Narratives of Human Capital for Sustainable Economic Growth: Empirical Evidence from Pakistan

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ABSTRACT

This study endeavors to estimate the association between human capital formation on the economic development of Pakistan. The human capital was further divided into two components; i.e. health and education. The study utilized the annual time series data for 1974-2019 and utilized ADF (Augmented Dickey-Fuller) to test for unit root. The study employs the ARDL (autoregressive and distributed lag) technique to find the short-run and long-run relation between human capital and economic growth. The study concluded population growth has a direct and significant impact on economic growth. The human capital index, health index, and education index has also a direct and significant impact on the economic development of Pakistan. It implies that an increase in human capital, health, and education enrollment cause to increase in economic growth.current research established an affiliation of economic growth with human capital on the aggregated and disaggregated level.

Keywords: Population Growth, Inflation, Human Capital, Education, Pakistan.

Introduction

Human capital is an intangible capital which is dominated by individuals and group of peoples. It has many indicators such as school enrollment, health, and life expectancy which are collectively called human capital (Kazmi, Ali and Ali 2017). Human capital is a stock of skills that a worker acquires. These skills are useful when the return is higher than the cost (Goldin, 2014). The investment in human capital is the most beneficial long-term investment that a country makes for the future welfare of its peoples. Human capital formation is the investment in health, schooling, and on the job training programs to improve the health, education, knowledge, skills, training, and capabilities of human beings. So, productive expenditures on human beings are named human capital formation (Bansak and Chezum 2009).Human capital is associated with any set of knowledge or characteristics the worker has, that is devoted to his/her productivity (Acemoglu, Gallego, and Robinson 2014). The knowledge, health, education, skills, training, and capabilities of the population are called human capital, in short, the skills and capabilities of the human beings are called human capital. "the process of increasing the number of persons who have skills, education and experience which are critical for the economic and political development of a country" (Harbison and Myers 1964).

Human capital formation is also known as 'Investment in Man'. An effort to measure the rate of returns to males and females by investing in different education levels (Becker, 1993). Human capital can be described as the measure of skills, capabilities, education, and

characteristics of labor that affect their productive capacity and earning power (Parks et al. 2011).During the first half of the twentieth century, human capital was depreciated at the cost of physical capital accumulation. Theories of the time concentrate on the physical capital as the key engine of the progress of an economy. During the 1960s, interest in the improvement of human capital began to surface. Schultz (1961) identified human capital with investment in education, he argues that investment in education could increase the per capita income in the United States. Becker and Chiswick (1999) argued that different expenditures on human capital and the corresponding rates of return determine in large part the distribution of earnings. The concept of human development was developed by Mahbub ul Haqq (1995) arguing that current measures of human development are not suitable for improving human lives.

Literature Review

Yurtkuran and Terzi (2015) examine the causality between schooling and economic growth in Turkey. They were using an annual record from the period 1950-2012. They utilized the Granger causality approach for estimation. To peruse the stationarity they used the ADF test. The variables that are utilized in their analysis were the number of students finishing the general, high school, vocational high school, and university. They were found a powerful and positive connection between the variables. Vocational and general high school play a substantial character in the economic growth of Turkey, while there is no causality running from university to GDP but they inquired about causality running from GDP to university.Bouchie (2016) empirically investigate the health and economic growth in Ghana by using annual records ranging from 1982-2012. The author was taking GDP as explained variable and life expectancy at birth as the explanatory variable. ARDL (autoregressive distributive lag) and co-integration test were used to calculate the effect of health on economic growth. Outcomes show good health significantly stimulates economic growth. He suggested that the government of Ghana should raise investment in the health sector to recover the health condition of the people.

