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Capital Accumulation and Economic Growth in Nigeria "Endogenous Growth Approach"

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Abstract: *The paper adopts a simple endogenous growth model to evaluate the short and long-run impact of Gross Fixed capital formation, human capital formation, savings and population growth rate on economic growth in Nigeria. The Autoregressive Distributed Lag model indicates no short and long-run impact of these variables on economic growth. Also using Pesaran Bound Test and Wald Coefficient Diagnostic Test, we found no long-run impact of Gross Fixed capital formation, human capital formation, national saving, and population growth rate on growth. Beside, the error term (et) is rightly signed but not significant and the speed of adjustment towards equilibrium is very poor at 23.99percent. it is very clear that none of the independent variables contributed greatly to the variations in the economic growth rate in both short-run and long run because the impulse they emitted for the both periods fluctuated all through the periods under review with small percentage impacts. For example the gross fixed capital formation produced 6.12 percent positive shocks for the ten periods and -4.38 percent negative shocks on economic growth, while human capital formation produced more negative shocks (-12.48)percent than positive (6.51) for the ten periods. Like-wise national savings and population- emitted more negative impulse (-6.55, -7.72) than positive (5.89, 6.52) on growth respectively .we recommend that government should provide an enabling environment that will encourage both domestic and foreign investment and in addition human capital development through education and in-job training should be encouraged.*

Keywords: *capital accumulation, human capital development, endogenous model, exogenous model, economic growth.*

I. Introduction

In the early days of economic history, Karl Marx contended that the production of surplus value is the "absolute law" of the capitalists mode of production, most of this surplus value is continually reconverted into capital called capital accumulation (https://en.wikipedia.org/wiki/Capital_accumulation). In 1946, Harrod Domar model was developed to explain an economy's growth rate in term of savings and productivity of capital, more investment leads to capital accumulation which generates economic growth. Based on some basic assumptions of fixed capital/labour ratio, this important model was discredited by the neoclassical model. On refining the general works of Neoclassicals, Solow (1956) opens a new chapter in development economics by pioneering an economic growth model based on the assumption that increasing capital accumulation, population and technical efficiency are the sources of economic growth. Therefore, this model implies that economic growth depends on policies to increase investment, by increasing savings, and using that investment more efficiently through technological advances (Jhinghan 2003).

Even though the Solow model was criticized on the grounds of its over-simplicity for ignoring many other factors and for the prediction that all economies would eventually grow at the same rate which has been widely refuted empirically, the role of three factors identified by Solow as propellers of economic growth has not been doubted. Hence, Mankiw-Romer-Weil (Solow-Swan model augmented with human capital) recommends that for any country to achieve and sustain economic growth, there must be an inclusion of human capital, because the marginal product of capital (K) are lower in poor countries and this explains the failure of the international investment to flow to poor countries. This model was used to explain 78percent variation in income across countries using human capital which has effect on physical capital and it is evident in the marginal product of physical capital. In conclusion they predicts that the income levels of poor country will tend to converge towards the income levels of rich countries if the poor countries have similar savings rates for both physical capital and human capital as a share of output, a process known as conditional convergence. However, savings rates vary widely across countries. In particular, since considerable financing constraints exist for investment in schooling, savings rates for human capital are likely to vary as a function of cultural and ideological characteristics in each country (Dornbusch et al 2004)

This augmented Solow-Swan model was extended by endogenous growth theory (The AK and Lucas model) to cover the short falls. The AK and Lucas model of growth holds that investment in human capital; innovation and knowledge are all significant contributors to economic growth. Therefore, they focused on the positive externalities and spill-over effects of a knowledge –based country. This also implies that policies which embrace openness, competition, change and innovation will promote growth. Conversely, policies which have the effect of restricting or slowing change by protecting or favouring particular existing industries or firms are likely over time to slow growth to the disadvantage of the community.

Having a critical look on the factors underlined by these models; capital accumulation, human capital development, national savings rate, technological progress, and other policies that encourages openness have been advanced as the main factors of long-term economic growth. It is generally believed that capital accumulation is the catalyst for countries to escape low level equilibrium trap involving a vicious cycle of poverty. For instance, Rostow's economic development model emphasizes that for the process of economic development to actually take-off, there is the need for sustained growth in terms of critical growth in the ratio of investment to national income. Similarly, Lewis (1955) notes that the process of economic development involves transforming an economy from being a 5% saver and investor to that which is saving and investing at least 12% of its net income. So it becomes pertinent that for any country to achieve and sustain growth, she must dedicate substantial part of the national income to savings, which is reinvestment to accumulate capital.

Capital accumulation is often suggested as a means for developing countries to increase their long term growth rates. To increase capital accumulation it is necessary to: increase savings ratios, maintain good banking system and system of loans, avoid corruption, good infrastructure to make investment more worthwhile.

But on the other hand Marx asserted that the general law of capitalist accumulation is that it creates both wealth and poverty. That is to say, "capitalist accumulation has an antagonistic character in that it produces and contains a unity of opposites. Capital accumulation produces an accumulation of wealth at one pole and an "accumulation of poverty and misery at other end". This is Marx's principal message about the process of capitalist accumulation. In addition, Solow's model argue that increasing capital stock can soon lead to diminishing returns. They argue that economic growth is fundamentally determined by population growth and technological innovation, while Endogenous growth models hold that capital accumulation can increase the long run trend rate of economic growth. However, to permit capital accumulation it is necessary to increase the savings ratios.

Given the above scenario, it is imperative to understand the macro dynamic interlinks between Gross Fixed capital formation, human capital formation and economic growth, therefore our questions are;

i) What is the impact of capital accumulation on the growth rate of Nigerian economy, has it helped the economy to grow or retard?
ii) If capital accumulation is propelled by policies that encourage openness, savings rate, and the level of population growth, then what is the relationship between Gross Fixed capital formation, human capital formation, population growth and savings in Nigeria?
iii) And how has economic growth responded to structural shock or impulse from Gross Fixed capital formation, human capital formation, savings rate, and population growth

Therefore, this paper is set to find (i) the short/long-run impact of Gross Fixed capital formation and human capital formation on economic growth. (ii) and to analyze how economic growth response to shock from Gross Fixed capital formation, and human capital formation, savings and population growth rate.

