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Investment in Human Capital and Economic Growth in Pakistan: A Time Series Analysis for CPEC Project

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Abstract: The issue that is Pakistan labor market will be fulfill the demand for technical human skillof increasing investment activities in the country under CPEC project which is the main part of china "one belt one road" initiative project. Therefore this study conducted on the bases of time series analysis, aim to investigate empirically the impact of Human capital on economic growth of Pakistan from 1985 to 2016. This study used Labor force of Pakistan as a target independent variable While GDP are used as proxy variable for Economic growth of Pakistan. ADF unit root test, Johansen co-integration, and granger causality techniques were used for long run nexus between the variables while Error Correction Model (ECM) has been used to investigate short run nexus between the dependent and independent variables. The result of various techniques shows that Human capital has statistically significant impact on GDP. The investment in CPEC will required more skillful, technical and non-technical labor force therefore to conclude that human capital recently are more important for economic growth of Pakistan. The empirical result on other side shows that all the define variables in our model accelerate economic growth but labor force for economic growth of Pakistan in short run is more important contributing growth.

Keywords: Human capital, GDP, Labor force, CPEC
JEL Classification: D75

1. Introduction

China Pakistan Economic corridor is an important part of China OBOR project "one belt one road" initiative. The belt and road initiative is a regional development strategy of Chinese government, focuses to bridge china with rest of world especially developing economies; recently developing economies facing many problems like lack of infrastructure, railway and highways, manufacturing and heavy machinery plants etc. Therefore this initiative to overcome such kinds of issues are important contribution of Chinese governments in this regard. The OBOR project geographically situated under six corridors, among which CPEC is situated, where it on one side connects South Asia with west and central Asia but on other side it connects central Asia with Gulf countries. The investment activities under this project taking place rapidly and demand for several kinds of technical and non-technical jobs increasing in the country. While deficiency of Human capital are the long run issue of developing countries; closely related to OBOR project this issue seem serious. This study related to a single country Pakistan to address this issue in some aspect, that how it will affects the activities of this project in future; the study also aim to further give some valuable suggestions to take steps for the solution of this problem. An effective, efficient and suitable human asset of a country can play an important role in the economic growth of host country. Every country spending a large portion of their national income for the development of human efficiency to add more value to skill. Skillful and technical labor force attracting investors for new investment, creating new employment opportunities and increased productivity. An active labor force canbring advancement in standard living in labor measured by the per capita income, accelerating national income, and increases saving for the economic development of a country.

Pakistan is the 6th most populous developing country in the world which has one of the largest labor force economy in the world, where 63% of population consist of labor force. Labor force total in Pakistan was reported at 67918996 in 2016, according to the World Bank collection of development indicators, compiled from officially recognized sources.

A large portion of labor force engage in agricultural and industrial sectors. Pakistan exports much of its technical and non-technical labor to Middle East and Western Europe, whose contributes a huge amount of foreign exchange reserve for the economy. The human capital of Pakistan is considering a key injector for the economy in 21th century. Various developmental projects taking place in the country recently to take benefits from the cheap labor force of Pakistan. Pakistan has a high amount and mobile labor force that can respond quickly to changing business needs. But here a question arising that as these labor force will qualify the relevant demand of emerging and advance market which recently taking place in the country especially in china Pakistan Economic corridor CPEC. The reason and answer of this question have different aspects. International MNCs

required are different from country to country. Another reason of this question is related to knowhow of new global technology which absolutely different from traditional and developing countries technologies. Therefore this study as a supportive part of Human capital issue for economic growth of Pakistan to further investigate empirically the impact of human capital on economic growth of Pakistan. In short the objective of this paper:

(1) To find the Impact of human capital on Economic of Pakistan
(2) To find that is Technical human capital will fulfill the demand of CPEC
(3) To find that what measure should be taken to increases the proficiency of labor force

Further there are four parts of this paper, second part include relevant literature review on the issue, third part define econometric methodology and fourth part consist on results of econometric tests while last part concluding and recommended the paper.

