

## **Does Human Capital Development Matter for Economic Growth? An Empirical Reflection of the Nigerian Experience**

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### **Abstract**

*The main objective of this paper is to empirically investigate the impact of human capital development on economic growth in Nigeria. The study covered the period between 1980 and 2014. The cointegration technique and the Error correction mechanism were used. The result shows that labour force and Gross Fixed Capital Formation have a positive and significant impact on the level of economic growth in Nigeria. The result shows further that government expenditure on health and educations have a positive and significant impact on the level of economic growth. The result recommends increased budgetary allocation to the education and health sectors and training of labour force amongst others.*

**Keywords:** human capital, economic growth, government expenditure on education co integration,

### **1. Introduction**

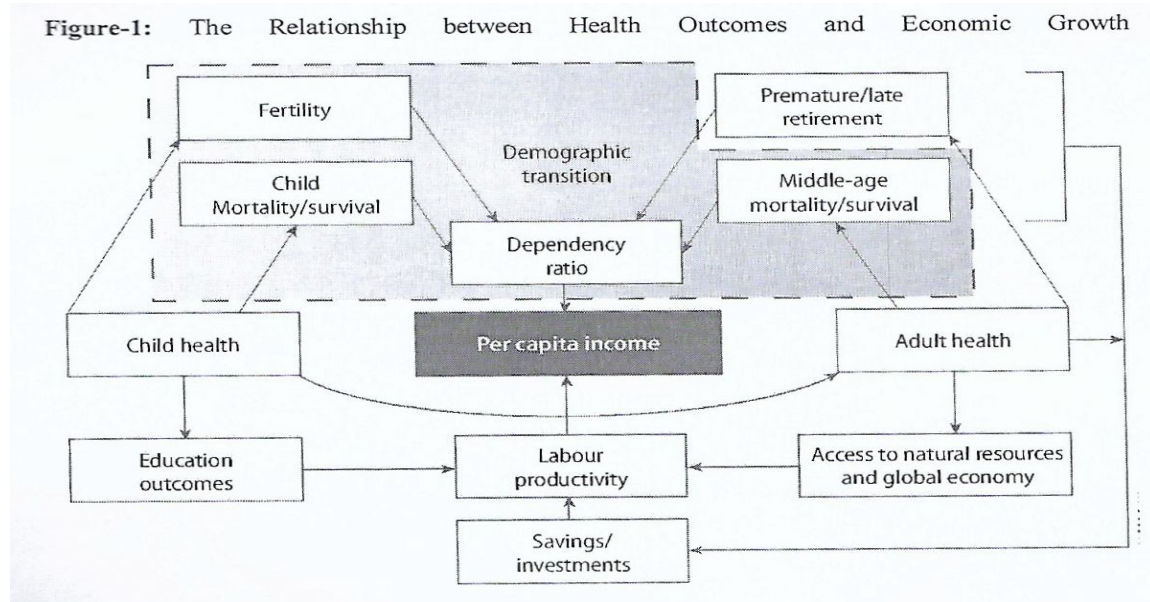
Human capital as noted by Schutz (1993) is the improvement of the assets of firms and employees so as to increase productivity and also enhance competition. Human capital involves skill acquisition through training and retraining of employees. Thus, human capital encompasses the acquisition of useful abilities by members of the society and it has been recognized globally as a major source of wealth creation. (Oladeji, 2015). The concept of human capital has changed the focus of economic development theorists to agree on the aggregate that the quality of human capital has a major impact on economic development and growth. They are of the view that the quality and quantity of the labour force determine production by virtue of being major factor of production (Oladeji, 2015). Investment in any country is influenced by the quality of the human capital. Improved human capital brings about improved innovation which will further expand investment opportunities. Human capital which facilitates the conversion of idle resources into useful forms consists of education, health and labour. (Paul and Akindele, 2016). Human capital development ensures that nations inhabitants are knowledgeable, skilled, productive and healthy.