1.1 THEORETICAL AND EMPIRICAL LITERATURE

1.1.1 The Role of Capital Accumulation in Growth Process/ Theories of Economic Growth

Capital accumulation refers to the investment of money or a financial asset for the purpose of making more money (whether in the form of profit, rent, interest, royalties, capital gain or some other kind of return). Accumulation of capital is the basis of capitalism. In Marxian economics, capital accumulation is often equated with investment of profit income or savings, especially in real capital goods. Capital accumulation refers ordinarily to: real investment in tangible means of production, such as acquisitions, research and development, etc. that can increase the capital flow, investment in financial assets represent yielding profit, interest, rent, royalties, fees or capital gains, investment in *non-productive* physical assets such as residential real estate or works of art that appreciate in value and by extension to: human capital , i.e., new education and training increasing the skills of the (potential) labour force which can increase earnings from work, social capital , i.e. the wealth and productive capacity that the people in a society hold in common, rather than as individuals or corporations. Both non-financial and financial capital accumulation is usually needed for economic growth, since additional production usually requires additional funds to enlarge the scale of production.

In search of the determinants of economic growth and the reasons behind the differences in growth across countries, several growth models have been developed. And almost of them have emphasized on the role of capital accumulation and human capital formation in the growth process.

Capital plays a vital role in the modern productive system. Production without capital is hard for us even to imagine. With the growth of technology and specialisation, capital has become more complex and is of superior and advanced type. More goods can be produced with the aid of capital. In fact, greater productivity of the developed economies like that of USA is mainly due to the extensive use of capital, i. e. machinery, tools or implements in the productive process. Capital adds greatly to the productivity of worker and hence of the economy as a whole (Guru Supriya 2013).

Taking a lead from the foremost theory of Harrod and Domar Growth Theory(1946), who in their model asserted that every economy saves a certain proportion of its national income, if only to replace worn – out capital goods. However, in order to grow, new investments representing net additions to the capital stock are necessary. According to this theory, the main obstacle to development in poor countries is the relatively low level of new capital formation. If the country needs to grow at a higher rate than its national savings ratio can create that or it can seek to fill this "savings gap" through either foreign aid or private foreign investment. Again many economists have remarked that, the rate of economic growth achieved in developed countries cannot be wholly explained by increases in labour and physical capital. He points out that technological progress has played a more important role than accumulation of physical capital in the process of economic growth.

Then the Exogenous Growth Model, also known as the Neo –classical growth model or Solow growth model helps us understand in the long –run, why incomes are as high as they are, and why they differ so much between countries.

The neoclassical growth model was developed by Solow (1956) and Swan (1956).It is built upon an aggregate, constant- returns- to- scale production function that combines labour and capital (with diminishing marginal returns) in the production of a composite good. Savings are assumed to be a fixed fraction of output, and technology improves at an exogenous rate.

Suppose the production function is Cobb- Douglas, so that

$$\mathbf{Y = AK^{\alpha}L^{1-\alpha}}, \quad \mathbf{0} < \alpha < 1,$$

Where Y denotes total output,
L the number of workers employed in the production process,
K the capital stock

Where, A measures the level of technology. Output per worker, **y=Y/L,** is thus given by

$$\mathbf{y = AK^{\alpha}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .. (\mathbf{1})$$

Where, k denotes the capital- labour ratio.
Capital accumulation is given by

$$k = sy - (\eta - \delta)k, \qquad 0 < s\delta < 1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where, s denotes the propensity to save, n> 0 the exogenous rate of population growth, and δ the rate of depreciation of physical capital.

The neoclassical growth model led to the "sources- of- growth" approach, a popular empirical methodology aimed at analyzing the determinants of the changes in output. This approach uses an aggregate production function to decompose growth into "contributions" from different sources, namely, the growth rates of factor inputs weighted by their competitive factor shares (the "contribution" of factors), plus a residual which is often labelled "technical progress," but more adequately described as the difference between the growth of output and a weighted sum of the growth of inputs (growth in total factor productivity).

Economists today use Solow's sources –of – growth accounting to estimate the separate effects of capital, labour, and technological change on economic growth.

According to the Neo –Classical theories, growth comes about in three ways, if holding land constant.

(i) Increase in the supply of labour
(ii) Increase in the stock of capital
(iii) Increase in technological changes / productivity

Increasing labour supply generates a larger output that rises if more people take part in a country's production i.e. through immigration, or if people who are not part of labour force start working.

Increase in working capital can be either in physical capital or human capital. Physical capital increase output because it enhances the productivity of labour and provides valuable services directly. A productivity increase takes place when investments in equipments like computers and machinery increases.

The trouble with the neoclassical model is that it fails to explain the most basic facts of actual growth behaviour. The model states that the rate of growth is determined outside the model and is independent of preferences, most aspects of the production function, and policy behaviour.

Therefore, accumulation of capital goods every year greatly increases the national product or income. Capital accumulation is necessary to provide people with tools of production. If the population goes on increasing and no net capital accumulation takes place, then the growing population would not be able to get necessary tools, instruments, machines and other means of production with the result that their capacity to produce would be seriously affected. Moreover, productivity of the workers depends upon the amount of capital per worker. The greater the quantity of capital per worker, the greater the productivity of the workers. It is not capital accumulation alone that increases the amount of capital per worker. Capital per worker rises when the rate of capital accumulation is greater than the rate of population growth. With the increase in capital per worker, productivity per worker will increase with the result that national product and income will increase. Therefore, increasing capital accumulation, by increasing the productivity of the workers, plays an important role in the growth of the economy.

From the viewpoint of economic growth capital formation is important also because it makes large-scale production and greater degree of specialisation possible. But can increase in capital accumulation guarantee large scale production and specialization without human capital development. Endogenous growth theory highlights the fact that if productivity is to increase, the labour force must continuously be provided with more resources. Resources in this case include physical capital, human capital, and knowledge.
Growth is therefore driven by accumulation of factors of production, while accumulation in turn is the result of investment in the private sector. This implies that the only way a government can affect economic growth, at least in the long run, is through its impact on investments in capital, education and research and development.

The AK Growth Model proposed by Rebelo (1991) results from setting α =0 in the neoclassical equation $y=Ak^{\alpha}$ therefore
$y = Ak \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$

Where k=K/L as before, but K now is interpreted as a broad measure of capital –composite measure of both physical and human capital stock. A is a parameter that captures factors affecting the level of technology
Using the capital accumulation equation (2), the steady- state growth rate of the capital stock per worker can be shown to be equal to

$$\mathbf{g_{k}} = s_A - (\eta + \delta)$$

With the steady- state growth rate per capita given by

$$\mathbf{g_y} = \mathbf{s_A} - (\eta + \delta) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

This means that growth rate is, for sA>n+δ, positive (and constant over time) and that the level of income per capita rises without bound.

An important implication of the AK model is that in contrast to the neoclassical model, an increase in the saving rate permanently raises growth rate per capita. In addition and in contrast with the neoclassical growth model, which predicts that poor countries should grow faster than rich countries –AK model implies that poor nations whose production process is characterized by the same degree of technological sophistication as other nations always grow at the same rate as rich countries regardless of initial level of income.

