

Human Capital Formation and Economic Growth in Pakistan

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Abstract

This study examines the role of human capital formation in economic growth in Pakistan by using the secondary data for the period of 1972-73 to 2010-11. The results implied that education enrollment (proxy for human capital), health and physical capital are important to boost the economic growth in Pakistan. Human capital, fixed capital and employed labor force affect the GDP and result in unidirectional and non-unidirectional causality. After estimating the model, we concluded that education enrollment index, gross fixed capital formation and Gini coefficient have positive and significant impact on gross domestic product, while head count ratio, infant mortality rate, CPI inflation and investment growth rate have negative and significant impact on gross domestic product in Pakistan.

Keywords: Human Capital; Economic Growth; Enrollment Index; Pakistan

I. Introduction

In an underdeveloped country like Pakistan, a huge proportion of population is residing below the national poverty line. It is commonly said that through economic growth, we can curtail unemployment and poverty but the situation is different in case of Pakistan. In Pakistan, we cannot reduce the poverty through only economic growth. It is the need to improve all indicators of economic growth. Therefore it is considered that investing in people accelerates their individual development and gives them the ability to get rid from poverty. This requires education and health facilities as well as some measures of income security.

It is considered that capital and natural resources are the slow factors while human capital is an active factor of production. Human beings can increase capital and build up social and economic organizations. We can never develop anything for economic growth, if we cannot develop the skills of our human beings. It is clear that if we want to use other resources effectively then we have to develop the capacity of our human beings through literacy, skill development and by quality enhancement so that we may trim down unemployment and enhance the process of growth.

Human capital and economic development both are interrelated to each other for some additional basis. Furthermore, it is also necessary for the government to spend additional amounts on education and health sector. By human capital we consider acquired mental and physical ability of human beings through education, skill development, training, health care and activity of some spiritual methods like yoga (Singh, 1999). Generally, the concept of Human Capital is used for education, skill development, health and other capacities of people that can enhance their productivity and efficiency (Todaro, 2002).

Without sufficient and qualitative human power in terms of health, knowledge and skills, it is difficult to exploit other means of production such as capital and natural resources effectively. The development of human resource is one of the essential conditions for economic growth (Harbinson and Myers, 1964). The common concept that investment in human beings results in increased economic growth is very old and goes back to the period of Adam Smith (1776). The economists of classical school of thought also stressed upon the investment in human beings.

After the establishment of Pakistan in 1947, the government gave its attention to build up human and physical capital in Pakistan. For the first time in history, Zulfikar Ali Bhutto, the Prime Minister of Pakistan gave attention to the education sector as well as to the manpower planning. For this purpose, he decided to nationalize different sectors of economy including education. He tried to provide free education for all the people of Pakistan.

Although, it is considered that the government of Bhutto has not some good period in history but it is reality that he exported a huge amount of labor (Surplus labor) to developed countries especially to the Gulf region. Now-a-days, the situation is very critical because Pakistani government has not been spending more than 2 percent of its gross national product on education sector. In health sector, the situation is also miserable because only about 2 percent of GDP has been spent on health sector in Pakistan. Human capital of Pakistan can also be used to accelerate the economic growth of the economy. Investment to increase literacy and skill development is necessary for the growth process of a country. Economic benefits are also higher if we invest in people and it has significant effects on the wages of the people.

Human capital formation has an inner role for the development of society. This is very critical situation in Pakistan that despite of significant growth rate, the indicators of human capital are not satisfactory. Almost all economic indicators that can measure the situation of human development are very low in Pakistan i.e. literacy rate, enrolment rate at school level, facilities of health and clean water etc. During the past period, all the concentration of government remained in the investment in physical capital only, while government ignored the human capital sector. Due to this lack of investment in human capital, today the result is in the form of unemployment, high poverty level, illiteracy and shortfall of electricity. Therefore to tackle this problem we investigated the impact of investment in Human capital on economic growth in Pakistan.

II. Literature Review

Many studies have been carried out to observe the relationship between human capital and economic growth in different countries. These studies suggest that human

capital formation deals with such capabilities like literacy, skill development, health facilities and experience. Furthermore, it is said that the share of human capital in economic growth is greater than the amount of physical capital. Some important studies from developed and developing countries are included in this section.

Mankiw et al. (1992) investigated the impact of human capital level on subsequent economic growth using cross-country analysis. They found a significant role of human capital measured by the secondary school enrollment rates.