There is thus a connection between physical capital and human capital since improvement in the stock of physical and human capital depends to a great extent on the formation of human capital. The poor state of human capital development in Nigeria has been partly responsible for the high level of unemployment, poverty and negative growth rate which has plunged the country into the current economic recession with a negative growth rate of -2.2 percent (NBS, 2016). Another challenge is that the human capital formation in Nigeria does not fit the peculiarity of the Nigerian situation. The Nigerian education system has paid little attention to the acquisition of technical knowledge which has hindered the pace of economic growth in Nigeria. Also, the public and private sectors of the Nigerian economy have over the years paid little attention to the training of labour blamed on lack of funds. This has in some cases led to the invitation of expatriates to perform tasks which Nigerians if well trained could perform. The budgetary allocation to the education sector has persistently been below the international standards. The United Nations Educational Scientific and Cultural Organisation (UNESCO) recommended 26 percent of a nations budget to education. However in Nigeria between the period of 1986 and 1990. Nigeria's education expenditure as a percentage of Gross Domestic Product averaged 5.64 percent and 5.84 percent between 1990 and 2003 from 2005 to 2007. It was 6.3 percent, 7.8 percent and 8.7 percent. This is below expectations since countries with fewer resources even invested more in human capital development.

For example, Seychelles committed 10.2 percent of its GDP to education between 1985-1987. Ghana allocated an average of 20 percent of its total expenditure to education yearly. Between the period of 1986 to 1992, Botswana spent 21 percent of her GDP on education Malaysia 19 percent, Kenya, 20 percent and Uganda 15 percent (Olaniyi and Adan, 2003, Ifeoma, et al, 2013 and Oladeji, 2015). The low budgetary allocation to human capital development and the consequent mismanagement of such funds have reduced the level of skill development which has reduced the marginal productivity of labour. This has reduced the level of investment and lowered the level of economic growth. The main objective of the study is thus to develop a model to empirically investigate the impact of human capital development on economic growth in Nigeria. This is important since good development of human capital has the potentials of taking the country away from the current economic recession through increase in labour productivity. The paper thus reviews expenditure on education and health, labour force productivity and the level of Gross Fixed Capital formation. Other than this introductory section, the second part of the paper focused on conceptual clarifications, which is followed by the third section on literature review. The fourth section focused on theoretical framework and model specification while the fifth section borders on the methods and materials. The findings form the sixth section and the seventh section concludes the research.

## 2. Conceptual Clarifications

Capital in the economic sense refers to those factors of production used in the creation of goods or services that are not themselves significantly consumed in the production process while the human element takes charge of all the economic activities such as production, consumption and all transactions to the consumers (Boldizzoni, 2008). The production process is thus improved by the efficient of human capital. Human capital is thus an important element in the accumulation process. It lays emphasis on knowledge and skills obtained through education and training (Beach, 2009). Human capital encompasses the knowledge and skills obtained throughout the education process. Health also constitutes an important aspect of human capital development as a healthy labour force is necessary for improved productivity which matters for economic growth.



Source: WHO: The World Health Report (1999)

## 3. Literature Review

Studies have been carried out globally to ascertain the impact of human capital development on the level of economic growth. A review of the literature provided below gives a mixed picture of the benefits of human capital development in promoting economic growth. God'stime and Uchechi (2014) studied human capital development and economic growth in Nigeria. The study covered the period between 1999 and 2012. The Ordinary Least Squares (OLS) was applied. The results revealed a positive and significant relationship between human capital and economic growth. Adelakin (2011) studied human capital development and economic growth in Nigeria.

The study which used the OLS technique found that enrolments in secondary institutions which was used as a proxy for human capital development have a strong positive relationship with the level of economic growth. Enefiok, Obio and Sunday (2014) investigated the impact of human capital development and economic empowerment in Akwa Ibom State of Nigeria. The study covered the period between 1999 to 2012. The descriptive statistics was adopted. The result shows that training and the government empowerment programmed have improved the productivity of labour and this has increased the development of the state. The impact of human capital development on economic growth in Nigeria forms. The focus of the study which covered the period between 1980 and 2012. The results using the OLS revealed that positive and significant relationship between the government expenditure on education and health on economic growth in Nigeria. Ifeoma et al(2013). Investigated human capital development and economic growth in Nigeria. Adopting the OLS technique, the result revealed a strong positive relationship between life expectancy, public expenditure on education and health, stock of physical capital and economic growth in Nigeria. Paul and Akindele (2016) adopted the Autoregressive Distribute Lag (ARDL) framework to investigate the impact of human capital development on economic growth in Nigeria.

