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The Effect of Human Capital Accumulation and Education on Economic Growth

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Abstract

The characteristic of human capital along with other social elements play an important role in the economic output of an economy and its always being under discussion by politicians, economists, and policymakers. According to human capital definition, education, work experience, formal training on the job, and skills with taking goals for training which is provided by family members to expand their capability and non-formal learning, all these investments also include in people expertise and all other actions that help to people in enhancing the productivity. There are many studies contributed in economics literature but they only focused on specific elements or regions, but this study explores the immediate impact of human capital accumulation with labor force, education expenditure trade openness, and investment on consequent economic output in terms of GDP. Current study was based on a sample of 180 developed and developing countries across the world from the period of 1981 to 2012. We employed fixed and random effects models on panel data to examine the human capital accumulation effect on economic growth. It was found that additional expenditure on public or private education, leads to enhance the education quality that increases the number of skilled labors and these labors increase the productivity. capital trade openness and Investment in fixed also has a significant and positive influence on economic output. In sum, the validity and availability of data of several developmental interventions are highlighted. It will be helpful for policymakers with paying attention to the relative effectiveness of these interventions on various relevant outcomes about spending on education for skilled labor and constructive economic growth.

Keywords: Education expenditure, Investment in fixed capital, Human capital, Labor force, Trade openness,

1. Introduction

Under the economy it is always question raised on the growth of economy along other social indicators of the human capital. Robert Solow and Trevor Swan introduced the neo-classical traditional model in 1950s in which described that the growing production of any economy depends upon the greater input of labor and capital units. According to this model, indicators like health of human and human capital are considered non-economic variables and not play any important role in the model. Furthermore, law of diminishing return to scale was satisfies the economy under the model of this. The growth model of neo-classical provided for the growth of the economy several consequences under the pre-assumptions mostly in slow growth of the economy, in share of increasing capital and at least to carry the growth of economy along with constant progress of technology.

In any economic growth maintenance procedure, the most responsible and main motivational hidden indicator is only the technology. While other indicators in the growth model of neo-classical was playing part in domain as outside or we can say that other important factors work under this model as external variables. This new scenario presented here mainly known as “endogenous growth model” in literature in year 1980 mid (Romer, 1986).

By human capital expansion, that the new idea provided by the growth model of endogenous capital, the law of diminishing scales of return not same as in other economies of East Asia. In briefly, above statement means that if the capital invested by any company it will be workers with high education, skills and good health but they were not work only for production process but also works in increasing technology and capital further on the basis of previous investment. This phenomenon called as "Hicks neutral". The production function changes and in return this furthermore reduced the investment.

In the growth of the economy the capital of human was playing the most important role, this concept approved by many studies. This concept was defined that the knowledge and skills in the productive wealth work as backbone. Likewise, attributes in individuals as personal, knowledge, well-being of economic & social, skills and expertise worked as backbone in features of individual labor (Healy & Côté, 2001). According to this human capital broad definition, in which limitized the education but preffers the experience of work, skills and trainings on jobs that were gain from members of family for the purpose of improving expertise through handover goals about educationof non-formal and job trainings, that further invested the wokers by a lot of skills experties and other economic activities. These activities improves workers for the sake of production use.

Malone and Edvinsson (1997) mentioned that capital of analytical depends on three main things likewise the capital of human, customer and structural. He briefly narrates the capital of human by individual skills, expertise, experiences from work jobs such as manager or employee of company and also by knowledge. Human capital on the basis of employee skills can be defined as component of intellectual capital and knowledge (Uliana, Macey, & Grant, 2005). Good health, supplemented factors, condition of work and education are the key features of human capital. Mostly more productive workers highly

qualified and workers having high skilled. These two features education and skills mainly improves the progress of technology for better and high production level (Kumar, 2006).

The development process of any economy was totally depend on the development of human and the development of human and furthermore this development of human totally based upon the capital development of human. So, the capital of human the significant impact we can't deny the role on the growth of economy. Probably here main focus of macroeconomic policies of all counties is to enhance the economic development by human development. Mahroum (2007) proposed that human capital management is related to three main abilities that are developing the talent, deploy the talent, and draw the talent from somewhere else. In growth of economic improvement the researchers suggests that capital of human investment is necessary.