Rebelo's analysis demonstrates that to obtain positive endogenous steady growth requires only the existence of a subset of capital goods whose production takes place under constant returns to scale and does not require the use of non–reproducible inputs. These externalities imply that the competitive equilibrium growth path does not coincide with that which could be achieved in an optimally planned economy.

The latter conclusion was reached by virtually all the theoretical analyses based upon successive formulations that belong to the family of "endogenous growth models". It carries the implication that growth performance might be improved by public policy action.

Lucas (1988), Human Capital Model is one of the best- known attempts to incorporate spillover effects of human capital accumulation to explain growth processes. The model is built upon the idea that individual workers are more productive, regardless of their skill level, if other workers have more human capital.

A simplified presentation of the model is as follows. Human capital is accumulated through explicit "production": a part of individuals' working time is devoted to accumulation of skills.

Formally, let k denote physical capital per worker and h human capital per worker or generally, "knowledge" capital. The production process is specified as follows

$$\mathbf{y} = \mathbf{Ak}^{\sigma}[\mu(\mathbf{h})]^{1-\sigma}, \quad 0 < \mu < 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where, u denotes the fraction of time that individuals devote to producing goods.
The growth of physical capital depends on the savings rate (I=sy), while the growth rate of human capital is determined by the amount of time devoted to its production:

$$\frac{h'}{h} = \alpha(1-\mu)\,, \qquad \alpha > 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (6)$$

This means that the long- run growth rate of both capital and output per worker is
$\propto (1-\mu)$.The rate of human capital growth and the ratio of physical capital to human capital converge to a constant. In the long- run, the level of income is proportional to the economy's initial stock of human capital.

The savings rate has no effect on the growth rate.
The important implication of Lucas (1988) model is that under a purely competitive equilibrium its presence leads to an underinvestment in human capital accumulation because private agents do not take into account the benefits of human capital accumulation. The equilibrium growth rate is smaller than the optimal growth rate, due the existence of externalities. Because the equilibrium growth rate depends on the rate of investment in human capital, the externality implies that growth would be higher with more investment in human capital. In conclusion, government policies are necessary to increase the equilibrium growth rate up to the level of optimal growth rate. This implies that a government subsidy to human capital formation or schooling could potentially result in a substantial increase in the rate of economic growth.

1.2 Empirical Literature

The relationship between capital formation of the nation and economic growth has been studied by a number of authors with different models and findings. This section will present the empirical result of several studies. Solow (1956) opens a new chapter in development economics by pioneering an economic growth model based on the assumption that increasing capital accumulation, population and technical efficiency are the sources of economic growth. Even though the Solow model was criticized on the grounds of its over-simplicity for ignoring many other factors and for the prediction that all economies would eventually grow at the same rate which has been widely refuted empirically, the role of three factors identified by Solow as propellers of economic growth has not been doubted. Hence, Arrow (1962) and Solow (1986) made some modifications to the original model by incorporating human capital or knowledge into the model. But empirically many researchers have emphasized on the impact of capital formation on growth and among them are;

Mba (2011) in their study looked at relationship between Foreign Private Investment, Capital Formation and Growth, in Nigeria using the two-stage least squares (2SLS) method of estimation. The study finds that the long run impact of capital formation and foreign private investment on economic growth is larger than their short-run impact. There is thus, a long-run equilibrium relationship among the variables as the error correction term is significant, but the speed of adjustment is small in both models. In their result, the two stage least squares estimates are very close to the OLS estimates suggesting that OLS estimates are consistent and unbiased. Hence, endogeneity was not a problem in the estimated models. There is therefore no simultaneity between GDP growth and capital formation model. These findings therefore have some policy implications as discussed in the work. In line with the above findings, Ugwuegbe (2013) analyze the impact of capital formation, stock market capitalization, inflation rate and interest rate on economic growth, the study employed Ordinary least square (OLS) technique. The empirical findings suggest that capital formation has positive and significant impact on economic growth in Nigeria for the period under review and this result corroborate with the findings of Bakare (2011), Orji and Mba (2010). Stock market also showed a positive impact, while both inflation rate and interest rate has a negative impact on economic growth in Nigeria for the period under review but the impact is statistically insignificant. The result further shows a long run relationship between capital formation and economic growth in Nigeria for the period under review.

On the other hand, there are studies that have a negative impact of capital accumulation on growth. Adekunle and Aderemi (2012) examined the relationship between Domestic Investment, Capital Formation and Population Growth in Nigeria and their result shows that the rate of investment does not assist the rate of growth of per capital GDP in Nigeria. The results also show that there is negative relationship between growth rates of the population and capital formation. With the curve estimation method results, investment rate can engender growth in the economy though slowly, on a linear path. Also Gomez-Antonio and Angelo Garjo (2012) adopt an empirical framework of a hexa-variate panel vector autoregressive (PVAR) approach on data from thirty sampled import-dependent developing economies. The variables included in the empirical PVAR model are inflation, capital accumulation, output growth rate, interest rate, exchange rate, terms of trade and import dependence. And the result suggests that the long-run static impact of capital accumulation and economic growth on inflation is negative. Besides, inflation and economic growth had dampening effects on capital accumulation contemporaneously in the long-run. Ogbuagu and Ifionu (2015) explore the impact of capital flow, human capital development on economic growth using pairwise granger causality and dynamic

autoregressive model. And they found no causality between capital flow (proxied by de jure and de facto measures of capital openness), human capital development (education expenditure and health expenditure) and economic growth.