The study which covered the period between 1980 and 2013 revealed a long run insignificant and positive relationship among secondary school enrolment, public expenditure on education, life expectancy rate, gross fixed capital formation and economic growth, Atoyebi et al. (2013) assessed human capital and economic growth in Nigeria. The study covered the period between 1970 and 2010. Adopting the co integration technique, the result shows a positive relationship between human capital development and economic growth. Mohsen and Maysam (2013) investigated the relationship between economic growth and human capital in developing countries. The study covered the period between 1970 and 2010. The granger causality test was used. The result shows strong causality from investment and economic growth to education in these countries. Yet education does not have any significant impact on GDP and investment. Saima, Rao and Khalid (2013) measured the impact of educational expenditure on economic growth in Pakistan. The study covered the period between 1972 and 2011. The OLS was adopted. The results revealed that education expenditure have a positive and significant impact on economic growth in the long run. Emilio, Soma and Tom (1998) studied the impact of human capital on growth in West Africa using a growth accounting methodology the result shows that private capital is found to be particularly important to growth but human capital appears to be insignificant. Maria (2001) investigated human capital accumulation and economic growth. The OLS was adopted. The result shows that education has significant and positive impact on economic growth.

#### 4 Theoretical Framework and Model Specification

This research draws from the Solow's growth model which incorporated human capital as one of the independent variables. Solow's growth model aligned growth in national income to three sources which are: increase in stock of physical capital, increase in the size of labour force and a residual which represents all other factors. Solow used the aggregate production function which is continuous and homogenous of degree one:

$$Q = F(L; K, T) \dots \dots \dots (1)$$

Where Q is aggregate real output, K is stock of capital, L is labour and T is Technical change. Assuming technical change to be constant, the model is thus stated below:

$$Q = A F (K, L) \dots \dots \dots (2)$$

Expressing equation 2 in growth form gives:

$$dQ/Q = [A.dQ / dK] dK/Q + [A.dQ/dw/dN.N/Q] dN/Q + dA/A \dots \dots \dots (3)$$

which can be transformed for estimation purpose to

$$\Delta Q/Q = \alpha_0 + \alpha_1 I/Q + \alpha_2 \Delta N/Y \dots \dots \dots (4)$$

Where:

$$\alpha_0 = d A/A$$

$$\alpha_1 = A.dQ / dk$$

$$\alpha_2 = A. dY/dN. N/Y$$

I = dk = Change in capital (investment)

I/Q = Ratio of investment to income

$\Delta N/Q$  = ratio of change in population to income

$A_0$  Which is the constant capital the growth in productivity,  $\alpha_1$  is the marginal productivity of capital and  $\alpha_2$  is the marginal productivity of capital and  $\alpha_2$  is the output elasticity with respect to population. The model to be estimated thus decomposed capital into its component and it is stated below as:

$$RGDP = b_0 + b_1 GFCF + b_2 LF + b_3 GEXH + b_4 GEDU + U +$$

$$b_1, b_2, b_3, b_4 > 0$$

Where

RGDP = Real Gross Domestic Product

GFCF = Gross Fixed Capital Formation

LF = Labour Force

GEXH = Government Expenditure on health

GEDU = Government expenditure on education

## 5. Materials and Methods

The co integration technique and the Error Correction Mechanism were adopted in the analysis of the results. The analysis will commence with the unit root test to find out whether the variables are stationary or not and their order of integration. The Johansen co integration techniques were used to assess the existence or not of a long run equilibrium relationship among the variables. The over parameterize and parsimonious ECM was used in assessing the various magnitudes and elasticity's. The impact of shocks was assessed with the variance decomposition and the impulse response tests. This will be done after the model has been subjected to the various diagnostic checks. The study covered the period between 1980 and 2014.

## 6. Results and Findings

The results of the ADF unit root test are shown in the table below: Table 1: ADF unit root test result.

