

## **THE IMPACT OF HUMAN CAPITAL DEVELOPMENT ON THE ECONOMIC GROWTH OF NIGERIA**

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### *ABSTRACT*

There can be no significant economic growth in any country without adequate human capital development. In the past decades, much of the planning in Nigeria was centered on the accumulation of physical capital for rapid growth and development, without due recognition of the important role of human capital in the development process. The overall objective of the paper is to investigate the impact of human capital development on economic growth in Nigeria during the period 1970 to 2008. Johansen cointegration technique and vector error correction analysis were used to ascertain this relationship. The basic macroeconomic variables of concern derived from the literature review are: Real gross domestic product (RGDP), real capital expenditure (RCE) on education, real recurrent expenditure (RRE) on education, real capital stock (RCS), total school (SCHE) enrolments and labour force (LF) are used to proxy human capital development.

The result indicated that human capital development has a significant impact on Nigeria's economic growth.

Key Words: Economic Growth, Human Capital Development, Nigeria

JEL Code: Q15, Q40

### **INTRODUCTION**

Economic development theorists generally agree that the quality of human resources has significant impact on economic growth. This body of thinking is of the opinion that the quality and quantity of labour determine production by virtue of it being a factor of production. Moreover, improving the quality of the work force yields implicit, non-economic outputs related to the generation of ideas and decisions, which have a significant positive impact on investment, innovation and other growth opportunities (Roux, 1994). The wealth and vitality of nations rest ultimately upon the development of people and the effective commitment of their energies and talents. Capital and natural resources are passive agents. The active agents of modernization are human beings, for they alone can accumulate capital, exploit natural resources and build political and social organizations.

The importance of human capital accumulation as an engine of economic growth and development has been widely recognized in theoretical and empirical studies. No country has achieved sustained economic development without substantial investment in human capital. Several studies have evolved to analyze the channels through which human capital can affect economic growth (Barro and Salai-i-Martin, 1995; and Temple, 1999). Much of this literature has emphasized on the complementary relationship between human and physical capital, noting how imbalances in these two stocks, as well as human capital externalities, can affect economic growth. The highly educated, such as scientists and technicians, appear to have a comparative advantage in understanding and adapting new or existing ideas into production processes.

There can be no significant economic growth in any country without adequate human capital development. In the past, much of the planning in Nigeria was centered on the accumulation of physical capital for rapid growth and development, without the recognition of the important role played by human capital in the development process.

As a matter of fact, people are the most valuable assets in a country. It is essential for human development that these assets be deployed sensibly. A defective incentive system can result in a waste of human resources, higher incidence of poverty and greater inequality in the distribution of income. It is not enough to use existing resources wisely, we must also add to the existing resources through human capital formation (Adenuga, 2002).

Human capital development has been described as an end or objective of development. It is a way to fulfill the potentials of people by enlarging their capabilities, and this necessarily implies empowerment of people, enabling them to participate actively in their own development. Human capital development enhances the skills, knowledge, productivity, creativity and inventiveness of people. Thus, human capital development is people and not goods or production centered strategy of development. Essentially, it is the empowerment of people to identify their own priorities and to implement programmes and projects of direct benefit to them. This in turn implies the active participation of people in the development process and the consequent need to establish institutions that permit and indeed encourage that participation.

The concept of human capital refers to the abilities and skills of human resources of a country, while human capital formation refers to the process of acquiring and increasing the number of persons who have the skills, education and experience that are critical for economic growth and development of a country (Okojie, 1995). Human resources is all embracing, that is, it is inclusive of persons who works now, or are likely to be productively employed sooner or later. It is a continuum, a continuing process from childhood to old age, and a must for any society or enterprise that wishes to survive under the complex challenges of a dynamic world.

Yesufu (2000), in agreement with this view, opines that “the essence of human resources development becomes one ensuring that the workforce is continuously adapted for, and upgraded to meet, the new challenges of its total environment”. This implies that those already on the job require retraining, reorientation or adaptation to meet the new challenges. This special human capacity can be acquired and developed through education, training, health promotion, as well as investment in all social services that influence man’s productive capacities (Adamu, 2003).

