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NEW EVIDENCE ON THE EFFECT OF HUMAN CAPITAL ON ECONOMIC GROWTH OF PAKISTAN

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ABSTRACT

The importance of human capital in the wealth of developed countries has increased significantly as it has transitioned from being a mere cost component to becoming the primary factor contributing to economic growth and societal development. This study attempts to assess Pakistan's human capital-led growth between 1973 and 2021. This has been accomplished by using a human capital index based on years of education, returns to education, and economic growth to ascertain the link in the long run and short run, the Auto Regressive Distributive Lagged (ARDL) co-integration methodology and error correction methods are utilized in this context. The model's stability is examined using CUSUMSQ and CUSUM. The results demonstrated that the human capital index has a significant and positive effect on economic growth over the long term, but it has a detrimental impact in the short term. Capital accumulation, population growth, and foreign direct investment have positive, long-term effects on GDP per capita. As human capital is an important factor in economic development. Therefore government should invest more in promoting more human capital.

Keywords: Economic growth; Human capital; Government expenditure; Foreign Direct Investment; Pakistan.
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INTRODUCTION

Economic growth can be described as the formation of goods and services within the nation from one time to another time to an expansion in the capability of the economic condition of the country. Economic growth refers to a change in production and yield which is a positive side of the economy (Ali et al., 2016). Now a day's gross domestic product (GDP) per capita has got much importance and has become an important stimulator of economic growth. Currently, it is increasing rapidly. Pakistan's GDP per capita in June 2021 reached USD 1,798 as compared with 1427.40 USD in June 2016. The term human capital is first used by Mincer (1958) and Schultz (1961). The aptitudes and skills of people might be referred to as "human capital." The notion of productive wealth as represented by labour, skills, and knowledge is expanded upon by the United Nations (2009). Both formal and informal education has a role in the acquisition of this competence, which is connected with humans. "Human capital development" means the accumulation and expansion of the population of people with the abilities, expertise, and experience required for economic success country. The individual, not just their education but also their health, is the main focus of the human capital hypothesis (Adelakun, 2011). The general definition of human capital included the following five categories: (1) Health and medical services; (ii) On job training; (iii) Primary, Secondary, and Higher Organized Formal Education; (iv) Study Programs for adults; and (v) Individuals and Families Migrating to Take Advantage of Changing Employment Opportunities. The practice of acquiring and growing the population of people with the knowledge, experience, and skills that are necessary for economic growth is

known as "human capital formation." The capabilities and skills of the human resources of a country are termed its "human capital." Investments in health and education are therefore viewed as a part of human capital.

According to Nelson and Phelps (1996), Abramovitz (1986), and Romer (1990), to advance technologically, a country must participate in inventive or imitative actions that largely utilize human capital as productive input. Endogenous growth theories, such as those put out by Mankiw et al. (1992) and Lucas (1988), place a strong focus on human capital. These models usually call on an economy to support socio-economic development, invest in its educational system, fight poverty, raise the likelihood of economic growth and labour market participation, and increase opportunities for economic growth. According to the argument, a nation's economy will develop over the long term if it invests more money in education. Therefore, investing in education would benefit both the human capital of individuals and the nation's economy as a whole: it would combat poverty, lower the number of kids who arrive at school hungry, address government-sponsored job anxieties, provide networking opportunities, increase the number of interdisciplinary job opportunities, and encourage socioeconomic development. There is a widespread belief that the higher the level of human capital, the better the rate of economic growth. Few other proxies like health, education, and skill-on-job training do have great importance, but education and health are listed at the top (Goode, 1959; Khilji, 2005; Schultz, 1961). Human capital and the development of the economy are associated with one another. Through development in human capital, one can achieve sustainable growth in the country's economy. Sustainable development means that the accomplishment of basic needs in the present time is deprived of the coming generation's prospects of basic needs. It is very analogous to human development and the aptitude of people. A huge portion of the world's population continues to reside under the line of poverty, and policymakers' attention has gradually moved towards manipulating different policies that assist the deprived people. Without any objection, economic growth is essential to help decrease poverty, but such growth is not sufficient. By taking the case of Pakistan, although fairly increasing growth rates, Pakistan's social development is still not up to the mark and poverty remains widespread, and almost 30 percent of the inhabitants are living under the poverty line. So, investing in human capital will make it able to create extra creative labor power that will guide to high development rates in the future as well as high incomes.

