NIGERIA'S ECONOMIC GROWTH: PERFORMANCE AND DETERMINANTS

By

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ABSTRACT

In this paper some recent developments in time series econometrics, which is of great potential for extending the frontier of economic research is applied to Nigerian data in order to estimate a production function type equation as well as examine the key macroeconomic determinants of economic growth in Nigeria. Of particular application is the vector error correction modelling technique. Apart from the determination of criteria for selecting the lag length, the paper also explored variance decomposition and effect of shocks through the impulse response function. Results from the econometric analysis revealed that output was elastic to capital injection in the short-term and that all the other macroeconomic variables were significant in explaining growth in Nigeria. The predictive power of the model was quite high and tracked the long-run growth path.

Keywords. Vector error correction, impulse response, variance decomposition, information criteria, Hodrick-Prescott.

I. Introduction

Economic growth is simply the percentage or proportionate increase in real income during a given period, normally a year. The size of the income and the method of sharing it are of great interest in modern macroeconomics. This is not only because, as Gillis et al. (1992) put it, *"one could cut a bigger piece of the pie, only by taking away a portion that belongs to another, and others think of increasing the size of the pie so that others could*

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have a share, but because of the structural changes that follow the sharing and increase in size, of the pie". In this phenomenon the size of the pie could also reduce giving rise to economic decline and thus, the converse of economic growth. Modern economic growth therefore involves fundamental structural changes in the way both production and societies are organized.

The history of economic growth shows that nations have different growth paths. Thus, while in the late eighteen century economic transformation began in England and spread gradually to other parts of Europe and North America, it did not get to Asia until the 1950s, Japan precisely. The different growth path gave rise to income gaps between nations which is in no way permanent as current evidence have shown.

Economic growth does not take place in a vacuum. There are basic factors that motivate growth. They include: basic resources, land, labour capital; human capital, education, training and health; and productivity. The availability of these engines does not in themselves guarantee growth. For instance, investment is the key to expanding capital, and savings, domestic and foreign, are needed to finance investment. Thus, improving a country's investment performance in both human and physical assets is important for growth.

Unlike other developing regions, empirical evidences in Africa show that the average output per capita in constant prices was lower at the end of 1990s than 30 years before, and in some countries, it has fallen by more than 50 per cent. Consequently, Africa is the only region to see investment and savings per capita decline after 1970. Averaging about 13 per cent of GDP in the 1990s, the savings rate of the typical African country has been the lowest in the world, while according to Soludo (2001) at least 30 per cent investment rate is required, at East Asian efficiency level, to induce a 7 per cent or more GDP growth required to reduce poverty by 50 per cent in 2015.

Sub-Saharan Africa (SSA) is a special case. It is the poorest region in the world with 33 of the 48 least developed countries (LDC's), and with an average per capita income in 1999 less than the level in 1969. The region, despite modest improvements since independence lags behind the rest of the world in terms of basic social indicators that measures the quality of life. Some of the indicators point to a crisis that is almost peculiar to the region; these include poor education and educational infrastructure, high child mortality and endemic diseases, growing urban population, and lack of access to sanitation in the urban areas. With an annual average real growth rate of 2.1 per cent, declining GDP per

capita of –0.8 per cent, investment to GDP ratio of only 16.2 per cent, deteriorating current account balance of –1.3, declining export volume of 3.3 per cent, and increasing urban population, in 1998, Sub-Saharan Africa's growth prospects are gloomy. This has not been helped by the composition of its investment, which is heavily tilted towards the public sector, consistent with the dominant role that the government has tended to play in most countries in this region.

It is worthy to note that while meeting growth challenges depend on investment performance, productivity gains are also crucial. The question of efficiency of resource use or productivity performance is one theme that has generated tremendous interest among economic scholars for decades. A common thread running through this discourse is a strong affirmation of the central place of productivity enhancement in the precipitation and perpetuation of growth.

Nigeria is a Sub-Saharan African country and shares the common characteristic with other countries in this region. Hence, the paper discusses the economic growth dynamics and the main determinants of growth, in Nigeria. In this paper, a vector error correction model (VECM) would be developed to estimate the production function for Nigeria in order to determine the share of capital and total factor productivity (TFP) in output growth. As recent empirical arguments have shown, the level of (TFP) is a relevant variable that explains growth. The rest of the paper is organised as follows: In section II the framework for understanding broad-based growth would be discussed. Section III supports stylised facts of the growth dynamics and crisis in Nigeria with empirical evidences. The econometric analysis of the determinants of growth is the main focus of section IV, while section V gives some concluding remarks.

II. Framework for Understanding Growth

The two possible sources of growth over the long term, particularly, when constant unemployment rate is assumed are growth of factor supplies and growth of productivity of the factors. There are, also, two complementary approaches to analysing the relationship between the growth of factor supplies and their productivity, on one hand, and the output growth on the other hand. The first approach is the growth theory while the second is the growth accounting. While growth theory is concerned with the theoretical modelling of the interactions among growth of factor supplies; output growth; saving; and capital formation,

growth accounting addresses the quantification of the contributions of different determinants of growth.

With respect to growth theory, there have been three waves of interest within the past 50 years or so. The first wave is associated with the work of Harrod (1948) and Domar (1947) in what was termed "The Harrod-Domar Impulse" (Solow, 1994). The theory presupposed that growth rate depended on a country's savings rate, capital/output ratio, and capital depreciation. This theory has often been criticised for three reasons. Firstly, it centres on the assumption of exogeneity for all key parameters. Secondly, it ignores technical change, and lastly, it does not allow for diminishing returns when one factor expands relative to another.