2. Literature Review

A large number of study have been undertaken to examine the impact of growing labor force on economy of Pakistan. The issue of impact of labor force on economic growth attained an impressive attention of researcher, economist and population expert in few years. A group of Researcher found a great relationship between labor force and economic growth while other group giving less importance to relationship compare with variables.

Maitra (2016)Investigated that investment in human capital and employment contributed to economic growth in Singapore by using Johansen co-integration test for the time period of 1981 to 2010and fined long-run relationship among economic growth, Human capital investment and employed labor forced. Clark et al. (2010)recommended that the impact of demographic trends on the level of employment and economic growth in japan for the time period of 1969 to 1998 by using NUPRI Macro simulation Model and find that the economic impact of these demographic realities depends on employers, individuals, and government reactions to a declining population and the ultimate decline in the size of the economy. Robert resulted that labor will affect japan economy in near future.

Jeong et al. (2015)advocated that world is growing smaller with advanced technologies, finding required labor around the globe has become much easier than ever before. In the world where on one side skillful labor can find easily by some hospitality industries but on another side it creates problems of shortage in the host market for skilful labor. The main idea is the technical value added expenses which low or developing economies cannot afford it therefore shortage of advance human capital are still the problem of developing economies.

James et al. (2003) analyzed that the relationship between the rise of in formalization and the corresponding ascendancy of neoliberal policies in developing countries, focusing in particular on how decline in average per capita GDP growth associated with neoliberalism has fostered in formalization. For the faster economic growth an advanced labor force are so important contribution injector in developing economies. Siath (1989)indicates that labor force is an important contributor to national accelerating process. National income can increases by much more times with the help of efficient and skillful labor force. The migrant process and problems has been mentioned. The migrant can migrated from the developing economies problems like political, labor law and economical low wage problems are the main issues which can compel the labor for migration.

Rawski (2003) examined the level and trend of prosperity in the period before the Civil War has been of long-standing interest. Contemporaries were of course concerned about their economic status and its uncertainty, as well as the path that lay ahead. Because the period was crucial to the long-term development of the United States, many scholars have examined it, some hoping to uncover the determinants of the economic transformation, others wishing simply to better under- stand the country's past. The labor force of china has been increased during few decades and employment level goes up in current decade but the problem which facing the manufacturing department are the decline of job opportunities for which the people of rural areas migrated to cities and towns.

Jennifer et al ., (2002) recommended that the greatest single issue facing the economies of the Middle East and North Africa is the challenge of employing its people in good jobs. While the region is heterogeneous in terms of developments in the labor market, the majority of the region has been characterized by high levels of unemployment, and in some cases by declining real wages, as well. The problem of job creation for the MENA region is staggering. Louer (2008) Says that the main political consequences of migration has been the deepening of state society conflict. The responsible factors of low and migrated human capital in the current age are the weak policies of state for managing and controlling the unemployment rate in developing economies by providing a suitable employment opportunities market to utilize the skill for the economic development instead of migrating to abroad market from the hoist market.

Rahul et al.(2013) used panel data to investigate empirically the impact of female labor force on Indian economy and find that female labor force has no efficient effect on Indian economy. To further improve their education and skill level they can affect the growth level of India. The rapid growing economy of India for such type of participation of female labor force can bring changes in economic growth which are the need of not only of emerging market but important for the standard life of Indian women labor force. Several cross-

country and within-country studies suggest female labor force participation tends to decline initially with economic development, plateaus at a certain stage of development before rising again.

Abraham (2017) advocated that productivity has been declined marginally from the 2005 figures; education remains the important factor determining women's participation in the formal sector. A strikingly 91 percent of the FLFP are engaged in the informal sector of the Ghanaian economy, a sector with a very low contribution per head. The contribution of man not only are the discussion subject for growth sector but the share of female labor force are also important at the same level. Therefore contribution of female as well as male both are discuss in this study.