Growth is impacted by human capital via two different channels. First, as a productive factor, human capital directly contributes to output. This rise in output would be directly impacted by the development of human capital. This is a level effect. Secondly, human capital can hasten the development of technology. In this way, the amount of human capital has an impact on productivity growth. This is the rate effect. Despite Pakistan's fundamental advancement rate, the human capital indices are not particularly good. Almost every monetary gauge which is regarded as a sign of development, such as health, education, sanitation, and pure drinking water, is quite low. In recent years the government has shown less concern about humans. Due to the shortage of interest in creature resources, now a day's country is facing an uncontrollable monster in the form of a high unemployment rate, higher level of poverty, absence of education, and shortfall in the energy sector. To flourish the economy of Pakistan, it is inevitable to invest in the human capital sector, thus making the subjects able to live their lives properly and work side by side to put Pakistan in the line of developed countries. The study contains a re-evaluation of human capital impact on the economic growth of Pakistan up to recently available data, i.e., 2021. The present study uses Barro and Lee's "human capital index from Penn World Tables v9.1 of the University of Pennsylvania, based on data of education years and return rate in the average".

The study's main objective is to thoroughly investigate human capital's effects on Pakistan's economic development, both in the short and long term. This is achieved by analyzing data from 1973 to 2021; in the end, some policy recommendations are given based on the findings.

LITERATURE REVIEW

Abbas and Mujahid-Mukhtar (2000) found an effect of school enrollment on Pakistan's economic growth during 1970-1994. Data on variables was attained from the Pakistan Economic Survey and the Federal Bureau of Statistics. Data of different variables were used in this model, i-e, education enrollment (primary, middle, high, and arts), literacy rate, health, and fixed capital formation OLS results showed that the primary enrollment rate had impacted positively and significantly. Abbas and Peck (2008) analyzed the association among Pakistan's economic growth and human capital, with secondary data ranging from 1960 to 2003. The stationarity of the model was checked through Augmented Dickey-Fuller (ADF) test. By using the Johenson cointegration technique, it is confirmed that Human capital plays a critical role in enhancing a country's growth. Abdalla and Arabi (2013) empirically inspected the effect of human capital on the economic growth of Sudan during 1982-2009. The variables analyzed in the discussion were total productivity, investment in health and education, foreign direct investment, and school attainment. The results based on three stage least square technique showed that educational quality has a vital function in speeding up the country's growth. Due to the use of outdated technology, the total factor productivity remained low in contributing towards economic growth.

Babatunde and Adefabi (2005) empirically investigated the long-term relationship between human capital and economic growth in Nigeria, utilizing data from 1970 to 2003. The analysis included an examination of two channels to assess how human capital can impact Nigeria's economic growth over the long term. Firstly, when using direct productive inputs of human capital in the production function. Secondly, when human capital affects technology parameter. Applied Johansen Cointegration technique and VECM. The results proved the presence of a long-term link between economic prosperity and education. The well-educated and skilled labor force had significantly influenced the economic growth in total productivity of factors and as a factor in the production function. Kiani and Adiqa (2013) took four different levels of education (primary, middle, high, and others), exports, and Bhu's to check the impact on Pakistan's economic progress. Employed the data from (1980- 2009). The authors conclude that primary education positively affects and significant role in accelerating the GDP growth rate during the period of 1980-2010 in Pakistan. Bhu's exports also played a significant role in uplifting economic development. Afridi (2016) examined the impact of human capital on Pakistan's economic growth during 1972- 2013. The explanatory variables included in the study were education enrollment, health and physical capital. Analysis was made by using the ARDL technique. The findings showed a favourable relationship between physical capital and birth rate, and the economy. The empirical data demonstrated that human capital is essential to a country's growth. Even though the results were ineffective in the short term, investing now could pay off in the long run.

