



Empirical Analytics of SAARC vs ASEAN in Perspective of Economic Growth and Capital Accumulation

Muhammad Mansha¹, Xiuyun Yang², Ahmed Raza ul Mustafa³, Muhammad Mubashar Nasim⁴

¹ PhD Scholar, School of Finance and Economics, Xian Jiaotong University, China.

Email: m.manshaciitvehari@gmail.com

² Professor, School of Finance and Economics, Xian Jiaotong University, China. Email: yangxiuyun@xjtu.edu.cn

³ Assistant Professor, Department of Economics, Shaheed Benazir Bhutto University, Shaheed Benazirabad, Pakistan. Email: raza.economist@yahoo.com

⁴ PhD Scholar, School of Finance and Economics, Xian Jiaotong University, China. Email: mubasharmirza14@gmail.com

ARTICLE INFO

Article History:

Received: June 05, 2022

Revised: June 16, 2022

Accepted: June 27, 2022

Available Online: June 29, 2022

Keywords:

Human/Physical Capital

Economic Growth

Panel FMOLS

SAARC

ASEAN

JEL Classification Codes:

C23, J24, N10, O16

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

It is an empirical exercise to build the connection between investment in human/ physical capital and economic growth. A panel data set is targeted by considering twelve selected SAARC and ASEAN economies for the period 2005-2019. To get the empirical findings a unit root analysis is made for data stationarity; the Fully Modified Ordinary Least Square (FMOLS) method is taken in practice to find the association of the investment in human/physical capital with economic growth. Moreover, the Pedroni test is used to examine cointegration among the regressors as well as explained variables. The research outcomes highlight that the investment in the human and physical capital formation through education/health expenditures and gross fixed capital formation plays a noteworthy part in economic growth in SAARC and ASEAN economies separately and overall. Moreover, the inflationary trends and the labor force participation rate have their significance for determining economic growth. The trade volume is a significant force for the economic growth until the export proportion will be greater than imports. In a policy outlook, there is a need to enhance the fiscal budget for the health and education sector that will ultimately enhance the economic growth of the concerned economies.



© 2022 The Authors, Published by iRASD. This is an Open Access Article under the [Creative Common Attribution Non-Commercial 4.0](https://creativecommons.org/licenses/by/4.0/)

Corresponding Author's Email: m.manshaciitvehari@gmail.com

Citation: Mansha, M., Yang, X., ul Mustafa, A. R., & Nasim, M. M. (2022). Empirical Analytics of SAARC vs ASEAN in Perspective of Economic Growth and Capital Accumulation. *IRASD Journal of Economics*, 4(2), 337–351. <https://doi.org/10.52131/joe.2022.0402.0083>

1. Introduction

The human capital differential achieved through schooling and healthiness is a large portion of the research that investigates pay differences with labor as human capital differential obtained through schooling and healthiness. Human spending enhances employees' mental and physical health, and the resulting skilled labor force contributes more to economic growth than the total of individual knowledge, skills, and capabilities known as human capital. According to the human capital idea, education improves a person's competence and income, making it an asset. However, this asset is not only important for individuals, but it also helps the state to be

more productive. Marshall (1920) elaborated that investment in the individual is a crucial strength. Human capital investment is necessary because achieving greater institutional goals requires some human skills and knowledge levels (ul Mustafa & Nishat, 2019). This study will allow in making some understanding of the variables that are effective for economic development. The literature highlights that the importance of human spending encourages economic growth (Chani, Sheikh, Mansha, Abbas, & Iqbal, 2021; ul Mustafa, Abro, & Awan, 2021; ul Mustafa, Nishat, & Abro, 2022; Uzawa, 1965). Romer (1986) depicted that investing in human capital is the most important factor impacting monetary growth. According to the report. Schultz (1961) mentioned that knowledge is necessary for development. Education is a vital component of economic development, according to human capital theories. Education and health spending enhances labor quality, promote labor force efficiency, and encourage new trades and economic development (Chuang & Sollenberger, 2000).

There are two methods through which the impact of human capital is measured on economic growth. The first is to familiarize the human capital to contribute to the growth of manufacturing (Uzawa, 1965). The second way, shadow (Nelson & Phelps, 1966), measured expenditure on health and education as a source of production enhancement. In the meantime, human capital accumulation determines the size of an economy's modernization or prevalence of appliance machinery; human capital is linked to the pace of growth. Barro and Lee (1993) investigated the relationship between human capital and economic growth using education as a source of human capital. To begin with, human capital has an impact on the invention's internal level., as demonstrated by Romer (1990). Second, human capital has an impact on the diffusion of knowledge (Nelson & Phelps, 1966). They discovered a 1% increase in capital accumulation points, resulting in a 0.13 percent rise in the progression. Human capital accumulation across the state has an important influence on the infectious growth of technology for different nations, as recognized by (Funke & Strulik, 2000).

Human skills and knowledge are required for an organization to achieve more substantial goals, and human capital investment is critical. The human capital share has spillover effects that increase productivity and growth by stimulating knowledge, ideas, and efficiency. This research will aid in determining which variable is most effective in accelerating fiscal development. The connection between the growth of an economy and human capital has been studied by considering school year enrollment data and has found a positive and significant relationship among these factors (Abbas & Mujahid-Mukhtar, 2000; Akpolat, 2014; Halder, Kumar, & Mallik, 2010). The literature confirms the fundamental connection among mentioned dependent and independent variables of the study, but findings differ across nations. There are no unanimous results from the literature, so it's quite an important issue containing the research objectives to define the association between human/physical capital accumulation and economic growth in SAARC and ASEAN economies.

The diversity of human/physical capital formation in SAARC and ASEAN regions is a key challenge. These problems are caused by government rules like small spending on schooling and health. Another issue in the SAARC and ASEAN region is a shortage of skilled workers and poor health conditions as a result of underinvestment in education and health. In both regions, spending on schooling, research and growth programs, technological innovations, and feminine labor force contribution is truncated. The novelty of this research is to make empirical testation of the growth theory based on the human/physical capital accumulation in SAARC and ASEAN regions. Moreover, the implementation of a variety of statistical tools (Unit Root and the Cointegration) is helpful to measure the strength of the outcomes. Physical capital investment on economic growth, as well as the relationship between human capital investment and economic development in SARRC and ASEAN countries. Moreover, this study provides a policy guideline about 1) enhancing the efficiency of the channels through which the human/physical capital can

generate; 2) utilizing the (human/physical capital) resources in an efficient way that can contribute to the economic growth in the given regions.