Variables	Level date	First difference	Order of interest
RGDP	1.76	4.22*	I (1)
GFCF	2.11	5.72*	I(1)
LF	0.96	3.95*	1(1)
GEXH	1.42	4.82*	I(1)
GEDU	2.31	7.24*	1(1)

NB: \* Indicate stationary at the 1% level

The result of the ADF unit root test indicates that all the variables were originally non-stationary. They became stationary after the first difference was taken. All the variables were stationary at the 1 percent level. This permits us to estimate the over parameterize and the parsimonious ECM. The result of the over parameterize Error Correction Mechanism (ECM) is shown in the appendix. The over parameterize ECM include two lags each of the independent variables. The parsimonious ECM is the preferred ECM used for policy purpose. The result of the preferred ECM with lag length selected using the Akaike Information Criteria (AIC) and Schwarz criterion is shown below:

**Table 2: Parsimonious ECM result, modeling : RGDP**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGFCF(-1)	0.804358	0.089032	9.034514	0.0000
LF	0.355879	0.097049	3.667002	0.0014
LGEXH(-2)	0.543836	0.059050	9.209750	0.0000
LGEDU	0.416753	0.138104	3.017669	0.0047
ECM(-1)	-0.532824	0.123905	-4.300272	0.0001
C	7.365361	0.843417	8.732765	0.0000

$$R^2 = 0.82, AIC = -2.14, SC = -2.38, DW = 2.02$$

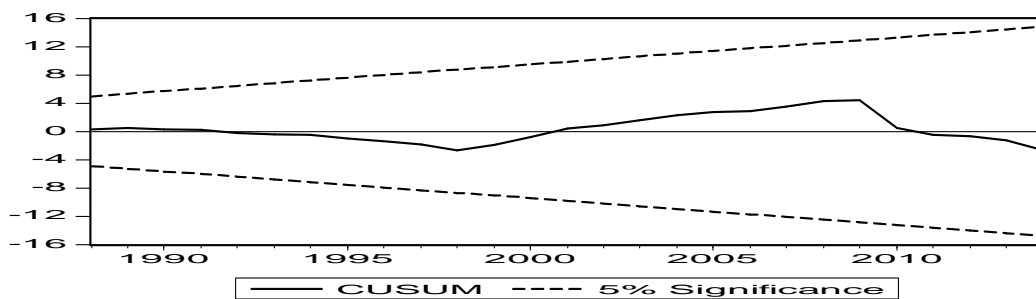
Coefficient of determination  $R^2$  suggests that 82 percent of the total changes in economic growth is explained within the model. The result shown that the one period lagged value of the Gross Fixed Capital formation is statistically significant in explaining the changes in economic growth. An increase in the Gross Capital Formation by 1 percent increase economic growth by 0.80 percent. The result shows that the labour force has a significant and positive impact on the level of economic growth in Nigeria. The result show that an improvement in the labour force by 1percent increased economic growth by 0.36 percent. The result shows further that the two periods lagged value of government expenditure on health has a significant and positive impact on the level of economic growth. An increase in the two period lagged value of government expenditure of health increased economic growth by 0.54 percent. Government expenditure on education has a significant and positive impact on the level of economic growth. An increase in government expenditure on education by 1 percent increased the level of economic growth by 0.42 percent. The diagnostic checks results are shown in the table below:

**Table 3: Summary of diagnostic Checks result**

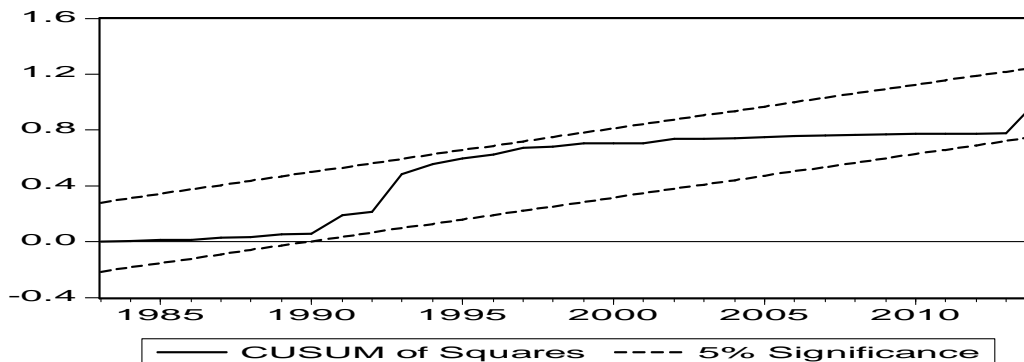
Jarque-bera		White heteroskedasticity test	
F test	1.07	F test	2.46
Probability	0.58	Probability	0.66
Brevsch-Godfrey serial Correlation LM Test			
F test	1.43		
Probability	0.91		