Erica et al. (2000) described that direct measure of labor force quality from international mathematics and science test scores are strongly related to growth. Indirect specification tests are generally consistent with a causal link. The relationship between quality of human capital and economic growth are strong and long run. The variation in quality of human capital are the main controversy of modern managerial expert to solve the problem accordingly. With the development of capital formation and investment from abroad can bring technical efficiency which increasing know how of the existing host country Human capital and hence the economy operating with full productive capacity.

Davidet al. (2007) is used the cross country panel data by applying abortion legislation as an instrument technique for fertility to investigate the effect of fertility on female labor Force participation in various countries and find that there are large negative effect of the fertility rate on female labor force participation. The direct effect is concentrated among those aged 20-39. Further David find that cohort participation is persistent over time giving an effect among older women. Therefore the present simulation model of the effect of fertility reduction on income per capita, taking into account these changes in female labor force participation as well as population numbers and age structure. Topel (2012) says that I have offered a selective survey of the economics of growth, with an obvious bias toward issues of interest to labor economists. The recent "growth of growth" as an area of economic research has been dominated by theory, and there has been little participation by labor economists. The questions raised by growth models are enormously important and ripe for applied analysis.(Siddiqui & Rehman, 2017)Indicate that economic growth is dependent mostly on skill education whereas tertiary and vocational education also important and can play same role in the development of economic growth. The basic difference between the east and south Asia economic growth are the expenditure on vocational and skill education. The development progress in growth of East Asia mostly depended on education progression.

VAN (2010)investigated that in developing countries like Pakistan with three sectors consumption goods, new technology, and education, the productivity of the consumption goods depends on new technology and skilled labor. The developing countries trying highly to expend their product market from import to export sectors. Therefore the country must import capital and invest in the training and education to advance the skill and knowledge of human inside the country.

Matthias et al. (2002) says that forced labor may enhance the endowment of unskilled labor. It can thus be expected to improve comparative advantage in unskilled-labor-intensive goods, that is, commodities where the impact of forced labor is likely to be felt most strongly. In contrast, foreign direct investment is negatively linked with forced labor. This result even holds for relatively poor developing countries. The above literature shed lights on various aspects of labor force. Some researcher shows positive impact and some indicate negative impacts of human capital on economic growth. The researcher applying various data and sample for different regions and nations. Among the above literature most of them are agree that economic growth highly connected with skillful and technical labor force of the host country. The above review of literature also highlights value added of both sex's male and female importance in economic development for different countries. These two sectors of the economy are necessary to promote the economic growth. This study conducted by modification of Maitra (2016) study. Maitra investigate empirically that how investment in human capital affected economic growth in Singapore and shows that investment in human capital changes economy of Singapore from low level to high level position and positive relation among the variables therefore I suggested to modify the relevant data and techniques to conduct same study for economy of Pakistan. On the best of my thinking this study is a first attempt for Pakistan economy in term of CPEC.

Hypothesis

H_{10}: The labor force of Pakistan is negatively associated with Economic growth of Pakistan.

H_{1A}: The labor force of Pakistan is positively associated with Economic growth of Pakistan.

H_{20}: The labor force of Pakistan has negative impact on China Pakistan economic corridor (CPEC)

H_{2A}: The labor force of Pakistan has positive impact on CPEC

3. Estimable Model, Data and Methodology

This study is used the time series data for the period time 1985 to 2016.Both National and International sources has been approached for data compilation. Using the data often include the possibility of obtaining spurious regression. However firstly to test if a time series is non–stationary this study will uses the Augmented Dickey-Fuller test, which examines the hypothesis that the variable in equation has a

unit root. If the series is found to have a unit root differencing the data is appropriate before performing the regression analysis, to avoid the problem of spurious regression arising from non-stationary in the time series.
Secondly, this study will involve testing of Co integration using the Johansen Maximum likelihood approach, to detect the existence of a long run relationship among the variables included in this study. For short run relationship, an error correction model (EMC) will be estimated (if there is a long run Co integrating relationship).