Section I briefly introduces this study, including its significance, the research objective, and the research question. Section II demonstrates the review of literature, evident from the research findings. Section III provides detailed information about the data sources and the econometric methodology used in this study. The research findings and their interpretation are contained in Section IV. In the last, the conclusion with the policy recommendations has been given in Section V.

2. Literature Review

Human/physical capital accumulation and economic growth are significant macroeconomic indicators and have a strong theoretical relationship with each other. There is a significant worth of these indicators in the literature where little practice is going to do in this section. This section will strengthen the objective of this research as well as the findings that will highlight in the results section of this study.

From the perspective of Nigeria, Keji (2021) constructed the nexus between human/physical capital and economic development. The study employed the VAR, VECM, and LM tests to measure the short-run/long-run relationship by considering the data set from 1981 to 2017 and predicted a significant and positive relationship between human/physical capital and economic growth. The researcher also suggests that government needs to establish some special agencies to monitor/ improve the capabilities and skills of the labor force for more efficient outcomes.

Ding, Huang, Gao, and Min (2021) examined the study of human/physical capital and economic development. A panel of data from 143 economies for the period 1990 to 2014 was used to measure the association among such variables. The research outcomes described a significant and positive relationship between the human/physical capital and the GDP and suggested that there is more need to invest further in human/physical capital for more sustainable economic development.

Bunyamin (2021) targeted the Indonesian state to empirically test the relationship of human/physical capital with economic development. Yearly time series data set contained from 1970-2017 for analysis. Primary, secondary, and tertiary school enrolment proxies have been used for human capital, and GDP is used proxy for economic growth. Autoregressive Distributed Lag (ARDL) model has been used for the analysis. It was discovered a significant and positive impact of human/physical capital on economic development in the Indonesian state.

Bentour and Fund (2020) considered the panel of twelve Arab countries to inspect the consequence of human capital on economic growth where the employment, human capital, physical capital, and real capital stock are used as regressors, while the real GDP was used as an explained variable. The empirical analysis was done by using Estimated Generalized Least Square (EGLS) and General Method of Moments (GMM) methods. It was depicted that there is bidirectional causality in human capital and GDP while all explanatory variables have a positive impact on GDP.

Liao, Du, Wang, and Yu (2019) noted the relationship between education spending and China's long-term economic growth. For an econometric estimate, the Cobb-Douglas production function was applied to 21 distinct Chinese towns. GDP was used as a dependent variable, while real physical capital stock, education, and labor investment were used as explanatory variables. There was found a significant positive relation of explanatory variables with explained one.

Iqbal, Awan, and Tayyab (2018) scanned the connection between human capital and economic growth in Pakistan using the annual data from 2005 to 2015. Life expectancy rate, health spending, education investment, and saving rate are used for human capital as independent variables, and productivity (GDP) is used as a dependent variable for economic growth. Ordinary Least Square (OLS) technique with linear regression model used for econometric analysis for obtaining results. The data have been taken from the different databases of Pakistan including the Pakistan Economic Survey (PES) and Pakistan Bureau Statistics (PBS) have been used in this research. The major results of this study show that indicators of education and health have a positive impact on GDP. They also suggest that Govt. should improve the infrastructure of health and education for productivity level.

M. Ali, Egbetokun, and Memon (2018) studied using data from 132 states for the period 1996 to 2011, researchers looked into the relationship between human capital, social capacities, and economic progress. It was discovered that both human capital and economic growth are important. Awan and Kamran (2018) proposed a relationship between economic growth and human capital in Pakistan's perspective by considering the annual data set of 1985-2014. For econometrics estimations, the Autoregressive Distributive Lag (ARDL) approach was used. The cointegration of the variables was determined using the bound test method. The ECM was also used to show how the convergence path leads to equilibrium. The information was gathered from the WDI, ECP, and SBP databases. The findings revealed that all regressors have a favorable impact on Pakistan's economic growth.

Adeyemi and Ogunsola (2016) assessed the relationship between investment in Nigeria's schooling and healthiness and economic growth. The Autoregressive Distributive Lag (ARDL) cointegration technique has been used by taking the annual data set from 1980 to 2013. It was found that most of the explanatory variables significantly contribute to Nigerian economic growth. Alataş and Çakir (2016) discovered the relationship between investment in schooling and healthiness with economic growth by covering the annual data span (1967-2011) of 65 countries. It concluded that health and schooling investment has an optimistic and statistically significant influence on economic growth. Pescu and Stefan (2016) explored the connection between human/physical capital and economic growth in 29 European countries taking the time series data set from 2000 to 2013. The results indicate a positive correlation among variables except for social protection expenditure, where capital accumulation has an adverse connection with social security spending.

Jameel and Naeem (2016) examined the relationship between human capital and economic development of 11 selected countries considering the period 1992 to 2014. The study explored that majority of the variables are enthusiastic for economic growth except for inflation. Wang and Liu (2016) targeted the 55 emerging economies; Frank (2018) considered 179 particular states, Huang, Tang, Peng, and Xiao (2015) incorporated the 31 provinces of China; and H. S. Ali, Yusop, and Hook (2015) taken Pakistan on board to investigate the linkages between human capital investment (by spending more for health and education purposes) and economic development. Conclusively, such expenditures are significant for the determination of economic growth for the concerned regions.

Pelinescu (2015) observed the nexus between human capital and economic growth from 2000 to 2012 for specific European Union countries. GDP per capita was taken as an endogenous variable. The education expenditure and exports of goods and services were taken as exogenous variables and used the pooled least squares and panel model approaches. The research findings explore that most of the regressors have a significant effect on economic growth. Eggoh, Houeninvo, and Sossou (2015) proposed the impact of investment in human capital on the economic growth of 49 African countries for the period 1996 to 2010. Findings contrarily suggest

that healthiness and schooling expenditure negatively impact the economic growth of concerning African countries. The facts behind such contrary findings are the underinvestment, bureaucracy, corruption, and inefficiency of institutions.

In this review practice, it is found that a massive literature is existing to support the theoretical linkages between human/physical capital generation and economic growth. Moreover, this literature will help to justify the research outcomes from the perspective of SAARC and ASEAN economies.

3. Research Methodology

Human capital theory indicates the education standard that improves the workforce's competence and output by enhancing their intellectual abilities. Schultz (1961) offered the indication that people should invest in human capital to improve their knowledge and health. Investing in schooling, healthiness, job training, and nutrition are examples of such spending. Human capital development shows a significant role in a country's growth. Basic knowledge boosts the efficiency of low-skill work, according to human capital experts.