Jiang, et al. (2016) explored the character of human capital for economic progress in Turkey utilizing yearly statistics from 1961-2011. To overcome the problem of structural breaks they were using Lagrange multipliers (LM). The affiliation between human capital and Turkey's economic progress was analyzed with a cointegration and causality approach. Research explores a dual causality link between human capital and economic growth. They were utilizing GDP as explained variable and human capital as an explanatory variable. They found GDP and human capital interrelated for the long term. Olson (2013) evaluated the affiliation of human capital development and economic progress in Nigeria. The yearly data ranging from 1977-2011 had been used. They employed the OLS approach for estimation. The result showed that public expenditures had an effect on schooling and health, primary school enrollment and life expectancy significantly interconnected to economic growth in Nigeria. They argued positive causality among the standard of living of the human capital development.Qadri & Waheed (2014) analyzed the human capital and economic progress of low, middle, and high-income countries (cross countries). They used data from 106 nations for the period 2002-2008. They concluded the rate of returns on human capital is greater in the low-income nations as compared to the long-term returns of human capital throughout the domain. They concluded expenditures on human capital are essential for middle and lowincome countries.

Mehrara & Musai (2013) examined the causal link of economic growth and human capital in developing nations utilizing yearly data during 1970-2010. To check the stationarity of the data they were using the Liven-Lin test and ADF unit rot test. They were using only three variables that were human capital, GDP, and investment. They utilized the panel co-

integration technique and GC (Granger Causality) model. They found a long-term affiliation among human capital, GDP, and investment. There was strong causality running from GDP and investment to human capital.Zivengwa *et al.* (2013) interpreted the causal association of schooling and economic development in Zimbabwe by utilizing yearly records from 1980-2008. They have utilized the pair-wise Granger causality and VAR (vector autoregression) model. To examine the stationary of data they were utilizing the ADF test. They found oneway causality between schooling and economic growth in Zimbabwe.Wu, X *et al.* (2016) explored the association between human capital development and economic progress in South Africa by utilizing the annual record of 1980-2011. To found the association among variables Johansen co-integration and the OLS approach were used. Granger causality was adopted to find the causal connection between HDI (human development index) and economic growth. The findings employed a direct and substantial impact on human capital development and economic progress for a long duration. While in the short term human development index, government spending on health, government spending on schooling, and openness have a constructive impact on GDP while investment hurts GDP.

Shapiro (2006) inspects the outcome of schooling, human capital, and economic growth utilizing data for 55 states and areas. They construct panel data ranging from 1960-2009. To check the stationarity, they were utilizing Levin,Lin, and chu test, I'm,Pesaran, and shin test. They found that primary and secondary education did not affect economic progress while advanced education had a constructive significant impact on economic growth and investigation also found life expectancy and per capita GDP growth had an optimistic correlation.Jamil*et al.* (2016) determined the impact of expenditure in human capital on the export of goods and services for Asian countries utilizing panel data ranging from 2000-2012. To inspect the stationarity of data they were using the cross section dependence (CD) test. They were using the panel EGLS (estimated Generalized Least Square) technique for estimation. They found that human capital is directly associated with the export of goods and services.

Human Capital - Concepts and Measurement

The concept of human capital as indicated in the early 1960s, while Schultz (1961) suggested that human capital contained skills, knowledge, and capabilities of people employed in an organization. Later Becker explains human capital is the "knowledge, information, ideas, and the health of individuals". Becker adds another element in the form of 'health of individual'. Education and training play an important role in both firm and employee performances. Becker proposed that employee training at both a specific and general level booststhe individual level of productivity (Technical Report CIPD, May2017). Human capital is divided into two categories: 1) general human capital, 2) specific human capital. The first one is explained as the general skills and knowledge that an individual has. This can be easily transferred into any firm or industry. While specific human capital is explained as specific skills and knowledge that an individual gains for a specific firm or industry. It cannot transfer from one firm to another (Kwon, 2009).

The human capital approach is used for health, skill enhancement, education, and other capabilities of people that can develop their productivity and effectiveness (Todaro, 2002). Human capital indicates that investment that is made by people for themselves increases their economic productivity (Olaniyan and Okemakinde (2008). The action that affects future income by expanding the resources in individuals is known as an investment in human capital. Such type of investment covers schooling, health care, on-the-job training, migration, and observing the facts about economic activities. All that type of investment boosts knowledge, skills, or health and raises productivity. Education and training are a very essential investments in human capital. (Nafukho, Hairston, and Brooks 2004). Human

capital will be appreciated in the market because it raises the profit of the firms (Acemoglu, 2010). Human capital is the investment in people in the form of education, training, and health that raises their productivity. When the returns of that investment are higher than the cost then the flow of these skills is repeated (Goldin, 2014).