The second began with the neoclassical (Solow) model, which contained the thinking that growth reflected technology and key inputs (Labour and Capital). It allowed for diminishing returns, perfect competition but not externalities. In the neoclassical growth process, savings were needed to increase capital stock, capital accumulation had limits to ensure diminishing marginal returns, and capital per unit of labour was limited. It postulated that growth also depended on population growth rate and that growth rate was supposed to converge to a steady state in the long run. Despite the modifications, the basic problems associated with the neoclassical thinking are that it hardly explains the sources of technological change.

The third is the newer alternative growth theory, which embraces a diverse body of theoretical and empirical work that emerged in the 1980s. This is the endogenous growth model. It distinguishes itself from the neoclassical growth by emphasising that economic growth was an endogenous outcome of an economic system, not the result of forces that impinged from outside. Thus, the theoretical work endogenised technological progress through "learning by doing" or "innovation process". It introduced human capital into the model and predicted that savings rate affected growth rate as well as final income levels. It also predicted that capital accumulation could sustain long-term growth while economic policy could accelerate or decelerate growth, even in the long term. The endogenous growth model stressed the importance of innovation, human capital, governance and institutions in the overall growth objectives.

A subset of the endogenous growth, referred to in literature as neo-Schumpeterian growth (Schumpeter emphasised the importance of temporary monopoly power as

motivating force in the innovative process) model further incorporated the fact that technological advancement comes from what people do and the existence of monopoly rents on discoveries. The emphasis on knowledge and technology in the Schumpeterian model has raised questions as to the role of government in promoting growth. Government is then seen as a critical agent that provides key intermediate inputs, establishes rules, and reduces uncertainty by creating the right macroeconomic environment for growth.

In recent times there have been revived interest in growth theory, which was touched off by articles from Romer (1986, from his 1983 thesis) and Lucas (1988, from his 1985 Marshal Lectures). In the study by Bisat et al. (1996), investment and growth was considered for the Middle East and North African (MENA) region. The study showed that notwithstanding cross country differences, investment had been low in this region and heavily tilted toward the public sector, too highly dependent on external influences, and less productive. They concluded that improving the region's investment performance was critical for economic growth.

Apart from the investigation of the determinants of growth in an economy and the decomposition of output growth into contributions from physical capital, labour, and productivity, the next two studies emphasised the role of total factor productivity. For instance, while not arguing that factor accumulation was important, Senhadji (1999) studied the sources of growth and cross-country differences in total factor productivity (TFP) in 88 countries using data from 1960–1994. His study focused on the levels of the variables instead of the growth rates, explaining that the levels, particularly of TFP was more relevant. He specified a production function, incorporating index of human capital of the form:

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

where, Y, A, K, L, and H are real GPD, TFP, stock of capital, total employment, a human development index. A time-series panel estimation revealed that the contribution of capital stock to output, α varied substantially across countries under assumption of constant return to scale. Next the decomposition of real output was carried out for different values of α assumed to be the same for all regions. The results showed among other conclusions that the contribution to output growth depended crucially on the share of physical capital in real output and that Africa had the lowest TFP growth, ranging from –0.26 to –0.79 per cent

during the period of analysis. The author went further to examine the determinants of TFP and concluded that initial conditions, external shocks, macroeconomic variables, political stability and trade regime were crucial determinants.

The work by Easterly and Levine (2001) tried to move away from the Neoclassical assumption of same level of technology for all countries and emphasised the central role of TFP, using five stylised facts to illuminate TFP and its determinants. TFP was seen to account for cross-country growth differences as well as growth differences over time. In the view of the authors, the exercise was necessary in order to allow for a more precise modelling of long-run economic growth and the design of appropriate policies. The detailed nature of the article provides empirical evidence that could advance the theoretical and practical frontier of sources and patterns of economic growth.

In another study, Elbadawi, et al. (1997), discussed the effects of large, external debt on growth. They identified both the direct and indirect channels of these effects. In the direct channel, debt accumulation stimulates growth initially, while past debt overhang impacts negatively on growth. In the indirect channel, government's inability to expand the economy as a result of reduction in available resources impacts negatively on growth. Accordingly, once an initial debt stock grows to a certain threshold, serving becomes a burden, and countries find themselves on the wrong side of the Debt-Laffer Curve (Soludo, 2001) with debt crowding out investment and growth. The other channel works through a liquidity constraint in which debt-service payments obligations reduces export earnings and thus impacts adversely on growth.

The studies mentioned above particularly employed cross-sectional growth regressions (across countries). This author seems to agree with Solow (2001) who regarded growth theory as *"a search for a dynamic model that could explain the evolution of an economy over time"*, without explicit cross-sectional implications, and that growth theory was conceived purely as a model for planned and well-developed economies.

The next study by Morales (1998), for El Salvador addresses part of Solow's concern by looking at growth in the context of a single developing economy. Using the standard Cobb-Douglas production function, he identified structural factors as having effects on the technological variable, while macroeconomic factors and expectations explain deviations from long-run trend. The analytical framework was based on the error correction model.

In particular, the significant positive impact of education improvement and the significant negative impact of adverse macroeconomic factors and competitive losses highlighted.

In Nigeria, two studies on growth readily come to mind. In Soludo (2001), a clear case was made for macroeconomic management as a necessary condition for broad-based growth. He attributed the lack of growth persistence to lack of production diversification, highly uncompetitive and de-capitalised economy, primitive economic structure, high rate of urbanization, risky and uncertain investment climate, and high transaction cost. He opined that good policies, market development, institutions, among others were necessary for growth. Ajayi (2001) carried out an empirical test on the debt overhang and the liquidity constraint hypotheses for Nigeria. The central argument was that capital flight and debt had deleterious effects on investment, hence growth. His results justified both the debt overhang and the liquidity constraint hypotheses. No known study in Nigeria has explicitly modelled the determinants of economic growth in Nigeria. This study seeks to fill that gap.