The importance of human capital formation concept on economic growth cannot be over emphasized and have been the fulcrum of aid and assistance by international agencies and developed countries. Furthermore, evidence from developed countries suggests that human capital has been the major driver of their development process. This notwithstanding, the impact on economic growth in Nigeria has been a subject of debate. Eigbiremolen and Anaduaka (2014) employs the augmented Solow human-capital-growth model to investigate the impact of human capital development on national output, a proxy for economic growth, using quarterly time- series data from 1999-2012. Empirical results show that human capital development, in line with theory, exhibits significant positive impact on output level. This collaborate with the findings of Ogujiofor (2013), he used the Error Correction Model as an analytical tool, examines empirically the relationship between economic growth and human capital development. Findings showed that investment in human capital in the form of education and capacity building at the primary and secondary levels impact significantly on economic growth, while capital expenditure on education was insignificant to the growth process. Also Sankay, Ismail and Shaari (2010) investigated the impact of human capital development on economic growth in Nigeria during the period 1970 to 2008 and the result indicated that human capital development has a significant impact on Nigeria's economic growth. Dauda (2010), using the human capital model of endogenous growth developed by Mankiw, Romer and Weil (1992), examined empirically the role of human capital in Nigeria's economic development. Findings show that there is a feedback mechanism between human capital formation and economic growth in Nigeria. Thus, the policy implication of the findings is that government should place a high priority on human capital development. Amassoma and Nwosa (2011) find no causality between human capital development and economic growth. Oluwatobi and Ogunrinola (2011) examined the relationship between human capital development efforts of the Government and economic growth in Nigeria. The result shows that there exists a positive relationship between government recurrent expenditure on human capital development and the level of real output, while capital expenditure is negatively related to the level of real output. Easterly (1997), after analyzing data from 146 countries in which Nigeria is one could not find any significant relationship between investment in physical capital and GDP growth. In fact the coefficients for 71 countries including Nigeria were negative. And this findings support the modern growth theories that there is an endogenous component to the growth nexus, which is grossly underdeveloped in developing countries. In modern thinking, investment is thought of in the context of accumulation of both physical and human capital.

However, studies have shown that significant share of China's growth could be explained by the accumulation of human capital (see World Bank, 1997). Odusola (1997) using time series data on Nigeria arrived at a result, which suggests significant butt weak linkages between the levels of government capital investment in education and real income per working age person. He found no significant relationship between the level of government recurrent expenditure on education and real per capita income. For investment in education to affect real growth, the increase in human capital formation resulting from increased educational investment must be translated into increased productivity through an efficient labour market, which adequately rewards investments in human capital. The new emphasis on the role of human capital development in economic growth led to the accumulation of empirical literature that focused on the estimation of returns to schooling at various levels of education.

II. Methodology

There are various theoretical models that have been used to explain the relationship between capital flow and economic growth. This study adopts a theoretical framework in which the effect of physical and human capital on growth is well highlighted, and that is a simple endogenous growth model. The relationship between capital stock and growth is examined with an endogenous growth model of the AK and Lucas, in which the effects of changes in financial variables on steady- state growth is brought about through the impact of capital accumulation.

A simplified presentation of the model is as follows. Human capital is accumulated through explicit "production": a part of individuals' working time is devoted to accumulation of skills.

Formally, let k denote physical capital per worker and h human capital per worker or generally, "knowledge" capital. The production process is specified as follows

$$\mathbf{y} = \mathbf{A}\mathbf{k}^{\boldsymbol{\sigma}}[\boldsymbol{\mu}(\mathbf{h})]^{\mathbf{1}-\boldsymbol{\sigma}}, \qquad \mathbf{0} < \mu < 1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \mathbf{(5)}$$

Where, u denotes the fraction of time that individuals devote to producing goods.

The growth of physical capital depends on the saving rate (I=sy), while the growth rate of human capital is determined by the amount of time devoted to its production:

$$\frac{h'}{h} = \alpha(1-\mu), \qquad \alpha > 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

This means that the long- run growth rate of both capital and output per worker is $\propto (1 - \mu)$.The rate of human capital growth and the ratio of physical capital to human capital converge to a constant.

This study employed annual series data from Central Bank of Nigeria statistical bulletin (2011), and the study plan covers the period of 1981 to 2013. In other to achieve the objectives of this study, Ordinary Least Square (OLS) technique was used to determine the impact of capital formation on economic growth in Nigeria. The choice of OLS is mainly because it minimizes the error sum of square and has a number of advantages such as unbiaseness, consistency, minimum variance and sufficiency; it is widely used and simply and easy to understand. The model that will analyze the relationship is implicitly stated as follows:

GDPGR = f(GFCF, HCF, NNS, POPR, INSQ, INFL,)…… (1)

The equation (1)is transformed into a linear function thus:

$GDPGR = b_0 + b_{1t}GFCF_t + b_2HCF_t + b_3NNS_t + b_4POPR_t + b_6INSQ_t + b_7INFL_t + U_t$ …… (2)

GDPGR = Growth Rate of Gross Domestic Product which is used as a proxy for economic growth
GFCF = Gross Fixed Capital Formation
HCF = Human Capital Formation
NNS = Savings Rate
POPGR = Population Growth Rate
INSQ = Institutional Quality
INFL = Inflation

Control variables introduced in the model are; INSQ = Institutional Quality, INFR = Inflation, and T = the time period
U = error term.

2.1 Measurement of Variables used in Estimation

- ***Economic Growth:***

To measure Economic Growth, we used data on Nigeria's Gross Domestic Product Growth Rate available from Central Bank of Nigeria Statistical Bulletin 2012.

- ***Institutional quality:***

It is well known that institutions matter a great deal for economic performance. Following Chantel et al (2006) and Raschky et al (2009), we use the type of political regime in a country- democratic or autocratic as our proxy for institutional quality. We use the polity IV database and this variable takes the value -10 for fully institutionalized autocratic regimes and 10 for fully institutionalized democratic regimes with special values of -66 (interruption), -77 (interregnum), -88 (transition) and 99 (independence).

- ***Human capital development measurement***

The conventional standard to measure human capital stock has been largely categorized into three parts; output, cost, and income based approach.

Some economists attempt to measure the stock of human capital utilizing school enrollment rates as a proxy of human capital (Baro and Lee 1993).

Nahru, Swanson and Dubey (1993) attempted to measure relationship between human capital and students, "accumulated years of schooling in the employable age as educational attainment. It is difficult to clearly demonstrate this relationship because educational attainment is a part of regular (school) education.

Romer (1999) used skilled adults and total adults to measure the stock of human capital in the national economy (eg. OECD utilized International Adult Literacy Survey (IALS), the ratio between literacy adults and total adults. While some researchers also have used cost based approaches in measuring the stock of human capital through summing costs investment for one's human capital. Others have also used income-based approach based on the returns which an individual obtains from labour market throughout education investment. Hanson (2008) shows OECD measure on human capital is closely linked to international comparable statistics considering investment in human capital, quality adjustment and result of education.

The conventional measurements also include investment in human capital focused on the current level of human capital investment within a national boundary. But the United Nation Development Programme (UNDP), has reported Human Development Index (HDI) to constitute; health, knowledge, and standard of living with many sub- variables such as life expectancy at birth, expenditures in school and health sector, adult literacy rates, school enrollment ratio and GDP per capita.