Abosetegn (2000) observed that the main causes of unemployment for tertiary level graduates were actually the absence of association between higher education and the labor market. This was also due to non-existence of any policy of employment for graduates and language barriers. There was also a serious difference between what the educational institutions and schools are producing and what the employers need. He found that the major factors that resolve the opportunity of employment of the graduates from vocational schools were connections between schools and companies which were found to be weakly developed especially in the government schools or institutions.

Bils and Klenow (2000) said that countries which have high enrollment rate in schools can achieve more growth in per capita income. High enrollment rate in education causes speedy improvements in level of productivity. The results have confirmed that education has a long run and significant relationship with growth. They suggested that progress in education standards will enhance the productivity and also affect the growth in the long run.

Abbas (2001) determined empirically the role of human capital in economic development. A complete analysis of two developing countries i.e. Pakistan and Sri Lanka was made. He employed the standard growth accounting methodology with human capital specified and production function in which Gross Domestic Product (GDP) was the dependent variable. So, overall empirical evidence of the study indicated that human capital played a crucial role in the growth of the economies for developing countries especially for these two countries.

Agiomirgianakis et al. (2002) examined the role of human capital on economic growth by using a large panel data. In the empirical analysis, panel data was employed using dynamic panel data techniques for a set of 93 countries over a period of 27 years. The findings not only suggested the existence of a robust positive relationship between education and economic growth but also concluded that higher levels of education had a stronger effect on economic growth.

Ashtoon et al. (2002) analyzed that human capital was helpful in growth process by encouraging the growth of some other factors especially investment in physical capital which is considered necessary for the country. It is considered that human capital has positive link with the physical capital growth.

Bosworth and Collins (2003) used growth accounting approach for analyzing cross-country differences in economic growth. They argued that capital factors alone cannot define economic growth but it is the 'A' in Cobb-Douglas production function $Y_t = A_t f(K_t, L_t)$ which is helpful for economic growth. They concluded that Attainment of

better and higher education enhances economic growth and improves the productivity of workers.

Rodrik (2003) argued that enhancing economic growth and maintaining it are two different things. He said that for starting the process of growth, we need only small reforms but if we want to maintain or sustain the growth, then we need continuous institutional reforms which can maintain productive dynamism. He believes that there are few principals that may help for strong growth i.e. security of property rights, competition in market and low inflation. These principals can be converted into some policy packages which further translated into institutional designs.

Amjad (2005) focused on those factors that explain Pakistan's relative growth performance. He looked particularly at the role of differences in the quality of human capital formation. The cross-country empirical results suggested that accumulation of physical capital and improvements in the quality of institutions have significant outcomes in terms of achieving higher growth rate but that better education and health care have also a significant impact on economic growth.

Akram (2008) tried to estimate the relationship between health status and economic growth. There observed a two-way relationship between improved health facilities and economic growth. Health and other types of human capital increases the per capita GDP by increasing productivity of human beings and then some part of this increased income is spent on investment in human capital which furthermore results in per capita growth.

As the literature showed that although great work have been done related to human capital but only a few studies focused on the role of investment in human capital in Pakistan, and different measures has been used for this purpose. Therefore this study is planned to fill up this gap in the literature.

III. Data and Methodology

This study is based on the secondary sources of data. The data are collected for the period of 1972-1973 to 2010-2011. The data for this study are obtained from Pakistan Economic Survey (of various years), State Bank of Pakistan and World Development Indicators.

To examine the relationship between human capital formation and economic growth, the above specified model has been analyzed by employing the method of Ordinary Least Squares (OLS). GDP is dependent variable while EEI, HCR, GFCF, IMR, GINI, IGR, INF are independent variables of our model. Regression errors in equations of these models will be tested for autocorrelation with the help of Durbin Watson (DW) test statistic.

a. Concepts of Variables Used in the Study

This section is reserved to focus on the considered variables in our analysis of human capital formation. These variables have been selected keeping in view their relative importance on theoretical and empirical ground. The choice of variables is consistent with the choice made by some other researchers (Mankiw 1992, Romer 1990,

Barro and Lee 2000). The Explanation of attempted variables and their hypothetical impact are described as follows:

Gross Domestic Product

Economic growth of a country is determined by increase in the size of the economy of a nation. A wide indicator to show the size of an economy is its output. Commonly, various economists measure economic output of a country through its Gross Domestic Product (GDP). We have taken Gross Domestic Product as a dependent variable in our study.

