Human Capital and Economic Growth: Evidences from Pakistan

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Abstract

This paper studies the impact of human capital (HK) on economic growth in Pakistan. Gross Domestic Product (GDP) growth is used as a dependent variable while independent variables are, human capital (proxied through public spending on health, public spending on education, primary, secondary and higher education enrollment), physical capital (proxied through capital stock) and labor force participation rate respectively. The time series data is taken from Economic Survey of Pakistan, Labor Force Surveys and World Bank Data source for the year 1981 to 2013-14. The relation among variables is checked through Autoregressive Regressive Distributed Lag Model and Error correction model. The estimation results expressed a significant association among the variables.

Key Words: Growth, Physical capital, Education, Health, Labor force participation, Pakistan

Introduction

It is worldwide accepted that human capital is the driving force or an important agent of economic development. The quality of human resources may be improved by the means of education and health services. Other than the issue of social concern, both the components of human capital provide healthy trained human resources for the economic growth and development. Human capital can be defined as the term economists used for education, health and other human capabilities which would raise the productivity when increased. Human capital is not limited to knowledge or comprehension. In many of the models contribution of health towards economic growth is positive and significant. The two very much related components of human capital i.e. health and education, work jointly to make the person more useful or productive. Output is affected through various channels by education which is mainly an important determinant of human capital. An educated person has more ability to learn much faster. Education creates awareness among the individuals, so increased level of education leads towards better health which as a result helps in increasing output. According to Mincer (1996), education is an important factor in enhancing labor force participation especially in case of female participation and due to this higher labor force participation, output increases further. Another important attribute is experience. In productivity growth no one can deny the role of experience. Other important elements of human capital are health and nutrition. A healthier worker is more able to contribute in the production process as compared to unhealthy counterpart. A healthier worker is more capable of producing more output. In the developing countries, the productivity of labor is low due to the negligence in the investment of human capital. Physical investment is also another most important factor which also

contributed in the per capita income growth. There is no proper utilization of physical capital because of the dependence of the physical capital on human capital like skillful, professional and technical individuals. In the economy, capital without human capital is of less importance. Therefore, co-existence of the two capitals is very much necessary. The study aims to examine the impact of HK proxied through public spending on health, public spending on education, primary, secondary and higher education enrollment on economic growth of Pakistan. In this study growth would be analyzed through Autoregressive Regressive Distributed Lag Model (ARDL model) and Error correction model (ECM) by deploying the time series data from 1971-2013.

Objectives

The objectives of the study are

  i) To investigate the impact of HK on the economic growth in Pakistan.
  ii) To recognize the long and short run association between the HK and growth of Pakistan

Literature Review

Literature provides many studies where human capital is considered an explanatory variable in the production function. Barro (1991) studies the relation between HK and economic growth. The independent variables comprises of the government policies or consumption and the educational attainment while the dependent variable is GDP. Results showed that estimated coefficient on the schooling variable have highly significant and positive value. Real gross domestic investment was found to be highly significant and have positive relationship with GDP while for the fertility it was significant but have negative correlation with GDP respectively.

Iyigun and Owen (1996) considered the alternative means of human capital accumulation. These alternative means includes learning by doing and formal education is somehow unconditionally advantageous for the economic growth. The study used a constant return to scale production function where output is dependent upon capital, labor, specific skills and general skills respectively. The study depicted that in those countries where the human capital is large, there individuals may attain more than the socially maximum level of education. Moreover a country, whose economy is less developed having the same technology, can be under-educated.

Abbas (2000) compared the effect of HK on economic growth in India and Pakistan. In this study, the proxies for human capital are enrollment at primary, secondary and higher secondary levels. The results showed that in both of the countries secondary schooling was positively related and significant while at 1% level of significance, primary education has positive effect in India and higher education in Pakistan.

Khan (2005) analyzed the role of differences in the quality of human capital. The empirical analysis uses a basic regression where the growth depends on investment, initial income, macroeconomic policy, institutional quality and labor quality. Different measures i.e. literacy rate, average years of schooling, secondary school enrollment and life expectancy are used to represent the quality of human capital. This study estimated the model developing countries including

Pakistan. The results indicated that education and health indicators are highly significant and both influence growth independently of each other. Khan (2005) Duma (2007) Iyigun and Owen (1996, Barro (1991

Duma (2007) analyzed the Sri Lanka's sources of growth by using the growth accounting framework. The study used Cobb-Douglas production function that links output to Total Factor Productivity), labor, capital and human capital respectively. Total factor productivity was seen to be major contributor towards growth, whose contribution was around 46%. It was found that in the era of 1980's labor contribution to growth was at the peak but with the passage of time, the labor's contribution declined. A prominent role of total factor productivity was seen after 80's.

