# Fiscal Policy and Economic Growth Relationship in Nigeria

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## Abstract

*The study investigates the impact of fiscal policy on economic growth in Nigeria. Annual data covering 1977 – 2009 were utilized. Unit roots of the series were examined using the Augmented Dickey-Fuller technique after which the cointegration test was conducted using the Engle-Granger Approach. Error-correction models were estimated to take care of short-run dynamics. Over all, the results indicate that productive expenditure positively impacted on economic growth during the period of coverage and a long-run relationship exists between them as confirmed by the cointegration test. The paper recommends improvement in government expenditure on health, education and economic services, as components of productive expenditure, to boost economic growth.*

**Key words**: Fiscal Policy, Economic Growth and Cointegration.

**JEL Classification Codes**: C32, E62, H22 and O15.

## *1. Introduction*

Over the last decade, the growth impact of fiscal policy has generated large volume of both theoretical and empirical literature. However, most of these studies paid more attention to developed economies and the inclusion of developing countries in case of cross-country studies were mainly to generate enough degrees of freedom in the course of statistical analysis (Aregbeyen, 2007). There is a popular assertion in the empirical literature that public spending is negatively correlated with economic growth due to inefficiency of the public sector especially in the developing countries where large proportion of public spending is attributed to non development expenditure like defence and interest payments on debt (Husnain et al., 2011) and Nigeria is not an exception.

However, current trends in fiscal administration has introduced various ways in view to reducing such expenditure that contributes little to the development goals of national economy. Alongside this thought is the adoption of MTEF (1998) as part of broad package of budget reforms to encourage cooperation across various government arms in planning and strategy for reducing wasteful expenditure.

Thus, rather than focusing on the aggregate impact of fiscal policy instruments on economic growth, a disaggregated approach will be adopted for better analysis. The rest of the paper is organized as follows: section 2 covers the theoretical framework on the study is underpinned, section 3 contains the related empirical evidence, section 4 deals with data and method, section 5 presents the results and discussion while section 6 contains the concluding remarks.

## *2. Theoretical Framework*

The theoretical underpinning for this study is basically endogenous growth theory, which advocates the stimulation of level and growth rate of per capita output through within the model using policies like fiscal (e.g. government spending). More specifically, models of the growth effects of fiscal policy are usually built on the basis of Barro (1990) framework and subsequently Barro and Sala-i-Martin (1992, 1995). This study draws inspiration from these studies by employing a Cobb-Douglas production function in which government expenditure enters as input.

## *3. Related Empirical Evidence*

The impact of fiscal policy on growth has generated large volume of empirical studies with mixed findings using cross sectional, time series and panel data. Some of these studies are country-specific while others are cross-country. Few of the studies are selected for review as follows: Fuente (1997) examined the impact of public expenditures and taxation on economic growth of 21 OECD countries from 1965 to 1995. The results of the study could not provide evidence in support of fiscal policy-led growth. Specifically, public expenditures tend to crow-out private investment leading to reduction in disposable income and the incentive to save.

Ghali and Al-Shamsi (1997) examined the causal links between fiscal policy (government expenditure) and economic growth (GDP) from 1973 to 1995 in U.A.E using a cointegration and error-correction framework. The results provided evidence in support of existence of cointegration between government expenditure and GDP. The results of the causality tests showed that causation runs from government expenditure to GDP.

Mansouri (2008) studied the relationship between fiscal policy and economic growth in Egypt, Morocco and Tunisia. The spans of data for each country are: 1970-2002 for Morocco, 1972-2002 for Tunisia and 1975-2002 for Egypt. The empirical results showed that 1 percent increase in public spending raised the real GDP by 1.26 percent in Morocco, 1.15 percent in Tunisia and 0.56 percent in Egypt. The results also indicated existence of long-run relationships for all the three countries.

Enache (2009) investigated the connection between fiscal policy and economic growth in Romania using Forecasted time series data which covered periods between 1992 and 2013. The empirical results indicated weak evidence for the positive impact of fiscal policy on economic growth. The study concluded that government authorities could use fiscal policy to affect economic growth in an indirect manner.

Karimi and Khosravi (2010) investigated the impact of monetary and fiscal policies on economic growth in Iran using autoregressive distributed approach to cointegration between 1960 and 2006. The empirical results indicated existence of long-run relationship between economic growth, monetary policy and fiscal policy. The results further revealed a negative impact of exchange rate and inflation (as proxies for monetary policy), but a positive and significant impact of government expenditure on growth.