Education Enrollment Index

The human capital proxy that we use in our study is 'school enrollment ratio'. It measures the number of students enrolled at a specific grade level. Barro and Lee (2000) and Mankiw (1992) have also used this proxy in their study. In this study the method used by Barro and Lee (2000) for generation of human capital has been used and we have used 'Education Enrollment Index (EEI)' as a proxy for Human Capital.

$$EEI = (5ED_t + 8ED_t + 10ED_t + 16ED_t) / \text{Population}$$

Where:

EEI = Education Enrolment Index

5ED_t = Enrolment of primary education

8ED_t = Enrolment of middle education

10ED_t = Enrollment of secondary education

16ED_t = Enrollment of higher secondary education

Head Count Ratio

The headcount ratio is the proportion of the population whose incomes are below the official threshold set by the government. Changes in the poverty headcount of any country can be described to one of the three factors: per capita economic growth, changes in the share of gross domestic product (GDP), and distribution of consumption among individuals within the country. Head count ratio is an important determinant of human capital formation. Poverty level of people has a strong impact on human capital formation and further on economic growth.

Gross Fixed Capital Formation

Gross Fixed Capital Formation calculates the value of acquisitions of new or existing fixed assets by the governments and households in the economy. Fluctuations in this indicator are considered to indicate something about future business activities and the outline of economic development. In Harrod-Domar model, the growth rate of income will be positively related to saving ratio and capital formation. So, we can say that the more a country is able to save and invest out of given national income, the greater will be the growth of that national income.

Infant Mortality Rate

The infant mortality rate is calculated by estimating total number of children dying under a year of age divided by the total number of children born in that year. One of the health indicator 'the infant mortality rate' is also called the 'infant death rate' is an important measure to estimate the welfare of infants, children and pregnant females. The two-way causality exists between income level and health status, is expected to have

status of the population considering the level of growth of the country's gross domestic product. It is said that health is influenced by income level and on the other hand health status influences the level of income. It discovered that health variables influence per capita GDP positively while per capita GDP, in turn, impacts health variables (e.g. IMR) positively.

Gini Coefficient

The Gini coefficient shows the income inequality and its value ranges from 0 to 1. Alternatively it is also expressed as a percentage which ranges from 0 to 100. A low value of Gini coefficient indicates a more equal income distribution while high value shows unequal distribution. Zero (0) value shows complete equality while value of 1 shows complete inequality in income distribution. Inequality of income has also a significant impact on human capital formation. Inequality in income is positively correlated with the schooling inequality and it is negatively correlated with the level of schooling. It also shows that higher level of schooling reduces the inequality of income.

Investment Growth Rate

Growth models of neoclassical economists stress on investment and population growth in the regression analysis. An increase in investment along with a reduction in growth rate of population will promote economic growth. This theory promotes capital accumulation as the engine of economic growth. The investment growth is limited by the availability of resources and it is in this sense that capital scarcity plays an important role in the determination of economic growth. It is assumed that the variations in the available technology smooth the progress of growth process. In this study we include investment growth rate (as percentage of GDP) in our analysis.

CPI Inflation Rate

Inflation in Pakistan has been estimated as annual percentage change of average consumer price index. CPI inflation which is an independent variable of our study has many advantages of using it in the model rather than other inflation rates. Some economists recommended using CPI inflation in the model due to the reason that it reduces the probability of negative correlation between inflation and growth rates (Sarel, 1996). Another advantage of using it in the model is that, CPI indices are independent of output volume, so its use in the model prevents correlation problems to occur in the model. Investment in human capital is a significant factor that contributes to long run economic growth. Many models of growth and inflation have taken human capital in the form of an endogenous variable. These models of growth show neutral or negative impact of inflation on investment in human capital.

b. Model Specification

In the specified model, the GDP is a dependent variable while EEI, HCR, GFCE, IMR, GINI, IGR and INF are independent variables. Following Mankiw, Romer and Weil (1992), our econometric model of the selected variables used in this study is given as follows:

$$LGDP = \beta_0 + \beta_1 (LEEI) + \beta_2 (HCR) + \beta_3 (LGFCF) + \beta_4 (LIMR) + \beta_5 (GINI) + \beta_6 (IGR) + \beta_7 (INF) + \varepsilon$$

Where		
LGDP	=	Log of Gross Domestic Product
LEEI	=	Log of Education Enrollment Index
HCR	=	Head Count Ratio
LGFC	=	Log of Gross Fixed Capital Formation
LIMR	=	Log of Infant Mortality Rate
GINI	=	Gini Coefficient
IGR	=	Investment Growth Rate
INF	=	CPI Inflation
\mathcal{E}	=	Error Term

IV. Results and Discussions

In this section we will present the statistical and econometric data analysis. Descriptive statistics is the discipline of describing the main quantitative features of [data](#) used in study. They give uncomplicated and simple summaries about the data and the measures. It is used for quantitative analysis of data. Descriptive statistics of the variables of our model is given in following table.