The Jarque-bera normality test with a probability of 0.82 indicates that the residuals are normally distributed. The result of the Breusch-Godfrey serial correlation Langrange multiplier (LM) test indicates that the residuals are not serially correlated. The result of the white heteroskedasticity test indicates that the residuals are homoscedastic. The result of the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Square of Recursive Residuals (CUSUMQ) stability tests are shown below:

**Figure1: CUSUM stability test**



**Figure2 : CUSUMQ stability test**



The result shows that the residuals are stable since in both cases the CUSUM and CUSUMQ lines fell in-between the two 4 percent lines. The result of the cholesky variance decomposition is shown in the appendix. The result shows that own shocks dominated. It ranges from 100 percent to 46 percent for economic growth, from 92 percent to 79 percent for Gross Fixed Capital Formation, from 85 percent to 84 percent for government expenditure on health, from 65 percent to 15 percent for labour force and from percent to 64 percent to 74 percent for government expenditure on education. The results of the colicky impulse response test are shown in the appendix. The result shows that an unanticipated increase in expected economic growth, Gross Fixed Capital Formation, government expenditure on health, labour force and government expenditure on education have a positive impact on actual economic growth, Gross Fixed Capital Formation, government expenditure on health, labour force and government expenditure on education. The result shows that an unanticipated increase in expected Gross Fixed Capital Formation has a negative impact on actual level of economic growth. Shocks to expect level of government expenditure on education has a negative impact on actual level of economic growth. Shocks to unanticipated labour force have positive impact on actual labour force. Also shocks to government expenditure on health have a positive impact on actual level of economic growth.

### **7. Conclusions and Recommendations**

The research explores the impact of human capital development on economic growth in Nigeria using the Solow Growth Model. Human capital development is the key to the growth process in both the developed and emerging economies of the world. This is because human capital is the only active factor of production. The level of labour productivity in Nigeria has been hindered by the low level of human capital development due to poor training and skill development. The low level of human capital development in Nigeria has reduced the utilization of resources. The co integration technique and the error correction mechanism were used to analyse the data. The result showed that despite the little funds allocated to human capital development, the Gross Fixed Capital Formation and labour force have significant and positive impact on the level of economic growth in Nigeria. The result also showed that funding of the education and health sectors have the potentials to increase the level of economic growth in Nigeria. The statistical significance of the ECM represents a satisfactory speed of adjustment. The result conclude that high human capital development hold the key to economic prosperity in Nigeria. The result recommends improved standard of education and health facilities through increased budgetary allocation to the sectors. The result recommends training of labour as this will improve labour productivity and hence economic growth.

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**Appendix 1: Overparameterize ECM Result**

Dependent Variable: DLRGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGFCF	0.074223	0.113545	0.653692	0.5185
LGFCF(-1)	0.153421	0.067894	2.259704	0.0341
LGFCF(-2)	0.288909	0.426144	0.677960	0.5032
LLF	0.920883	0.031904	28.86379	0.0000
LLF(-1)	0.074873	0.042714	1.752899	0.0902
LLF(-2)	0.002486	0.030556	0.081363	0.9357
LGEXH	0.130092	0.163031	0.797955	0.4314
LGEXH(-1)	0.165154	0.623306	0.264964	0.7929
LGEXH(-2)	0.174436	0.086412	2.018652	0.0559
LGEDU	0.807396	0.180387	4.475898	0.0001
LGEDU(-1)	8.630979	5.743253	1.502803	0.1454
LGEDU(-2)	0.266502	0.306892	0.868389	0.3934
ECM(-1)	-0.483866	0.105695	-4.577960	0.0001
C	5.568697	2.968759	1.875766	0.0708
R-squared	0.807950	Mean dependent var		9.657656
Adjusted R-squared	0.793238	S.D. dependent var		1.479484
S.E. of regression	0.622020	Akaike info criterion		2.145569
Sum squared resid	11.22035	Schwarz criterion		2.718983
Log likelihood	-32.12973	F-statistic		16.04678
Durbin-Watson stat	2.158353	Prob(F-statistic)		0.000000