III. Basic Factors Affecting Growth: The Nigeria's Economic Growth Dynamics

Several factors have been recognised in literature as growth engines. They include, basic resources (land, labour and capital), productivity of factors of production (skills and knowledge or innovation), institutional and macroeconomic environment, types of economic organization, governance and transparency, etc. This section will attempt to locate and situate some of these factors using the table of selected macroeconomic (table 1) indicators to explain Nigeria's growth dynamics.

Productivity

Continuous enhancement of productivity has been very central to the brilliant performance of the Asian Tigers and Japan in recent years (Obadan and Odusola, 2000), due to increases in competitiveness (Roberts and Tybout, 1997). In Nigeria, however, productivity has been on a declining trend in almost all sectors of the economy. This is as a result of limited human and physical capital. For instance, adult literacy rate has remained constant at 57.0 since the mid-1990s, up from 55.0 in 1993. This rate still lag behind the western countries ratio of about 82 per cent, Asia and the Middle East of 64 and 58 per cent, respectively (1997) and thus Nigeria is in the bottom quantile for sub-Saharan African

countries combined. Whatever gains that had been made in terms of the financing of education in the last two decades had not provided the needed accumulation of human capital for growth as a result of the "brain drain" syndrome, which became prevalent from the early 1980s owing mainly to political instability. With unemployment and declining opportunities for better education, such drain of human capital is likely to persist with dire consequence for economic growth. Life expectancy at birth, which is put at 54 years is lower than the average of 63 years, Asia; 65 for the Western Hemisphere, 60 for the Middle East and Europe, and 74 for the advanced economies.

Investment in Nigeria, in particular gross domestic investment (GDI) averaged an annual growth rate of 0.7 per cent between 1990 and 1997. As a percentage of GDP it declined from 21 per cent in 1980 to 18 per cent in 1998, while gross domestic savings that was 31 per cent of GDP in 1980 declined to 24 per cent of GDP in 1998. Private investment on the other hand has averaged only 16 per cent of GDP since 1994 and was only 21 per cent in 1999, the highest since the early 1990s. Investment in Nigeria has also been largely unproductive, particularly government investment. Public expenditure without much consideration for efficiency of the spending has resulted in the expenditure not achieving its objective at a minimum cost. The low capacity utilisation of install plant and equipment currently put at 34.5 per cent from a peak of 73.3 per cent in 1981, also raise questions about the justification for new investments.

Political and Economic System

From independence in 1960 to date, Nigeria has made several attempts at different political systems. While the first republic was modelled after the British parliamentary system, the second and third republic followed the US federal system. However, military regime has featured prominently in Nigeria political arena since 1960 and lasted for 29 years. Overall, the economic transformation of Nigeria could be put into three phases: oil boom, 1973–1983; economic crisis, 1981–1985; adjustment and post adjustment, 1986 to date. Suffice to say that during these phases Nigeria enjoyed some periods of economic growth but without development owing to pervasive inequalities, lack of will to shift in competitive advantage base on natural endowment to knowledge-based competitiveness, and poverty.

Admittedly, strong institutions are needed to exert pressure on the domestic economy and increase productivity. In Nigeria, several public institutions had been set up since

independence to jump-start the economy. The creation of public monopolies, with an industrial sector dominated by highly subsidised and inefficient public enterprises has been a constraining factor to growth. The wave of privatization, which has swept across most high-growth Sub-Saharan African countries has remained lip service in Nigeria till today. Issues such as political instability, human and property rights, governance, have combined to impinge on Nigeria's growth.

Macroeconomic Structure

The national income, which was substantial in the 1960s, fluctuated widely from the eighties following the severe external shock brought about by the fall in crude oil prices and policy failures. Thus, Nigeria recorded negative growth averaging 3.9 per cent between 1982 and 1984 with a slight recovery in 1988 following the adoption of the Structural Adjustment Programme (SAP) in 1986.

The case in Nigeria fits the empirical evidence that countries with high and variable inflation rates grow (invest) less rapidly than countries with low inflation. Thus, the economy from 1986 was characterised by modest but low growth and rising inflation. Indeed the inflation rate remained at double digit up till 1996 while fiscal deficit has grown particularly in the last four years and reached a very high point of about 9 per cent of GDP in 1999. Furthermore, an overvalued exchange rate lowers the relative cost of imported capital (thus encouraging investment) and also erodes a firm's competitiveness and productivity. With the steady depreciation of the Nigeria exchange rate and the widening parallel market premium, the performance of the naira in the foreign exchange market has been a source of much public discourse in recent times. Interestingly, although the number of institution in the financial sector, has grown rapidly since the late 1980s, financial depth has remained very shallow with the broad money to GDP ratio averaging 13 per cent in the last ten years. This ratio is almost one quarter of the industrial country levels.

Nigeria's has a heavy debt burden currently put at about 91 per cent of the country's gross national income (GNI). The year 2000 debt service obligation of Nigeria was 4–5 per cent of GDP, about three times the national education budget, nine times the public health budget, for a country with illiteracy rate of 57 per cent and on the cusp of a massive AIDS pandemic (Sachs 2001). Debt stock itself is a heavy tax on investment and growth. Once the

initial stock of debt grows beyond a certain threshold, servicing becomes a burden with debt crowding out investment and growth.

In the next section a vector error correction model would be specified to explain the role of macroeconomic variables, external and structural policies in Nigeria's economic growth.