Table 1 Descriptive Statistics of the Variables

	LGDP	LEEI	HCR	LGFCF	LIMR	GINI	IGR	INF
Mean	13.81	-2.12	26.26	12.04	4.53	18.31	18.17	9.04
Median	13.80	-2.04	24.79	12.21	4.58	18.52	18.50	9.60
Maximum	16.44	-1.83	39.49	14.65	4.84	22.52	22.50	14.10
Minimum	11.03	-2.41	17.32	8.94	4.22	12.93	12.80	3.10
Std. Dev.	1.54	0.22	5.37	1.64	0.15	1.96	2.13	2.95
Skewness	-0.02	-0.10	0.76	-0.14	-0.28	-0.42	-0.44	-0.40
Kurtosis	1.87	1.42	2.80	2.00	2.15	4.34	3.57	2.21
Jarque-Bera	2.01	4.03	3.70	1.72	1.63	3.96	1.72	1.97
Probability	0.37	0.13	0.16	0.42	0.44	0.14	0.42	0.37
Observations	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00

Note: All the estimations are carried out by E-views

In Table 1, the detailed descriptive analysis is carried out. Our data consists of thirty eight years of annual observation from 1972-1973 to 2010-11. The descriptive statistics exhibits that the average of gross domestic product is 13.81 with standard deviation of 1.54. The average education enrollment index is -2.17 with standard deviation of .22.

The average for head count ratio is 26.26 with the standard deviation of 5.37. The average for gross domestic fixed capital formation is 12.04 with standard deviation of 1.64. The average for infant mortality rate is 4.53 with standard deviation of 0.15.

The average for coefficient index is 18.31 with standard deviation of 1.96. The average investment growth rate is 18.17 with standard deviation of 2.13. The average for inflation is 9.04 with the standard deviation of 2.95. The skewness is a measure of the

lack of symmetry in the data. Education enrollment index and gross fixed capital formation are little skewed as compared to the rest of the variables. Kurtosis statistic of the variables shows that education enrollment index and gross fixed capital formation are platykurtic (flat or short tailed) and all other variables are relatively leptokurtic (long-tailed or higher peak).

Correlation coefficient shows the degree of linear relationship between two variables. A Correlation Matrix is a table which shows all possible correlation coefficients between a set of variables. Correlation matrix of the variables of our model is given in following table.

Table 2 Correlation Matrix of the Variables

	LGDP	LEEI	HCR	LGFCF	LIMR	GINI	IGR	INF
LGDP	1.00							
LEEI	0.93	1.00						
HCR	-0.46	-0.29	1.00					
LGFCF	0.97	0.91	-0.42	1.00				
LIMR	-0.79	-0.79	-0.02	-0.77	1.00			
GINI	0.40	0.31	-0.67	0.43	-0.16	1.00		
IGR	0.22	0.15	-0.62	0.26	0.00	0.94	1.00	
INF	-0.26	-0.25	0.07	-0.19	0.06	0.21	0.22	1.00

Note: All the estimations are carried out by E-views

The results describe that there is strong positive correlation of LGDP with LEEI and LGFCF. There is weak positive association of LGDP with GINI and IGR. Above table also shows that there is weak negative correlation of LGDP with HCR and INF. The correlation between LGDP and LIMR is negatively strong. There is weak negative association of LEEI with HCR and INF. There is weak positive association of LEEI with GINI and IGR. There is high correlation between LEEI and LGFCF. There is relatively strong negative correlation between LEEI and LIMR. Association of HCR with LGFCF and LIMR is negative and weak. There is strong negative association of HCR with GINI and IGR. There is weak positive association between HCR and CPI inflation (INF). There is strong negative correlation between LGFCF and LIMR. Association of LGFCF with GINI and IGR is positive and weak.

There is weak negative association between LGFCF and INF as the value of correlation is -0.19. There is weak negative association between LIMR and GINI. It is also noted that there is zero interdependence between LIMR and IGR. There is weak positive association between GINI and INF. There is high correlation between GINI and IGR. It also shows that there is weak positive association of IGR and INF.

The results of the estimated model are arranged in Table 3, which explains that our specified model performed very well in terms of F-statistic. The results describe that our model is highly significant. R^2 the coefficient of determination explains how much linear relationship has the dependent variable with independent variables. The value of R^2 is

0.98, which explains that 98 percent variations in the gross domestic product are explained by the concerned independent variables. The value of Durbin Watson (DW) statistic is 1.97 which indicates that there is no problem of autocorrelation in this model.