Education transforms people's worth, trust, and performance, according to the modernized theory. Modern standards and approaches are taught in various institutes such as universities, the media, and factories. This strategy combines honesty with new understanding, independence from traditional institutions, and passion for the concept and social efficacy. The larger numbers of studies show that the renewal of institutes improved the smoothness of a particular novelty. Becker (1962) and ul Mustafa et al. (2021) established education and training, according to the human capital hypothesis, represent an investment in future productivity rather than a depletion of resources. Firms and workers alike, according to this viewpoint, rely on spending on schooling to boost efficiency, profits, and compensation. According to the model of human/physical capital accumulation and its growth, Solow (1994) followed the Cobb-Douglas production function as given below:

$$Y(t) = K(t)^\alpha H(t)^\beta [A(t)L(t)]^{1-\alpha-\beta} \quad \text{for } \alpha > 0, \beta > 0, \text{ and } \alpha + \beta < 1 \quad (1)$$

Where H denotes the standard of human/physical capital, and L denotes the number of workers. An enhancement in a skilled labor supply contributes to L as well as the H .

Specifically, for $k = K/AL$, $h = H/AL$ and $y = Y/AL$ equation (1) implies that

$$y(t) = k(t)^\alpha h(t)^\beta \quad (2)$$

For the empirical testation of the investment for human/physical capital generation and economic development, the constructed model is given below:

$$GDP = f(\text{Education Expenditure}_{it} + \text{Health Expenditure}_{it} + \text{Gross Fixed Capital Formation}_{it} + \text{Labor Force}_{it} + \text{Trade}_{it} + \text{Inflation}_{it} + \varepsilon_{it}) \quad (3)$$

The following is the regression equation based on the above function.

$$\log GDP_{pc_{it}} = \phi_0 + \phi_1 \text{Edu}_{Exp_{it}} + \phi_2 \text{Health}_{Exp_{it}} + \phi_3 \text{GFCC}_{it} + \phi_4 \log LF_{it} + \phi_5 \text{Trd}_{it} + \phi_6 \text{Inf}_{it} + \varepsilon_{it} \quad (4)$$

Where the $\log GDP_{pc_{it}}$ represents the logarithmic formation of Per Capita Gross Domestic Product. It is used as GDP per capita at the current international USD (\$). The $\text{Edu}_{Exp_{it}}$ and $\text{Health}_{Exp_{it}}$ are taken as the percentage share of gross national/domestic product, respectively, and denote the education and health expenditures. The gross fixed capital formation is

represented by $GFCC_{it}$ and taken as a percentage share of the GDP of the concerned state. The other macroeconomic indicators like Labour force, trade, and inflation are denoted by $LogLF_{it}$, Trd_{it} and Inf_{it} respectively where the logarithmic form of the labor force is used to check the growth impact. The Trd_{it} shows the volume of trade as a percentage share of Gross Domestic Product. The Inf_{it} is proxied by a consumer price index. The ε_{it} denotes the error term. The subscript i and t represent the country and time observation of a variable in the regression model. Moreover, the ϕ_i are the slope coefficients of the variables for $i = 1, 2, 3, 4, 5, 6$ and ϕ_0 denotes the intercept for $i = 0$. In the above regression model, the education expenditures, health expenditures, and the gross fixed capital formation are taken as core variables; however, the labor force, trade volume, and inflation are taken as the control variable.

In time series/panel data analysis, the macroeconomic variables have a stationarity problem. Regarding the data stationarity, this study employed the unit root test to know the order of integration. Dickey and Fuller (1981); Im, Pesaran, and Shin (2003) and Perron (1990) tests are applied to measure the data stationarity in the panel data set. For the test of cointegration, there is a need to integrate all variables in the same order in the panel unit root test. Pedroni (1999) introduced some panel cointegration tests by incorporating heterogeneity. By allowing the multiple regressors, the projected equation is given below:

$$Y_{i,t} = \alpha_i + \varphi_t + \sum_{k=1}^K \beta_{ki} X_{mi,t} + \mu_{i,t} \tag{5}$$

Initially, the equation (4) is projected by applying the ordinary least square method and ε_{it} (residuals) are further used to estimate the following equation:

$$\hat{\varepsilon}_{i,t} = \varphi_i \hat{\varepsilon}_{i,t-1} + \gamma_{i,t} \tag{6}$$

In the equation, (6) φ_i are the AR parameters and $\gamma_{i,t}$ are the error terms. The null hypotheses of (6) are given as:

$$H_0: \varphi_i = 1 \text{ Where } i = 1, 2, 3, \dots, n \tag{7}$$

There will be no cointegration if the null hypothesis is accepted, while a cointegrating relationship exists between cross-sections of the panel if the null hypothesis is rejected. Pedroni developed seven different cointegration statistics to test the null hypothesis in the heterogeneous panel data set framework. The test has two categories. The first is the "within dimension" that does not allow heterogeneity across countries. The alternative hypothesis is "Cointegration within dimension" against the null hypothesis that is given below:

$$H_0: \varphi_i = \varphi < 1 \forall i \ (i = 1, 2, 3 \dots, n) \tag{8}$$

The second is the group mean statistics "between dimensions" that allows heterogeneity across countries. The alternative hypothesis is "Cointegration between dimensions" against the null hypothesis that is given below:

$$H_0: \varphi_i < 1 \forall i \ (i = 1, 2, 3 \dots, N) \tag{9}$$

The null hypotheses for both "within dimension" and "between dimensions" is the same, while the alternative hypotheses are different for both categories.

Individual long-run projections are still being made as part of this research. As a result, Pedroni (2001) Fully Modified Ordinary Least Square (FMOLS) method is used. In small samples, the FMOLS method provides accurate parameter estimates while accounting for regressor

endogeneity and serial correlation. The presence of a constant term and a plausible association between the error term and regressor differences were considered by FMOLS.

A panel of SAARC (Nepal, India, Bhutan, Bangladesh, Sri Lanka, and Pakistan) and ASEAN (Cambodia, Indonesia, Philippines, Malaysia, Thailand, and Singapore) countries is taken for the period 2005-2019 to make the empirical analysis. The data on all variables are taken from the World Development Indicators (WDI), the World Bank database. All variables, their description, measurement, and the sources of the data are given in Table 1.

