



Relationship between Health Expenditure and GDP in an Augmented Solow Growth Model for Pakistan: A Multivariate Analysis of Short and Long Run

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ABSTRACT

The purpose of this paper is to contribute to this debate. It is achieved by Relationship between Health Expenditure and GDP in an Augmented Solow Growth Model for Pakistan. This paper uses the 1985 to 2015 time series data to assess the relationship between the health expenditure and GDP. The Cobb-Douglas function is initially use than Augmented Solow Growth Model has been used to estimate the relationship between health Expenditure have been deployed. Data analysis shows that there is a positive correlation between the Health expenditure and GDP, which is conducive to all previous expectations

Thus, this evidence provides support for the "positive impact" of the debate and provides some guidance on how policy reform should focus on strengthening the performance of the Pakistani Health Expenditure through Augmented Solow Growth Model. In addition, the evidence for this study provides some guidance on policy reforms to improve Pakistan's microfinance performance.

KEY WORDS: Health expenditure, GDP, Solow Growth

INTRODUCTION

Background:

Endogenous growth model emphasizes the importance of human capital to economic growth and development. Health is an important determinant of economic development; a healthy population means higher productivity and hence higher per capita income. The importance of human capital to economic growth can not be overemphasized, because it is a catalyst for economic development. The contribution of health expenditure to economic development stems from the health-led growth hypothesis. It considers health to be capital; therefore, investing in health can result in increased labor productivity, which in turn increases income and thus increases the welfare of the population. Bloom and Canning emphasize that motivation for developing new skills and knowledge is higher when the workforce is healthy because they want long-term benefits. However, when the workforce is characterized by poorly healthy workers, productivity will be adversely affected, which explains the development gap between different regions of the world. Fifty percent of the economic growth gap between developing and developed countries is due to poor health and low life expectancy [14].

Health is not only its own priority but also an indispensable element for sustained economic growth and development. Not only policy analysts but also sub-Saharan African governments have greatly underestimated the importance of spending for health. The role of health in influencing economic outcomes has been well understood, especially at the micro level. For example, healthier workers may be able to work longer hours, generally more productive than healthy relatives, and thus be able to earn higher incomes than the latter, all else being equal; diseases and diseases shorten people's work life , Thus reducing their lifetime's income [7].

Unhealthy nations incline to be poor, and poor nations incline to be unhealthy. Through the comprehensive way of past, perfections in flourishing economy have come with improvements in health. Health is a sort of social assets along with an input to generating additional kinds of humanoid assets. Actuality unhealthily weakens the capability to work efficiently and the capability and encouragements to finance in human capital.

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An essential element of the development of human capital is to boost the health of the population. Life expectancy, increasing labor supply and its productivity can be achieved by enhancing the health of a country in all its segments, other forms of human capital particularly education investment and its productivity can be increased. Subsequently health and health enhancements are related to socioeconomic conditions, it is essential to assess the effects of these variables by providing of health services. Because of externalities, market failures and the capability of maximum of the population to pay, the health sector essentials government involvements [12].

Robert Solo is seriously taken by this study. It is offered by Solo in 1956 in his classic article that we started to examine economic growth by taking regular neoclassical production functions and lessening capital yields. The populace growth ratio and saving proportion are served as extraneous, and he recommends that these two variables analyzed the steady state of per capita income levels. Altered countries achieve different levels of constancy, as countries' savings and population growth amounts differ. It is simply predicted by Solow's model, that how income stability is affected by these variables. The greater the savings speed, wealthier the country. The poorer the country as greater the population growth rate [3].