For the measurement of human capital following approaches are used. First, the cost-based approach, second the Income-based approach, and third is the Output-based approach. In the cost-based approach, the human capital can be measure with the help of the cost of production. This approach is also used in measuring the expenditures on adult training, health, safety, and mobility. It is also known as a backward-looking approach because it focuses on past investments. The Income-based approach can measure human capital by adding all the future income flow that all individuals expect to receive during their whole workinglife. This approach isknown as a forward-looking approach because this approach tells about future earnings. The output-based approach measures human capital by output. Several indicators serve as stock of human capital. They may be literacy rate, average years of schooling and enrollment rate, etc. (Apiroam, 2015)

Data and Methodology

Data and methodological problems have tremendous attention in economic analysis. This section is associated with data and methodology which explain the association among economic growth and human capital formation of Pakistan for the period 1974-2019.

Theoretical Methodology

Several techniques are utilizing for finding the long-run connection among the variables e.g. Engle-Granger (1787), and Johansen Juselius (1990). However, Pesaran and Shin (1990) develop a methodology that is further proceeding by Pesaran et al. (2001). This approach is known as autoregressive and distributed lag (ARDL). The ARDL approach is simpler than the other co-integration approach, applicable for a small sample size (Chani, Hassan, Shahid, 2012).

Pesaran *et al.* (2001) present the ARDL approach as an unbiased and efficient one and it determines short-term and long-term results in one equation. (Kamaran, 2017). Before estimating a time series model it is essential to analyze the short-run and long-run relationship among variables. There are different types of techniques to find the cointegration among variables(Samar and Waqas, 2014). This co-integration approach is useful when variables show different order of integration i.e. [I(0), I(1)].

Empirical Models

The detail of the empirical models of the study is as follows. The researcher has formulated three empirical models in which the disaggregated, as well as the aggregated impact of human capital, is analyzed for economic growth.

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a) General models
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 $\begin{array}{ll} Model \ 1: & GDPGR_t = f(ELF, INVG, INF, HCI, PG) \\ Model \ 2: & GDPGR_t = f(ELF, INVG, INF, EI, PR, PHCR) \\ Model \ 3: & GDPGR_t = f(ELF, INVG, INF, HI, PHCR) \\ \end{array} \\ \begin{array}{ll} b) \ ARDL \ Model \\ \hline ARDL \ equations \ of \ short-run \\ Model \ 1: & \Delta GDPGR_t = \sum_{i=1}^p \omega_{1i} \Delta ELF_{t-1} + \sum_{i=1}^p \omega_{2i} \Delta INVG_{t-1} + \sum_{i=1}^p \omega_{3i} \Delta INF_{t-1} + \\ \sum_{i=1}^p \omega_{4i} \Delta HCI_{t-1} + \sum_{i=1}^p \omega_{5i} \Delta PG_{t-1} + \sum_{i=1}^p \omega_{6i} \Delta GDPG_{t-1} + \mu_{1t} \end{array}$

Model 2:

 $\Delta GDPGR_t = \gamma_0 \sum_{i=1}^p \omega_{1i} \Delta ELF_{t-1} + \sum_{i=1}^p \omega_{1i} \Delta ELF_{t-1} + \sum_{i=1}^p \omega_{2i} \Delta INVG_{t-1} + \sum_{i=1}^p \omega_{3i} \Delta INF_{t-1} + \sum_{i=1}^p \omega_{4i} \Delta HI_{t-1} + \sum_{i=1}^p \omega_{5i} \Delta PHCR_{t-1} + \mu_{1t}$ Model 3: $\Delta GDPGR_t = \gamma_0 + \sum_{i=1}^p \omega_{1i} \Delta ELF_{t-1} + \sum_{i=1}^p \omega_{2i} \Delta INVG_{t-1} + \sum_{i=1}^p \omega_{3i} \Delta INF_{t-1} + \sum_{i=1}^p$ $\sum_{i=1}^{p} \omega_{4i} \Delta EI_{t-1} + \sum_{i=1}^{p} \omega_{5i} \Delta PR_{t-1} + \sum_{i=1}^{p} \omega_{6i} \Delta PHCR_{t-1} + \mu_{1t}$ **ARDL** equations for the long run Model 1: $GDPGR_t = \gamma_0 + \sum_{i=1}^t \phi_{1i} \Delta ELF_{t-1} + \sum_{i=1}^t \phi_{2i} \Delta INVG_{t-1} + \sum_{i=1}^t \phi_{3i} \Delta INF_{t-1} + \sum_{i=1}^t \phi_$ $\sum_{i=1}^{t} \phi_{4i} \Delta HCI_{t-1} + \sum_{i=1}^{t} \phi_{5i} \Delta PG_{t-1} + \mu_{2t}$ Model 2: $GDPGR_{t} = \gamma_{0} + \sum_{i=1}^{t} \phi_{1i} \Delta ELF_{t-1} + \sum_{i=1}^{t} \phi_{2i} \Delta INVG_{t-1} + \sum_{i=1}^{t} \phi_{3i} \Delta INF_{t-1} + \sum_{i=1}^{t$ $\sum_{i=1}^{t} \phi_{4i} \Delta H I_{t-1} + \sum_{i=1}^{t} \phi_{5i} \Delta P H C R_{t-1} + \mu_{2t}$ Model 3: $GDPGR_{t} = \gamma_{0} + \sum_{i=1}^{t} \phi_{1i} \Delta ELF_{t-1} + \sum_{i=1}^{t} \phi_{2i} \Delta INVG_{t-1} + \sum_{i=1}^{t} \phi_{3i} \Delta INF_{t-1} + \sum_{i=1}^{t$ $\sum_{i=1}^{t} \phi_{4i} \Delta EI_{t-1} + \sum_{i=1}^{t} \phi_{5i} \Delta PR_{t-1} + \sum_{i=1}^{t} \phi_{6i} \Delta PHCR_{t-1} + \mu_{2t}$ Where, GDPGR = GDP growth rate PG = Population growth*INF* = *Inflation* INVG = Investment growth $HCI = Human \ capital \ index$ $ELF = Employed \ labor \ force$ HI = Health indexP.H.C.R = Poverty head count ratio*PR* = *Personal remittances*

Empirical Analysis

This analysis covers all the empirical details of the model. All three models are estimated here along with the unit root and the descriptive analysis of the data.

variables	Description	Mean	Median	Std – Dev
GDP growth	The growth rate of all ultimate production during one year	4.93	4.85	2.07
Population growth	Population growth is an increase in the size of a population over a specific period.	2.58	2.48	0.50
Inflation	A continuous expansion in the accepted prices of all the goods and services in a nation during a particular period.	9.10	9.75	3.67
Investment growth	Investment growth is an increase in the investment of the economy whether it is government investment and population investment.	16.24	12.80	12.14
Human capital index	The combination of primary, secondary, tertiary enrollment rates, total fertility rates, and government expenditures on health.	0.00	-0.62	1.01
Employee labor force	The number of individuals who are employed is known as the employed labor force.	32.17	30.93	8.84
Education index	Combination of primary, secondary, and tertiary enrollment rates.	92.26	82.95	67.13
Poverty head	The total number of people who survive below the	24.97	23.48	4.00

Table 1: Descriptive Statistics

count ratio	poverty line.			
Personal remittances	The transfer of earnings earned by foreign migrants in their home country.	93305 52.00	2000000 .00	2143 2273. 00