Table 1
Description of the Variables

| Variables | Description | Measurement | Source |
|-----------|--|--|---|
| logGDPpc | Logarithmic formation of Gross Domestic Product per capita | Per Capita PPP at current international USD (\$) | World Development Indicators (WDI), World Bank database |
| Edu_Exp | Government Expenditures on Education | The percentage share of GNI | |
| H_Exp | Government Expenditures on Health | The percentage share of GDP | |
| GFCG | Gross Fixed Capital Formation | The percentage share of GDP | |
| LogLF | Logarithmic form of Labor Force | The growth rate of the Labour Force | |
| Trd | Trade Volume | The percentage share of GDP | |
| Inf | Inflation | Consumer Price Index | |

Source: Author's Construction

4. Empirical Findings

This section provides detailed information regarding the research findings where the research findings are segmented into two parts 1) graphical analysis, and 2) regression analysis. In the first part, a graphical practice has been made to know the trends of the macroeconomic indicators of the SAARC and ASEAN economies that will effectively help to make some better understanding of the macroeconomic trends. In the second part, research outcomes have been marked by making the regression analysis.

4.1. Graphical Analysis

In the graphical analysis, different macroeconomic indicators have been targeted to analyze the trend of those variables in ASEAN and SAARC countries. The SAARC countries have on average greater GDP growth (5.89 percent) than the ASEAN countries (5.54 percent) for the given average period (See Figure 1). Thailand and Nepal are on the bottom line because of the least economic growth in their respective regions.

Education and health expenditures are the sources of human capital generation for the economies. In this prospect, the average spending on education/health in ASEAN countries is 3.27/1.55 percent of the GDP. In comparison, the SAARC countries have average spending on education/ health are 3.30/1.20 percent of their GDP (See Figures 2 and 3). Malaysia and Bhutan are at the top in their respective regions to generate the fiscal space for educational purposes. Thailand and Bhutan are at peak in their respective regions to allocate the funds for health purposes. In regression analysis, it will expect to have a positive association with the GDP growth.

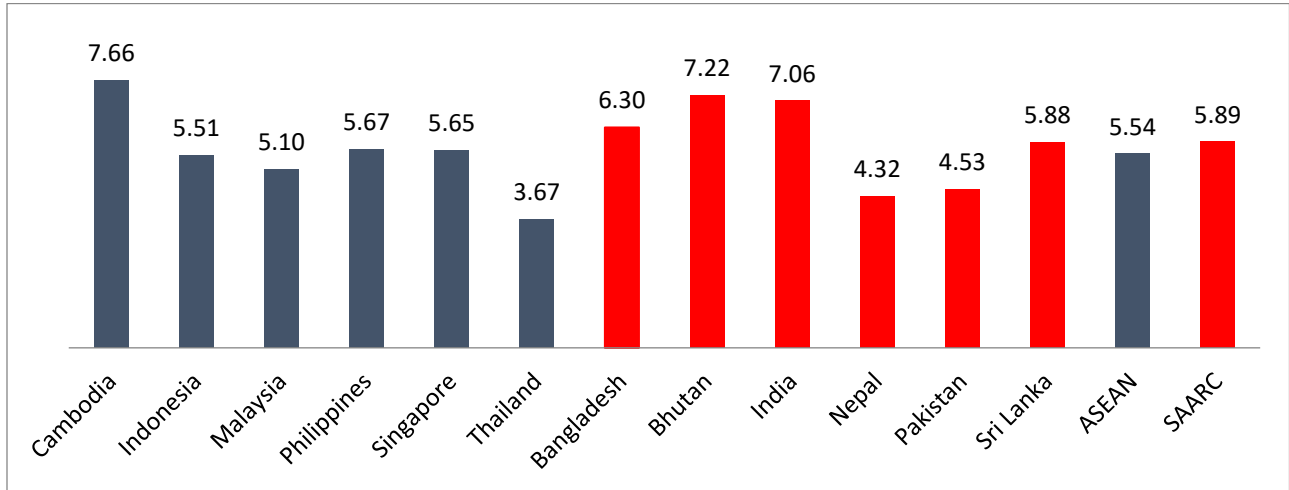


Figure 1: GDP Growth (Annual Percent)

Source: Author's Construction

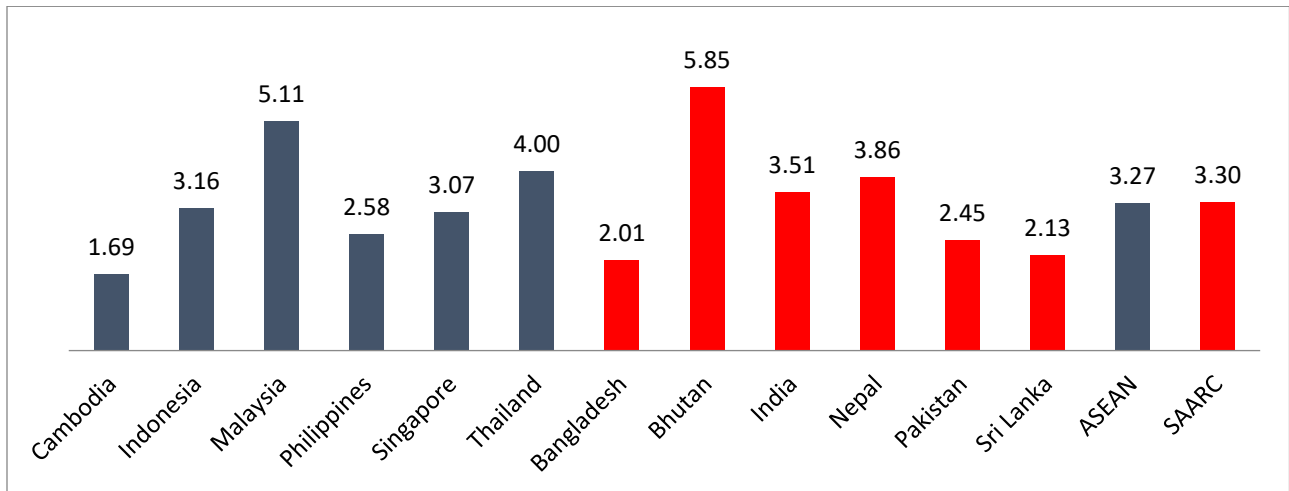


Figure 2: Education Expenditures (Percentage of GDP)

Source: Author's Construction

The gross fixed capital formation is the input factor and is effective for output generation. The gross fixed capital formations are 24.04 and 29.36 percent of the respective GDP in ASEAN and SAARC countries (See Figure 4). Specifically, Indonesia and Bhutan have the greatest share of gross fixed capital formation in their respective region.

From figure 5, the average inflation rate in ASEAN countries is 3.79 percent, while the SAARC countries have 7.34 percent. Partially the SAARC countries are showing higher inflation rates than the ASEAN ones. Nominally there is an expectation of a higher GDP in SAARC economies as compared to the ASEAN economies.