Hence, by including the addition of human and material capital, Solow model can be enlarged. The omission of human capital from the typical Solow model can explicate why the assessed effect of savings and population growth seems to be more over huge because of two causes. Firstly, for somewhat specified rate of human capital accretion, lesser population growth, and more savings rate will raise income levels, thus income is affected by tangible capital and population growth. Secondly, ignoring the accumulation of human capital diverges from the assessed amounts of savings and population growth. Afterwards developing and estimating the improved Solow model, a problem has been come that has been taken critically in current years: the disaster of national per capita income. Convergences is not been expected in this study. By dissimilarity, it is predicted by Solow model that different countries frequently attain altered steady states. An extensive range of non-converged countries have been traditionally studied in the past. It is concluded that once the storage and population growth rate differences, then the amount of convergence the model is roughly the same [6].

Subsequently the classic initiating work by Solow (1956), substantial development has been made in the hypothetical and pragmatic literature of the endogenous growth model. By considering the savings rate and population growth rate exogenous, to examine economic growth by supposing a neoclassical production function and a reduction in the rate of return on capital, this preliminary work is done. Human capital has been added in the models known as the MRW models by [6]. Subsequently, human capital is a significant element in estimating growth has been found by [7]. Likewise [3] have also investigated the important influence of the association amongst human capital and openness as an amount of the state's capability to rivet technical advancement and total factor productivity has been substantially affected. Developments in population health are an essential part of human capital formation has been considered as a critical issue by [12].

Research questions:

Many questions arise after study literature on Augmented Growth. How Augmented Growth Model effect GDP in Pakistan? How income (GDP) of the country effect Growth model? How Augmented play its role in the growth of developing country like Pakistan. This study tried to find out the answers of some of these questions.

Rationale of the study:

Problem statement:

Augmented Growth plays vital role in economic growth and development of a county. It is the supply of funds for investment projects of a country. If there is regular supply of Growth available for investors, there would be smooth business operations and hence would result in expansion of productive capacity of an economy. If there is expansion of productivity at higher sustained rate. With opening of new and new employment opportunities of a country, unemployed labor would be absorbed in production process and thereby increase the overall productivity of inputs. As standard of living directly depends on rate of expansion of national economy, therefore, national economy would share the aggregate prosperity among the neglected and marginalized segment of the society.

Significance of Study:

The healthiness of a country should be improved by enhancing the productivity of further kinds of human capital, especially investment in education, thus shifting the labor supply curve outer and increasing labor output [15].

The Health Capital Augmented Growth Model

We first specify two factors from the Cobb-Douglas production function, namely, capital and labor.

$$Y_t = K_t^\alpha A_t L_t^{1-\alpha} \quad (1)$$

If Y_t is the actual income, K_t is the physical capital, L_t is the labor force, and A_t is the technical parameter level, reflecting how a country in the input into the output. At specified as

$$\ln A_t = \Pi X_t \quad (2)$$

Wherever the constraint trajectory to be estimated is ΠX_t is the vector of the variable that determines the total factor productivity (TFP). The trajectory X_t comprises the logarithmic level of economic openness O_t , because the countries that are much exposed to the respite of the sphere have more ability to engross the technological developments created by principal countries (Romer, 1992; Barro and Sala-i-Martin, 1995). Then For simplicity, it is supposed that the labor force is defined as "a" for exogenous growth.

$$L_t = L_0 e^{at} \quad (3)$$

Explaining $k_t = (K_t / L_t)$ and $y_t = Y_t / L_t$ as the capital stock and level of yield each unit of labor correspondingly, the transformation of capital is done as

$$\dot{K}_t = \omega_t^k y_t - (\alpha + \delta) k_t = \omega_t^k k_t^\alpha - (\alpha + \delta) k_t \quad (4)$$

Where a point shows change over time, ω_t^k is part of tangible capital investment in period t , and δ is depreciation rate. The capital stock (k_t) congregates to the stable state rate of assets (k_t^*) as

$$k_t^* = [\omega_t^k / (n + g + \delta)]^{1/(1-\alpha)} \quad (5)$$

Relieving the rate of k_t^* from (4) in (1) and by taking natural logs on equal edges, the firm state income each capita is inscribed as:

$$\ln y_t = \beta_0 + \frac{\alpha}{1-\alpha} \ln \omega_t^k - \frac{\alpha}{1-\alpha} \ln(n + g + \delta) + \varepsilon_t \quad (6)$$