In human capital development, education and health are essential. Education is concerned with the cultivation of “the whole person” including intellectual, character and psychomotor development. It is the human resources of any nation, rather than its physical capital and material resources, which ultimately determines the character and pace of its economic and social development. According to Harbison:

*“Human resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production; human beings are the active agents who accumulate capital, exploit natural resources, build a social, economic and political organization, and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to develop anything else” (Harbison, 1973).*

However, the UNICEF in its 'state of the world's children' report for 1999' pointed out that about four million Nigerian children have no access to basic education, and that majority of those that are 'lucky' to enter schools are given sub-standard education (Akhaine, 1999). Today, there are about 48,242 primary schools with 16,796,078 students in public schools and 1,965,517 in private schools in Nigeria. In addition, Nigeria has 7,104 secondary schools with 4,448,981 students (The Guardian, May 6, 1999 and Dike, 2001). Funding has been in response to conditionalities imposed by international financial institutions (IFIs). Statistics show that federal government expenditure on education between 1997 and 2000 has been below 10% of overall expenditure. The national expenditure on education cannot be computed because various states expenditures on education cannot be determined, in relation to the UNESCO recommendation of 26% of national budgets (Otiye Igbuzor 2006).

The Federal Government reformed agenda is anchored on the National Economic Empowerment Development Strategy 2002 (NEEDS) document. It was indicated that adult literacy rate of at least 65% by 2007 would be attained. The NEEDS recognize the centrality of human capital development towards achieving economic growth. It was described as a vital transformational tool. Therefore, the strategy aims at empowering the citizenry to acquire skills and knowledge that would prepare them for the world of work. Going by the UNESCO latest report 2010, clearly Nigeria is still very far from meeting the global economic development target of 2015.

## LITERATURE REVIEW

The pioneering work in this regard is the work of Lucas (1988) which revealed that the growth rate of human capital, which also depends on the amount of time allocated by individuals to acquire skills. Rebelo (1991) later extended the model by introducing physical capital as an additional input in the human capital

accumulation function. However, the model of endogenous growth by Romer (1990) assumes that the creation of new ideas is a direct function of human capital, which manifests in the form of knowledge. As a result investment in human capital led to growth in physical capital which in turn leads to economic growth. Other studies that supported human capital accumulation as a source of economic growth includes (Barro and Lee, 1993; Romer, 1991; Benhabib and Spiegel, 1994). Some studies have examined different ways through human capital can affect economic growth.

The endogenous growth literature captures the insight that the crucial force behind positive growth rates is the elimination of the tendency of diminishing returns to investment in a broad class of capital goods, including human capital. Antecedents of this literature utilize theories of technological progress, innovation and imitation (Romer, 1987; Grossman and Helpman, 1991), learning by doing (Stokey, 1991), and population change, fertility and human capital investment (Becker and Barro, 1988) in order to introduce increasing or constant returns to scale to the cumulative factor of production. Recent advances in the new growth theory identify, among many others, the degree of educational attainment as a crucial determinant of the long-run rate of economic growth (*cf.* Gallipoli *et al.*, 2006; Canton, 2007). Following the lines of Uzawa (1965) and Lucas (1988), many theories have been developed to explain the process of human capital accumulation via investment in education, both public and private. In Uzawa (1965), an individual's productivity depends on how much time she devotes to education. In Lucas (1988), human capital is the engine of growth and is produced by a technology where the only input is human capital itself.

Studies of the effects of human capital on growth, such as Mankiw, Romer, and Weil (1992) and Barro (1991), were based on data sets pertaining to a very diverse array of (more than 100) countries during the post-1960 era. They used narrow flow measures of human capital such as the school enrolment rates at the primary and secondary levels, which were found to be positively associated with output growth rates. Barro reported that the process of catching up was firmly linked to human capital formation: only those poor countries with high levels of human capital formation relative to their GDP tended to catch up with the richer countries.