As for as Labor force participation is concerned, figure 6 highlights that the ASEAN countries have a greater share of labor (71.98 percent) participation for output generation than the SAARC countries, where the participation is 62.96 percent. Overall, the labor force participation rate is high which is the symbol of output enhancement and the growth of these countries.

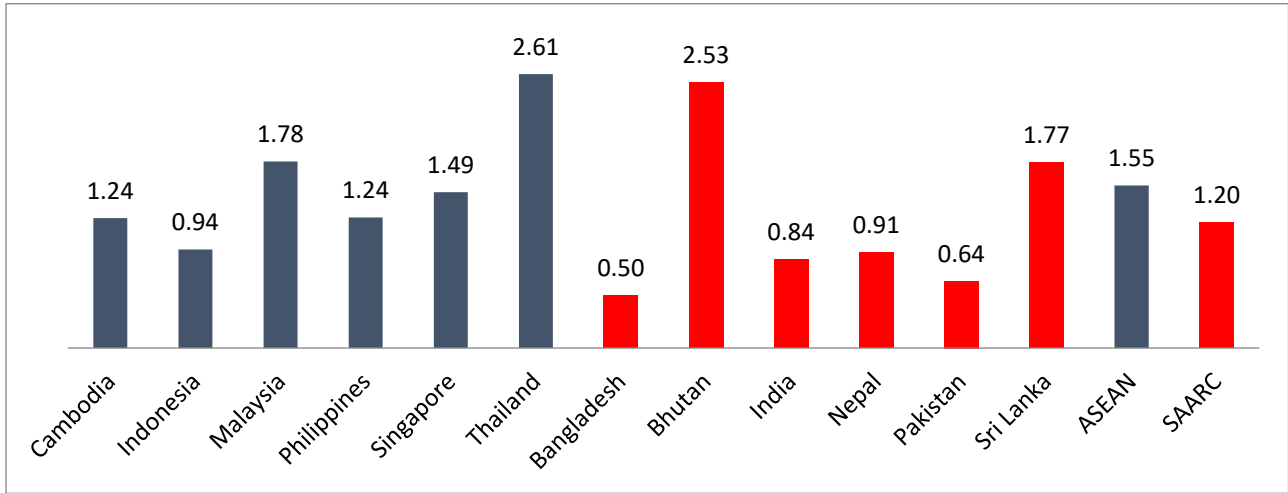


Figure 3: Health Expenditures (Percentage of GDP)

Source: Author's Construction

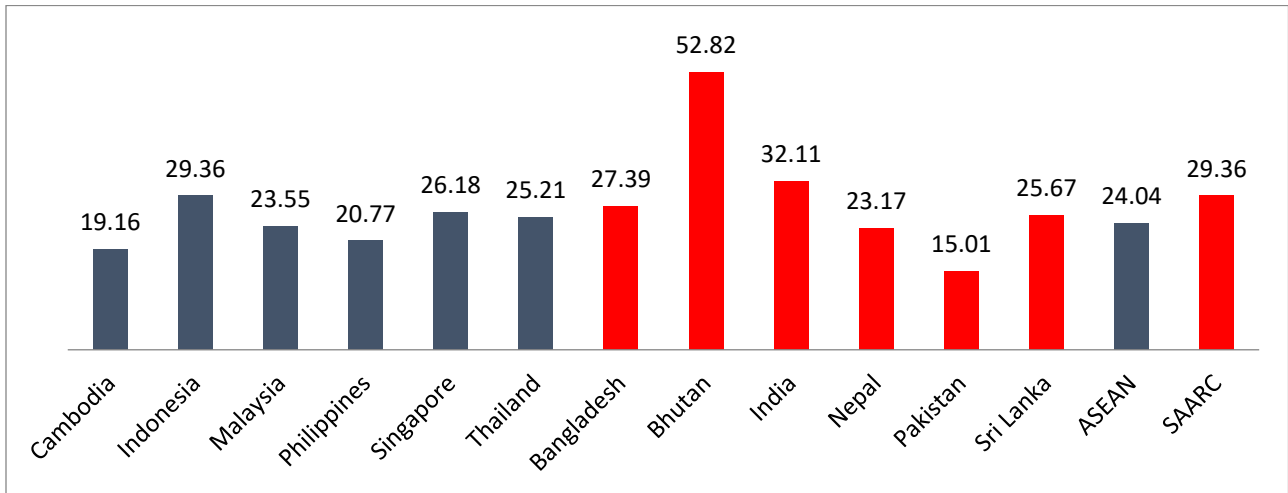


Figure 4: Gross Fixed Capital Formation (Percentage share of GDP)

Source: Author's Construction

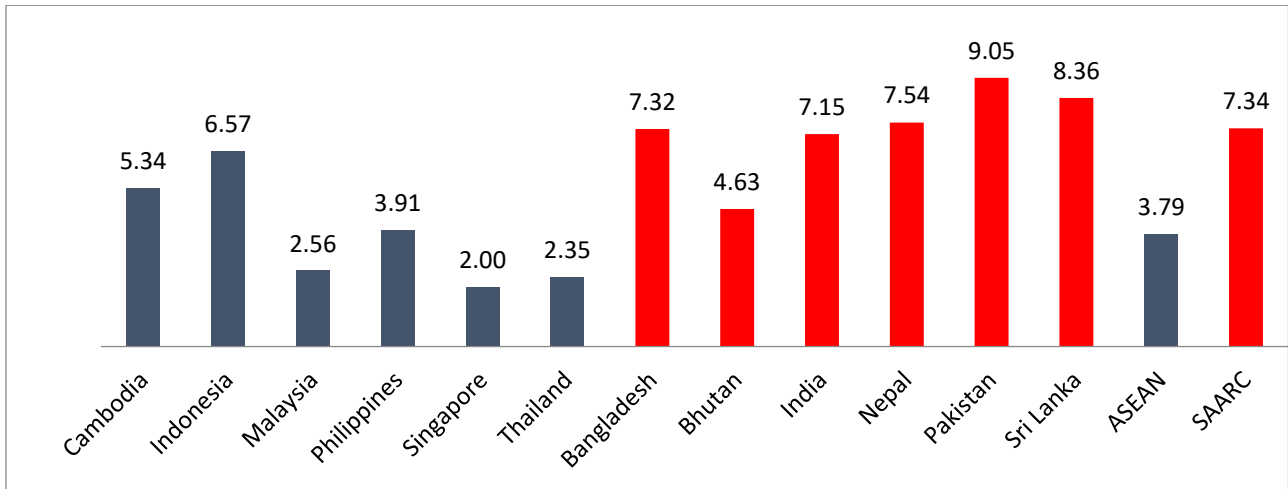


Figure 5: Inflation Rate (Annual)