IV. Methodology

IV.1 Analytical Framework

Following Morales (1998), a Cobb-Douglas production is adopted in this study for the determinants of economic growth in Nigeria. The basic model is of the form:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \quad \text{-----} \quad \text{-----} \quad (2).$$

Where $0<\alpha<1$. Y is output, K is the stock of human and physical capital, L is the labour stock used in producing a given output, A, the total factor productivity or technological capability, and α is the long run contribution of capital to output. Rewriting (2) by dividing through by L gives in equation (3) below a standardisation of output and capital with units of labour to correct for multi-collinearity between capital and labour (Morales, 1998). This was confirmed empirically for Nigeria. Thus,

$$y = \text{Log}A + \alpha \text{ Log}k \quad \text{-} \quad \text{--------} \quad \text{----} \quad (3).$$

The resulting variables, y and k measure labour productivity and capital intensity.

The technology variable, A is treated as a non-constant factor. The basic assumption here is that greater endowment of technological capabilities will allow higher amounts of output from a given level of input. This technological capability is determined by structural factors affecting the way factors of production are utilised. The pure technological parameter, like literacy rate or primary school enrolment was not significant for Nigeria. This may be as a result of the fact that the educational system is not functional and not technology oriented. The contribution of TFP to growth, which according to Senhadji (1999) depends crucially on the share of physical output in real output would be determined as a residual. The implication of this is that, the higher α, the lower the contribution of TPF.

In terms of analytical technique[2], a dynamic model, cast in a VECM framework will be specified. The proposed VECM is a VAR (p,l,r) where p is the lag order, with the lag structure determined following Lutkepohl (1991). Also, l is the trend order and r is the rank of the vector error correction term, measuring the extent to which the system is out of equilibrium. An examination of the graph of the variables would justify the exclusion or otherwise of drifts. The choice of a VECM derives from its usefulness for modelling systems of interrelated time series and for analysing the dynamic impact of random disturbances on the system of variables. It also allows for the presence of a long run relationship between its variables. Thus, the long-run behaviour of the endogenous variables converges to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term or the error correction term, which allows for deviation from long-run equilibrium, is corrected gradually through a series of partial short-run adjustments. In this case the VECM also produces a set of impulse responses or dynamic multipliers to trace the effect of one standard deviation shock to one of the innovations on current and future values of the endogenous variables. It also produces forecast error variance decompositions, which decomposes variations in the endogenous variable into component shocks in the VECM system and helps in determining the long run impact of the explanatory variables on growth.

In this model the magnitude of deviations from long-run trends is determined by short-term macroeconomic factors while GDP converges to its long-run path at the speed of adjustment reflected in the error correction specification.

The main determinants of output are capital, macroeconomic and structural variables. Thus, real GDP per worker is used to proxy output (RGDGW), stock of capital was assumed to mimic gross capital formation per worker (RGFCW), employment in both public and private sector was used to proxy labour (1). The other variables that impact on growth were mainly macroeconomic variable, such as change in price level (CPI), real exchange rate (RER) and total exports (TRD) to capture competitiveness, debt burden (DEXP), and dummy (DUM) for the effect of structural regime shift on growth. A priori, capital injections, real exchange rate depreciation, increases in total trade are expected to have positive impact on growth. On the other hand, a rise in price level and debt overhang is expected to have delirious effects on growth. The dummy variable was assigned the number 1, prior to the

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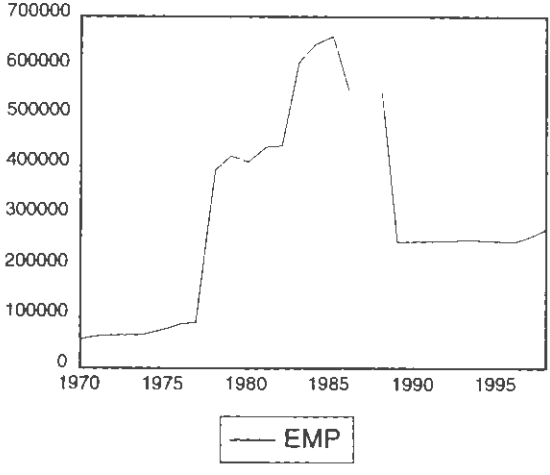
2 The ordinary least squares (OLS) estimation of a parsimonious dynamic error correction model of the form: $dlogy = \alpha\, d\log k - \delta\{\log y(-1) - \beta Logk(-1)\} + \lambda g(w) \; -- \; -(3)$.

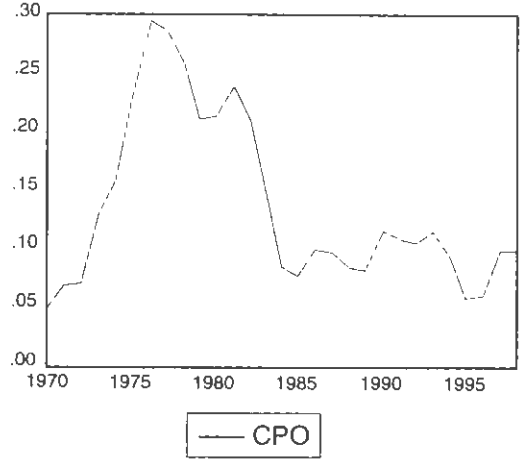
The short-run impact is given by α and λ, while δ measures the speed of adjustment. This is also estimated for comparison.