While there is persuasive evidence about the positive relation between initial human capital levels and output growth and (weaker) empirical support for the relation between changes in human capital and growth, it is not at all clear that this implies a causal relationship running from human capital to economic growth. Motivated by the fact that schooling has increased dramatically in the last 30 years while the "productivity slowdown" became manifest in many of the higher income economies, Bils and Klenow (2000) suggest that the causal direction may run from growth to schooling. That relationship would be predicted by a Mincerian model in which high anticipated growth leads to lower discount rates in the population, and so to higher demands for schooling. Of course, both variables might be driven by other factors. From the results of different empirical tests, Bils and Klenow conclude that the channel from schooling to growth is too weak to explain the strong positive association found by Barro (1991), and Barro and Lee (1993), as described above. However, they argue that the "growth to schooling" connection is capable of generating a coefficient of the magnitude reported by Barro.

Azariadis and Drazen (1990) model the mechanism of human capital transmission across generations in the more plausible framework of an overlapping generation's model (Lucas followed Ramsey in the simplifying assumption that households, as well as firms, are infinitely lived). In these models agents inherit the human capital accumulated by the previous generation; they then decide how much time to devote to train a young graduate in acquiring further skills in technology that increases labour quality, thereby affecting their marginal productivity when older. Since a given generation deciding its own human capital investment does not take into account the inter temporal spill-over effect upon the human capital endowment of future generations, there is a technological externality that can result in constant or increasing returns to human capital at the social level. This state of affairs could be ascribed to the impossibility of contracting with the future generations, and sometimes is described as allocation inefficiency due to "incompleteness of markets". The source of this problem affecting human capital investment is therefore, rather different from the set of conditions previously seen to impair the allocation efficiency of markets that do exist.

Acemoglu (1998) has offered a formal demonstration of how positive spill-over effects (pecuniary externalities) created by workers' educational and training investment decisions can give rise to macro-level increasing returns in human capital. His model supposes that workers and firms make their investments in human and physical capital, respectively, before being randomly matched with one another. The direct consequence of random matching is that the expected rate of return on human capital is increasing in the expected amount of (complementary) physical capital with which a worker will be provided; similarly, the return on physical capital is increasing in the average human capital that the firms

expect the workers to bring to the job. Hence, an increase in education for a group of workers induces the firms to invest more in tangible assets, thereby increasing the return to all workers in the economy. Through a similar argument, the model is seen also to imply that there are “social increasing returns” in physical capital.

In a recent development, Gupta and Chakraborty (2004) develop an endogenous growth model of a dual economy where human capital accumulation is the source of economic growth. They argued that the duality between the rich individual exists in the mechanism of human capital accumulation. Rich individuals allocate labour time not only for their own production and knowledge accumulation but also train the poor individuals. In a different dimension, Bratti et al (2004) estimated a model of economic growth and human capital accumulation based on a sample of countries at a different stage of development. Their result revealed that the increase in the primary and secondary level of education contributes to an increase in productivity. They posit that human capital accumulation rates are affected by demographic variables. For example, they established that an increase in life expectancy at birth brings about an increase in secondary and tertiary education while a decrease in the juvenile dependence rate negatively affects secondary education. Finally, they added that geographic variables have a considerable importance in the human capital accumulation process. Nevertheless, studies differed on the impact of human capital on productivity growth.

As a source of productivity, Haouas and Yagoubi (2005) examined openness and human capital as sources of productivity growth for Middle East and North Africa (MENA) countries. Controlling for fixed effects as well as endogeneity in the model, they found that while human capital significantly influenced growth, it has no underlying effect on productivity growth. Park (2004) empirically investigates the growth implication of dispersion of population distribution in terms of educational attainment levels. Based on a pooled of 5-year interval time-series data set of 94 developed and developing countries between 1960 and 1965, the study revealed that the dispersion index as well as the average index of human capital positively influences productivity growth. They conclude that education policy that creates more dispersions in the human capital will promote growth. Similarly, but in a slightly different manner, Loening (2002) investigates the impact of human capital on economic growth in Guatemala through the application of an error correction methodology. He examined two different channels by which human capital is expected to influence growth. The result from his study revealed that a better-educated labour force appears to have a positive and significant impact on economic growth both via factor accumulation as well as on the evolution of total factor productivity.