Table1 illustrates the descriptive statistics. Here, five columns illustrate the list of variables in column 1, in next column 2 shows the description of variables while the third, fourth and fifth column shows the mean, median, and standard deviation respectively. The GDP growth has a mean of 4.9309, median 4.8465 and standard deviation is 2.0666. The mean and median of the population growth is 2.5756 and 2.4846 respectively with a standard deviation of 0.5047. Inflation has a mean of 9.1035 with a median of 9.7500 and a standard deviation of 3.6662. The mean median and standard deviation of investment growth are 16.2421, 12.8000, and 12.1373 respectively. The human capital index has a mean of 3.91E-16, the median is - 0.6199 and the standard deviation is 1.0073. The employed labor force has 32.1710 mean, 30.9300 median, and 8.8364 standard deviations. The mean, median, and standard deviation of the education index are 92.2569, 82.9496, and 67.1334 respectively. The poverty headcount ratio has a mean of 24.9655, the median is 23.4772 and the standard deviation is 3.9962. The mean and median of personal remittances is 9330552, 200000 with a standard deviation of 21432273.

Unit root analysis

Unit root test is generally held to observe the stationary of the data set. It is essential before the estimation of the data. ADF (Augmented-Ducky-Fuller) and PP (Phillips-Parron) test of stationery utilized for unit root that is defined when the mean and variance of series are constant over time (Danancica, 2011). The characteristic of a process in which the statistical parameters are constant is known as stationary (Aluko & Oluseyi, 2015; Kamaran, 2017).

Table2: ADF (Augmented Dickey-Fuller) Unit Root Test					
Variables		ADF			
	Intercept	Trend &Intercept	none		
	-4.1032				
GDP (dl level)	(0.0026)				
DC(at first difference)		-5.6045			
PG(al first alf ference)		(0.0005)			
INE(at long)	-3.1994				
INF (di level)	(0.0280)				
AINUC (at finat difference as)	-5.9962				
$\Delta I N V G (u j i r si u i j j e r e n c e)$	(0.0000)				
AUCI (at finat difformance)	-1.7660	-1.6639	-1.3757		
AHCI (al first alf ference)	(0.3908)	(0.7465)	(0.1539)		
AFIF (at fixet difference)	-5.8661				
$\Delta ELF(uijirsiuijjerence)$	(0.0000)				
AUI(at finat difference)	-2.0936	-2.2429	0.9828		
	(0.2484)	(0.4517)	(0.9102)		
ADUCD(at fixed difference as)	-3.5600				
$\Delta PHCR(al jirst alj jerence)$	(0.0118)				
ADD(at finat difform as)	-5.4232				
$\Delta PR(uijirsiuijjerence)$	(0.0001)				
AEL (at finat difference)	-5.2191				
$\Delta E I \left(a i j i r s i a i j j e r e n c e \right)$	(0.0001)				

Table?: ADF (Augmented Dickey-Fuller) Unit Root Test

Source: Authors' Estimation.

Table 2 illustrates that the variables included in the study are not stationary. Yet different variables are showing the no unit root. So, the variables are mixed in integrating order

		Table 3: Co	-integration	Analysis		
	Мос	lel 1	Mo	del 2	Мос	del 3
	F – Statistic	c = 11.9415	F – Statisti	c = 12.8979	F – Statisti	c = 9.5794
Significance	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
10%	2.26	3.35	2.26	3.35	2.26	3.35
5%	2.62	3.79	2.62	3.79	2.62	3.79
2.5%	2.96	4.18	2.96	4.18	2.96	4.18
1%	3.41	4.68	3.41	4.68	3.41	4.68

Table 3 demonstrates the bond test results of Models 1, 2, and 3. The level of significance was checked at 10%, 5%, 2.5%, and 1%. The estimated value of the F-stat for the first model is 11.9415, for the 2^{nd} Modelis 12.8979 and for the 3^{rd} model is 9.5794 that is greater than the critical values of the upper bound for all of the three models. So, the researcherfound a long-run association among the variables of the models respectively.