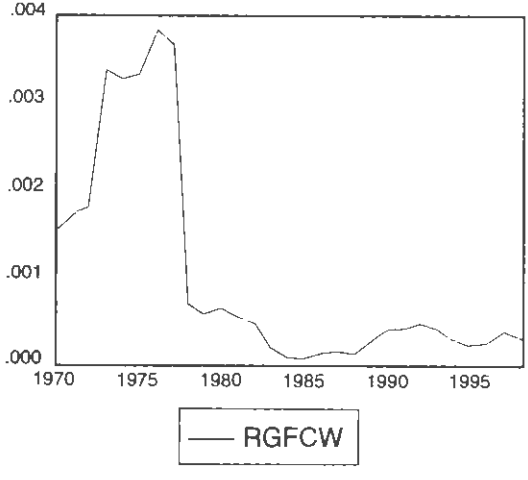
structural adjustment programme, and zeros otherwise, hence a positive sign is expected, a priori. The model is most appropriate for short-run predictions. All the variables in the model were difference stationary. All data used in this study were compiled from Central Bank of Nigeria publications and covers the period 1970 to 1998.

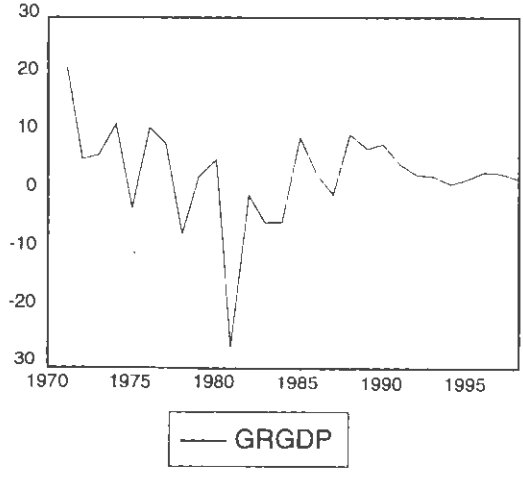
IV.2 Some Stylised fact on Output, Capital and Labour in Nigeria

The four graphs below show employment, the incremental capital output ratio, real capita per worker, and real GDP growth for Nigeria from 1970 to 1998. Capital intensity and productivity has been on the decline as shown in the graph. Notice also that the decline in growth, capital intensity and productivity from 1980, and employment at the beginning of the structural adjustment programme in 1986. Also, notice the low growth base of the post war years.

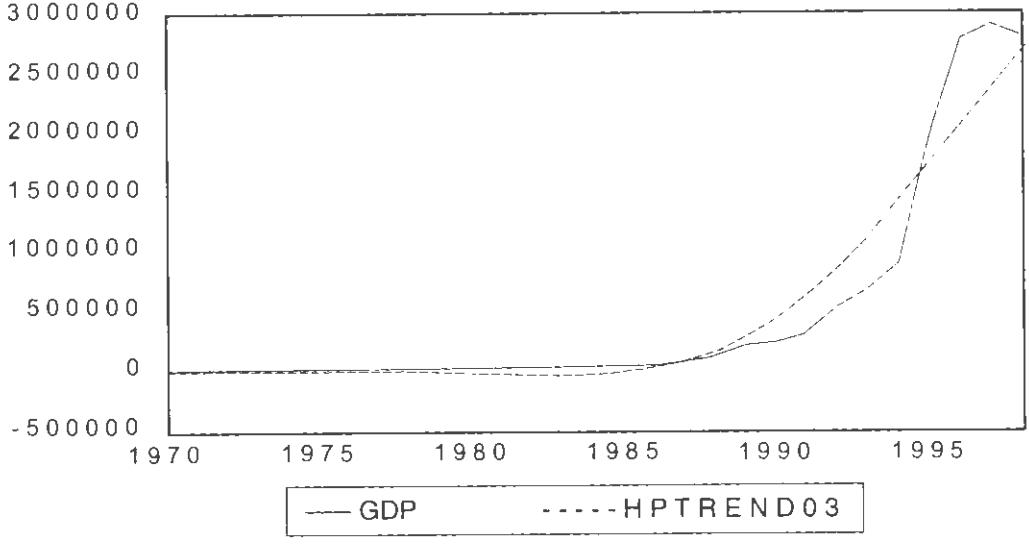








Of particular interest is the next chart below, which shows the potential growth for Nigeria. The Hodrick-Prescott filter plotted below for GDP shows that it takes Nigeria approximately 10 years to reach the level of output consistent with its long run growth after a shock. For instance, during the oil boom, data indicated that Nigeria was well above its potential growth path. Thus, after that positive shock there was depression and Nigeria did not attain its growth path till 1986. Indeed, after the oil shock of the early 1980s the country did not attain its growth path till 1996.



The empirical model to be fitted would in any case compute the speed of adjustment to long-run growth for Nigeria.

IV.3 Major Findings from Empirical Model

The results of the major findings are presented in table 2 in the appendix below. Note the similarity between the OLS and VECM results. Also, values in parenthesis are t- statistics. All tests were conducted at 5% level of significance.

(i) The error correction variable was largely negative and significant:

The Johansen cointegration test indicated the presence of one cointegrating equation. Thus the output and input variables were cointegrated. This result confirms the existence of a long run equilibrium relationship between capital and output. The speed of adjustment to the long-run growth path is approximately seven years. This result is close to the intuitive deduction from the graph earlier shown.

(ii) The short-run impact of growth in the previous years to growth in the current period was negative and semi-elastic in the first year and third year but elastic in the second and fourth year:

This is very consistent with historical data, which showed some volatility and a particularly sharp drop in output at the end of the 1970s. Results from the Autoregressive Conditionality Heteroscedasticity (ARCH) model in the appendix confirmed the presence and frequency of extreme events.