The importance of education and human capital has been brought out in many studies of economic growth and development. Robert (1991) developed a human capital model which shows that education and the creation of human capital was responsible for both the differences in labour productivity and the differences in overall levels of technology that we observe in the world. More than anything else, it has been the spectacular growth in East Asia that has given education and human capital their current popularity in the field of economic growth and development. Countries such as Hong Kong, Korea, Singapore, and Taiwan have achieved unprecedented rates of economic growth while making large investments in education. In the statistical analysis that accompanied his study, the World Bank (1993) found that improvement in education is a very significant explanatory variable for East Asian economic growth. There are several ways of modeling how the huge expansion of education accelerated economic growth and development. The first is to view education as an investment in human capital. A different view of the role of education in the economic success is that education has positive externalities. “Educate part of the community and the whole of it benefits,” The idea that education generates positive externalities is by no means new. Many of the classical economists argued strongly for government’s active support of education on the grounds of the positive externalities that society would gain from a more educated labour force and populace. (Van-Den-Berg 2001). Smith (1976) views the externalities to education as important to the proper functioning not only of the economy but of a democratic society.

Maddison (1970) reported the effect of education and health expenditure on growth for 22 developing countries for the period spanning 1950-1965. This study was unique in one respect. It makes a distinction between growth that has been induced by policy and growth that would have occurred spontaneously. It was reported from the study that on the average policy-induced growth in the form of investment and improved health and education. Again Thirwall (2000) confirmed the initial findings of other researchers by concluding that the major sources of growth in developing countries is increased factor inputs, aided by improvements in the quality of labour through health improvement and education. The study further reveals that, though resource transfers induced growth, it is not very important for developing

countries, because of the inability of the industrial sector to absorb the surplus labour increase and the weakness of the education system to produce a quality graduates for the economy.

A broader approach of analyzing the impact of social spending is to consider the investment on human capital. Todaro (2000) reported that such investment takes many forms, including expenditures on health facilities, on the job and institutional training, formally organised education, study programmes and adult education. Investment in human capital can overcome many of the characteristics of labour force that act as impediments to greater productivity such as poor health, illiteracy, unreceptiveness to new knowledge, fear of change, lack of incentive and immorality. Education might raise productivity (Todaro 2000) and there has been sufficient demand for this more productive educated labour to maintain or increase private return but the demand for educated labour comes, at last in part, from individually remunerative yet socially wasteful or unproductive activities. In this case, the relative wage of each individual could rise with education producing the micro evidence while an increase in average education would cause aggregate output to stagnate or fall (Pritchett 2001).

Again Mincer (1974) and Temple (1999) separately reported that, the quality and structure of education matter on its impact on growth. It has the tendency to stunt growth if the quality is low and resources allocated to it are not well-targeted. Growth theories have always treated human capital development as given in the growth process. Classical theory emphasis the important for capital accumulation, while Neo-classical extended Keynes (1936) analysis of static equilibrium by looking at what will happen if changes in income produce investment (Harrod, 1945 and Domar, 1946).

An empirical review of the theory by Garba (2002) showed that cross-country regressions have shown a positive correlation between educational attainment and economic growth and development. Odekunle (2001) affirms that investment in human capital has positive effects on the supply of entrepreneurial activity and technological innovation. Ayeni (2003) asserts that education as an investment has future benefits of creation of status, job security and other benefits in cash and in kind. However, Ayara (2002) reports that education has not had the expected positive growth impact on economic growth in Nigeria. Hence, he proposes three possibilities that could account for such results, which are:

1. Educational capital has gone into privately remunerative but socially unproductive activities.
2. There has been a slow growth in the demand for educated labour.
3. The education system has failed, such that schooling provides few (or no) skills.