Importance of the human capital importance is cleared by United Nations changed approach in comparative analysis in growth of economy in various economies under the whole world.

Capital of human not only contributes by education inefficient production of good and services, innovations, and advance industrial climate but also has some extra benefits such as a decline in crime ratio, less inequality, and understanding the rules and regulations of the state that are also contributing in the increase in economic growth (Rist, 2008).

On this problem there are lots of material is existed related to this topic. But by exploring literature, knows that the quality and scope were distracted or we can say that the previous work mostly concentrated on specific factors, size of sample and particular region. So, the previous results are not cleared. By exploring all situation of above mentioned it is cleared that there is no data collection properly on this issue. Also existence of this study was no longer. Therefore, here on this basis of gap this study is conducted on based of large scale data randomly on the growth of the economy and on the capital accumulation of human. So, here the main motivation is to re-examine between the growth of economy and capital of human relationship under the whole world along several developmental interventions which may help policymakers for making comprehensive economic growth policy.

After viewing this first part, the next parts of this paper depends upon following remaining topics. In second part briefly mention the review of literature. In third part explores the framework of whole study. The fourth part describes data sources and methodology and the results empirically. And fifth part describes the discussion of results and at last the final part discussed the recommendations on policy and the conclusion of whole study.

2. Review of Literature

For the growth of national economy the capital of human element is important (Mankiw et al., 1992; Schultz, 1961; Denison, 1962; Rebelo (1991); Romer, 1986; De la Fuente & Ciccone 2002 and Riley, 2014; Lucas, 1988 ;). Many studies described the human capital importance for the growth of economy but Mincer, (1958) explored the pioneer who introduces human capital in his study and after that, Schultz, (1961) also emphasized on this term that human capital is a key element for production function which is ignored by Solow, (1956). They concluded that economic growth will be enhances along the expansion in the investment of human capital. For future higher incomes, development and growth in

backhand in investment the capital of human that were more effectives and productive workforce. Good health, cost on social and high qualification was the key determinants of standard of living current. And these determinants also directly important for coming dream in future life standards (Kakar et al., 2011).

Human capital considered that it has a significant effect on the production by labor efficiency Mankiw et al., 1992); Rebelo (1991); Romer (1990); and develop competition among competitor by skilled labor, advance technology and innovation which carries to enhance the economic growth (Siggel, 2001; Pistorius, 2004 and Horwitz, 2005). Different researchers measured the human capital in different ways such as education expenditures, (Kakar et al., 2011; Chi, 2008; Rosés, 2010 and Prados de la Escosura), labor force and capital formation Mamuneas et al. (2006) and Haldar and Malik (2010).

For the last few decades, this is the most debated issue worldwide. Different studies described the inter-connection between the growth of economy and capital of human as empirically and theoretically. Rosenzweig (1990) studied that developed countries are more investing in human capital than developing countries, which creates a gap between their living standers. After that, for the growth of economic model the considerable struggle was carried by hypotheses practically within the period of long time. By some researchers hypothesis this effort has been stimulate (Solow, 1956; Lucas, 1988; Romer, 1988; Barro, 1991; Kyriacou, 1991). Mankiw et al., (1992) explored the growth model of Solow that whether it's reliable along the growth of economy changes or not. These researchers utilized human capital as a population enrolled in secondary education of 121 countries during 1960-1985 and found that for the growth of economy the main indicator is the capital of human, which is fully sported to endogenous growth theory. Bils and Klenow (2000) also examined the impacts on growth of economy of human capital and furthermore explored the significant and positive relationship between the growth of the economy and capital of human. This shows that the raising the capital of human, which was measured by the enrollment rate in school, and this furthermore increases in growth of the economy.