3.1 Data Collection:

Annual data for the sample period 1985-2016 are used. The data has been compiled from famous data bases which include both national and international institutions namely; Pakistan Bureau of Statistics (http://www.pbs.gov.pk), Economic Survey of Pakistan (www.finance.gov.pk/survey) ,Central Board of Revenue(www.fbr.gov.pk), Board of Investment Pakistan (http://boi.gov.p), World Bank (https://data.worldbank.org) World bank United Nations, National Accounts Statistics(http://unctadstat.unctad.org), for various years.

3.2 Methodology and Estimation

In order to analyze the impact of human capital on economic growth of Pakistan a linear regression model has been used. The model is designed by taking real GDP as dependent variable, while labor force (LF), FDI, Trade, real Interest rate (RI), terrorism (TEM)are taken as independent variables. The endogenous growth theory will serve as the theoretical Framework. Taking cue from the basics of this theory, a model will specified using real Gross domestic product as a function of, labor force, FDI, real interest, terrorism and Trade.

GDP=f (labor force, foreign direct investment, real interest, terrorism and trade)

The model can be stated in specified way as:

GDP = f (LF, FDI, RI, TEM, Trade)

Where:

GDP = Gross Domestic Production at Constant local currency
Trade = is export of goods and services
RI= real interest rate
FDI= foreign direct public investment inflow
LF = is current labor force of Pakistan
TEM= terrorism attacks

$$GDP_{it} = \alpha 0 + \alpha_1 LF_t + \alpha_2 FDI + \alpha_3 Trade + \alpha_4 RI + \alpha_5 TEM + U$$

The study will use time series data for the period 1985 to 2016. Using the time series usually include the possibility of obtaining spurious regression. However, firstly to test if a time series is non stationary therefore this study will used first ADF test, which to examine the hypothesis that the variables in equation has a unit root differencing the data is appropriate before performing the regression analysis to avoid the problem of spurious regression arising from non-stationary in the time series. Secondly this study involve testing of Co-integration using the Johansen Maximum likelihood approach to detect the existence of a long-run relationship among the variables define in the model. We also applied Granger Causality test that mutual interaction between the variables exist or not. For the short run relationship, an error correction model (ECM) is used which based on the difference form of variables and also include one lagged value of error correction term in the model. The long estimation should be analyzed through ADF unit root test, Integration, Granger Causality while short run estimation will evaluate through ECM. Annual data for the sample period 1995 to 2016 collected from Pakistan economic survey.

4. Result and Discussion

Results and discussion are based on the estimations of the model as mentioned in methodology; the analysis contains both short run and long run estimations. ADF, co-integration, and Granger Casualty test is used for the long run estimations while ECM will show the short run nexus between the variables. Here Table -1 estimates the ADF unit root test.

ADF unit root test

Table-1: ADF unit root test

variable	At level			At first difference				
	intercept	Intercept & trend	None	intercept	Intercept& trend	none	Result	Result
Trade	0.9393	0.6356	0.3104	0.0002	0.0005	0.0000	Stationary at 1st difference	
FDI	0.0966	0.0514	0.7238	0.0000	0.0000	0.0000	Stationary at 1st difference	
GDP	0.0764	0.2310	0.4209	0.0001	0.0009	0.0000	stationary at 1st difference	
LF	0.7052	0.4533	0.8496	0.0001	0.0014	0.0000	stationary at 1st difference	
RI	0.5962	0.5438	0.4900	0.0002	0.0015	0.0000	stationary at 1st difference	
TEM	0.6027	0.8553	0.3150	0.0015	0.0076	0.0001	stationary at 1st difference	

ADF unit root test shows in the table-1 which contains variables in the first columns, ADF estimation at level contains three sub columns which is intercept, intercept and trend, and non-columns. At first difference contains also

three sub columns same like a level which is intercept, intercept and trend, and none columns. Final columns consist on conclusion of the ADF test. The ADF estimations which includes all variables in the model are non-stationary at level but become all the mentioned variables in the model, stationary at first difference which is can qualify the basic condition of Johansen and Julius co-integration (J.J) approach. ADF unit root test is applied on all eight variables data series in order to examine stationary of the data. The results of unit root analysis are given in Table 1 which shows that all the series stationary at first difference. This analysis shows that no data series is stationary at level but stationary at first differenced; therefore, these variables may contain long run relationship among existing variables. Keeping this view, we apply Johansen co-integration approach to find long run relation. Table 1: Results of ADF unit root tests.