Table 4: Short Run Results					
Variables	Model 1	Model 2	Model 3		
	6.6309				
D (PG)	(2.8639)	-	-		
	[0.0103]				
	-0.0121	-0.0924	0.1047		
D(INF)	(-0.1313)	(-1.0307)	(0.9191)		
	[0.8970]	[0.3139]	[0.3762]		
	0.2339	0.3292	0.2415		
D(INF(-1))	(2.3697)	(2.8943)	(1.6769)		
	[0.0292]	[0.0084]	[0.1194]		
	0.0075	0.1156	0.0288		
D(INVG)	(0.1637)	(2.7987)	(0.4287)		
	[0.8718]	[0.0105]	[0.6757]		
	-0.0746		-0.1022		
D(INVG(-1))	(-1.7423)	-	(-1.2442)		
	[0.0985]		[0.2372]		
	15.3174				
D(HCI)	(0.5308)	-	-		
	[0.6020]				
	-34.1284				
D(HCI(-1))	(-1.1294)	-	-		
	[0.2735]				
	-0.7475	0.2465	0.4347		
D(ELF)	(-2.7104)	(1.6716)	(0.5994)		
	[0.0143]	[0.1088]	[0.5601]		
			-0.8751		
D(ELF(-1))	-	-	(-1.7404)		
			[0.1073]		
		-0.0770			
D(HI)	-	(-2.8863)	-		
		[0.0086]			
		0.0428	-0.0034		
D(P.H.C.R)	-	(0.6057)	(-0.0147)		
		[0.5509]	[0.9885]		
			-0.2177		
D(PCR(-1))	-	-	(-1.0592)		
			[0.3104]		
			0.0000		
D(PR)	-	-	(1.5404)		
			[0.1494]		
			-0.0000		
<i>D</i> (<i>F</i> N (-1))	-	-	(-1.1177)		

			[0.2856]
			-0.2184
D(EI)	-	-	(-1.7111)
			[0.1128]
			0.2108
D(EI(-1))	-	-	(2.1116)
			[0.0564]

Table 4 illustrates the ARDL short-run results. Model 1 indicates that population development has a direct and significant effect on GDP growth. The result illustrates that a one-unit increase in population development brings 6.6309 units to change in GDP development in the shortrun with a probability of 0.0103. Ali and Ali (2013) found a positive effect on population development and economic growth. Inflation has a negative and insignificant impact. Afzal et al (2010) also indicated an inverse effect of inflation on economic growth. Ali et al. (2012) conclude an adverse impact of investment on economic growth. The employed labor force has an inverse but significant effect on GDP development in Model 1. That is one unit rise in employed labor force brings 0.7475 unit decline in GDP development with probability 0.0143 that shows it is significant at 5% level. Fakhar et al. (2013) showed a negative relation between the employed labor force and economic growth.

Model 2 indicates that for the short period inflation has an inverse but significant impact on GDP development for the current period. It shows that a one-unit rise in inflation will lead to a 0.0924 unit decline in GDP development with the probability of 0.3139. Awan and Kamran, (2017) also estimated an inverse and significant impact of inflation. In the short run, investment development has a direct effect on GDP growth. The coefficient of investment development for Model 2 is 0.1156. The positive effect of investment development on GDP is also indicated by Swaby (2007). The employed labor force has a direct and insignificant effect on GDP. The effect of poverty headcount ratio on GDP development has positive but insignificant in the short run. Afzal et al. (2010) also found an insignificant impact of poverty on economic growth.

In Model 3 for the short time, the current values of inflation have an insignificant impact on economic growth. This result is supported by Saeed and Awaan, (2017). Hashmi and Akram, (2012) derived a direct effect of investment growth. For the short period, current values of the employed labor force demonstrate a direct but insignificant effect on GDP growth. There is a direct effect of the employed labor force on development (Chaudhary et al. 2009). The poverty headcount ratio has a negative and insignificant effect in the short run. Afzal et al. (2010) indicated a negative relation between poverty head-countratio and economic growth. The effect of personal remittances and GDP is insignificant. Saeed et al. (2017) and Afzal et al. (2010) conclude a direct association between education and economic growth.