Idris and Rahmah (2012) examined the association between economic growth and HK in Pakistan. A strong and positive link between HK and economic growth was found. The study suggested that sustained economic growth may be achieved in Pakistan by spending more on human capital. The estimations are done by using the simple formula used for the human capital index. Results indicated that with investment in human capital, skills of workforce may be raised or boosted that would further increase the marginal productivity of capital.

Hanushek and Woessmann (2012) examined the role of human capital, FDI and infrastructure capital on the regional inequality economic growth of America. Output is dependent variable while capital, number of workers with schooling above elementary level and the number of workers who have not graduated are taken as independent variables respectively in the production function taken. The results attained showed a positive effect of HK on output.

Oluwatoyin (2012) studied the relationship between FDI, HK and GDP growth in Malaysia. The study showed insignificant effect of FDI on the GDP growth. Moreover a positive link between the HK and GDP growth was observed. Significant contribution of lower skilled labor force towards GDP growth was seen. In the long run, a rise of 0.25% in GDP would occur when an increase of 1% would be seen in highly skilled labor force and 0.33% in GDP per capital respectively. At 10% level of significance, a positive effect on growth had been showed from the exports side. One of the results obtained showed that domestic capital accumulation is responsible for the economic growth of the Malaysian economy.

Data and Methodology

Data are obtained from various issues of Economic Survey of Pakistan for the year 1971-2013. Table 1 shows human capital indicators.

The current study focus on collision of HK and GDP growth. Dependent variable is GDP growth while independent variables are; public sector spending on health (PSH), public spending on education (PSED) as percent of GDP, primary education enrollment rate (PEER), Secondary education enrollment rate (SEER) and higher education enrollment (HEER) rate, physical capital (CSTK) proxied through capital stock and labor force participation rate (LFPR). For stationarity of data, unit root test is used. Wald Test is used to check that whether long run connection lies between dependent variable and independent variables. Short run analysis is

Table 1

Human Capital Indicators in Pakistan, in 1971-2013 periods

Years	GDP Growth	Public Spending On Education	Public spending On Health	Primary Enrollment	Secondary Enrollment	Higher Enrollment	Labor Force Participation rate
	(Annual %)	(% of GDP)	(% of GDP)	(Numbers)	(Numbers)	(Numbers)	
1971	0.47	1.65	0.40	4210	366	17507	51.7
1980	6.60	2.13	0.72	5474	509	42688	46.60
1990	4.45	2.52	0.86	10837	913	61857	50.60
1995	4.96	2.82	0.86	14527	1525	82955	49.20
2000	4.26	1.84	0.58	14105	1565	124944	51.00
2001	1.98	1.80	0.59	14560	1574	276274	50.80
2002	3.22	1.80	0.58	15094	1589	331745	50.70
2003	4.84	2.00	0.57	16207	1800	423236	51.10
2004	7.37	1.95	0.57	18190	1936	471964	51.60
2005	7.67	2.25	0.57	17757	2188	521473	52.60
2006	6.18	2.63	0.57	17993	2373	605885	53.60
2007	4.83	2.64	0.57	18360	2484	741092	53.20
2008	1.70	2.75	0.56	18468	2556	803507	53.10
2009	2.83	2.59	0.54	18772	2583	935599	53.60
2010	1.60	2.29	0.23	18063	2630	1107682	54.00
2011	2.79	2.22	0.27	18667	2753	1319799	54.10
2012	4.02	2.14	0.35	18748	2824	1662477	54.20
2013	6.07	2.30	0.40	18756	3016	1969079	53.10

Source: Economic Survey of Pakistan, World Bank (Various Issues)

conducted through ECM. Theoretical framework represents the relationship between the dependent and independent variables. In unit root test there is a value known as augmented dickey fuller (ADF) test statistic. If the ADF value lies to the left of 10% level (test critical value) then

the variable is stationary otherwise not. All the variables whether they are dependent or independent would be checked for unit root.

Results

The results of unit root test of the variables under study are given in Table 2.