Where β_0 is the intercept and ε_t is an error term. Equation (6) is a shortened arrangement of the Solow model, then is applied as a fundamental model in pragmatic norms (see, e.g [5]). Far along, social capital was incorporated into another investment. Increasing the human capital in the growth model demonstrated to be suitable for predicting the size of the capacity and the extent of the alpha, and the exclusion of human capital resulted in normative bias. From (1) production function could be inscribed as:

$$Y_t = K_t^\alpha H_t^\beta A_t L_t^{1-\alpha-\beta} \quad \alpha + \beta < 1 \quad (7)$$

Adding to the physical capital in equation (3), H is the human capital stock (representing the mediocre level of education). The standard of humanoid capital growth depends on:

$$\dot{h}_t = \omega_t^h y_t - (\alpha + \delta) h_t = \omega_t^h h_t^\beta - (\alpha + \delta) h_t \quad (8)$$

Where ω_t^h part of the human capital investment is in the period t $h_t = \left(\frac{H_t}{L_t}\right)$ is the humanoid capital each unit of labor. Thus, equation (6) is now written as:

$$\ln y_t = \beta_0 + \frac{\alpha}{1-\alpha-\beta} \ln \omega_t^k + \frac{\beta}{1-\alpha-\beta} \ln \omega_t^h - \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n + g + \delta) + \varepsilon_t \quad (9)$$

Alike to humanoid capital appreciation, the Solow model could be expanded to healthiness investments. The advancement of health spending depends on.

$$\dot{e}_t = \omega_t^e y_t - (\alpha + \delta) e_t = \omega_t^e h_t^\gamma - (\alpha + \delta) e_t \quad (10)$$

In the period t , where part of the health capital investment ω_t^e is produced and $e_t = (\frac{E_t}{L_t})$ is the humanoid capital for each unit of labor. Equation (9) is inscribed as:

$$\ln y_t = \beta_0 + \frac{\alpha}{1 - \alpha - \beta - \gamma} \ln \omega_t^k + \frac{\beta}{1 - \alpha - \beta - \gamma} \ln \omega_t^h + \frac{\gamma}{1 - \alpha - \beta - \gamma} \ln \omega_t^e - \frac{\alpha + \beta + \gamma}{1 - \alpha - \beta - \gamma} \ln(n + g + \delta) + \varepsilon_t \quad (11)$$

The model in equation (10) could be assessed using OLS. In the new theory of endogenous growth, some people think that the degree of technological progress has increased with the increase in the degree of openness of the country. Taking into account this view, openness variables (by trade intensity agents) are too encompassed in the model to capture the impact of technological advancement. It would also weaken the normative prejudice and rise the strength of the induced reasoning. Likewise, the increase in humanoid capital and health capital and physical capital also improved the enactment of the Solow model. Investment in human, health and physical capital is anticipated as having affirmative impact on each capita income. Correspondingly, openness variables are anticipated as having a progressive impact on each capita income. It supports to eliminate the deficiency of technical demand, increase the size of the marketplace or the accessibility of production expertise to the impact of revolution, resulting in higher per capita income.

REVIEW OF LITERATURE

The sequential relationship amongst GDP and health expenses each capita for Pakistan in an augmented Solow growth model proposed by [6] for the dated of 1973-2001 was estimated by Aurangzeb (2002). Co-integration, ECM analysis and many investigative and condition tests have been used in this analysis. A substantial and positive association amongst gross domestic production and Health Expenses, both in the long- and short-run has been resulted in this study. The data has been attained from different publications of the Economic Survey of Pakistan and Arithmetical Additions issued by the Ministry of Finance. Co-integrating vectors between the variables of equation has been analyzed by estimating null hypothesis. The presence of a robust and constant long-run association between variables in the growth model has been confirmed by Johansen co-integration test. ECM technique has been applied to evade the specious regression phenomenon and its estimations, presence of a short- and long-term positive and important association amongst health expenses and economic growth. The measurements and diagnostic test give suitable consequences. Henceforth an addition of health expenses as a substitution for investment in health capital also increase the importance of the measurements of humanoid and physical assets in the growth model.