**Appendix 2: Variance Decomposition Result**

Variance Decomposition of LRGDP:

Perid	S.E.	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.087620	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.114133	76.19820	1.201532	2.500486	6.000478	14.09931
3	0.136161	74.00538	3.677522	1.913444	7.677950	12.72571
4	0.164106	65.43598	3.753785	12.27163	6.414224	12.12438
5	0.190919	56.95115	6.120593	19.81065	6.630137	10.48747
6	0.213641	53.71909	6.142188	23.55612	6.249592	10.33302
7	0.234943	50.92978	6.658750	25.86302	6.159300	10.38915
8	0.254607	49.33025	7.046891	27.51195	5.915230	10.19568
9	0.273591	47.29793	7.272482	29.38882	5.685552	10.35523
10	0.291367	45.89695	7.507201	30.74281	5.568356	10.28468

Variance Decomposition of LGFCF:

Perid	S.E.	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.581135	7.656061	92.34394	0.000000	0.000000	0.000000
2	0.618620	6.773099	82.19619	8.790189	0.085707	2.154818

3	0.741772	6.963199	76.69481	6.125747	7.941219	2.275020
4	0.806646	9.417496	74.57149	6.690775	7.354633	1.965610
5	0.865344	8.193572	75.23304	6.121513	6.957519	3.494353
6	0.914574	8.117006	76.00357	5.846019	6.879261	3.154144
7	0.958094	7.968648	76.72837	5.375728	6.880461	3.046792
8	1.007379	7.552749	77.68301	4.872725	7.066067	2.825454
9	1.046763	7.513677	78.12410	4.543856	7.063890	2.754476
10	1.089272	7.334575	78.68331	4.212330	7.111644	2.658137

## Variance Decomposition of LGEXH:

Perid	S.E.	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.207602	5.307465	9.483252	85.20928	0.000000	0.000000
2	0.372691	4.876375	7.953716	85.77946	0.910642	0.479808
3	0.471332	5.337092	8.891187	84.41905	1.040367	0.312299
4	0.548971	5.752561	9.521867	83.39162	0.882037	0.451918
5	0.628176	5.696921	10.07798	82.97545	0.709670	0.539979
6	0.708275	5.302498	10.25447	83.23951	0.584522	0.619004
7	0.783677	5.006018	10.28599	83.53420	0.514280	0.659510
8	0.853646	4.870484	10.30698	83.68540	0.468328	0.668813
9	0.918847	4.756849	10.36152	83.76253	0.430818	0.688282
10	0.979703	4.654098	10.40654	83.82445	0.399209	0.715695

## Variance Decomposition of LLF:

Perid	S.E.	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.102723	6.328586	24.16926	4.590308	64.91184	0.000000
2	0.255108	24.75452	6.254095	29.41897	29.81654	9.755881
3	0.337803	23.63144	4.779056	42.44924	22.55112	6.589145
4	0.405255	19.62040	4.018604	52.73949	18.88866	4.732848
5	0.462309	18.59440	4.301599	56.25772	16.84238	4.003897
6	0.508660	18.15703	4.198484	57.38081	16.42575	3.837931
7	0.553863	17.66258	4.144709	58.52395	15.96368	3.705083
8	0.597140	17.22761	4.175868	59.58690	15.51102	3.498608
9	0.638763	16.93556	4.129983	60.42525	15.11627	3.392936
10	0.676969	16.69041	4.123586	61.10326	14.79455	3.288188

## Variance Decomposition of LGEDU:

Perid	S.E.	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.261866	0.051926	0.023756	29.43184	6.821859	63.67062
2	0.368797	1.231126	0.218645	29.01977	8.684530	60.84593
3	0.441918	0.987885	1.574071	20.84695	11.33328	65.25781
4	0.509795	0.894554	2.522033	15.91618	11.84475	68.82248
5	0.562899	0.735103	2.918412	13.66987	11.93449	70.74213
6	0.611495	0.664746	3.520511	12.37509	11.87940	71.56025
7	0.660453	0.577182	4.055171	11.18656	11.89946	72.28162
8	0.708411	0.503724	4.338252	10.22414	11.95670	72.97719
9	0.752809	0.451608	4.613614	9.612458	11.98399	73.33833
10	0.795136	0.408543	4.855334	9.219365	11.99029	73.52647