Table 5: Long-Run Analysis						
Variables	Model 1	Model 2	Model 3			
	3.3686					
PG	(3.6669)	-	-			
	[0.0018]					
	-0.0737	-0.1590	-0.0423			
INF	(-1.3196)	(-2.0941)	(-0.3456)			
	[0.2035]	[0.0480]	[0.7357]			
	0.1129	0.1491	0.1646			
INVG	(3.8739)	(4.7422)	(2.5026)			
	[0.0011]	[0.0001]	[0.0278]			
	20.0176	_				
HCI	(3.3399)	-	-			

				-
	[0.0036]			I
	-0.3797	0.1799	0.6968	
ELF	(-2.3694)	(1.7908)	(1.8088)	
	[0.0292]	[0.0871]	[0.0956]	
		0.0562		
HI	-	(2884)	-	
		[0.0034]		
		0.0313	0.1450	
PHCR	-	(0.5994)	(1.9801)	
		[0.5550]	[0.0711]	
			0.0000	
PR	-	-	(2.1286)	
			[0.0547]	
			0.1412	
EI	-	-	(2.3856)	
			[0.0344]	

Table 5 illustrates the LR results of our models. Model 1 shows that the effect of population development (PG) is direct and significant, as one unit increase in population brings 3.3686 units increase in GDP. Khan, Zaman, and Zhang (2016) estimate a direct impact onthe population and economic growth. Awan, Fridi, and Chaudhary, (2015) conclude in their research that inflation has a negative impact on economic growth. The results indicate that investment has a direct and significant effect on GDP growth. The positive relation between investment and economic development is also sported by Aurangzeb and Haq (2012). The results of the human capital index indicate a direct and significant effect. The coefficient of the human capital index is 20.0176 with a probability of 0.0036 that shows a direct and significant impact of the human capital index on GDP growth. Chani et al. (2012) and Qadri, and Waheed (2013) also demonstrate a direct effect of human capital on economic growth. Fakhar et al. (2013) indicated that there is a negative association between the employed labor force and economic growth.

Model 2 results show that one unit rise in inflation brings a 0.1590 unit decline in GDP. Awaan et al. (2015) also conclude that there is an inverse impact of inflation on economic growth. Investment has a direct and significant effect on GDP growth. The positive effect of investment is supported by Swaby (2007). Sheikh et al. (2015) also estimated a positive effect in their study. The estimated values indicate that the impact of the health index on GDP is direct and statistically significant. One unit change in the health index brings 0.0562 units to change in GDP. Akram et al. (2008) found a direct effect of health on economic growth. For Model 3 inflation has a negative and insignificant effect on GDP. Afzal et al. (2010), Fakhar et al. (2013), and Saeed et al. (2015) also indicate a negative relation. The impact of investment is significant. The poverty headcount ratio has a positive effect in Model 3. The coefficient value of the poverty headcount ratio is 0.1450 while the probability value is 0.0711. The estimation values show that there is a direct and significant association between the education index and GDP. One unit change in the education index leads to a 0.1412 unit change in GDP. A positive effect of education on economic development is also estimated by Ali et al. (2012), Saeed et al. (2017), Afzal et al. (2017), and Samar and Waqas, (2014).

Table 6: diagnostic analysis						
Test Model 1		Mod	el 2	Model 3		
1050	F-statistic	Prob.	F-statistic	Prob.	F-statistic	Prob.
LM-test	2.2778	0.1392	1.0833	0.3910	2.3749	1.3247









Conclusion and Policy Recommendation

The basic aim of this analysis is to estimate the association between human capital formation and the economic development of Pakistan. The study has been utilizing the secondary timeseries data for 1974-2019. The results of the study indicate that population growth has a direct and significant impact on economic growth. The human capital index, health index, and education index has also a direct and significant impact on the economic development of Pakistan. It implies that an increase in human capital, health, and education enrollment cause to increase in economic growth. Employed labor force rises the economic development. The policy recommendations cover that Government should control the inflation rate.Government should focus more on investing in human beings. As investment in human capital increase then the skills and abilities of peoples increase that cause to enhance the development of an economy.

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