Seren et al., (2002) investigated the impacts of human capital on growth of the economy for Spanish regions between period from 1964-1999 and Abbas (2000, 2001) for cross country India and Pakistan in 2000, Pakistan and Sri Lanka in 2001. They concluded the economic growth capital of human has the significant and positive relationship, which means the growth of economy will be enhances along the expansion in capital of human.

Later on, different studies utilized for the capital of human by various proxies for analyzing the connection between the growth of economy and the capital of human i.e. Xiaoqing, (2005) used physical capital time series from 1972-2002 for china and finding shows the significant and positive impacts on the growth of the economy of the human capital. Mamuneas et al. (2006) measured human capital by capital stock, labor, change in technology, and productivity of 51 countries during 1971-1987 panel data and found some interesting results that were high and low-income countries get equal returns on the capital of human but returns privately on the capital of human were high. Moreover, in middle income countries private on capital of human returns were higher rather than the capital of humans return. Ciccone & De la Fuente and (2002) estimated the strive to solve

out the issues about trainings of vocational and technical and outcomes from education, along with the interchange in different levels of instruction within a bounding of a year and it's preferable than that (Lee & Barro, 1993).

Sequeira (2007) examined the effect in research and development of human capital using many measures from the period of 1970-2000 and validated the significant effect in research and development, the capital of human, which contributes productive in economic growth. Haldar and Malik (2010) analyzed the effect the capital of human stock and the capital physically on the GNP (gross national product) for India during 1960-2006 and confirmed the interconnection among the gross national product and the capital of human, but they fail to find the relationship between physical capital and gross national product.
Bottone et al. (2011) analyzed institution impact of productivity of workers as a proxy of human capital of eleven European economies from 1996-2006 and found significant impact on labor force and additional education which leads to high living standers. Ali et al. (2012) explores the impact of the capital of human development on Gross Domestic Product. In this study utilized the investment growth rate, enrollment on education, capital of physical and measures of health also as measure of human capital and finding shows positive impact of explanatory variables on GDP instead of investment growth rate that is not good for the growth of economy.
Asghar et al. (2012) analyzed the connection among GDP and the capital of human (health and education) for Pakistan during 1974-2009 data by using Johansen cointegration model and validated the relationship between them. Gitto et al. (2013) inspected the interlinkage among productivity of labor and advance technology for Italian regions during the period of 1980-2006 data and concluded that human capital leads to income growth and high income growth regions have advance technologies. Boccanfuso et al. (2013) examined impacts of the capital of human among growth of economy for the 22 economies of Africa during the 1970-2000-time period data and found the significant and positive impact of the capital of human on Gross Domestic Product growth of the economy empirically. Waheed and Qadri (2014) intended to examine by utilizing the stock capital, through expenditures on education and this was taken here as the capital of human proxy, and by the labor force the impacts of capital of human on the growth of economy. They used 1978-2007 time series data of Pakistan and found the growth of the economy and capital of human highly co-integrated significantly and positively affected the growth of economy by human capital.
Furthermore, some researchers failed in exploring interlinkages among the capital of human and the growth of the economy i.e. Mincer (1974) again estimated the log-linear connection among wage, income and qualification level and found negative results among them. Spiegel and Benhabib (1994) examined relationship among the education level and total output per capita with cross-country analysis but he fails to find the relationship between them. Kimko and Hanushek (2000) invented on the educational quality index based on thirty eight economies that was depends on the scienes and mathematic academies performances during the period of 1965-1992. This index was developed for the purpose of exploring relationship among educational level and the growth of economy but

all this struggle was wasted because he was failed in exploring the relationship among these.

Most of the researchers accepted that it depends on the individual capacity of humans to seek the abilities and education (Beach, 2009). For evaluation according to methods of new, derived the more accurate and clear tables on the expectancy life of the work (Millimet et al., 2010).

Therefore, the according the work of empirical and the theoretically by both, the interlinkages among the capital of human accumulation and growth of economy is not clear. There is still a need to explore the relationship between them to get better and efficient results that would be helpful for policymakers in developing comprehensive economic policy.