[3] analyzed the Solow growth model, whether it is reliable with the worldwide disparity in the standard of living or not. It is showed that an augmented Solow model including accretion of human and physical capital offers an outstanding picture of the cross-country data. The associations of the Solow model for conjunction in ethics of living, that, whether deprived nations incline to develop quicker than developed states have been analyzed in this study. It is concluded by results that Countries congregate at the same rate that augmented Solow model forecasts keeping population growth and capital accretion persistent. To analyses the augmented Solow, a proxy for human-capital accumulation is used as an entrains our cross-country analysis. The data is encompassed by real income, government and private consumption, investment and population, practically for the whole sphere except centrally premeditated economies. Annually data for the period 1960-1985 has been used for estimation.

Outdoor assessments of physical and humanoid capital stocks route the growth secretarial deteriorations implicit by a Cobb Douglas cumulative production function was done. It has been resulted in this study that human capital appears unimportantly in describing per capita growth rates, but indicated a progressive role for human capital. At finest, though, registration ratios symbolize investment heights in human capital. It is explained in this study that literacy variable could be utilized as proxy of human capital but it has some crucial issues. Estimations of physical and human capital stocks to evaluate off-road indication on the factors of economic growth were utilized in this paper. It is approximated by a standard Cobb-Douglas production function. Results by this study showed some uncertainty on the customary part specified to human capital in the development procedure as an isolated element of production. Firstly, it is concluded that humanoid capital growth devours an insubstantial and adverse impact in describing each capita income evolution. This conclusion is forceful to a number of alternate descriptions and data sources. Positive role to the levels of human capital in growth accounting has been concluded. Consequences normally ensure that per capita income growth certainly hanged certainly on normal stages of humanoid capital.

Though the additional factors flop to significantly mark ratio of investment formerly one accounts for alterations in element accretion through nations.

The basic association, at the national level, between socio-economic factors and health resources in a developing country like Pakistan was examined by [12]. The basic supposition is that auspicious socio-economic conditions, especially to influence resource division for improving the health status of any nation, modifications in gross domestic product per capita-GNPP, and education-E are predicted to play a significant role, the consequence on health strategies might be multidimensional. Data has been taken for analysis from Government of Pakistan (1994) for the time-period 1974-93. Urbanization is a significant factor of the accessibility of health employees and infrastructure. This indicates that education and GDP are intensely correlated. It is resulted that GDP is an important factor of non-development expenses on health and urbanization has an adverse and empirically substantial influence. The influence of education is amazingly destructive. The results displays that though the accessibility of health resources like doctors and nurses is rising in Pakistan, however their utilization and supply persist main issues.

[6] forecasted in his analysis that government expenses and taxation will have both short and long term impacts on growth. This prediction has been tested by using panes of yearly and period-averaged data for OECD countries through 1970-95. Endogenous growth model is strongly supported by conclusions and suggest that long-run Oscar impacts are not completely taken by these panel techniques. Contrasting earlier surveys, assessments are free from prejudices related with partial speciation of the government budget constraint. Data has been taken for twenty-two OECD countries from 1970. The Oscar data, which has been used in this study are collected from IMF, Government Financial Statistics Yearbook. Entirely Oscar variables are stated as fractions of GDP. By utilizing an OECD data set, it has concluded that, while enhancing a mixture of non-productive expenses and non-distortionary taxation, dynamic expenses increase the growth rate and distortionary taxes decrease it, as accordingly forecasts of the Barro ~1990 model.