Foster and Rosenzweig (1995) demonstrate that increased education is associated with faster technology adoption in Green Revolution India. Similarly, higher education levels have been shown to increase innovation in businesses in Sri Lanka. In this sense human development may also enter into an Uzawa-Lucas type endogenous growth model as a factor affecting growth rates through its effect on technological change. Statistical analysis of clothing and engineering industries in Sri Lanka (Deraniyagala, 1995), showed that the skill and education levels of workers and entrepreneurs were positively related to the rate of technical change of the firm. Education alone, of course, cannot transform an economy.

## **METHODOLOGY**

### **Model Specification**

Human capital development can influence the capacity of individuals and the economy to increase the overall performance of the economy. Nevertheless we can comfortably say that human capital is a key factor at work in influencing the growth of a country's gross domestic product; there are important factors that can be used as a yardstick for measuring human capital development as cited in the literature review, therefore, it behooves on researchers to take in account the relative influence of these factors when an evaluation of the impact of human capital development on an economy's general performance.

For the purpose of this study, the variables to be used are real gross domestic product, real capital expenditures on education, real recurrent expenditure on education, real capital stock labor force and total school enrollment (total primary school enrolment, total secondary school enrolment and total tertiary enrolment).

Real capital expenditure on education (*RCE*) and real recurrent expenditures (*RRE*) on education have been part of the federal government of Nigerian expenditure in order to enhanced development process in the country via real gross domestic product enlargement (*RGDP*). However, evidence show that School enrolments (primary school enrolment, post primary school enrolment and tertiary enrolment), real

gross capital stock (*RCS*) and expansion in labour force (*LF*) contribute to the expansion of the country's real gross domestic product (*RGDP*) and overall development process as well.

The following functional relationship is specified to determine the impact of human capital development on the Nigerian Economic growth.

$$RGDP = F(RCE, RRE, RCS, LF, SCHE) \quad (3 - 1)$$

RGDP=Real gross domestic product

RCE=Real current expenditure on education

RRE=Real recurrent expenditure on education

RCS=Real capital stock

LF=Total labour force

SCHE=Total school enrollment

Here, *RGDP* serves as the dependent variable while current *RCE*, *RRE*, *RCS*, *LF* and *SCHE* serve as the independent variables. The data for this study covers a period of 39 years spanning from 1970-2008. Data on *RGDP*, *RCE*, and *RRE*, are source from the Central bank of Nigeria *statistical bulletin 2009*, data on *SCHE* is source from the Nigerian national bureau of statistics *annual abstract of statistics 2009*, data on *RCS* is from the Bureau of Public Enterprise of Nigeria *Statistical Fact Sheet 2009*. Following Loening (2002) we considered an expanded Cobb–Douglass Model with constant return to scale where the contribution of each explanatory variable in explaining the *RGDP* is captured by its exponent.

$$RGDP = A.RCE^{\alpha}. RRE^{\beta}. RCS^{\lambda}. LF^{\delta}. SCHE^{(1-\alpha-\beta-\lambda-\delta)} \quad (3 - 2)$$

Here, *A* refers to productivity coefficient. By taking natural logarithm of both sides of equation 3-2, the linearized form of the model is as follow.

$$\ln RGDP = C + \alpha \ln RCE + \beta \ln RRE + \lambda \ln RCS + \delta \ln LF + (1 - \alpha - \beta - \lambda - \delta) \ln SCHE \quad (3 - 3)$$

Here  $C = \ln A$  which is the constant term and each coefficient shows the elasticity of economic growth with respect to the changes in the associated variable. In order to estimate these coefficients the study looks for suitable econometric method to estimate the value of the coefficients.

## EMPIRICAL ANALYSIS

### Unit Root Test

This process examined the characteristics of the variables selected to avoid the problems of spurious correlation often associated with non-stationary time series and generate long-run equilibrium relationships concurrently. The variables were examined in logarithmic forms to help in achieving linearity. The data series was tested for stationarity using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test as the starting point to assess the order of integration.