(iii) In the short-run, capital intensity was elastic:

The coefficients of capital in the production function were highly significant and properly signed. However, the coefficient declined in the longer term of the third year to 0.42. This seems to fit the neo-classical prediction that investment can only sustain growth in the short and medium term. Once the economy attains a steady state of equilibrium in the long term, growth can only come from technological progress. The result also collaborates those in Morales (1998) for El Salvador whose long-term coefficient of capital was 0.49 and Senhadji (1999) with a contribution of 0.43 for Sub-Saharan Africa. In Nigeria, therefore, capital accounted for a greater share of variation in output in the short-term than in the long term. Indeed, the Granger causality test[3] shows that there is a highly significant bi-directional causality between output and capital. Also, the result shows that the average TFP elasticity of growth in Nigeria was only 0.2 in the first period and thereafter declined considerably until the third period when it increased to 0.6. This confirms the fact that structural factors affect TPF with a three-year lag that would be long enough for the development of the skills and knowledge needed for the operation and improvement of the acquired production capability.

(iv) The short-run impact of other macroeconomic variables on growth was highly significant:

Macroeconomic variables in growth literature, which are hypothesised to have a robust correlation with output growth were used and were properly signed but most of them were semi-elastic.

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3 RGDPW causes RGFCW, $X^2 = 72.137$ (p=0.0000)
RGFCW causes RGDPW, $X^2 = 15.016$ (p=0.0047)

(v) The negative impact of inflation on output was confirmed in the model:

This is because inflation is associated with greater price variability and greater uncertainty, thereby reducing the effectiveness of the price mechanism and investment. In particular, in this study, a one per cent change in the price level is associated with a 0.42 per cent annual reduction in productivity growth. Other studies that have collaborated this result are[4]; Jarrett and Selody (1982) for Canada — one per cent reduction in inflation was associated with 0.3 per cent growth in output; Rudebusch and Wilcox (1994) for United States — one per cent increase in inflation was associated with 0.35 per cent decline in productivity growth.

(vi) Real exchange rate depreciation had a positive impact on growth:

A positive relationship between economic growth and real exchange rate is often assumed to arise from a tendency for productivity growth in the tradable good sector to outpace that in the non-tradable sector. Competitive losses as measured by the appreciation in the real exchange rate therefore have adverse impact on growth. The model showed that an increase (depreciation) in the real exchange rate was significant for growth and properly signed. However, the long years of a fixed exchange rate arrangement and high domestic inflation has meant that the country has become uncompetitive with a lower aggregate demand since net exports are negative. This explains why the real exchange rate elasticity of growth productivity is low at 0.46.

(vii) The high significance of the impact of trade on growth was underscored in the study:

The economic rationale of trade liberalization is anchored on improved efficiency of resource allocation and enhanced growth prospect. An open trade regime therefore allows a country to expand trade and investment options. Nigeria is an open economy. In fact, it is too open and as a result all sort of goods are dumped into the country with little prospect for enhanced growth. The result shows a significant positive but inelastic relationship between total trade and economic growth.

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4 See Fisher (1994)

(viii) The debt-overhang hypothesis was tested in the model:

Debt is a heavy tax on investment and growth. The empirical model showed a highly significant negative relationship between the debt-burden, which is measured as the ratio of debt service to export. In particular, a one per cent rise in debt burden is capable of reducing growth productivity by as much as 0.9 per cent. Thus, debt burden was elastic with respect to growth in Nigeria. This result confirms the powerful drag on Nigeria's growth prospect of a heavy debt burden.

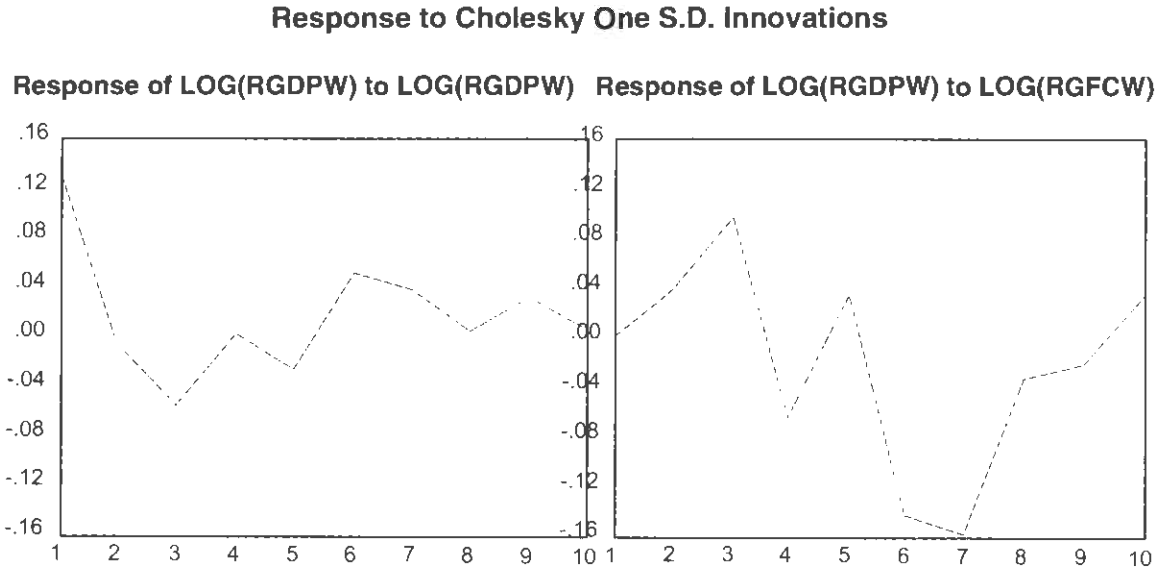
(ix) The effect of the structural break was highly significant:

The only break considered in this study was the pre and post structural adjustment programme periods. The positive significance of this variable was associated with periods prior to the structural adjustment programme. The result confirms that the conditionality induced policy changes occasioning the introduction of SAP in practice did not induce growth. The reason may not necessarily be the programme itself but its implementation.