Source: Author's Construction

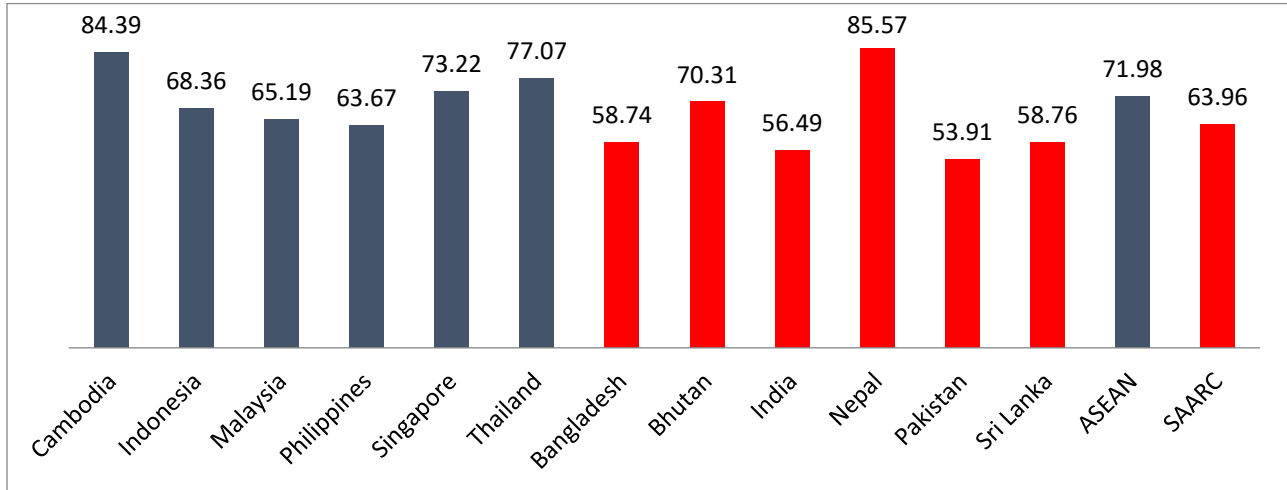


Figure 6: Labor Force Participation Rate (% share of Total Population age 15-64)

Source: Author's Construction

4.2. Regression Analysis

As per the findings from the unit root test, all regressors are non-stationary at $I(0)$ (Level) but become stationary at $I(1)$ (first difference). It is predicted that the variables will be integrated in the first order $I(1)$. According to Table 2, the Im, Pesaran, and Shin W-stat test describe that all the variables are stationary at the first difference [$I(1)$]. Moreover, the ADF - Fisher Chi-square and PP - Fisher Chi-square tests are used to check the robustness of the unit root findings. The results endorse the previous findings from Im, Pesaran, and Shin W-stat test. According to the FMOLS model's precondition (all variables should be integrated on order (1), the FMOLS method applies to empirical analysis.

Table 2
Panel Unit Root

| Variables | Pesaran and Shin | | ADF - Fisher | | PP - Fisher | |
|-----------|-------------------|---------------------|-------------------|--------------------|-------------------|--------------------|
| | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) |
| | t-stat (Prob) | t-stat (Prob) | t-stat (Prob) | t-stat (Prob) | t-stat (Prob) | t-stat (Prob) |
| logGDPpc | 0.737 (1.000) | -4.585 (0.000)* | 5.336 (1.000) | -3.741 (0.000)* | 0.737 (0.945) | -2.452 (0.000)* |
| Edu_Exp | -0.105 (0.458) | -8.755 (0.000)* | -0.315 (0.958) | -4.694 (0.000)* | -0.007 (0.756) | -6.314 (0.000)* |
| H_Exp | 0.403 (0.657) | -7.729 (0.000)* | 0.273 (0.842) | -5.104 (0.000)* | 1.041 (0.604) | -9.269 (0.000)* |
| GFCG | -0.697 (0.243) | -5.409 (0.000)* | -0.392 (0.347) | -3.981 (0.000)* | -1.009 (0.945) | -6.017 (0.000)* |
| LogLF | 1.160 (1.000) | -3.266 (0.000)* | 1.174 (0.412) | -5.092 (0.000)* | 0.860 (.904) | -4.992 (0.000)* |
| Trd | -0.094 (0.462) | -7.385 (0.000)* | -0.081 (0.973) | -2.994 (0.000)* | -1.082 (0.791) | -6.083 (0.000)* |
| Inf | -0.845 (0.199) | -10.857 (0.000)* | -0.946 (0.364) | -9.480 (0.000)* | -0.706 (0.213) | -9.064 (0.000)* |

Note: * shows that the values are significant at a 1% percent level of significance.

Source: Author's Estimation

In regression analysis, the investment in human capital generation through education expenditures plays a significant role in economic development. The results in Table 3 describe

that education expenditures are significant in SAARC and ASEAN countries partially and overall. There is a significant positive association between health expenditures and economic development in ASEAN countries' perspective but converse and insignificant association in SAARC countries. Overall, health spending and economic growth have a considerable and favorable relationship. The gross fixed capital formation contributes positively to both (SAARC and ASEAN) countries' economic development. It reveals that capital accumulation and investments are significant for determining economic development for the concerned economies separately and overall. Inflation is likely to rise when an economy grows (Fabayo & Ajilore, 2006).

The findings support this theory because inflation and economic growth have a positive and significant link. In both partial regression and overall analysis, labor force participation is a key factor in boosting economic growth. It predicts that labor force participation is a driving force to enhance the economic development in the given economies. The trade volume is proxied by summing the imports and exports of the concerned states. The empirical findings show that the trade volume is important for determining economic growth, but there is a negative sign for SAARC states and a positive sign for ASEAN states. It reveals that imports are greater than the exports in proportion to SAARC states and negatively contribute to economic growth. Because of the greater proportion of ASEAN states' exports, there is a positive contribution to their economic development. Overall, the impact of trade volume is negative because of the greater import volume of the SAARC countries.