Explaining the impact of regression coefficient, we first look at the coefficient of LEEI. It shows that there is a significant positive impact of education enrollment index on gross domestic product. This explains that increase in education enrollment index causes gross domestic product to increase. The estimated statistic explains that there is negative and significant impact of Head Count Ratio on LGDP. Gross Fixed Capital Formation (LGFCF) describes positive and significant impact on LGDP. Our results show that about one percent increase in LGFCF is required to bring about 0.45 percent increase in LGDP.

There is negative and significant impact of LIMR on LGDP. This shows that about one percent change in infant mortality rate will bring about 2.47 percentage points change in LGDP in inverse direction. GINI describes positive and significant impact on LGDP. There is negative and significant impact of investment growth rate on LGDP. There is negative and significant impact of CPI inflation on LGDP.

Table 3 Parameter Estimates of Human Capital Formation Model

Independent Variables	Equation of the Model
Intercept	24.852 (9.183)*
Log of Education Enrollment Index (LEEI)	1.319 (3.230)*
Head Count Ratio (HCR)	-0.0649 (-6.559)*
Log of Gross Fixed Capital Formation (LGFCF)	0.453 (7.192)*
Log of Infant Mortality Rate (LIMR)	-2.477 (-5.640)*
Gini Coefficient (GINI)	0.146 (2.254)**
Investment Growth Rate (IGR)	-0.170 (-3.162)*
CPI Inflation (INF)	-0.039
R-Squared	0.98
Adjusted R-Squared	0.98
D-W Statistic	1.97
Sample Size	38

(Dependent Variable is Log of Gross Domestic Product)

Note: The t-Statistics (in Parenthesis) significant at 1% and 5% level are indicated by * and ** respectively. All the estimations are carried out by E-views.

The Granger Causality test is used for determining whether one [time series](#) is useful in forecasting another or not. A time series X is said to be Granger-cause Y if it can be shown that lagged X values provide statistically significant information about future values of Y . The results imply that education enrollment (proxy for human capital), health and physical capital are important to boost the economic growth in Pakistan. Human capital, fixed capital and employed labor force affect the GDP and results in unidirectional and non-unidirectional causality.

V. Conclusion and Suggestions

The study has made an attempt to provide the empirical confirmation on the relationship between human capital formation and economic growth. The results of this study indicated that there is long run relationship between economic growth, education enrollment, CPI inflation, investment growth, head count ratio and fixed capital formation. Education enrollment index (EEI) has significant and positive impact on economic growth; it means increase in education enrollment stimulates economic growth. Head count ratio (HCR) which is used as a proxy for poverty, has negative relationship with economic growth. It indicates as poverty increases, the process of economic growth will slow down. The Gini coefficient (GINI) and gross domestic fixed capital formation (GFCF) have positive and significant effect on economic growth.

Results show that investment growth rate (IGR) has negative impact on economic growth in Pakistan which is contrary to the theory. This is because of insufficient investment in Pakistan. The capital investment is low in Pakistan which reduces new capacity for the demand for goods. Low demand and output of goods further discourage investment in new machinery. So due to low investment, the IGR has negative effect on economic growth. Moreover, in Pakistan, mostly investment expenditures by government have carried out for non productive purposes. This is also a major reason for the negative impact of investment growth rate on economic growth. According to this study, some policy recommendations are stated as follows:

- i. As improved technology and efficiency are the factors essential to economic growth so more attention should be given to advanced technology, training and skill development of human capital.
- ii. Government should increase job opportunities for people so that the increasing population could improve the economic growth of country and become a mean of growth rather than a obstacle in the way of economic development of the country.
- iii. A large share of government expenditures goes in the way of transaction rather than the development activities. Government should make measures to alleviate poverty so that the fruits of government expenditures could be achieved.
- iv. Inflation should be managed because high or unpredictable inflation rates are observed as destructive for an overall economy of a country.
- v. Investment in capital should be increased which will enhance new capacity for the demand for goods. Increased demand and output will support investment in new capital machinery which will further help to maintain the growth in the economy by rising long run aggregate supply.

- vi. Government should increase the enrolment ratio at all education levels. Education contributes to economic development through the production of knowledge and skills. It also increases labor productivity and quality of life, reinforces civil society and encourages democracy.
- vii. Government should increase opportunities for the education of female. Education of female will develop child health. This will lower infant mortality rate. It contributes in productivity and economic growth not only in recent generation but also in the next generation.
- viii. Income inequality should be reduced through appropriate government policies for economic growth because there is a two-way positive association between a more equal distribution of income and a higher rate of economic growth.

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