[5] estimated restricted conjunction of OECD countries in health care expenses (HCE) per capita and gross domestic product (GDP). It grants assessment of the augmented Solow model recommended [6] to describe deviation in production and expenses each capita cross wise nations. Because of different savings rate, education, and population growth countries face different steady state growth paths. This study is an expansion of the MRW model by including health capital proxy by HCE to the improved Solow model. The concern of causation association amongst GDP and HCE is inspected. The experiential investigation is grounded on OECD states' data dated of 1970-1992. The consequences show that OECD countries congregate at 3.7% annually to their stable state level of income each capita. The consequences indicate that HCE has affirmative influence on the economic growth and the rate of conjunction. To analyze restricted merging of OECD nations in gross domestic product (GDP) and health maintenance expenses (HCE) each capita is the goal of this study.

The impacts of health humanoid capital on the growth ratio of each capita income in Sub-Saharan African and OECD states Kwabena were examined. To estimate progression ratio of each capita income which is dynamically and certainly affected by the store of investment and healthiness social capital, an developed Solow growth model, panel data and a dynamic panel evaluator have been applied in this study. Assessed results by examining the income growing equation with panel data of 21 Sub-Saharan African states of 20-year era and for 22 OECD nations of 35-year period shows that 22% and 30% of the evolution growth ratio of each capita income could be ascribed to health with positive influence in both samples. It is recommended by these results that addition in healthiness investments in Sub-Saharan African countries will raise economic growth shortly and permanently by becoming portion of the countries' shares of humanoid capital. As of a study perception, outcomes suggest that the stock of healthiness social capital and investment in it would be involved in growth calculations as additional estimators.

[10] analyzed the association among health and economic growth by following Barro (1991) and using, life expectancy and mortality degrees as factors of health although the Gross Domestic Product (GDP) is a sign for economic growth. The GDP and expenses on health data used have been taken from the Central Bank of Nigeria (CBN) of 1985-2009. It is concluded that the model is well-managed and the descriptive variables define around 87% deviation in GDP, which is the dependent and proxy variable for economic growth. Then tire expenses on health for the period 1985 to 2009 did not indicate a decent tendency and actually fund consumed on health capital schemes decline suddenly. This could be attained by enhancing the services of all channels of health sector, enhancing the assurance of health specialists and generate facilitating atmosphere for the manufacturers.

[1] has estimated the temporary associations amongst health expenditure and economic growth, as it has been become essential element in a number of current experimental studies. This study discovers this association at the

U.S. state-level. This study is an addition to literature by examining probable dynamic associations amongst health care expenses and financial evolution, estimated by gross state product in the southeast United States. Time series methodology has been used to take the empirical consequences, showing a weak, but progressive connection. Subsequently identifying unit roots in the data, cointegration in overall analysis was not identified, as a long run association appeared to be only for Georgia. The outcomes of the VAR examination are respectively restricted. Though the forms of the instinct functions confirm that there is appropriate positive association between positive particular health care expenses and economic growth. Gross state product (GSP) data for the period 1980-2004 has been taken from the U.S. Bureau of Economic Analysis (BEA) while State special health care expenses (PHCE) data for the same period were attained from the Center for Medicare and Medicaid Services (CMMS).its results were same as have examined by previous studies.

Theoretic and experiential literature both have a affirmative influence of human capital accretion as a kind of health on economic growth was assessed by [4].The obtained experiential proof is variegated for developed countries. Though, this study re-examines that whether health capital development increases GDP growth in developed states by employing anew experiential method of panel Granger-causality analysis. Thus, the assessment that health capital development raises long-run economic growth in the OECD zone is not supported by results. A comparatively new empirical procedure of dynamic panel Granger-causality assessments has been applied to inspect the impacts of health capital formation on long-term economic growth in this study. Just about 60% of the research depends on some portion of life expectancy rate and some select health care expenses (HCE) as a measurement. Data on per-capita health care expenses by a minimum five years, starting around 1970 are accessible from the OECD Health catalogue for 21 states. OECD data was not supported by any evidence, that whether capital development by health care expenses or the increase in life cycle anticipation Granger-cause per-capita GDP effect growth or not.