Co-integration

The upcoming table shows Co-integration result, but before to apply J.J technique we must need to find out the relevant lag Length table. Application of Johansen co-integration test, it is important to find the lag length of the VAR through some lag selection criteria in order to have parsimonious model. Numbers of lag selection criteria can taking independently in the mentioned result of lag length criteria. After ascertaining lag length, we apply Johansen co-integration test and the results of this test are given at Tables 2 and 3.

Table 2 shows the results of trace statistic whereas Table 3 presents the results of maximum Eigen statistics. Trace statistics and maximum Eigen statistics values help to find the rank(s) which shows the number of vector(s) containing long run relations. It is evident from Table 2 that the null hypothesis of no rank is rejected at 1 percent significant level. Moreover, the results of Table 3 reveal that null hypothesis of no rank was also rejected at 1 percent level of significance. Therefore, the results of both trace and max-Eigen statistics confirm that one co-integration vector exists in the model. It means long run relationship prevails among the variables. Table 2: Johansen co-integration test: results of trace stat value.

Table-2: Co-integration

Sample (adjusted): 1987 to 2016					
Included observations: 30 after adjustments					
Trend assumption: Linear deterministic trend					
Series: GDP FDI Trade LF RI TEM					
Lags interval (in first differences): 1 to 1					
Unrestricted Co integration Rank Test (Trace)					
Hypothesis		Trace	0.05		
No of CE(s)	Eigen value	Statistic	Critical value	Prob.**	
None*	0.7537	116.6147	95.7536	0.0009	
At most 1*	0.6516	74.5772	69.8180	0.0198	
At most 2*	0.5066	42.9391	47.8561	0.0335	
At most 3*	0.3952	21.7431	29.7970	0.0045	
At most 4*	0.2526	9.2823	15.4947	0.0009	
At most 5*	0.1587	3.4568	3.8415	0.0530	
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level					
* denotes rejection of the hypothesis at the 0.05 level					
**MacKinnon-Haug-Michelis (1999) p-values					
unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
Hypothesized		Max-Eigen	0.05		
No of CE(s)	Eigen value	statistics	critical value	Prob.**	
None	0.7537	42.0375	40.0776	0.0297	
At most 1*	0.6517	31.6380	33.8769	0.0508	
At most 2*	0.5067	21.1961	27.5843	0.0021	
At most 3*	0.3953	15.0895	21.1316	0.0334	

At most 4*	0.1981	6.6212	14.2646	0.0257	
At most 5*	0.0011	0.0323	3.8415	0.0630	
Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level					
* denotes rejection of the hypothesis at the 0.05 level					
**MacKinnon-Haug-Michelis (1999) p-values					

The above table shows co-integration estimations: it contains two sub-tables one trace statistics and other maximal Eigen-value statistics. Both of these statistics are estimated through maximal likelihood method; these statistics are tested against their relevant critical values; the co-integration shows existence of five co-integrating vectors maximal Eigen values and trace statistics. This indicates that all variables have long run relationship and determine each other.

Granger Causality Tests

Tale-4: Granger Causality Tests

Sample: 1985 to 2016			
Lags: 11			
Null Hypothesis:	Obs	F-Stat.	Prob.
Trade does not Granger Cause GDP	31	0.6014	0.0446
FDI does not Granger Cause GDP	31	0.7406	0.0468
LF does not Granger Cause GDP	31	0.7413	0.3966
RI does not Granger Cause GDP	31	3.0225	0.0931
TEM does not Granger Cause GDP	31	2.3319	0.1380

Granger causality results shows bivariate causality between GDP and other variables. It implies that Trade, Foreign direct investment (FDI), Labor force (LF), Real interest (RI) and Terrorism (TEM) causes GDP of Pakistan. Here our target variable labor force (LF) also shows relevant changes in Pakistan GDP. The relevant cause shows that as human capital of Pakistan increases it affects GDP at higher level. Compare with other variables except Terrorism which affecting GDP inversely. The production of GDP also need higher human capital that causes the economic growth and production.

