low compared to the other Asian countries (Akram, 2008).

Education sector is also in a state of dilemma. According to the reports of Economic Surveys of Pakistan, the share of education in public expenditure was 1.1% in 1970, 0.8% in 1980, 2.3% in 1990, and only 1% of GDP in fiscal year 2004-05, and 2.3 % in fiscal year 2009-10.
Most of the expenditures on education go to recurring expenditures. In Pakistan, priority is always given to higher education whereas primary and secondary education is ignored with the result that gross primary enrollment was 95% in 2009-10 with 55% literacy rate. Pakistan’s health and education indicators, when compared to other Asian countries, represent a depressing picture. There is an intense need to increase public spending on education and health in Pakistan.

This paper attempts to examine the impact of human capital (education and health) on the economic growth of Pakistan using annual data for the period 1970-2010.

**Objectives of the Study:**

Following are the objectives of the study:

1. To study the impact of Human Capital on Economic Growth of Pakistan, during the period 1970 to 2010.
2. To study empirically the long and short run relationship between human capital and economic growth in Pakistan.

To achieve these objectives Auto Regressive Distributive Lags (ARDL) and Error Correction Mechanism (ECM) will be used. Several diagnostic and specification tests were also conducted for checking the validity of model. The empirical findings show a significant and positive relationship.

**Model Specifications**

To assess the impact of human capital on economic growth the following model has been estimated.

Gross Domestic Product per capita (GDP_PC) depends upon Public Expenditure on Health (ExH), Public Expenditure on Education (ExE), Infant Mortality Rate (IMR), life expectancy (LE), Primary Enrollment rate (EnP), Secondary Enrollment Rate (EnS), and Enrollment Rate at Tertiary level (EnH).

Thus:

\[ Y = f(ExE, ExH, EnP, EnS, EnH, IMR, LE) \]  

GDP per capita has been shown as a proxy for economic growth and proxies for health are public expenditure on health, life expectancy and infant mortality rate and for education, public expenditure on education, enrollment at primary, secondary and tertiary level, are used.

The empirical model for this research is as follow:
Where $\beta_0$, intercept of the equation and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are all the co-efficient with the corresponding regressors, and $\epsilon_t$ stochastic error term.

The short run and long run relationship between education, health and economic growth was estimated by using ECM and ARDL approach to co integration. A brief introduction of ARDL and ECM model is given below:

Auto Regressive Distributed Lag (ARDL)

“ARDL approach was first developed by Pesaran et al. (2001). It is a unification of autoregressive models and distributed lag models. In any ARDL model a time series is a function of its lagged values, current and lagged values of one or more explanatory variables. In ARDL approach there is no need for pre-testing of possible unit root. ARDL approach can identify that whether a long run relationship between two variables exists regardless of the fact that the two variables are unit root or stationary. The most important factor is that ARDL yields consistent long run coefficients that are asymptotic normal, irrespective of whether the given series are order of one I(1), or order of zero, I(0). (Pesaran et al 1994)”.

Following Pesaran et.al (2001), the ARDL model is as under,

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \beta_3 z_{t-1} + \beta_4 w_{t-1} + \beta_5 (t-1) + \beta_6 (Le) + \epsilon_t$$

Where $\beta_0$, intercept of the equation and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are all the co-efficient with the corresponding regressors, and $\epsilon_t$ stochastic error term.

Using Akaike Information Criteria (AIC), the structural lags are established. After running the regression of equation “3”, the Wald test (F-statistics) will be computed to differentiate the long run relationship between concerned variables. The calculated value of F-statistics will be evaluated with the critical values tabulated in table CI (iii) of Pesaran et al. (2001).

Error Correction Mechanism (ECM)

“In regression model long-run equilibrium relationship may occur among variables, but short-run equilibrium may not. ECM is therefore used to correct or remove the discrepancy that occurs in the short-run. The coefficient of ECM model gives the percentage of the discrepancy
between the variables that can be eliminated in the next time period. The coefficients of the explanatory variables in the ECM measure the short-run relationship. ECM shows the speed of adjustment towards the long run equilibrium after a short run shock.