2.2 Method of Data Analyses and Time Series Property of Data Used

The methodology applied in this study following the literature is based on time series data sets. The estimation procedure adopted in deriving the estimates of the parameters of economic relationships is the Ordinary Least Squares (OLS).

i. ***Unit-Root Test:***

There often exists the problem of non-stationarity in empirical research involving time series data and this renders the traditional tools of econometrics (like OLS) inappropriate. To overcome this unit-root problem, we test for stationarity of the series in use. The Augmented Dickey-Fuller test (ADF) is of choice in this study because of its efficiency in detecting unit root. It is specified as follows:

$$\Delta Y_t = \theta_o + \theta_1 Y_{t-1} + \sum_{i=1}^{k} b_i \Delta Y_{t-i} + \mu_t \quad \text{..... (7)}$$

Where, Y_t is a vector of all variables in the model θ_i and b_i are parameters of the model, $\mu_t$is thewhite noise at time while k and Δ remain as defined in equation (6) above. This we will achieve, conducting the test by first or second level difference if the series are integrated of order one or order two (i.e. I(1) or I(2)). The null hypothesis here is that Y_t has a unit root (that is, non-stationary) and the alternative is that there is no unit root (that is, stationary). If the variables turn out to contain unit roots, we will therefore, conclude that they are non-stationary.

- ***Autoregressive Distributed Lag Model for Objective 1***

In statistics and econometrics, a distributed lag model is a model for time series data in which a regression equation is used to predict current values of a dependent variable based on both the current values of an explanatory variable and the lagged (past period) values of this explanatory variable. (http://en.wikipedia.org/wiki/Distributed_lag)

The starting point for a distributed lag model is an assumed structure of the form

$$y_t = a + w_0 x_t + w_1 x_{t-1} + w_2 x_{t-2} + \ldots + \text{error term} \quad \text{..... (8)}$$

or the form

$$y_t = a + w_0 x_t + w_1 x_{t-1} + w_2 x_{t-2} + \ldots + w_n x_{t-n} + \text{error term}, \quad \text{..... (9)}$$

where y_t is the value at time period t of the dependent variable y, a is the intercept term to be estimated, and w_i is called the lag weight (also to be estimated) placed on the value I periods previously of the explanatory variable x. In the first equation, the dependent variable is assumed to be affected by values of the independent variable arbitrarily far in the past, so the number of lag weights is infinite and the model is called an *infinite distributed lag model*. In the alternative, second, equation, there are only a finite number of lag weights, indicating an assumption that there is a maximum lag beyond which values of the independent variable do not affect the dependent variable; a model based on this assumption is called a *finite distributed lag model*. (http://en.wikipedia.org/wiki/Distributed_lag)

- ***Impulse Response Function of VAR for objective (2)***

To achieve the second objective, we examined the impulse response function (IRF) of the vector Auto regressive model. The impulse response functions are responses all variable on the model to a one unit structural shock to one variable in the model. The impulse responses are plotted on the y-axis with the period from the initial shock on the x-axis.

For the VAR (p) of form

$$y_t = \nu + A_1 y_{t-1} + \ldots + A_p y_{t-p} + u_t. \quad \text{..... (3)}$$

III. Result Presentations And Interpretation

- ***Unit Root Test***

As indicated in the literature, most time series variables are non-stationary and using non-stationary variables in the model might lead to spurious regressions. The first or second differenced terms of the most variables will usually be stationary. Hence, the variables were found significant at first differences. See the summary of the Unit root test below.

Table 1; Unit Root Test Result

	Level (Pvalues)			1st Differenced(Pvalues)		
Variables	(Constant)	With Trend	No Trend	(Constant)	With Trend	No Trend
GDPGR	0.0037	0.0034	0.0010	0.0000	0.0000	0.0000
GFCF	0.0674	0.2756	0.0113	0.0000	0.0000	0.0000
HCF	0.0000	0.0000	0.4335	0.0000	0.0000	0.0000
NNS	0.0043	0.0055	0.2767	0.0000	0.0000	0.0000
POPGR	0.7319	0.0000	0.4498	0.0000	0.0002	0.0000
INSQ	0.0243	0.0421	0.0697	0.0000	0.0004	0.0000

Source: Author's

The first step in VAR estimation is to select the suitable lag order for the unrestricted VAR. In this respect, lag length criteria test computes various criteria to select the lag order of an unrestricted VAR. In selecting the appropriate lag number, the VAR lag order selection criteria test was employed and lag of 2 is selected for subsequent test based on the minimum Final Prediction Error (FPE) , Akaike information Criteria (AIC) and Schwarz information criterion.

Table 2: VAR Lag Order Selection Criteria

Endogenous variables: D(GDPGR)
Exogenous variables: C D(GFCF) D(HCF) D(NNS) D(POPGR) D(INSQ) D(INFL)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-80.46161	NA*	87.18487	7.288467	7.632066	7.379624
1	-78.66154	2.400085	82.30228*	7.221795*	7.614480*	7.325975*
2	-78.41307	0.310587*	88.67724*	7.284423*	7.726193*	7.401625
3	-77.30939	1.287633	89.28873	7.275782	7.766638	7.406007
4	-77.26967	0.043029	98.65815	7.355806	7.895747	7.499052
5	-77.22856	0.041112	109.5574	7.435713	8.024740	7.591982
6	-76.22466	0.920238	112.9789	7.435389	8.073501	7.604680
7	-74.42394	1.500599	109.8504	7.368662	8.055860	7.550976
8	-74.40493	0.014263	125.0696	7.450411	8.186694	7.645747

* indicates lag order selected by the criterion.
Source: Author's

- ***Autoregressive Distributed Lag Model for Objective 1***

We adopted autoregressive distributed lag model to evaluate the short and long run impact of capital accumulation, human capital development, savings rate, and population growth rate on economic growth. Thus the result is presented on the table below;

Table 3: ARDL Result

Dependent Variable: D(GDPGR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	135.6633	125.9021	1.077530	0.3226
D(GDPGR(-1))	-0.516025	0.776425	-0.664617	0.5310
D(GDPGR(-2))	-0.636245	0.534334	-1.190725	0.2787
D(GFCF(-1))	-0.062291	0.140553	-0.443187	0.6732
D(GFCF(-2))	0.004299	0.140008	0.030703	0.9765
D(HCF(-1))	2.115439	3.945630	0.536147	0.6111
D(HCF(-2))	0.297700	2.196288	0.135547	0.8966
D(NNS(-1))	1.041249	0.532382	1.955832	0.0983
D(NNS(-2))	0.260896	0.297603	0.876658	0.4144
D(POPGR(-1))	-127.6970	69.94310	-1.825727	0.1177
D(POPGR(-2))	198.1093	116.7906	1.696277	0.1408
D(INSQ(-1))	-0.413294	0.226791	-1.822352	0.1182