Analyses the impacts of health expenses on the Nigerian economic growth was estimated by [9]. Data on life probability at birth, fertility rate, capital and frequent expenses between 1985 and 2009 was taken for analysis. It is obviously perceived that the impacts of health expenses on the economic growth will be significant, if funds are cautiously used to the correct networks. It is recommended by this study is that more stress must be employed on the development of the excellence and kind of health to be delivered. This can only be possible to attain by enhancing the quality of health in all its sections. Henceforth, most important objective of any government should be provision of quality of health provision, along this economic development and poverty reduction of any country can be possible by providing maximum health facilities. Facility of clean water should also be the goal of any good government.

[9] struggled to inspect the impacts of health expenses on the Nigerian economic growth by estimating data on life expectation at birth, fertility rate, capital and persistent expenses among 1985 and 2009. It has been observed evidently that, moneys are cautiously used in the correct way; the impact of these expenses on the economic growth will be significant. It is recommended that more weight should be put on development of quality and forms of health to be given by enhancing the facilities in all channels of health sector. Data on GDP and health expense have been taken from the Central Bank of Nigeria (CBN) Statistical Bulletin, many issues. An encouraging on notation among human capital and economic growth of countries has been accepted by Economists. Therefore, with economic development and poverty reduction, health must be an essential objective of any government. Good government should have concentration on accessibility of clean water.

[10] planned to evaluate the influence of health expenditure on economic growth in Nigeria. Gross capital formation, total health expenses and the labor force output were assessed the major determinants of Economic growth in Nigeria by applying Multiple regression technique. By this study Life expectancy rate has adverse influence on growth. Time series data for the period of forty one (41) 1970– 2010 were attained from Central Bank of Nigeria (CBN) Statistical Bulletin (several issues) and African Statistical Year Books formed by the African Development Bank(several editions) is used in this study for analysis. The association amongst health expenditure and economic growth Grounded on a reformed neo classical Solow production function was estimated by a multiple regression technique. The model states Aggregate Real Output (Y) as a meaning of Capital Stock (K), Human Capital.

[8] concentrated on the influence of health programs on economic growth in Nigeria. Influence of health programs on human capital development in Nigeria was estimated by using subordinate data from Central Bank of Nigeria (CBN) statistical announcement for the period 1981 to 2012. To analyze the parameters of both models,

proposed by the study Ordinary Least Square technique was used, resulting in showing affirmative and substantial influence of health programs on human capital improvement in Nigeria. This result follows that with the a priori probability centered on economic theory by supposing that health programs have affirmative association and substantial effect on economic growth by the t-probability value 0.000 of health programs. This suggests that health programs have actual and positive influence on economic growth in Nigeria.

3. The Data:

Data by the Ministry of Finance issued the "Pakistan Economic Survey" and "Statistical Supplement" and other issues. These data cover the period from 1985 to 2015 each year. The time series includes the population, the actual gross domestic product, the actual total fixed capital formation, the real physical capital and the, HDI (human development Index) is used as human capital. Health expenses is seen as a representative of health capital, and trade concentration described by trade-to-GDP percentage is considered an open representative.

4. METHODOLOGY AND EMPIRICAL FINDINGS

Step I: Univariate Analysis

“A time series Y_t is static if its possibility distribution cannot variate within time,” (Stock and Watson, 2004). As quoted by Dolado, Jenkinson and Sosvilla-Rivero (1990) Engle and Granger (1987) explain command of incorporation as, “A variable is Y_t said to be assimilated of order d [or $y, \sim I(d)$] if it has static, invertible, non-deterministic autoregressive moving average (ARMA) demonstration after diverting d times”. Consequently, a time series is said to be stationary at level if it has no order of assimilation, whereas for a time sequence is static at first transformation if it has assimilated of orders one. Overall, if a time sequences has to be differenced d periods, at that time it takes an order of assimilation I (d) (Gujarati, 2004).