The result of the tests indicated that the null hypothesis (the series has a unit root) at 5 % significance level cannot be rejected at levels. At first difference all the variables are stationary or I(1). Therefore, the null hypothesis is rejected and the alternative accepted for each of the variables. The unit root result is depicted on table 1.0 below.

The results of the unit root test at first difference analysis affirmed the need to test for cointegration among these variables. We move on to test for cointegration using the Johansen–Juselius cointegrating technique that allows for the existence of multiple cointegrating relationships.

### Johansen Cointegration

From table 1.1 the Johansen-Juselius (JJ) procedure utilizes two test statistics to determine the number of cointegrating vectors. These are trace and maximum eigenvalue test statistics. Utilizing the  $\lambda_{\text{trace}} = T \sum_j =$

$r+1 \ln(1\lambda_i)$  equation, the null hypothesis for the trace test statistic states that there are at most  $r$  number of cointegrating vectors and the alternative hypothesis as  $r+1$  cointegrating vectors. In the equation  $\underline{T}$  represents the number of observations, and  $\hat{\lambda}_i$  shows the estimated values of the characteristic roots assuming that the series are  $I(1)$ .

The Max-Eigen statistic indicated 1 cointegrating vectors at both 1% and 5% level of significances and Trace statistic indicated 2 cointegrating vectors at 5% and 1 cointegrating vector at 1%, we considered Trace statistic for this study that indicated just one cointegrating vector at 1%.  $\lambda_{\text{trace}}$  test statistics results indicated that there is exactly one cointegrating vector at 1% level of significance in the model with a lag period of 1. This means that a single vector uniquely defines the cointegration space (Harris and Sollis, 2003: 152). Table 1.1 below depicts the test result from the cointegration test.

In this case, the dependent variable is LR GDP while LRCE, LRRE, LRCS, LLF and LSCHE are the independent variables. The estimated long-run parameters which are readily available from the Johansen-Juselius (JJ) procedure suggested that real capital expenditure on education, real recurrent expenditure on education and labour force has negative relationships with economic growth, while real capital stock and school enrollments are positively associated with economic growth. This implies that real capital stock and school enrollments plays significant roles in economic growth.

### Vector Error Correction Model

The vector error correction model (VECM) result is given in table 1.3. A set of necessary standard diagnostic tests was conducted during the process of estimation to rule out any discrepancies.

This table reports the results from estimation of the VECM with the choice of lag intervals as 1 as determined by Schwarz info criterion (SIC). Based on the VECM estimation the speed of the adjustment coefficient showed that the short run regression is adjusting to the long run equilibrium by 45 percent in each period. From the table, we can also see that labour force (LF) has a significant impact on real gross domestic product (RGDP) in the short-run.

The response of real gross domestic product to innovation that comes from real capital expenditure on education is positive for the first seven years, it reached its peak in the third year and declined onward until the seventh year where it maintained a stable flow at a neutral level in the long-run and the response of real gross domestic product to innovations that comes from real recurrent expenditure on education is completely negative. With one year lag the dependent variable (RGDP) responded negatively to the innovations of real recurrent expenditure on education, which decline slightly within one-to-two years and declined sharply within two-to-three years, then maintained stable flow in the long run.

The response of real gross domestic product to shocks that come from real capital stock is positive within two-to-three years; it reached its peak at the second year and decline to neutral as indicated by zero at the third year. It declined negatively within the fourth and fifth year then maintains its flow at a neutral level in the long run.

The response of real gross domestic product to shocks that comes from labour force is negative within the first three years and maintained a positive slope in the long run. It declined sharply within the first two years and attained its minimum at the second year then increased positively to its peak at the eighth year and maintained stability at its peak in the long run and the response of real gross domestic product to innovations that comes from total school enrollments is completely positive. It rises sharply within the first three years and rises slightly to its peak at the eighth year then maintained a stable slope in the long run.