Table 3
Fully Modified Ordinary Least Square (FMOLS) Method

| Variable | SAARC | ASEAN | Overall |
|----------------------|----------------------|---------------------|----------------------|
| | Coeff (Prob) | Coeff (Prob) | Coeff (Prob) |
| Edu_Exp | (0.112) (0.000)* | (0.571) (0.002)* | (0.079) (0.000)* |
| H_Exp | (-0.013) (0.117) | (0.399) (0.013)* | (0.047) (0.001)* |
| GFCG | (0.011) (0.000)* | (0.159) (0.041)* | (0.011) (0.000)* |
| Inf | (0.012) (0.001)* | (0.031) (0.038)* | (0.013) (0.002)* |
| LF | (0.018) (0.003)* | (0.037) (0.000)* | (0.021) (0.024) |
| TRD | (-0.001) (0.014)* | (0.011) (0.005)* | (-0.003) (0.011)* |
| R-squared | 0.869 | 0.999 | 0.965 |
| R-squared (Adjusted) | 0.849 | 0.999 | 0.962 |
| S.E. of regression | 0.217 | 0.024 | 0.198 |
| Long-run variance | 0.002 | 0.001 | 0.001 |

Note: * shows the significance values at a 5 percent level of significance. Countries: Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka Cambodia, Indonesia, Malaysia, Philippines, Singapore, and Thailand.

Source: Author's Construction

In the descriptive analysis, the coefficient of determination is about to determine 86.9 percent and 99.9 percent economic development by the explanatory variables in the SAARC and ASEAN countries, respectively. Overall, the explanatory measures determine 96.5 percent of the economic development of the SAARC and ASEAN countries.

Table 4 highlight the results regarding the long-run equilibrium relationship among the variables. It is found that the statistics are statistically insignificant with no trend but are significant by introducing the trend and intercept within the dimension and between the dimension. It reveals a long-run association between explanatory variables (education

expenditures, health expenditures, gross fixed capital formation, etc.) and the explained variable (economic growth).

Table 4
Pedroni Cointegration Test

| Economic Growth (GDP) | | |
|------------------------------|--------------------------|----------------------------|
| | No Trend | Intercept and Trend |
| Within Dimension | t-stat (Prob) | t-stat (Prob) |
| Panel v-statistics | -3.876 (0.998) | 1.581 (0.056)** |
| Panel rho-statistics | 3.319 (0.998) | 4.486 (1.000) |
| Panel PP-statistics | 0.963 (0.831) | -5.257 (0.000)* |
| Panel ADF-statistics | 0.236 (0.594) | -4.667 (0.000)* |
| Between Dimension | | |
| Group rho-statistics | 4.823 (1.000) | 6.197 (1.000) |
| Group PP-statistics | 0.207 (0.583) | -7.203 (0.000)* |
| Group ADF-statistics | 0.498 (0.691) | -3.355 (0.000)* |

Note: * and ** show that the values are significant at 1% and 5% significance levels, respectively.

Source: Author's Estimation

5. Conclusion and Policy Recommendations

This research has intentions to determine the connection between human/physical capital investment and economic growth across developing economies. A panel data set is targeted by considering six countries from SAARC (India, Sri Lanka, Nepal, Bhutan, Bangladesh, and Pakistan) and six countries from ASEAN (Cambodia, Indonesia, Malaysia, Philippines, Singapore, and Thailand) for the period 2005-2019. The health/education spending and gross fixed capital formation are the key factors for the human and physical capital investment to determine the economic growth for the concerned economies because of the sufficient existing literature for the SAARC and ASEAN regions.

The findings show that the human/physical capital accumulation through enhancing the spending on education and health plays a noteworthy role in economic growth in SAARC and ASEAN economies separately and overall. Moreover, the gross fixed capital formation is momentous for economic growth. The inflationary trends and the labor force participation rate in the economies contribute positively to economic development. The trade volume is a significant force for the economic growth until the export proportion will be greater than imports. The Pedroni test for cointegration highlights a long-run association between human/physical capital investment and economic growth in such economies.

This study has tried to cover the research objectives appropriately but there are a few limitations of this study that as the data availability issue. Due to lack of data availability, only 12 selected countries were included in this research from SAARC and ASEAN regions. Additional macroeconomic factors that might more accurately reflect the relationship between human capital and economic growth could be introduced in future studies, which would be inspirational.

In policy recommendations, there is a need to improve the fiscal budget for the health and education sector that will ultimately enhance the economic growth of the concerned economies. Meanwhile, the governments need to look at the investments that will suggestively contribute to the trade volume and lead to economic development. Because of the unavailability of the data set of different states, only six countries are taken from SAARC, and six countries are taken from ASEAN.

Authors Contribution

Muhammad Mansha: literature search, data analysis, data interpretation, methodology, drafting
Xiuyun Yang: critical revision, incorporation of intellectual content

Ahmed Raza ul Mustafa: study design and concept, drafting, reviewing and proofreading

Muhammad Mubashar Naseem: graphical analysis, data collection, results and discussion

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

References

- Abbas, Q., & Mujahid-Mukhtar, E. (2000). The role of human capital in economic growth: a comparative study of Pakistan and India [with Comments]. *The Pakistan development review*, 39(4), 451-473.
- Adeyemi, P. A., & Ogunsola, A. J. (2016). The impact of human capital development on economic growth in Nigeria: ARDL approach. *IOSR Journal of Humanities and Social Science*, 24(1), 34-41. doi:<https://doi.org/10.9790/0837-2401063441>
- Akpolat, A. G. (2014). The long-term impact of human capital investment on GDP: a panel cointegrated regression analysis. *Economics Research International*, 2014(August), 646518. doi:<http://dx.doi.org/10.1155/2014/646518>
- Alataş, S., & Çakir, M. (2016). The effect of human capital on economic growth: A panel data analysis. *Yönetim Bilimleri Dergisi*, 14(27), 539-555.
- Ali, H. S., Yusop, Z. B., & Hook, L. S. (2015). Financial development and energy consumption nexus in Nigeria: An application of autoregressive distributed lag bound testing approach. *International Journal of Energy Economics and Policy*, 5(3), 816-821.
- Ali, M., Egbetokun, A., & Memon, M. H. (2018). Human capital, social capabilities and economic growth. *Economies*, 6(1), 1-15. doi:<https://doi.org/10.3390/economies6010002>
- Awan, A. G., & Kamran, A. (2018). Testing and Assessment of large classes in English Language. *Global Journal of Management, Social Sciences and Humanities*, 3(4), 622-650.
- Barro, R. J., & Lee, J.-W. (1993). International comparisons of educational attainment. *Journal of monetary economics*, 32(3), 363-394. doi:[https://doi.org/10.1016/0304-3932\(93\)90023-9](https://doi.org/10.1016/0304-3932(93)90023-9)
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of political economy*, 70(5, Part 2), 9-49. doi:<https://doi.org/10.1086/258724>
- Bentour, E. M., & Fund, A. M. (2020). *The effects of human capital on economic growth in the Arab countries compared to some Asian and OECD countries*. Retrieved from United Arab Emirates:
- Bunyamin, F. (2021). The Impact of Physical Capital and Human Capital (Level of Education) on Growth in Indonesia. Available at SSRN 3853444. doi:<http://dx.doi.org/10.2139/ssrn.3853444>
- Chani, M. I., Sheikh, M. R., Mansha, M., Abbas, A., & Iqbal, J. (2021). Impact of human capital investment on economic growth in muslim and non-muslim asian countries. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(4), 5227-5247.