(x) Impulse Response and Variance Decomposition:

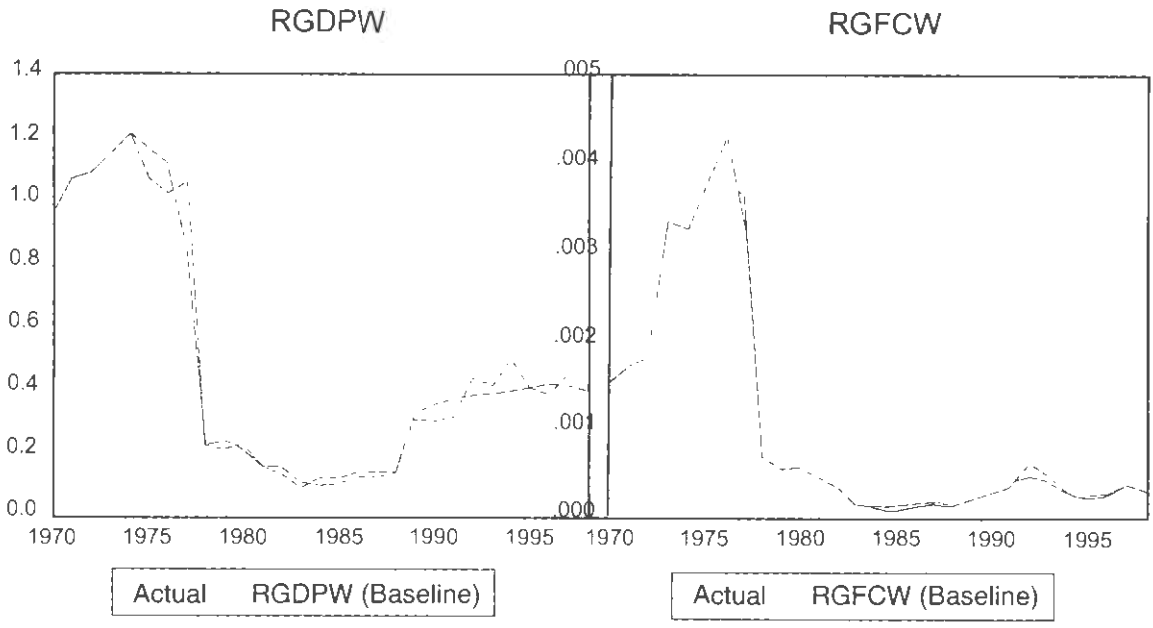
As expected, the response of output to innovations in capital was positive. It declined initially until the seventh period before increasing and trended upwards. For instance, if the capital goods used in the production are imported given that imports constitutes a withdrawal, as is the case in Nigeria, output may not increase immediately as a result of capital shock. However, output would rise after efficient utilization of the equipment and technology through improved learning mechanism acquired through government policies toward education, particularly education in science and technology, on-the-job training, and research and development of external support mechanism. The variance decomposition shows that 91 per cent of the variation in output is explained by own shocks and only 8 per cent by shocks to capital at least in the first period. Subsequently, the variation in output as a result of capital shocks increases and peaks from the 7th period as about 70 per cent of the variations in output were explained by shocks to capital and only 20 per cent by own shocks. This result confirms the result from the impulse response function and is consistent with

most applied research, which shows that a variable explains almost all its forecast error variance at short horizon but smaller proportions at longer horizon.



(xi) Model stability and forecasting power:

The VEC stability condition check indicated that all the roots of the characteristic polynomial lay within the unit circle (table 3). Also, the within-sample forecast for output indicates that the predictive power of the model was very high. The chart below presents the actual value and the baseline forecast for real output per worker. As can be seen the baseline forecast under conditions of no policy change tracks the output path of the actual data, with a minimal forecast error. For instance, the model predicts that the economy grew below its potential in the early 1970s and thereafter the rate of growth decelerated quite smoothly, attaining its growth path for subsequent periods up till 1989. It then grew above its potential till 1993 as a result of the gains of improved oil prices. Thereafter, the chaotic political situation and the macroeconomic policy reversals led to a downward slide in growth below the countries potential. The decline in inflation since 1996 has contributed to a convergence towards the long-run growth path as observed from that period. This model can be used to forecast output per worker for Nigeria in subsequent years.



V. Policy Implication and Concluding Remarks

The model has confirmed almost all the conclusions in empirical literature on growth. The first is that growth matters a lot for development and that the key factors are basic resources, investment is crucial to expand capital, technical change is critical to enhance productivity and that government is a critical agent that provides the key inputs and establishes rules. In other words sustainable growth results from investment in capital and growth in total factor productivity. Indeed there is also a strong support for the fact that causality runs from macroeconomic stability to growth. Thus, policies on exchange rate to stabilize the rate, trade in order to remove barriers and other restrictions, domestic prices, external debt management are important measures for stimulating growth. Other policies that would ensure political stability, minimize corruption, and promote good governance would reduce investment risk and boost the inflow of foreign capital needed to improve infrastructure supply.

Economic growth in Nigeria is inadequate to the needs of the country, particularly in order to reduce the pervasive poverty. The poor growth performance had been largely due to the interaction of economic, political, social and institutional factors that have hampered the right conditions for productive investment to flourish. However, most of the factors can be changed provided there is the will to pursue consistently the long agenda of needed

reforms. With the current efforts at openness and liberalisation, after years of distortions and financial repression through controls, businesses, households, and the public sector have to learn and adapt to the new economic environment where economic decisions are no longer made by the government, but by market forces in a competitive environment. Nigeria's policy makers are therefore right in placing growth at the top of the economic agenda.