D(INSQ(-2))	-0.323828	0.213329	-1.517971	0.1798
D(INFL(-1))	0.155269	0.141304	1.098833	0.3140
D(INFL(-2))	0.156011	0.220857	0.706389	0.5064
GDPGR(-1)	-0.709414	0.746942	-0.949757	0.3789
GFCF(-1)	-0.013086	0.227721	-0.057464	0.9560
HCF(-1)	-3.187513	5.928278	-0.537679	0.6101
NNS(-1)	-0.785399	0.506769	-1.549819	0.1722
POPGR(-1)	-40.41442	39.29730	-1.028427	0.3434
INSQ(-1)	0.421456	0.268105	1.571984	0.1670
INFL(-1)	-0.097576	0.246441	-0.395941	0.7058
ET(-1)	-0.239921	0.715954	-0.335107	0.7489

R-squared	0.858851	Mean dependent var	0.217207
Adjusted R-squared	0.341306	S.D. dependent var	8.891074
S.E. of regression	7.215994	Akaike info criterion	6.801147
Sum squared resid	312.4234	Schwarz criterion	7.885554
Log likelihood	-75.61664	Hannan-Quinn criter.	7.140770
F-statistic	1.659470	Durbin-Watson stat	2.169229
Prob(F-statistic)	0.274673		

Source: Author's

From the above table 3, it is very obvious that none of the short run coefficient of the independent variable (gross fixed capital formation, human capital formation, net national savings, population growth rate, institutional quality and inflation rate) at lag (1 &2) have significant impact on economic growth at 0.05 level. Therefore there is no short run relationship between the dependent variables and the independent variables.
In addition using the Bound Test to determine the long-run associationship, we found that the F-statistics value (1.6595) is less than the pesaran upper Bound value (4.85), therefore we accept the null hypothesis that there is no long-run impact of gross fixed capital formation, human capital formation, net national savings, population growth rate, institutional quality and inflation rate on economic growth
Beside, the error term (et) is rightly signed but not significant and the speed of adjustment towards equilibrium is very poor at 23.99percent.

Table 4: Wald Coefficient Diagnostic Hypothesis Test

Null Hypothesis; C(15)= C(16)=C(17)=C(18)=C(19)=C(20)=0

Test Statistic	Value	Df	Probability
F-statistic	1.556715	(6, 8)	0.2744
Chi-square	9.340290	6	0.1553

Source: Author's

Also to check the long run impact of our models, we used the Wald Hypothesis Test, and the P-value of our long run coefficient is more than 5percent, therefore we conclude that there is no long run impact of the independent variables (gross fixed capital formation, human capital formation, net national savings, population growth rate, institutional quality and inflation rate) on the rate of growth. And this result concede with the result of the ARDL in table 3; which present individual P-values of the long-run coefficients on the auto regressive distributed Lag table.

- ***The Impulse Responses Function (IRF) Result for Objective (2)***

The result of the Impulse Responses Function (IRF), aimed at tracing the responses of the dependent variable (economic growth rate) with the independent variables (gross fixed capital formation, human capital formation, net national savings, population growth rate, institutional quality and inflation rate). Thus the result is presented as below:

Table 5: Impulse Reponses of D(GDPGR)

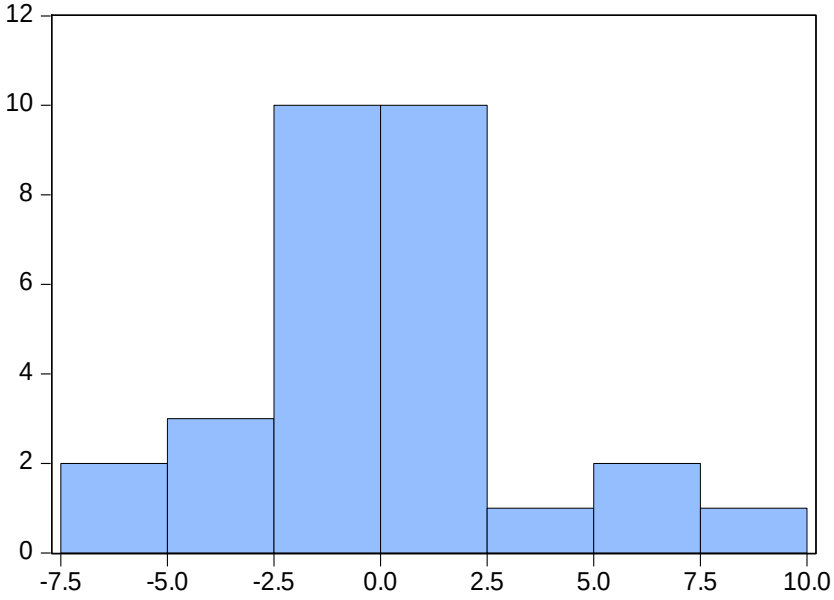
Period	D(GDPGR)	D(GFCF)	D(HCF)	D(NNS)	D(POPGR)	D(INSQ)	D(INFL)
1	8.590974	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	(1.12805)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	-6.136476	0.682496	0.617054	1.274355	-3.658899	-0.829939	0.133614
	(3.06054)	(2.76082)	(2.73447)	(2.28719)	(2.59993)	(1.84853)	(0.11366)
3	1.082296	-1.112349	-1.367650	-4.248263	3.610356	0.053424	-0.060363
	(3.91059)	(3.33450)	(3.60668)	(2.97015)	(3.26669)	(2.20805)	(0.15809)
4	-0.977051	1.375128	-2.207335	0.868227	0.047044	1.173196	-0.125403
	(3.94872)	(3.59104)	(3.83654)	(2.91666)	(3.25964)	(2.30106)	(0.18013)
5	0.020072	-2.278655	0.932500	-0.499170	-0.971839	1.299971	0.087320
	(3.80843)	(3.55037)	(3.63527)	(2.77087)	(3.12918)	(2.28358)	(0.17899)
6	-0.306431	1.827858	-0.042445	2.142264	-0.274055	0.633868	-0.083186
	(3.41931)	(3.42194)	(3.47298)	(2.73565)	(3.09271)	(2.20299)	(0.16869)
7	1.741157	-0.292132	1.826170	-0.951003	-1.112426	-0.854372	0.140932
	(3.00605)	(3.31163)	(3.46702)	(2.64997)	(3.00052)	(2.11535)	(0.16091)
8	1.016317	-0.406416	-1.323433	1.145821	2.306943	-2.624657	-0.129142
	(2.73222)	(3.13723)	(3.54225)	(2.75088)	(3.06908)	(2.00593)	(0.15750)
9	-0.634351	-0.313368	3.150089	-0.879344	0.578733	1.269525	0.050054
	(2.76900)	(3.12361)	(3.65142)	(2.62588)	(2.88336)	(1.97753)	(0.14752)
10	-1.378841	2.281897	-3.601906	0.487870	-1.724540	0.325411	0.017101
	(2.73223)	(3.10797)	(3.62106)	(2.60628)	(2.63255)	(2.01644)	(0.14548)

Source: Author's

The table above shows the impulse response of economic growth rate (GDPGR) to one standard deviation/innovation or to a unit structural shock of gross fixed capital formation, human capital formation, net national savings, population growth rate, institutional quality and inflation rate.