Akram et al. (2008) investigated the impact of various health indicators on economic growth in Pakistan between 1972 and 2006. The researchers obtained the variables' data from FBS and Economic Survey and used unit root analysis to assess their stationarity. They applied ARDL and ECM techniques to secondary data and found that health was positively and significantly associated with economic growth in the long run. However, in the short run, the two variables were found to be inversely related. Ali et al. (2012) examined the influence of human capital investment on Pakistan's economic growth, using secondary data from 1973 to 2011. The model incorporated various variables, including health, physical capital, and school enrollment, as independent variables, while GDP was the dependent variable. In this model, Ordinary Least Square (OLS) technique was used. Education enrollment had significantly related, but Infant Mortality and CPI Inflation are negatively related to GDP. The results of the study confirmed the LR connection between education enrollment and GDP. Ali and Jabeen (2013) studied the association among education and economic growth through time in Nepal by taking data from 1995 to 2013. The WDI and Economic Survey of Pakistan were used to collect the data. To estimate results Johenson cointegration technique and OLS method on time series were used. The results showed that there exists LR association in education and real

per capita GDP and recommended that education should be given top importance to achieve a sustainable economy.

Ali et al. (2016) studied the association between Pakistan's economic growth and human capital. The information was used between 1974 and 2014. In this study, the variable used were human capital, saving, inflation and FDI, and labor force. Results indicated that education enhanced not only the productivity but also the efficiency of individuals. The major factors in the economic expansion were human capital and technology. Omojimite (2010) studied the relationship between education and GDP in Nigeria by using secondary data during 1980-2005. The variables of the study were education enrollment (primary, secondary, and higher) and GDP. Estimations were made through the ARDL technique and generalized methods of moments (GMM) test. The outcome showed that education and GDP are significantly and optimistically related to each other. Daghighiasli et al. (2014) examined the connection between human capital and economic growth in oil-rich economies between the years 1980 and 2010. The results demonstrated that while human capital positively affects economies in "European Eurasia, North America, the Middle East, and Central America, it has little to no impact on economies in African countries."

Rusli and Hamid (2014) find out that there is an LR and SR association among Malaysia's economic growth and human capital. The model's validity was examined in the study using rigorous empirical testing using data from various sources. In order to evaluate the impact over the long and short terms, it also made use of the error correction model (ECM), cointegration test, variance decomposition, short-run Granger causality, and impulse response function. Results indicated a long-term link between state spending on education and economic expansion. Shahzad (2015) examined how human capital affects economic expansion. Time series data from 1990 to 2013 were used. Education enrolment, health (IMR), and physical capital were the study's variables (FGCF, IGR). The ADF unit root was utilised to verify that the data was stationary. For the investigation, the Ordinary Least Square (OLS) approach was used. The findings demonstrated the favourable and considerable impact of increased educational enrollment on economic growth. This makes it abundantly evident that putting greater emphasis on education will boost the country's progress. The results also showed an inverse but substantial association between consumer price index, the infant mortality rate and GDP

Khan et al. (2005) investigated the relationship among human capital (real GDP per-capita growth, CPI inflation, capital formation (GFCF), gross secondary enrolment, life expectancy rate and adult literacy rate) and economic growth in context with Pakistan by obtaining the data from IMF and World Bank. The results indicated the significant impact of education and health care. Further improvement in these sectors will not only improve the living conditions of the residents of the country but also attain high growth rates. Results confirmed that the nations that devote more resources to their human capital achieve better results in terms of economic expansion. Khattak and Khan (2012) showed education's contribution to economic growth of Pakistan with secondary data from 1971-2008. The stationarity of data was checked through ADF, using Johansen cointegration and ordinary least squares. Secondary education and real GDP are substantially correlated, according to the OLS results. Although primary education has a positive effect on economic growth, the effects seem insignificant. The existence of long-term associations among variables was also acknowledged. The results of cointegration demonstrated the long-term link between real GDP and schooling. They recommended that when formulating policies, education should be given primary priority. Using panel data from 1990–1995, Khembo and Techereni (2013) empirically examined the relationship between human capital and economic growth in SADC. The learning outcomes revealed that whereas health and GDP are negatively correlated, education and economic growth are positively correlated.

METHODOLOGY

The research on this subject reveals a wide range of methodological methods, from the MRW models of Mankiw et al. (1992), which expanded the Solow growth models, to the convergence studies suggested by

Barro and Sala-i-Martin (1992). They included human capital as a new component to the Solow model. Consequently, this model's production function has the following forms:

$$Y_t = AK^{\alpha}(hL)^{\beta}$$

Where Y is production or GDP, L is labour, H is the stock of human capital, K is physical capital, L is labour, and A is the level of technology.