On Nigeria, Ekpo (1994) studied the contributions of public expenditure to economic growth in Nigeria over the periods 1960 to 1992. The findings from the study provided support for fiscal policy-led growth through crowd-in private investment resulting from government expenditure on infrastructure. Nurudeen and Usman (2010) analyzed the impact of government expenditure on economic growth in Nigeria over the period 1970 – 2008. The paper revealed that government total capital expenditure, total recurrent expenditures and expenditure on education have negative effect on economic growth while expenditures on health, transport and communication are growth enhancing. Dauda (2010) examined the effect of investment spending in education on economic growth in Nigeria using thirty-one (31) years time series data from 1977 to 2007. The study employs cointegration and error correction techniques. The result shows positive and significant effect of educational expenditure on economic growth.

## *4. Data and Method*

### 4.1 Data

The data used for this study are basically time series covering 1977 – 2009, that is thirty-three (33) years. The data were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin.

### 4.2 Model Specification

For the purpose of this study, we specify the following regression model:

$$L\_RGDP_t = \alpha_0 + \alpha_1 L\_PGC_t + \alpha_2 L\_UPGC_t + \alpha_3 L\_DYT_t + \alpha_4 L\_KE_t + \mu_t \quad (1)$$

Where:

$L\_RGDP_t$ = Log of Real Gross Domestic Product.

$L\_PGC_t$ = Log of Productive Government Consumption Expenditure defined as expenditure on health, education and economic services.

$L\_UPGC_t$ = Log of Unproductive Government Consumption Expenditure defined as total recurrent government expenditure less recurrent expenditure on health, education and economic services.

$L\_DYT_t$ = Log of Direct Income Tax (Distortionary revenue)

$L\_KE_t$ = Log of Capital Expenditure.

$\mu_t$ = White noise error term

A priori Expectation: $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 < 0$, $\alpha_4 > 0$.

### 4.3 Econometric Diagnostic Tests:

**Unit Root Test**

Macroeconomic time series data are generally characterized by stochastic trend which can be removed by differencing. Thus, we intend to adopt Augmented Dickey-Fuller (ADF) Technique to verify the unit root property of the series.

**Cointegration Test**

In order to avoid spurious estimates, we intend to establish long-run relationship among the variables included in the model and Engle-Granger Approach to cointegration will be adopted. This approach is based on conducting unit root test on residual obtained from the estimated regression equation. If the residual is found to be stationary at level, we conclude that the variables are cointegrated and as such a long-run relationship exists among them.

**Error Correction Models**

We specify the following error correction models in order to establish the short-run dynamics:

$$\Delta y_t = \emptyset_0 + \sum_{i=1}^{m} \emptyset_{1,i} \Delta y_{t-i} + \sum_{i=0}^{m} \emptyset_{2,i} \Delta x_{t-i} + \sum_{i=0}^{m} \emptyset_{3,i} \Delta z_{t-i} + \delta ECT_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta x_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1,i} \Delta x_{t-i} + \sum_{i=0}^{n} \gamma_{2,i} \Delta y_{t-i} + \sum_{i=0}^{n} \gamma_{3,i} \Delta z_{t-i} + \vartheta ECT'_{t-1} + \mu_t \quad (3)$$

Where

y = Log of Real Gross Domestic Product.

x = Log of Productive Government Consumption Expenditure.

z = Direct Income Tax

$\delta$ and $\vartheta$ = Are measures of speed of adjustment back to equilibrium after short-run disturbance.

Note: Following the same order of terms, capital expenditure enters the models.

### *5. RESULTS AND DISCUSSION*

The results of unit root test are contained in table 1. The results show that all the variables with the exception of productive consumption expenditure (L_PGC) and error correction term (ECT) are stationary at first difference (d(1)). Table 2 contains the multivariate regression results of the overparameterised growth model. The results indicate that both productive government expenditure and unproductive government expenditure are statistically insignificant. This necessitates the dropping of unproductive government expenditure form the model and hence the results contained in table 3, which will be the focus of the discussion. The improved results as contained in table 3 show that individually, all the coefficients (including the constant) are statistically significant. Precisely, the coefficient of productive government expenditure (PGC) is found to be statistically significant at 5 percent level as indicated by its probability value 0.01707 and rightly signed (positive). This, therefore, implies that 1 percent increase in productive government expenditure raises the economic growth (RGDP) by 22.4 percent. However, the remaining two significant coefficients of the explanatory variables, direct income tax (DYT) and capital expenditure (KE), go contrary to the theoretical expectation and found to be positive and negative respectively.