Hence it is essential to analyze the data for stationarity, or consistently to examine the command of integration for the apprehensive variables. The unit root test will apply on time series to check the stationarity

In this paper, at fore most step, we examine whether a time series is a stationary, a casual walk, a random walk with drift, or trend stationary. Here are altered methods that are accessible to assess the theory of stationarity of the data. Augmented Dickey and Fuller (1979, 1981) test has been applied to test the existence of unit root in a univariate time series. The idea behind this test is that lags of the dependent variable are added to the DF test. The ADF test is specified as follows;

$$\Delta y_t = \alpha + \beta_t + \rho y_{t-1} + \sum_{i=1}^n \lambda_i \Delta y_{t-i} + \varepsilon_t \quad \dots\dots\dots (12)$$

$i = \dots, 1, 2, \dots, n$

In (12) ΔY_{t-1} demonstrate the lagged value of regressed variable to interpret for the autocorrelation. Augmented dickey fuller ADF has been applied to analyze the stationarity of the concerned variables.

As it has been stated above that utmost of the time series are non-stationary or consistently their mean and variance differ by period. By differencing these variables could be transformed into stationary variables. If they are not transformed into stationary variables, the estimates are not effective and consistent. Augmented Dickey Fuller (ADF) has been employed to examine the stationarity of concerned variables.

Co-integration analysis:

(Johansen, 1988, 1991; and Johansen and Juselius, 1990) approach has been employed to assess the presence of synergistic integration in the essential series. Mutually they use the maximum Eigenvalue (λ_{max}) and the trace (τ) test statistic to define the amount of co-integration vectors r. The null hypothesis of the test is that there is no common integral vector amongst the variables of equation (10). The results show that the non-cooperative null hypothesis was rejected in two tests at 1% significance level. Thus, there is a stout and steady long-run association amongst the variables in Eq. (10)

Considering that Johnson cointegration shows that there are multiple common integration vectors, the question is whether there are one or more common integration vectors in the underlying sequence that are better. The presence of many common merge vectors may shows that the system being examined is fixed in multiple directions and is therefore more established (Dickey et al., 1994).

Long-run parameter estimates:

The long-run factors assessed by employing the Johansen technique are standardized on the base of the GDP variable by set its assessed coefficient at -1. The factors and their corresponding standard errors are given in Table 1.

Assessed long-run parameters

Equation	Coefficient	Std. Error
Yt	-1	
Kt	0.26*	0.03
Ht	0.39*	0.02
Et	0.14*	0.02
Ot	0.12*	0.08
Constant	-1.61*	0.17

Table 1 shows the consequences of the Augmented Dickey fuller tests of unit root. All the independent variables are converted into logarithmic arrangement before applying the unit root test. The data is converted into logarithmic form to decrease the influence of outliers and level the data set (Maddala, 1992). The results reveal that all the variables; Real GDP, Population, Human Capital, Trade openness, Real Physical capital, Health Expenditures and Real Gross Fixed Capital Formation are non-stationary at the level. The 't' values were found to be lesser than the associated critical values at level which strongly accepted the null hypothesis of unit root or equivalently that the variables are non-stationary. The results also represent that all the variables are integrated of the order, I (1). Subsequently we have inveterate that all the variables included in estimated model are integrated of the similar order which is an essential state for the presence of long-term steadiness association amongst the variables, the Johansen co integration could be used to analyze cointegration or equally to see the long run association between the concerned variables.