Annual time series data from the years 1973 to 2021 are used in this study. The log of GDP is used in the model's dependent variable as a stand-in for economic growth. Human capital is an independent variable that is assessed using the human capital index (HCI) indicators from "Penn World Tables v10 of the University of Pennsylvania", based on information on educational years and the average return rate. The World Development Indicator's data on capital creation and government consumption expenditures, as well as UNCTAD's data on FDI, are additional explanatory factors.

$$\mathrm{LnGDP}_t = \beta_0 + \beta_1 \mathrm{LHC}_t + \beta_2 \mathrm{POP}_t + \beta_3 \mathrm{CFGP}_t + \beta_4 \mathrm{FDI} + \beta_5 \mathrm{GEG} + \mu_t \quad (1)$$

Wheres;

LnGDP_t = Gross Domestic Product Per Capita in current time period.

LHC_t= log of Human capital index

POP_t= Population growth rate in current time period

CFGP_t = Gross fixed Capital formation in current time period.

FDI = Foreign Direct Investment net inflow percentage of GDP in current time period.

GEG = final government consumption expenditure in current time period.

μ_t = error term

Using the Auto Regressive Distributive Lag Bound Testing Approach (ARDL) proposed by Peasran, Shin, and Smith in 2001, the current study sought to determine the relationship among human capital and Pakistan economic growth in Pakistan. Unlike other methodologies, the ARDL cointegration method does not require unit root pretests.

Therefore, when variables are integrated in multiple orders, such as I(0), I(1), or mixed order, and resilient in the situation of a single long-run association among the basic variables in a small sample size, ARDL cointegration technique is recommended.

$$\Delta \mathrm{lnGDP}_t = \partial + \sum_{i=1}^{j} e_i \Delta \mathrm{LnGDP}_{t-i} + \sum_{i=1}^{k} f_i \Delta \mathrm{LHC}_{t-i} + \sum_{i=1}^{l} g_i \Delta \text{Population growth}_{t-i} + \sum_{i=1}^{m} h_i \Delta\, \mathrm{CFG}_{t-i} + \sum_{i=1}^{n} i_i \Delta \mathrm{FDI}_{t-1} + \sum_{i=1}^{n} i_i \Delta \mathrm{GEG}_{t-1}\, \delta_1 \mathrm{lnGDP}_{t-1} + \delta_2 \mathrm{LHC}_{t-1} + \delta_3 \text{Population growth}_{t-1} + \delta_4 \mathrm{CFG}_{t-1} + \delta_5 \mathrm{FDI}_{t-1} + \delta_6 \mathrm{GEG}_{t-1} + \varepsilon_t \quad (2)$$

RESULTS AND DISCUSSION

The descriptive statistics of the dependent and independent variables used in the studies are given in Table 1. For the assessment of the unit root test, basically DF test is used, which is presented by Dickey and Fuller (1979) to check the fluctuations in data over the period of time, but such an estimation method has a drawback that it could not include the lag of dependent variable. After this study, to remove such drawbacks, the ADF test has been presented. Such tests not only include lag of the dependent variable but also remove the serial correlation from the data (Asterious and Hall, 2011).

In Table 2, the results of the unit root test are given. The results show population growth, foreign direct investment percentage of GDP (FDI), human capital, and real per capita GDP are stationary at I (I) while

consumption expenditure and capital formation are stationary at a level I (0), using Augmented Dickey-Fuller Test (ADF).

Table 1. Descriptive statistics.

variables	LGDPC	LHC	PG	FDIP	GEG	CFG
Mean	6.8	0.41	2.69	0.72	5.67	3.55
Median	6.84	0.3	2.85	0.5	6.05	4.32
Maximum	7.2	0.64	4.42	3.6	46.48	15.82
Minimum	6.318	0.18	1.20	-0.04	-15.03	-11.0
Std. Dev.	0.27	0.15	0.78	0.81	9.68	6.43
Observations	49	49	49	49	49	49

Note: Author's own calculation.

Table 2. Augmented Dickey-Fuller Test (ADF).

Variables	Level		1st Difference		Order of Integration
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
LHC	0.33	-2.93	-1.73	-1.53	I(1)
FDIP	-2.71	-2.99	- 5.37	- 5.33	I(1)
GEG	-8.60	-8.50	- 8.09	- 8.02	I(0)
PG	-0.67	-3.73	- 5.58	- 5.65	I(1)
CFG	-4.85	-4.43	- 9.91	- 9.86	I(0)
LGDPC	-0.85	-2.12	-4.73	-4.70	I(1)

Note: Author's own calculations.