3. Data and methodology

3.1 Data Collection

For identify the human capital accumulation effect on economic output we used 180 countries panel data including developed, developing, and underdeveloped from 1981 to 2012. Economic output is defined by gross domestic product US$ 2000 (GDP US$2000), For human capital, we used the most appropriate proxies such as expenditure per student primary (% per capita of GDP), labor force, gross fixed capital formation (constant 2000 US$) and total trade (% of GDP). All the above mention variables data collected from the WDI (World Bank indicator, 2012).

3.2 Methodology

The main purpose of this is to examine the association among human capital accumulation and education and economic output. For this objective, we have obtained a panel data contained 180 countries cross-sections for the period of 1981-2012. Most of the researchers in existing litrature used different models like OLS regession analysis which may face differen problem such as omitted observations biases, endogeneity and weak instrument etc. So, in this study we have employed fixed effect and random effect approach to avoid such problems. Figure 3.1 shows the complete process for efficiently choose the most suitable model among use pooled OLS or random effects model fixed effects model for random sample of panel data (Dougherty, 2007). According to Dougherty model selection criteria, if the data is not random sample then we can only apply fixed effect model for obtaining efficient. On the other hand, the sample is random than we should employ both models, fixed effect and random effect, and decision would be on the bases on Hausman's test. If the Hausman's test shows significant coefficients then reject the null hypothesis, "difference in coefficients not systematic" and accept the alternate hypothesis and we shell choose fixed effect model. However, If the Hausman's test shows insignificant coefficients then accept the null hypothesis, "difference in coefficients not systematic" and reject the alternate hypothesis "difference in coefficients systematic" and we shell choose random effect model.

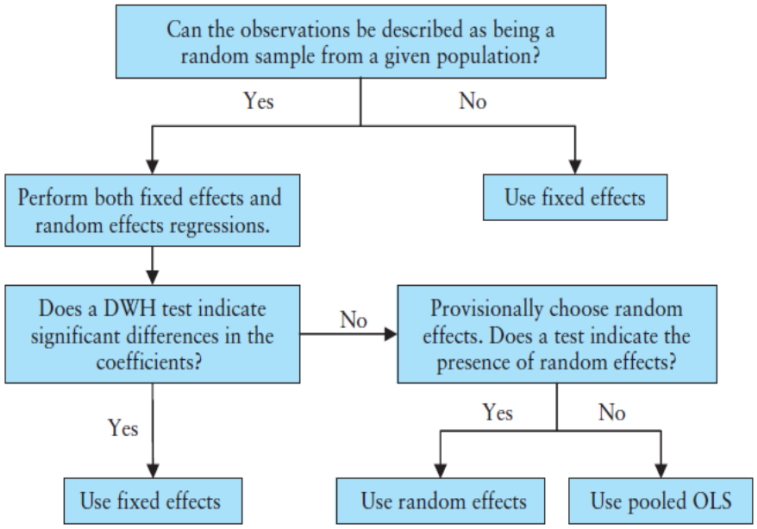

Fig.1: Model selection criteria for random sample

After the confirmation of Hausman's test, random effect model has been selected for analysis to examine the behavior of human capital accumulation and education on economic output. One more step to purify the selection is that we shell apply Breusch Pagan Lagrange multiplier test to clarify either we shell go for random effect model or pooled Ordinary Least Square (OLS) regression. If Breusch Pagan Lagrange multiplier test provide significant results than we shell reject null hypothesis "no random effects" and accept alternate hypothesis "random effects" and apply random effect model for analysis. However, if the result are opposite means insignificant from Breusch Pagan Lagrange multiplier test than we shell accept null hypothesis "no random effects" and reject alternate hypothesis "random effects" and select pooled Ordinary Least Square (OLS) regression for analysis.