Consequently, it is very clear that none of the independent variables contributed greatly to the variations in the economic growth rate in both short-run and long run because the impulse they emitted for the both periods fluctuated all through the period under review with small percentage impact. For example the gross fixed capital formation produced 6.12 percent positive shocks for the ten periods and -4.38 percent negative shocks to economic growth, while human capital formation produced more negative shocks (-12.48)percent than positive (6.51) for the ten periods. Like-wise other variables

Figure 1; Jarque-Bera Normality Test



Jarque-Bera Normality Test Shows that the model is normally distributed with the probability value of 8percent while Breusch-Godfrey serial correlation test indicates no serial or auto correlation and this concedes with the Durbin Watson Value (2.1) in the ARDL table2 above.

Table 6; Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.647798	Prob. F(2,4)	0.1254
Obs*R-squared	18.73051	Prob. Chi-Square(2)	0.0001

Sourc; Author"s

IV. Conclusion

It is generally believed that capital accumulation and human capital formation are the important factors that a country needs to escape vicious cycle of poverty. Capital accumulation is often suggested as a means for developing countries to increase their long term growth rates. To increase capital accumulation it is necessary to: increase savings ratios, maintain good banking system and system of loans, avoid corruption, good infrastructure to make investment more worthwhile.

In consonance with the renowned Karl Marx theory together with the exogenous and endogenous growth models, that strongly affirmed that that long-run economic growth depends on capital investment, human capital formations and savings rate so many researchers have tried to find the impact of these variables on the rate of economic growth. Ugwumba (2013), Bakare (2011) and Orji and Mba (2010) have found a positive impact of capital on the growth rate of Nigerian economy.

This study have evaluated the short and long—run impact of capital formation, human capital formation on economic growth and in addition has analyzed the impulse responses of economic growth from unit structural innovation of the capital accumulation, human capital formation and other independent variables. And we found no short and long run impact of capital accumulation, human capital development on economic growth and more over in the short and long run periods capital accumulation, human capital development, net national savings, population growth have produced an insignificant impact on the rate of economic growth. And the significant sign fluctuated all through the ten periods. Specifically, capital accumulation and human capital formation produced (6.12percent, 6.51percent, -4.38 and -12.48percent) respectively.

In conclusion, Gross Fixed capital formation and human capital formation produced negative and insignificant impact on economic growth and negative impulse was also emitted in both short and long-run. And this is not surprising because of the political and socioeconomic instability in Nigeria. Therefore, we recommend that government should provide an enabling environment that will encourage both domestic and foreign investment and in addition human development through education and in-job training should be encouraged.

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Appendix

VAR Lag Order Selection Criteria
Endogenous variables: D(GDPGR)
Exogenous variables: C D(GFCF) D(HCF) D(NNS) D(POPGR) D(INSQ) D(INFL)
Date: 10/31/15 Time: 13:51
Sample: 1981 2013
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-80.46161	NA*	87.18487	7.288467	7.632066	7.379624
1	-78.66154	2.400085	82.30228*	7.221795*	7.614480*	7.325975*
2	-78.41307	0.310587*	88.67724*	7.284423*	7.726193*	7.401625
3	-77.30939	1.287633	89.28873	7.275782	7.766638	7.406007
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5	-77.22856	0.041112	109.5574	7.435713	8.024740	7.591982
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7	-74.42394	1.500599	109.8504	7.368662	8.055860	7.550976
8	-74.40493	0.014263	125.0696	7.450411	8.186694	7.645747

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

d(gdpgr) c d(gdpgr(-1)) d(gdpgr(-2)) d(gfcf(-1)) d(gfcf(-2)) d(hcf(-1)) d(hcf(-2)) d(nns(-1)) d(nns(-2)) d(popgr(-1)) d(popgr(-2)) d(insq(-1)) d(insq(-2)) d(infl(-1)) d(infl(-2)) gdpgr(-1) gfcf(-1) hcf(-1) nns(-1) popgr(-1) insq(-1) infl(-1) et(-1)

Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 10/31/15 Time: 20:42
Sample (adjusted): 1985 2013
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	135.6633	125.9021	1.077530	0.3226
D(GDPGR(-1))	-0.516025	0.776425	-0.664617	0.5310
D(GDPGR(-2))	-0.636245	0.534334	-1.190725	0.2787
D(GFCF(-1))	-0.062291	0.140553	-0.443187	0.6732
D(GFCF(-2))	0.004299	0.140008	0.030703	0.9765
D(HCF(-1))	2.115439	3.945630	0.536147	0.6111
D(HCF(-2))	0.297700	2.196288	0.135547	0.8966
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D(NNS(-2))	0.260896	0.297603	0.876658	0.4144
D(POPGR(-1))	-127.6970	69.94310	-1.825727	0.1177
D(POPGR(-2))	198.1093	116.7906	1.696277	0.1408
D(INSQ(-1))	-0.413294	0.226791	-1.822352	0.1182
D(INSQ(-2))	-0.323828	0.213329	-1.517971	0.1798
D(INFL(-1))	0.155269	0.141304	1.098833	0.3140
D(INFL(-2))	0.156011	0.220857	0.706389	0.5064
GDPGR(-1)	-0.709414	0.746942	-0.949757	0.3789
GFCF(-1)	-0.013086	0.227721	-0.057464	0.9560
HCF(-1)	-3.187513	5.928278	-0.537679	0.6101
NNS(-1)	-0.785399	0.506769	-1.549819	0.1722
POPGR(-1)	-40.41442	39.29730	-1.028427	0.3434
INSQ(-1)	0.421456	0.268105	1.571984	0.1670
INFL(-1)	-0.097576	0.246441	-0.395941	0.7058
ET(-1)	-0.239921	0.715954	-0.335107	0.7489

R-squared	0.858851	Mean dependent var	0.217207
Adjusted R-squared	0.341306	S.D. dependent var	8.891074
S.E. of regression	7.215994	Akaike info criterion	6.801147
Sum squared resid	312.4234	Schwarz criterion	7.885554
Log likelihood	-75.61664	Hannan-Quinn criter.	7.140770
F-statistic	1.659470	Durbin-Watson stat	2.169229
Prob(F-statistic)	0.274673		