### CONCLUSION AND RECOMMENDATION

The paper investigated empirically the impact of human capital development and economic growth of Nigeria using Johansen cointegration technique and vector error correction analysis. It reveals that investment in human capital, in the form of education and capacity building through training and orientation impacts positively on the economic growth in the long-run; this confirmed the study by Adenuga and Otu (economic growth and human capital development: a case of Nigeria, 2006). Evidence from the VECM showed that in the short-run only labour force tend to impact significantly on economic growth within one year lag period. The result also revealed that government spending on education does not impact positively on economic growth. The study, therefore, supports human capital as a source of economic growth.

The persistence of many of the problems in spite of the various policy formulation and responses points to the need for a more responsive, functional and qualitative educational system. To contribute significantly to economic growth and development, education must be of high quality and also meet the skill-demand needs of the economy; therefore, the Nigerian government should increase spending on education as well as incentives to meet up with the UNESCO budget recommendation of 26%. Government should provide the enabling environment by ensuring macroeconomic stability that will encourage increased investment in human capital by the private sector. To increase physical capital formation in the education sector, Government should increase spending on social and economic infrastructure in order to enhance the efficiency of the labour force and enhance productivity, and by implication, economic growth. The efforts of Government in increasing primary school enrolment through the free compulsory Universal Basic Education should be sustained and made free up to the end of the junior secondary school.

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TABLE 1 : Unit Root Result

Variables	Variables at level		Variables at first difference	
	ADF	PP	ADF	PP
LRGDP	-2.277744 (0.1841)	-2.056650 (0.2002)	-5.681391*** (0.0000)	-5.700358*** (0.0000)
LRCE	-0.947944 (0.7616)	-0.922683 (0.7701)	-6.961393*** (0.0000)	-6.921326*** (0.0000)
LRRE	-0.771842 (0.8153)	-0.461926 (0.8877)	-5.177116*** (0.0001)	-17.66944*** (0.0001)
LRCS	-0.101191 (0.9616)	0.386003 (0.9797)	-3.562100** (0.0116)	-3.528089*** (0.0126)
LLF	-3.530640 (1.0000)	-2.673453 (0.0880)	-7.934541*** (0.0000)	-8.274499*** (0.0000)
LSCHE	-1.432140 (0.5558)	-1.831623 (0.3601)	-3.796723*** (0.0065)	-5.324900*** (0.0001)

TABLE 1.1 : Johansen cointegration based on Trace test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	1 Percent Critical Value
r = 0*	0.785924	132.5872	103.18
r = 1	0.564694	75.55459	76.07
r = 2	0.528950	44.78148	54.46
r = 3	0.215560	16.92821	35.65
r = 4	0.183027	7.945146	20.04

Trace test indicates 1 cointegrating equation(s) at the 10% level of significance. \*(\*\*) denotes rejection of the null hypothesis at 1% level of significance.

TABLE 1.2 : Cointegration test equation

LRGDP	LRCE	LRRE	LRCS	LLF	LSCHE
1.000000	0.290224	0.195573	-3.621083	1.903887	-2.877732
	(0.08140)	(0.10756)	(0.90554)	(1.58050)	(0.47335)

1 Cointegrating equation(s) Log Likelihood 71.62589 Normalized cointegrating coefficients(standard error in parentheses)

TABLE 1.3 : VECM Estimates of Human Capital Development Affecting Economic Growth (GDP)

Variables	Coefficients	Standard Error	T-Statistics
CoinEq1	-0.457006	(0.10861)	[-4.20783]*
D(LRGDP(-1))	-0.020934	(0.14580)	[-0.14358]
D(LRCE(-1))	0.112749	(0.09259)	[1.21770]
D(LRRE(-1))	0.054087	(0.06971)	[0.77585]
D(LRCS(-1))	-0.539996	(1.58416)	[-0.34087]
D(LLF(-1))	-7.523252	(2.64692)	[-2.84227]*
D(LSCHE(-1))	-0.445422	(0.54457)	[-0.81794]
C	0.383466	(0.10871)	[3.52731]

Included observations: 37 after adjustments

Standard errors in ( ) & t-statistics in [ ]

FIGURE 1 : Impulse Response Function of Human Capital Development Affecting Economic Growth (GDP)