According to the Dougherty, (2007) model selection critaria, this has ramdom sample data of 180 developed and developing countries for the period of 1980-2012. So, we have employed both random effect model and fixed effect model and then apply Hausman's specification test to get the differences between these two them and identification of most appropriate test for obtaining efficient results. The difference between these two test are; fixed effect model presnt constant coeffecients and the intercepts are varied in cross secssions in panel data, however, random effect model presnt variation in both coeffecients and intercepts of cross secssions in panel data. In this study fixed effect model and random effect model are as follow:

$$GDP_{it} = \alpha_0 + \beta_1 LAB_{it} + \beta_2 INV_{it} + \beta_3 EDU_{it} + \beta_4 TO_{it} + u_{it} \quad (1)$$

$$GDP_{it} = \alpha_0 + \beta_1 LAB_{it} + \beta_2 INV_{it} + \beta_3 EDU_{it} + \beta_4 TO_{it} + u_{it} + e_{it} \quad (2)$$

Where GDP_{it} presents the economic growth, LAB_{it} means total labor force, EDU_{it} shows total expenses in education and TO_{it} labels the trade openness total import and export.

Furthermore, e_{it} and u_{it} expressed an error between within-country and countries respectively. All the variables are converted into log as follow:

$$lnGDP_{it} = \alpha_0 + \beta_1 lnLAB_{it} + \beta_2 lnINV_{it} + \beta_3 lnEDU_{it} + \beta_4 lnTO_{it} + u_{it} \quad (3)$$

$$lnGDP_{it} = \alpha_0 + \beta_1 lnLAB_{it} + \beta_2 lnINV_{it} + \beta_3 lnEDU_{it} + \beta_4 lnTO_{it} + u_{it} + e_{it} \quad (4)$$

4. Empirical Analysis and results discussions

All the characteristics have been examined to identify the reliability of the data. After satisfied the parameters of data efficiency and reliability we have applied econometric tools to identify the effect of human capital on the economic output and investigate the association among variables. We have employed descriptive analysis and correlation matrix analysis of all factors as follow:

4.1 Results of Descriptive Analyses

The characteristics of the data have presented in Table-1. This table shows only key elements of the data characteristics in which include numbers of observations, mean value of the variables, standard errors, minimum values and maximum values. According to the statistics of Table-1, unbalanced panel data have been used in this study.

Table-1
Results of Descriptive Analyses

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP_{it}	5217	23.144	2.432	16.134	30.168
TO_{it}	4821	84.904	51.126	6.320	460.47
INV_{it}	3541	22.264	2.258	12.556	28.441
EDU_{it}	1825	15.149	8.225	0	67.666
LAB_{it}	3525	14.868	1.803	10.377	20.499

4.2 Results of Correlational Matrix Analyses

Correlational analyses only present the linear relationship between two factors without defining cause and effect. The main objective of these analyses are to define the nature of the relationship between factors. These analyses cannot define cause and effect relationship between factors, it only describes the change together at some constant rate. The results of correlational analyses are presented in Table-2.

The results present that correlation between economic output and labor force, economic output and investment and economic output and education expenditures are positive and significant. However, correlation between economic output and trade openness is negative and significant. Similarly, explanatory variables such as labor force and investment have positive and significant relationship but labor force have negative and significant correlation with trade openness and education. Furthermore, investment and trade openness have negative and significant correlation but investment and education have positive and significant correlation. Trade openness and education have negative and significant correlation.

Table-2
Results of the Correlation Matrix

	GDP	LAB	INV	TO	EDU
GDP	1				
	0.000				
LAB	0.716	1			
	0.000	0.000			
INV	0.984	0.6552	1		
	0.000	0.000	0.000		
TO	-0.141	-0.362	-0.1284	1	
	0.000	0.000	0.000	0.000	
EDU	0.145	-0.0539	0.1594	-0.0036	1
	0.000	0.000	0.000	0.000	0.000

Result of Fixed Effects Model Analyses:

After getting confirmation of data reliability we have applied fixed and random affect models to be following Dougherty, (2007). The results of fixed effect model are presented in Table-3. According to table-3, all the independent variables e.i. trade openness, investment, education expenditures and labor force have positive and significant effect on economic output. Furthermore, individual effects are also defined for policy making, such as if 1% increases in trade openness, investment and labor force then these will lead 0.0014%, 0.3466% and 0.788% to economic output at one percent significant level respectively. Similarly, 1% increase in education expenditure will rise 0.0031% in economic growth at five percent significant level. Conclusion is that if the government take these factor serious and increase their volumes then it will get raise in economic output significantly. Other some important statistical indicators that strengthen the authenticity of our results are presented in the end of the table-3. All these statistical values such R^2 and F-stat value support our results.