- Chuang, J., & Sollenberger, N. (2000). Beyond 3G: Wideband wireless data access based on OFDM and dynamic packet assignment. *IEEE Communications Magazine*, 38(7), 78-87. doi:<https://doi.org/10.1109/35.852035>
- Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: journal of the Econometric Society*, 49(4), 1057-1072. doi:<https://doi.org/10.2307/1912517>
- Ding, X., Huang, Y., Gao, W., & Min, W. (2021). A Comparative Study of the Impacts of Human Capital and Physical Capital on Building Sustainable Economies at Different Stages of Economic Development. *Energies*, 14(19), 6259. doi:<https://doi.org/10.3390/en14196259>
- Eggoh, J., Houeninvo, H., & Sossou, G.-A. (2015). Education, health and economic growth in African countries. *Journal of Economic Development*, 40(1), 93-111.
- Fabayo, J. A., & Ajilore, O. T. (2006). Inflation: How much is too much for economic growth in Nigeria. *Indian Economic Review*, 41(2), 129-147.
- Frank, N. (2018). Making the grade: The contribution of education expenditure to economic growth. *Undergraduate Economic Review*, 14(1), 11-25.
- Funke, M., & Strulik, H. (2000). On endogenous growth with physical capital, human capital and product variety. *European Economic Review*, 44(3), 491-515. doi:[https://doi.org/10.1016/S0014-2921\(98\)00072-5](https://doi.org/10.1016/S0014-2921(98)00072-5)
- Halder, D., Kumar, S., & Mallik, G. (2010). Does human capital cause economic growth? A case study of India. *International Journal of Economic Sciences and Applied Research*, 3(1), 7-25.
- Huang, X., Tang, L., Peng, Y., & Xiao, Z. (2015). Mathematical Models and Effectiveness Analysis of Government Education and Health Expenditures on Economic Growth. *The Open Cybernetics & Systemics Journal*, 9(1), 1409-1415. doi:<http://dx.doi.org/10.2174/1874110X01509011409>
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74. doi:[https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- Iqbal, L., Awan, A. G., & Tayyab, M. (2018). Impact of health and education on the level of productivity: evidence from Pakistan. *Global Journal of Management, Social Sciences and Humanities*, 4(4), 933-947.
- Jameel, S., & Naeem, M. Z. (2016). Impact of human capital on economic growth: A panel study. *Bulletin of Business and Economics (BBE)*, 5(4), 231-248.
- Keji, S. A. (2021). Human capital and economic growth in Nigeria. *Future Business Journal*, 7(1), 1-8. doi:<https://doi.org/10.1186/s43093-021-00095-4>
- Liao, L., Du, M., Wang, B., & Yu, Y. (2019). The impact of educational investment on sustainable economic growth in Guangdong, China: A cointegration and causality analysis. *Sustainability*, 11(3), 766. doi:<https://doi.org/10.3390/su11030766>
- Marshall, A. (1920). *Principles of Economics*: Cosimo, Inc.
- Nelson, R. R., & Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. *The American economic review*, 56(1/2), 69-75.
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1), 653-670. doi:<https://doi.org/10.1111/1468-0084.0610s1653>
- Pedroni, P. (2001). Fully modified OLS for heterogeneous cointegrated panels. In B. H. Baltagi, T. B. Fomby, & R. Carter Hill (Eds.), *Nonstationary panels, panel cointegration, and dynamic panels* (Vol. 15, pp. 93-130). Bingley: Emerald Group Publishing Limited.
- Pelinescu, E. (2015). The impact of human capital on economic growth. *Procedia Economics and Finance*, 22, 184-190. doi:[https://doi.org/10.1016/S2212-5671\(15\)00258-0](https://doi.org/10.1016/S2212-5671(15)00258-0)
- Perron, P. (1990). Testing for a unit root in a time series with a changing mean. *Journal of Business & Economic Statistics*, 8(2), 153-162.

- Pescu, M., & Stefan, C. (2016). The effects of gaps and disparities on economic growth. A study of 10 former socialist countries from Central Eastern Europe, members of the EU. *Amfiteatru Economic*, 18(43), 592-610.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political economy*, 94(5), 1002-1037. doi:<https://doi.org/10.1086/261420>
- Romer, P. M. (1990). Endogenous technological change. *Journal of political economy*, 98(5, Part 2), S71-S102. doi:<https://doi.org/10.1086/261725>
- Schultz, T. W. (1961). Investment in human capital. *The American economic review*, 51(1), 1-17.
- Solow, R. M. (1994). Perspectives on growth theory. *Journal of economic perspectives*, 8(1), 45-54. doi:<https://doi.org/10.1257/jep.8.1.45>
- ul Mustafa, A. R., Abro, A. A., & Awan, N. W. (2021). Social Protection and Economic Growth: An Empirical Analysis for Emerging Economies. *Elementary Education Online*, 20(5), 6932-6932. doi:<https://doi.org/10.17051/ilkonline.2021.05.781>
- ul Mustafa, A. R., & Nishat, M. (2019). Dynamics of social protection in context of structural and institutional performances: A disaggregate analysis for Pakistan. *Business and Economic Review*, 11(1), 31-53. doi:<http://dx.doi.org/10.22547/BER/11.1.2>
- ul Mustafa, A. R., Nishat, M., & Abro, A. A. (2022). Social Protection Spending in Context of Structural and Institutional Performance: A Global Empirical Analysis. *Social Indicators Research*, 1-25. doi:<https://doi.org/10.1007/s11205-022-02933-6>
- Uzawa, H. (1965). Optimum technical change in an aggregative model of economic growth. *International economic review*, 6(1), 18-31. doi:<https://doi.org/10.2307/2525621>
- Wang, Y., & Liu, S. (2016). Education, human capital and economic growth: Empirical research on 55 countries and regions (1960-2009). *Theoretical Economics Letters*, 6(2), 347-365.