## Cholesky Ordering: LRGDP LGFCF LGEXH LLF LGEDU



**Appendix 3:**

Response of LRGDP:					
Period	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.087620	0.000000	0.000000	0.000000	0.000000
2	0.047418	-0.012511	0.018048	0.027958	-0.042856
3	0.061602	-0.022919	0.005388	0.025335	-0.022863
4	0.062465	-0.018141	0.054315	0.017433	-0.030097
5	0.056003	-0.034929	0.062579	0.026254	-0.023612
6	0.061318	-0.023926	0.059419	0.020875	-0.029892
7	0.059947	-0.029531	0.059366	0.023396	-0.031912
8	0.062176	-0.029877	0.059654	0.020850	-0.029575
9	0.058526	-0.029588	0.064526	0.020524	-0.033790
10	0.059670	-0.030489	0.064038	0.021714	-0.031306

Response of LGFCF:					
Period	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.160798	0.558446	0.000000	0.000000	0.000000
2	-0.008007	0.051912	-0.183410	-0.018111	0.090809
3	-0.111325	0.327776	0.008133	-0.208246	-0.065356
4	-0.151540	0.251449	0.099146	-0.064501	-0.016494
5	-0.008802	0.279534	0.047997	-0.065148	0.115657
6	-0.080865	0.269014	0.055314	-0.073770	0.014707
7	-0.072481	0.261908	-0.021153	-0.074950	0.039814
8	-0.059148	0.289849	0.010139	-0.092458	0.026555
9	-0.075380	0.260152	0.018401	-0.075450	0.038834
10	-0.068538	0.278518	0.013866	-0.083551	0.036851

Response of LGEXH:					
Period	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.047827	-0.063931	0.191635	0.000000	0.000000
2	0.066976	-0.083429	0.287093	0.035565	0.025816
3	0.071298	-0.093298	0.261522	0.032347	-0.005229
4	0.074026	-0.094572	0.252539	0.018627	-0.025849
5	0.071721	-0.105225	0.275878	0.011925	-0.027728
6	0.064186	-0.108045	0.300248	0.011484	-0.031217
7	0.064376	-0.108303	0.308952	0.015039	-0.030743
8	0.068900	-0.109255	0.311125	0.015947	-0.028694
9	0.068333	-0.111230	0.312035	0.014985	-0.030616
10	0.067155	-0.111371	0.312044	0.013942	-0.032532

Response of LLF:					
Period	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.025842	0.050501	-0.022008	0.082762	0.000000
2	0.124268	0.038985	-0.136607	0.112050	0.079681
3	0.104191	0.037192	-0.171153	0.079553	0.034202
4	0.072505	0.033859	-0.195387	0.072718	0.015935
5	0.086711	0.050931	-0.183370	0.070541	0.028012
6	0.085069	0.040855	-0.168002	0.080635	0.037048
7	0.084876	0.043030	-0.176257	0.080447	0.037892
8	0.085129	0.046644	-0.181499	0.079609	0.033306
9	0.087582	0.044282	-0.184589	0.079803	0.036994
10	0.085965	0.045242	-0.182983	0.078259	0.035008

Response of LGEDU:

Period	LRGDP	LGFCF	LGEXH	LLF	LGEDU
1	0.005967	0.004036	0.142065	0.068396	0.208953
2	-0.040483	0.016766	0.138880	0.084463	0.197727
3	-0.015962	0.052694	0.035243	0.101592	0.211389
4	0.019890	0.058996	-0.025542	0.093008	0.226761
5	-0.002085	0.051890	-0.044147	0.083855	0.212807
6	-0.012508	0.062586	-0.054407	0.081273	0.208405
7	-0.005656	0.067264	-0.050217	0.086516	0.218422
8	-0.003203	0.063897	-0.050139	0.089995	0.225704
9	-0.005607	0.066144	-0.056271	0.088947	0.222240
10	-0.004860	0.067462	-0.061748	0.088836	0.221903

Cholesky Ordering: LRGDP LGFCF LGEXH LLF LGEDU

**Appendix 4: Jarque-bera normality test esult**