For checking ECM the following model has been used.

\[ \Delta \text{log} Y_{t} = a + \sum (f = 1)^{p} \Delta \text{log} Y_{t-1} + \sum (f = 0)^{p} \Delta \text{log} \text{Ex}_{t-1} \]

Where “\( \Delta \) ” is the difference operator and “\( p \)” is the lag length.

In this equation “LR” is the long run relationship and is as follow,

\[ LR_{e} = \text{log} Y_{e} - \text{log} \text{Ex}_{e} - \text{log} \text{En}_{p} - \text{log} \text{En}_{S} - \text{log} \text{En}_{N} - \text{log} \text{Ex}_{H} - \text{log} \text{IM}_R - \text{log} \text{Le} \]

Empirical Results and Analysis

Unit Root Results

This study uses Augmented Dickey Fuller (ADF) and Philips Perron (PP) unit root tests in order to check the stationarity.

Table # 1ADF Test Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intercept</th>
<th>Trend</th>
<th>None</th>
<th>Intercept</th>
<th>Trend</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>LY</td>
<td>-0.2431 (0.9242)</td>
<td>-1.8970 (0.6370)</td>
<td>3.9793 (0.9999)</td>
<td>-5.2562 (0.0001)</td>
<td>-5.1495 (0.0008)</td>
<td>-2.9102 (0.0047)</td>
</tr>
<tr>
<td>LEXH</td>
<td>-1.8067 (0.3720)</td>
<td>-1.7671 (0.6983)</td>
<td>7.1139 (1.0000)</td>
<td>-4.2908 (0.0016)</td>
<td>-4.5246 (0.0045)</td>
<td>-1.2122 (0.2019)</td>
</tr>
<tr>
<td>LEXE</td>
<td>-0.2058 (0.9294)</td>
<td>-2.3780 (0.3839)</td>
<td>15.457 (1.0000)</td>
<td>-4.5946 (0.007)</td>
<td>-4.5538 (0.0041)</td>
<td>-0.8257 (0.3514)</td>
</tr>
<tr>
<td>LENS</td>
<td>0.0432 (0.9570)</td>
<td>-2.0365 (0.5637)</td>
<td>0.0432 (0.9570)</td>
<td>-5.0518 (0.0002)</td>
<td>-5.0371 (0.0011)</td>
<td>-4.3190 (0.0001)</td>
</tr>
<tr>
<td>LENS</td>
<td>0.0820 (0.9603)</td>
<td>-2.7012 (0.2418)</td>
<td>1.6563 (0.9743)</td>
<td>-5.2465 (0.0001)</td>
<td>-5.3600 (0.0005)</td>
<td>-5.0336 (0.0000)</td>
</tr>
<tr>
<td>LENH</td>
<td>-0.0934 (0.9431)</td>
<td>-2.3261 (0.4197)</td>
<td>1.5990 (0.9710)</td>
<td>-3.8439 (0.0054)</td>
<td>-3.9229 (0.0203)</td>
<td>-3.4210 (0.0011)</td>
</tr>
<tr>
<td>LIMR</td>
<td>0.0168 (0.9544)</td>
<td>-2.8212 (0.1987)</td>
<td>-2.5359 (0.0126)</td>
<td>-2.7779 (0.0707)</td>
<td>-2.7453 (0.2252)</td>
<td>-1.0261 (0.2691)</td>
</tr>
<tr>
<td>LLE</td>
<td>0.3229 (0.9764)</td>
<td>-3.5499 (0.0503)</td>
<td>-2.5359 (0.0126)</td>
<td>-3.1427 (0.0322)</td>
<td>-2.2353 (0.4591)</td>
<td>-1.6683 (0.089)</td>
</tr>
</tbody>
</table>

Source: Author’s own calculation using E-views 5.
The calculated statistics of both tests show that all the variables namely log of Public Expenditure on Education and Health, log of Enrollment at Primary, Secondary and Tertiary level, log of infant mortality rate, log of life expectancy and log GDP per capita are stationary at 1st difference.