Short-run ECM estimation:

Conferring by Engle and Granger (1987), common factors essentially have ECM demonstration. The main benefit of ECM is that it evades the false association amongst dependencies and independent variables, and creates usage of any short and long-term evidence. By using the Akaike (1969) FPE standard and the Caines, Keng and Sethi (1981) "gravity" (SGC) criteria, the corresponding lag length of respective variable and the sequence 3 entered in the ECM are selected.

The sign is the foremost differential operative, and Δ -te is an error term. Regression corresponds to the one-year lag error correction term, and $tEC06 < \alpha$ is estimated. With the dynamic description of the model, short-term crescendos are affected by the aberration after the continuing association described by ECt-1. Note that the ECM model does not comprise intercept items. The cause is that the error correction ECt-1 at present contains its estimation.

Error Correction Specification**Growth Equation:**

$$\Delta Y_t^r = - \sum_{i=1}^2 \alpha_{1i} \Delta Y_{t-i}^r + \sum_{j=1}^5 \alpha_{2j} \Delta K_{t-j}^r + \sum_{k=1}^3 \alpha_{3k} \Delta H_{t-k} \\ + \sum_{m=1}^2 \alpha_{4m} \Delta E_{t-m} - \sum_{n=1}^1 \alpha_{5n} \Delta O_{t-n} - \alpha_6 EC_{t-1} + \varepsilon_t$$

The observed results demonstrate that health expenses is a numerically substantial and consistent factors of growth. Thus, short-term growth is the growth of all three categories of capital. Though, openness variables have a significant but negative impact on short-term growth.

Open variables have a significant but negative influence on short-term growth. Several investigative and regulatory tests have been employed to examine the effectiveness of policy deductions collected from estimates of the ECM model.

Summary and Conclusion:

According to an economic model of earlier studies estimating the yearly economic data of Pakistan, this paper examines the probable cointegration of health expenses and GDP in the enhanced Solow growth model in the Cobb-Douglas functional form. It uses Johansen co-analysis, ECM methods and altered investigative tests. Prior to conducting a common test, the unit root test was executed by ADF and PP tests. The stated t-values as of the ADF

and PP tests show that the potential sequences appear to remain stationary in the first difference. Johnson's co-test approves the resilient and steady long-term association between the variables in the growth model.

Application of ECM technology to evade false regression phenomenon. The ECM model estimates that there is a short and long-run progressive and substantial relationship amongst health expenses and financial economic development. In addition, the short-term factors of the other two capitals (ie, material and human capital) have a substantial progressive impact on growth variables. In the long-term equilibrium adjustment, the error correction item ECT-1 was considered statistically significant. The instructions and diagnostic test results are satisfactory. Thus, the way in which health spending is included in health capital investment also increases the importance of human capital and physical capital in the growth model

Several diagnostic and measurement investigations have been smeared in order to square the rationality of the policy deductions, which are collected from the approximation of the ECM model.

Policy Recommendations:

- **It should help in policy debate.**
- **It should help in policy making.**
- **It should help in making growth model in country.**

Limitations and Recommendations:

In similar context, saving cause investment, and investment cause financial development in the country. Once economy moves on the higher level of financial development, the number of financial institutes starts increasing which in turn affect the behaviors related to consumption and cash holding of a society. In the existence of wider availability and accessibility of financial institutions, an economy moves on to, high technology status which further accelerate economic growth and development.

Economic growth coupled with financial sector development and innovation, an economy moves to the state of open society with business orientation rather than consumption orientation. All these are the multi-directional affects of transmission of saving into national economy.

Health capital has been added to Pakistan's Solow growth model. Secondly, its methodology is constructed on the covariance vector autoregressive (VAR) model introduced by Johansen (1988, 1991 and 1995). It has been considered crucially that multivariate modeling mechanism give a most important benefit in that multiple cointegration associations could be demonstrated in the system without the necessity to enact any standardization in the two-way Engle-Granger two-step cointegration process [15].

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