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APPENDIX

Graph of the Generalised Autoregressive Condition Heteroscedasticity (GACH) Model

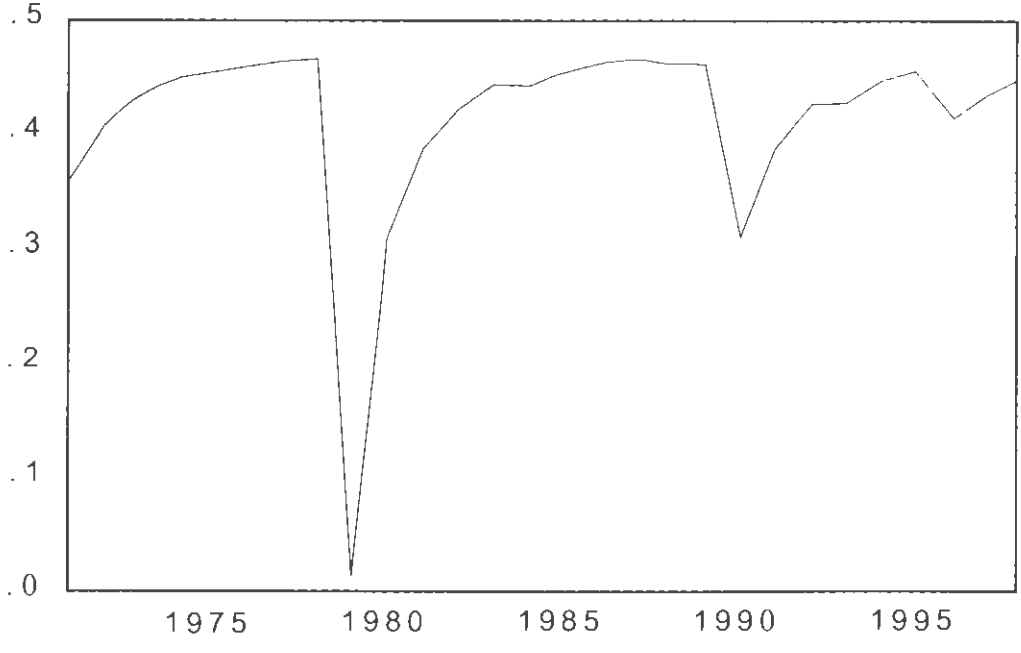

TABLE 1

SELECTED MACROECONOMIC INDICATORS IN THE LAST TEN YEARS

Year	GDP (%)	Capacity Utilisation	Literacy Rate	Investment % of GDP	Inflation Rate (%)	Total Debt % of GDP	Broad Money % of GDP	Fiscal Deficit % of GDP	Life Expectancy
1989	7.4	42.4	50.1	8.2	40.9	106.9	11.4	6.7	5....
1990	8.2	40.3	52.2	11.8	7.5	114.6	14.3	8.5	5....
1991	4.7	42.0	54.0	10.9	13.0	101.4	15.2	12.4	5....
1992	3.0	38.1	54.0	10.7	44.5	99.0	13.8	7.2	5....
1993	2.7	35.0	55.0	11.6	57.2	90.8	16.8	15.4	5....
1994	1.3	30.4	55.0	9.3	57.0	70.9	18.5	7.9	5....
1995	2.2	29.1	57.0	5.8	72.8	36.2	10.2	0.5	5....
1996	3.4	32.5	57.0	6.1	29.3	26.2	7.8	7.9	5....
1997	3.2	34.0	57.0	10.0	8.5	19.1	8.9	-0.2	5....
1998	2.4	34.9	57.0	10.0	10.0	22.3	11.2	-4.7	5....

TABLE 2

ERROR CORRECTION ESTIMATES FOR OUTPUT PER WORKER (RGDPW)

Exogenous	Estimation Technique	
	VECM	OLS
Dlog R GDPW-1	-0.5084	-0.5125
	(-2.73)	(-2.75)
Dlog R GDPW-2	1.0801	1.0511
	(-5.56)	(-5.47)
Dlog R GDPW-3	-0.4905	-0.4886
	(-2.71)	(-2.70)
Dlog R GDPW-4	-1.1988	-1.2238
	(-6.62)	(-6.82)
Dlog R GFCW-1	0.8055	0.7581
	(4.23)	(4.10)
Dlog R GFCW-2	1.1141	1.0275
	(5.99)	(6.23)
Dlog R GFCW-3	0.4192	0.3962
	(3.07)	(2.94)
Dlog R GFCW-4	1.1288	1.1303
	(7.72)	(7.73)
CPI	-0.421	-0.345
	(-2.85)	(-2.71)
RER	0.4582	0.4664
	(3.90)	(3.98)
DEXP	-0.8685	-0.8846
	(-8.26)	(-8.51)
TRD	0.4496	0.3468
	(3.89)	(6.48)
DUM	0.6486	0.4478
	(2.41)	(2.48)
C	-0.8253	NA
	(-1.00)	NA
ECV	-0.6627	0.6367
	(10.63)	(-11.22)
R2	0.960186	0.955164
S.E. of Regression	0.131664	0.13173

Values in parenthesis are the critical t-values for rejecting the null hypothesis.

TABLE 3

OTHER USEFUL RESULTS

Period	Variance Decomposition		VEC Stability Condition
	Log (RGDPW)	Log (RGFCW)	
1	100.00	0.00	1.00
2	91.80	8.18	0.93
3	64.60	35.38	0.93
4	57.20	42.78	0.90
5	55.90	44.06	0.90
6	39.40	60.56	0.80
7	29.30	70.68	0.80
8	29.00	70.96	0.61
9	29.80	70.12	0.61
10	29.50	70.49	0.59