Wald Test:
Equation: Untitled

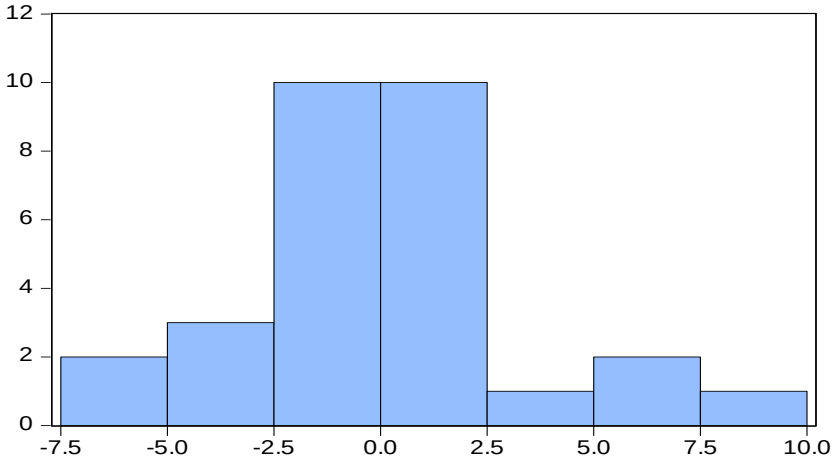
Test Statistic	Value	Df	Probability
F-statistic	1.556715	(6, 8)	0.2744
Chi-square	9.340290	6	0.1553

Null Hypothesis: C(15)=C(16)= C(17)=C(18)
=C(19)=C(20)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(15)	0.150900	0.196519
C(16)	-0.852476	0.685917
C(17)	0.029582	0.209101
C(18)	-1.328271	5.263646
C(19)	-0.673199	0.351918
C(20)	-27.41122	34.31406

Restrictions are linear in coefficients.

Response of D(GDPGR): Period	D(GDPGR)	D(GFCF)	D(HCF)	D(NNS)	D(POPGR)	D(INSQ)	D(INFL)
1	8.590974	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	(1.12805)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	-6.136476	0.682496	0.617054	1.274355	-3.658899	-0.829939	0.133614
	(3.06054)	(2.76082)	(2.73447)	(2.28719)	(2.59993)	(1.84853)	(0.11366)
3	1.082296	-1.112349	-1.367650	-4.248263	3.610356	0.053424	-0.060363
	(3.91059)	(3.33450)	(3.60668)	(2.97015)	(3.26669)	(2.20805)	(0.15809)
4	-0.977051	1.375128	-2.207335	0.868227	0.047044	1.173196	-0.125403
	(3.94872)	(3.59104)	(3.83654)	(2.91666)	(3.25964)	(2.30106)	(0.18013)
5	0.020072	-2.278655	0.932500	-0.499170	-0.971839	1.299971	0.087320
	(3.80843)	(3.55037)	(3.63527)	(2.77087)	(3.12918)	(2.28358)	(0.17899)
6	-0.306431	1.827858	-0.042445	2.142264	-0.274055	0.633868	-0.083186
	(3.41931)	(3.42194)	(3.47298)	(2.73565)	(3.09271)	(2.20299)	(0.16869)
7	1.741157	-0.292132	1.826170	-0.951003	-1.112426	-0.854372	0.140932
	(3.00605)	(3.31163)	(3.46702)	(2.64997)	(3.00052)	(2.11535)	(0.16091)
8	1.016317	-0.406416	-1.323433	1.145821	2.306943	-2.624657	-0.129142
	(2.73222)	(3.13723)	(3.54225)	(2.75088)	(3.06908)	(2.00593)	(0.15750)
9	-0.634351	-0.313368	3.150089	-0.879344	0.578733	1.269525	0.050054
	(2.76900)	(3.12361)	(3.65142)	(2.62588)	(2.88336)	(1.97753)	(0.14752)
10	-1.378841	2.281897	-3.601906	0.487870	-1.724540	0.325411	0.017101
	(2.73223)	(3.10797)	(3.62106)	(2.60628)	(2.63255)	(2.01644)	(0.14548)



Series: Residuals
Sample 1985 2013
Observations 29

Mean	-3.84e-14
Median	-0.278936
Maximum	9.560885
Minimum	-6.042346
Std. Dev.	3.340356
Skewness	0.805255
Kurtosis	4.227446
Jarque-Bera	4.954605
Probability	0.083969

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.647798	Prob. F(2,4)	0.1254
Obs*R-squared	18.73051	Prob. Chi-Square(2)	0.0001

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/31/15 Time: 20:47
Sample: 1985 2013

Included observations: 29
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-177.6169	132.6955	-1.338530	0.2517
D(GDPGR(-1))	-0.719429	0.627297	-1.146873	0.3154
D(GDPGR(-2))	0.288565	0.434506	0.664121	0.5429
D(GFCF(-1))	-0.124214	0.113282	-1.096509	0.3344
D(GFCF(-2))	-0.011789	0.105386	-0.111866	0.9163
D(HCF(-1))	-4.967149	3.513185	-1.413859	0.2303
D(HCF(-2))	-1.703852	1.722251	-0.989317	0.3785
D(NNS(-1))	-0.246583	0.405350	-0.608323	0.5758
D(NNS(-2))	0.034811	0.218709	0.159168	0.8813
D(POPGR(-1))	58.20627	57.99183	1.003698	0.3723
D(POPGR(-2))	-166.7107	123.9032	-1.345492	0.2497
D(INSQ(-1))	0.267052	0.211479	1.262785	0.2753
D(INSQ(-2))	0.290578	0.197826	1.468857	0.2158
D(INFL(-1))	0.052002	0.105715	0.491909	0.6486
D(INFL(-2))	-0.098840	0.173965	-0.568161	0.6003
GDPGR(-1)	0.625846	0.605167	1.034170	0.3595
GFCF(-1)	0.054293	0.167290	0.324546	0.7618
HCF(-1)	8.233067	5.901087	1.395178	0.2354
NNS(-1)	-0.240375	0.381329	-0.630362	0.5627
POPGR(-1)	53.57978	41.18491	1.300957	0.2632
INSQ(-1)	-0.287532	0.229686	-1.251849	0.2788
INFL(-1)	0.275601	0.212770	1.295301	0.2649
ET(-1)	1.074972	1.212786	0.886366	0.4255
RESID(-1)	-1.269193	1.076688	-1.178794	0.3038
RESID(-2)	-1.361311	0.714804	-1.904454	0.1296