Result of Random Effects Model Analyses

After applied fixed effect model, according to Dougherty, (2007), if the data sample is random then we have to apply random effect model also. So, we have employed random effect model and its results are presented in Table-4. According to table-4, all the independent variables e.i. trade openness, investment, education expenditures and labor force have positive and significant effect on economic output in this model also. Moreover, individual effects are also defined such as if 1% increases in trade openness, investment and labor force then these will lead 0.0010%, 0.5333% and 0.4460% to economic output at one percent significant level respectively. Similarly, 1% increase in education expenditure will rise 0.0026% in economic growth at five percent significant level. Conclusion is that if the government take these factor serious and increase their volumes then it will get raise in economic output significantly. Other some important statistical indicators that strengthen the authenticity of our results are presented in the end of the table-4. All these statistical values such R^2 and F-stat supported our results.

Table-3
Results of Fixed Effects Model Analyses

Variable	Coef.	R. Std. Err.	t.stat	P.value
TO_{it}	0.0014	0.0004	3.7	0.000
INV_{it}	0.3466	0.0441	7.87	0.000
EDU_{it}	0.0031	0.0014	2.24	0.027
LAB_{it}	0.7883	0.0973	8.1	0.000
Constant	4.3844	1.1198	3.92	0.000

Overall R^2= 0.7617; Between R^2 = 0.7685; Within R^2= 0.8157
F test = 119.37(P-value=0.000)

Table-4
Results of Random Effects Model Analyses

Variable	Coef.	R. Std. Err.	T.stat	P.value
TO_{it}	0.00103	0.0003963	2.61	0.009
INV_{it}	0.53333	0.0408297	13.06	0.000
EDU_{it}	0.0026	0.0012192	2.13	0.033
LAB_{it}	0.44602	0.0591246	7.54	0.000
Constant	5.07339	0.5708109	8.89	0.000

Overall R^2= 0.9066; Between R^2 = 0.9103; Within R^2= 0.7825
F test = 119.37(P-value=0.000), Wald chi2 = 1058.58 P-value=0.000,

The result of Hausman's Test:
After analyzing the fixed effect and random effect models, we have applied Hausman's Test to select either random effect model is better or fixed effect model is better. According to the results of Hausman's Test we reject the null hypothesis and select fixed effect model as most appropriate results.

Table 5
Results of Hausman specification test

Variable	Fixed	Random	Diff.	S.E
TO_{it}	0.001437	0.0010349	0.0004018	.
INV_{it}	0.346666	0.5333343	-0.186668	.
EDU_{it}	0.003151	0.0025999	0.000551	.
LAB_{it}	0.788371	0.4460194	0.3423517	0.02355

5. Conclusion

The results found in this study are in accordance with literature that investigates the human capital and education effect on output of the economy. The objective of this study is attained satisfactorily, the researcher got a significant and positive relationship between investment and economic output. The results of the fixed effect model show that human capital has a significant and positive influence on economic output and random effects have also significant and positive relation with economic output. Furthermore, education has also significant and positive effect in both fixed and random effect. It shows that increase in human capital will rise the economic output of selected countries significantly.

The conclusion of this research is favorable for researchers, Governments, and policymakers for developing and comprehensive policies and take decisions about education expenditure to enhance the skills of the labor to get more output. The Government of these economies should enhance the international trade, invest in private and public educations, and investment in fixed capital to boost the output.

The researcher recommends that the governments and policymakers of these countries take serious actions and invest more and more in education. This study proved that this investment enhances the economic growth of these countries. They can raise the funds, provide all resources and infrastructure to the public. They should encourage merit, eliminate corrupt employees. All this can promote private as a public level of education, skilled labor force, and higher productivity. These practices can help them to grow in this world.

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