Causal linkage between gross domestic product (GDP) and Labor force (LF) is estimated. As already explained, all the variables are integrated at first order and lags length of the variables is one as per different lag length selection criteria. The results of the causality are presented in Table 4 which shows that labor force (LF) causes gross domestic product in Pakistan because the null hypothesis is reject at 5 percent significant level. Reverse causality from gross domestic product to labor force also exists and the null hypothesis of this case is also rejected at 5 percent level of significance. It means that both gross domestic product and labor force cause each other in Pakistan.

This analysis reveals that there is unidirectional causality from labor force to economic growth for Pakistan. In addition to that, there is unidirectional causality from economic growth to labor force because null hypothesis of this case is also rejected at 10 percent significant level. To conclude, this study found bidirectional causal association between gross domestic product and labor force whereas labor force causes economic growth and economic growth causes Export in Pakistan.

Table-5: ECM result

Dependent Variable: DGDP				
Method: Least Squares				
Sample (adjusted): 1987-2016				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	0.0015	0.08131	0.0193	0.0000
FDI	0.0125	0.0201	0.6223	0.0231
Trade	2.7131	36.2877	0.0747	0.0415
LF	1.0042	36.3521	0.0866	0.0034
RI	2.6411	0.5677	0.1871	0.0401
TEM	0.4510	0.3218	0.1760	0.7610

R-squared	0.3304	Mean depend ent var	0.0749
Adjusted R squared	0.2140	S.D. depende nt var	0.7586
S.E. of regression	0.8989	Akaike info c riterion	2.8940
Sum squared resid	10.5060	Schwarz crite rion	3.2426
Log likelihood	-21.9400	Hannan-Quin n criter	2.9621
F-statistic	11. 4137	Durbin-Watso n stat	2.0180
Prob (F-statistic)	0.04811		

5. Conclusion and Recommendations

The issue that is Pakistan labor market will be fulfill the demand for technical human skill of increasing investment activities in the country under CPEC project which is the main part of china "one belt one road" initiative project. The issue that as Pakistan labor market will be fulfill the demand for technical and non-technical human skill and for increasing investment activities in the country. Therefore this study aim is to find empirically the impact of Human capital on economic growth of Pakistan for time period of 1995 to 2016. The study used Labor force of Pakistan as a target independent variable While GDP were used as proxy variable for Economic growth. ADF unit root test, Johnson and joules co-integration, and granger causality techniques are used for long run to find the existing nexus between the variables in define model while Error Correction Model (ECM) has been used to find short run linkages between the dependent and independent variables.

The result of various techniques shows that Human capital statistically significant impact on GDP. Every define variable in the model shows positive impact on GDP except terrorism which has inverse link with GDP. Therefore to conclude that human capital recently are more important for Pakistan economic growth than other variables for support to fulfill the demand of labor in the market. Investment in CPEC will required more skillful, technical and non-technical labor. The empirical result also shows that all the variables boosting up economic growth but labor force for economic growth of Pakistan has comparatively great importance in short run.

We therefore recommend these policies to bring in notice of government to increase value added of the human capital by providing technical skill to fulfil the demand of emerging social CPEC labor market in short run as well as long run. Another thing which important considering important matter are the advancement of Skill, knowledge and attitudes of human capital. An investment environment will be favorable for foreign investors if ensure sustained provision of human capital. It is also recommended that policies be put in place to communicate with international labor market to seek something new globally. The opening of different skill and languages center for market demand of human capital are also the need of recent emerging market.

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