Table 2
Results of Unit Root Test

Variables	Level/First Difference	ADF statistic	Variables	Level/First Difference	ADF statistic
GDP	Level	-5.20	SEER	First Difference	-4.549
PSED	First Difference	-8.660	HEER	First Difference	-5.516
PSH	First Difference	-5.535	CSTK	First Difference	-6.521
PEER	First Difference	-6.632	LFPR	Level	-3.570

Source: Author's Estimation.

The above results show that GDP growth and labor force participation rate are stationary at level while capital stock, public spending on health, public spending on education, and enrollments are stationary at first difference. So it is obvious that ARDL model would be applied. If the value of F-Stat is greater than the upper bound value of the bound testing table by Pesaran Shin and Smith (2001) then it comes out to be significant. Table 3 gives the results of Wald test.

Table 3
Results Of Wald Test

Test	Value	D.f	Probability
F-stat	7.039040	(8,24)	0.0002
Chi-square	48.72232	8	0.0001

Source: Authors Estimation

Lower bound (3.67) and upper bound (4.10) by Pesaran et al. (2001).

Autoregressive Regressive Distributed Lag Model is a technique used to check the relation among dependent variable is GDP growth rate while independent variables. Table 4 gives results of ARDL Model.

Table 4
Results of ARDL Model

Variables	Coefficients	t-Statistic	Probability
Constant	-16.356	-1.37	0.205
PSH	0.508	2.569	0.043
PSED	0.495	2.469	0.030
PEER	0.244	2.083	0.039
SEER	0.334	2.183	0.021
HEER	0.533	2.864	0.008
LFPR	0.338	2.703	0.001
CSTK	0.478	2.735	0.004
R-Square	0.75	Durbin Watson	2.041
Adjusted R^2	0.58	F-Statistic	4.316

Source: Author's Estimation

It is clear that lag values of the explanatory variables have significant impact on economic growth. It is observed that 1 percent increase in primary education enrollment tends to increase economic growth by 24 percent. Secondary education enrollment has positive impact on economic growth. Similarly, if secondary education enrollment is increased by one percent, we expect economic growth to increase by 33 percent. It is found that higher education enrollment has positive impact on economic growth. If higher education enrollment rate increases by 1 percent then it tends to increase economic growth by 53 percent.

Public spending on health, public spending on education are found to exert positive effect on growth. That is increase of 1 percent in public spending on education and health tends to increase economic growth by 50 percent. Results indicate that labor force participation rate also has positive impact. That is 1 percent increase in labor force participation rate tends to increase economic growth by 38 percent. Similarly, if capital stock is increased by 1 percent we find economic growth to increase by 48 percent. The above results obtained are very much similar to the theory and general findings of Abbas and Peek (2008), and Hanushek and Woessmann (2012). Value of R-Square reveals that model has explanatory power of 75%. If any disturbance in short run model is observed then coefficient of ECM informs that how much adjustment would be required to come back to achieve equilibrium. The results of ECM are given in Table 5.

Table 5

Results of ECM			
Variables	Coefficient	t-Statistic	Probability
DlnCSTK	5.12E-16	3.7391	0.0035
DlnPSH	7.47E-15	4.1027	0.0003
DlnPSED	1.20E-15	2.7444	0.0006
DlnPEER	6.54E-18	3.8979	0.0020
DlnSEER	6.57E-18	2.5124	0.0161
DlnHEER	3.38E-20	2.8083	0.0551
DlnLFPR	7.25E-18	2.9600	0.0018
DlnGDP_1	1.00	1.55E+15	0.0001
ECM_1	1.83E-16	1.283190	0.2093

Source: Author's estimation.

If the value of the ECM is negative and lies between zero and one and is significant then there exists a short run relation among variables. Here value of coefficient does not fulfill the conditions for ECM, so there does not exist short run relationship between the variables.

Conclusion

Human capital variables like public sector spending on health, public spending on education, primary education enrollment, secondary education enrollment and higher education enrollment show strong effect on growth in Pakistan. This indicates that all these variables are important to enhance growth rate in the country. Capital stock is also found to place strong positive effect on growth in Pakistan. Efficiency of labor is increased by imparting of emphasis both on human as well as physical capital as it will in turn increase the productivity and ultimately increases growth. The estimation results confirm the threotical association between the dependent and independent variables of Pakistan.

Policy Recommendations

- It is suggested to depute more funds to education and health sectors.
- There is a need to give more attention to advanced technology, trainings and skill improvement for development of human capital.
- Regarding higher education institutions, more emphasis should be on development of infrastructure by the government so as to increase the proportion of highly educated labor.

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