Co-integration

Following the first step in the ARDL model, this study looks at Long Run relationship between the variables by carrying out partial F-test. In this study lags up to two periods have been imposed on each first differenced variable. The estimated F-statistic is reported in the following Table.

Table # 3 F-state of ARDL Models

<table>
<thead>
<tr>
<th>Lag length</th>
<th>F-State</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.296247</td>
<td>No co-integration</td>
</tr>
<tr>
<td>2</td>
<td>14.27827</td>
<td>Co-integration</td>
</tr>
</tbody>
</table>

Source: Author’s own calculation using E-views 5.
(3.65—4.66, 2.79—3.67 and 2.37—3.20 are the lower and upper critical values for Bound testing ARDL for 1%, 5% and 10% significance levels, respectively).
It is cleared from the above table that all the variables in 2 lags model are co-integrated and have a long run relationship.

4.3 Stability of the Model

Stability of Model 2 is tested by CUSUM and CUSUM Square tests. The results both tests proposed by Brown et al. (1975) stay within a 5% level (portrayed by two straight lines).

**Figure #1 Plot of CUSUM**

![CUSUM Plot](image1)

**Figure # 2 Plot of CUSUM Square**

![CUSUM Square Plot](image2)

It is cleared from the above two tables that the plotted line is between the 5% lines which shows that the model is stable, this shows that all the variables have a long run relationship.
Table # 4 Regression Result of ECM

\[
\text{DLY} = 0.417 \times \text{DLY}(-1) + 0.205 \times \text{DLENH} + 0.0895 \times \text{DLENS} - 0.00803 \times \text{DLENS}(-1) \\
\quad (0.1485) \quad (0.1122) \quad (0.0334) \quad (0.0353) \\
+ 0.1665 \times \text{DLENP} - 0.1829 \times \text{DLENP}(-1) + 0.01189 \times \text{DLEXE} - 0.0056 \times \text{DLEXE}(-1) + \\
\quad (0.0996) \quad (0.0967) \quad (0.0579) \quad (0.0712) \\
0.0175 \times \text{DLEXH} - 0.0688 \times \text{DLEXH}(-1) + 2.01908 \times \text{DLLE} - 1.32040 \times \text{DLIMR} + \\
\quad (0.0252) \quad (0.0242) \quad (1.3099) \quad (0.7045) \\
1.08675 \times \text{DLIMR}(-1) - 0.3674 \times \text{ECM}(-1) \\
\quad (0.6322) \quad (1.1425)
\]

\[
R^2 = 0.66 \quad R^2(\text{adj}) = 0.52
\]

Source: Author own calculation using E-views

The values in parenthesis are standard values.

ECM (-1) is – 0.3674. The percentage value of ECM is equal to 36.74% showing that the variables have to be adjusted approximately to restore equilibrium in the short run.

In our model the value of ECM is negative which imply that in Pakistan human capital and economic growth have a strong and positive relationship.

The value of \( R^2 \) is 0.66 showing that the explanatory variables explain 66% of changes in the dependent variable. It also means that the variables chosen are strong in explaining economic growth.

Conclusions

This paper has attempted to find out the long run and short run relationship between human capital and economic growth in Pakistan for the period 1970-2010.

The study has been investigated by ARDL co integration test and ECM technique, the main findings are as:

- The ADF and PP tests confirmed that all the variables are non-stationary at the level but found stationary at the first differences.
- The ARDL test confirmed that human capital and economic growth are co-integrated, indicating a long run relationship between the two.

This suggests that public spending on education and health may be increased.
Reference and Bibliography


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