Bound Test

The bound test is applied to ensure the long-run association between variables. Null hypothesis explains no association among variables, while the alternative hypothesis examines the cointegration among variables.

Table 3. ARDL bound testing.

	Values	k
F-statistic	4.7076	5
Critical Value Bounds		
Level of Significance	I0 Bound	I1 Bound
1%	3.41	4.68

Note: Author's own calculations.

Table 3 indicates that the value of the F statistic (4.7076) is greater than the value of upper bound at the 1 % level. So, Alternative hypotheses cannot be rejected means that long-run association lies between human capital, population growth, foreign direct investment, government expenditure, capital formation, and economic growth.

The long-term association between human capital and economic growth is shown in Table 4. The human capital coefficient is 5.3, indicating that it has a long-term, positive, and considerable impact on economic growth. It means that a 1% increase in human capital will result in a 5% increase in GDP per capita while all other factors remain constant. Population expansion has a beneficial impact on economic growth, as demonstrated by the population growth rate coefficient of 0.3339. Economic growth is positively impacted by capital formation, as indicated by the coefficient of capital formation of 0.08. These findings are consistent with theory and meet the initial expectations.

Table 4. Long run coefficient under ARDL approach.

Variable	Coefficient	Std. Error	T-Statistics	Prob. Value
LHC	5.3030	2.18	2.43	0.02
PG	0.3339	0.23	1.43	0.16
FDIP	-0.4749	0.24	-1.95	0.06
GEG	0.0106	0.02	0.67	0.50
CFG	0.0849	0.05	1.69	0.10
C	4.3715	1.20	3.63	0.001

Note: Dependent Variable: LGDPC; Author's own calculations.

Table 5. Short run analysis.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(LGDPC(-1))	-0.31	0.17	-1.87	0.07
D(LHC)	-0.41	0.18	-2.24	0.03
D(PG)	0.02	0.007	2.59	0.015
D(FDIP)	-0.0006	0.006	-0.10	0.91
D(FDIP(-1))	0.01	0.006	1.84	0.08
D(GEG)	-0.0002	0.0003	-0.90	0.33
D(GEG(-1))	-0.0002	0.0003	-0.64	0.53
D(CFG)	0.0017	0.0004	4.11	0.0003
D(CFG(-1))	-0.0008	0.0005	-1.57	0.13
CointEq(-1)	-0.52	0.028	-1.85	0.07

Note: Author's own calculations.

The error correction model associated with the short-run model based on the ARDL approach is shown in Table 5. The coefficient of ECM_{t-1} is -0.52, which implies that it adjusts towards the equilibrium at the rate of 52 percent per year and is significant at the 5 % level. The lagged value of human capital (-0.41) indicates that, in the short run, it is not positively affected economic growth. One reason for this is that enrollment in secondary schools is utilised as a stand-in for human capital, but after engaging in productive activities, students' effectiveness can be assessed. It represents that in the short run, government consumption expenditure, population growth rate, human capital, foreign direct investment, and capital formation have significantly affected economic growth. The coefficient of D(FDIP) is -0.0006 in one lagged year, which indicates that it inversely affects economic growth, but in 2nd lagged period, it has a positive and significant impact on GDP. The probability of D(GEG) is -0.0003, which shows that final government consumption expenditures had a negative and insignificant effect on GDP in 1st lag. It had a significant effect on GDP. Coefficient D(CFG) is 0.002 showing that gross capital formation affects economic growth positively and significantly in 1st lagged year. It had a negative and insignificant effect on GDP. The lagged value of D(PG) 0.02 positively and significantly affected economic growth in the short run.

Stability of Model

The stability of the model is explained by using CUSUM and CUSUM Squares tests. Figures 1 and 2. CUSUM and CUSUM Squares tests explain that the estimated model is stable at a 5% level of significance. The estimated line lies inside the critical bounds. If the line cross over the critical bounds, then the model is unstable.

The result in Figure 1 shows that the line lies inside the critical bounds, so the estimated model is statistically stable. The given Figure 2 indicates that the line lies inside the critical bounds, explaining that the model is statistically stable. This can be helpful for further policy ideas.

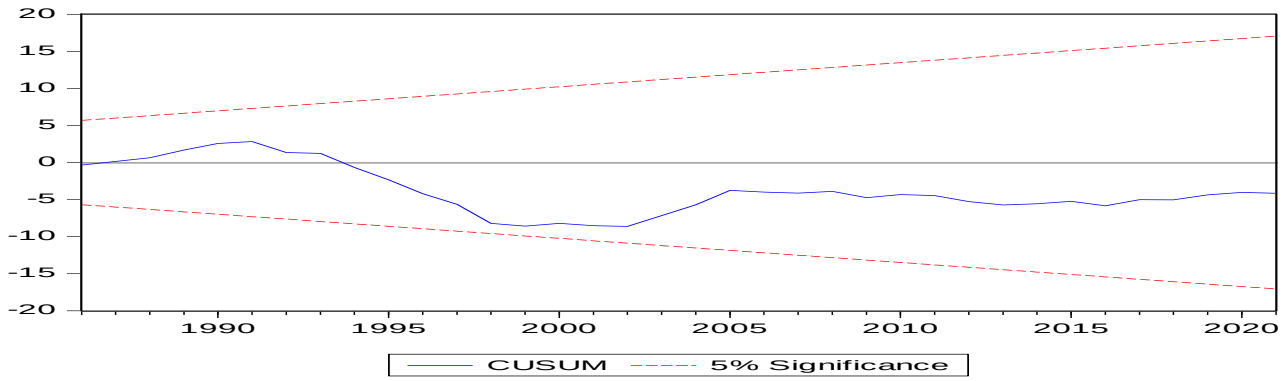

Figure 1. Plot of Cumulative Sum of Recursive Residuals.

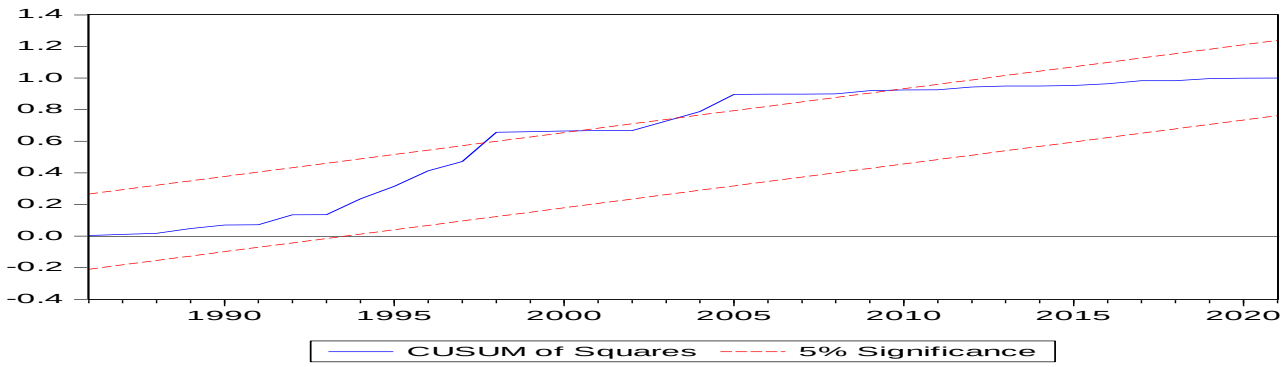

Figure 2. Plot of Cumulative Sum of squares of Recursive Residuals.

CONCLUSIONS AND POLICY IMPLICATIONS

The study's goal is to clarify the connection among the human capital index and economic growth in Pakistan from 1973 to 2021. The human capital index, which is used as a proxy for human capital, affects economic growth negatively during the short run, whereas it affects positively in the long run. Spending on education and capital formation are used as stand-ins for human capital, with population growth and foreign direct investment used as supporting variables. According to the study's findings, there is a long-term association among economic growth, final consumption expenditures, capital formation, population increase, and foreign direct investment. Final consumption expenditures (GEG) have positively affected economic growth, which suggests that increased education spending will boost it. Additionally, FDI significantly and favorably impacts Pakistan's economic expansion. Government spending on education should be increased in order to accelerate economic growth because education helps to increase productivity by enhancing knowledge and skills. Based on the discussion's findings, it is recommended that the government and other decision-makers concentrate on boosting human capital in the short- and long term. Growth in Pakistan is related to education enhancement as well as health facilities. As education and health are key indicators of human capital so government allocation of budget in both sectors should be compatible with developing nations. Almost 5% of the budget should be allocated to both sectors.

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