The $R^2$ 0.8277 (82.77%) implies that 82.77 percent of total variation in real GDP is explained by the regression equation. Coincidentally, the goodness of fit of the regression remained high after adjusting for the degrees of freedom as indicated by the adjusted $R^2$ ($\overline{R}^2 = 0.8099$ or 80.99%). The F-statistic 46.43, which is a measure of the joint significance of the explanatory variables, is found to be statistically significant at 1 percent as indicated by the corresponding probability value ($3.41 \times 10^{-11}$). After observing that the Durbin-Watson statistic 1.28 is low to rule out autocorrelation, we decided to analyze it further by conducting LM test for autocorrelation up to order 1.The result as contained in table 4 shows that no sufficient evidence to reject the null hypothesis of no autocorrelation up to order 1 as indicated by the LMF probability value 0.0643. The results of the error correction models as contained in tables 5a and 5b respectively provided evidence for equilibrium to be restored after short-run disturbances as indicated by the statistically significant and negatively signed coefficients of the error correction terms ($ECT_1$ and $ECT_2$).

The Engle-Granger cointegration test results confirm the existence of long-run relationship among the variables as showed by the stationarity of error correction term (ECT) at level (See Table 1). Overall, these results are in agreement with similar study on Kenya by M'Amanja and Morrisey (2005). However, the results go contrary to the findings of Husnain et al. (2011) and, Okpara and Nwaoha (2010) in their studies on Pakistan and Nigeria respectively.

### *6. CONCLUDING REMARKS*

The paper investigates the impact of both fiscal revenue and expenditure on economic growth of Nigeria. To achieve this, we classified the fiscal expenditure into productive and unproductive government expenditure while direct income tax was used as a proxy for distortionary fiscal revenue. In order to avoid spurious estimates, the unit roots of the series were verified using Augmented Dickey-Fuller (ADF) technique after which cointegration was conducted. The error correction models were also estimated to determine the short-run dynamics. The key findings include long-run positive impact of productive government expenditure on economic growth. Unexpectedly, distortionary revenue positively impacted growth. The paper, therefore, recommends improvement in government expenditure on health, education and economic services, as components of productive expenditure, to boost economic growth.

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## APPENDIX

**Table 1: Unit Root Test Results**

| Variables | ADF Statistics | P-Value | Order of integration |
|---|---|---|---|
| L_RGDP | -4.5149 | 0.001375 | I (1) |
| L_PGC | -4.0372 | 0.007703 | I (0) |
| L_UPGC | -5.3235 | 4.001e-005 | I (1) |
| L_DYT | -5.40982 | 2.621e-005 | I (1) |
| L_KE | -5.13726 | 9.675e-005 | I (1) |
| ECT | -3.77774 | 0.01763 | I (0) |

**Note:** All the variables are statistically significant at 1%.
**Source:** Authors' Computation from Computer Output.

**Table 2: Over parameterized Regression Estimates**

**Method: OLS, using observations 1977-2009 (T = 33)**
**Dependent variable: l_RGDP**

| | Coefficient | Std. Error | t-ratio | p-value | |
|---|---|---|---|---|---|
| Const | 10.2867 | 0.626763 | 16.4124 | <0.00001 | *** |
| l_PGC | 0.199973 | 0.14462 | 1.3828 | 0.17767 | |
| l_UPGC | 0.0318738 | 0.15095 | 0.2112 | 0.83430 | |
| l_DYT | 0.393323 | 0.0971059 | 4.0505 | 0.00037 | *** |
| l_KE | -0.334401 | 0.108027 | -3.0955 | 0.00443 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 12.38998 | S.D. dependent var | 0.873585 |
| Sum squared resid | 4.201403 | S.E. of regression | 0.387363 |
| R-squared | 0.827958 | Adjusted R-squared | 0.803381 |
| F(4, 28) | 33.68776 | P-value(F) | 2.51e-10 |
| Log-likelihood | -12.81700 | Akaike criterion | 35.63400 |
| Schwarz criterion | 43.11654 | Hannan-Quinn | 38.15165 |
| Rho | 0.335864 | Durbin-Watson | 1.260616 |

**Note:** *** implies statistically significant at 1% level.
**Source:** Computer output.

**Table 3: Regression Results after Dropping Unproductive Government Expenditure (L_UPGC).**

**Method: OLS, using observations 1977-2009 (T = 33)**
**Dependent variable: l_RGDP**

| | Coefficient | Std. Error | t-ratio | p-value | |
|---|---|---|---|---|---|
| Const | 10.2611 | 0.604717 | 16.9684 | <0.00001 | *** |
| l_PGC | 0.223882 | 0.0884697 | 2.5306 | 0.01707 | ** |
| l_DYT | 0.392796 | 0.0954614 | 4.1147 | 0.00029 | *** |
| l_KE | -0.323565 | 0.093483 | -3.4612 | 0.00169 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 12.38998 | S.D. dependent var | 0.873585 |
| Sum squared resid | 4.208093 | S.E. of regression | 0.380929 |
| R-squared | 0.827684 | Adjusted R-squared | 0.809858 |
| F(3, 29) | 46.43187 | P-value(F) | 3.41e-11 |
| Log-likelihood | -12.84325 | Akaike criterion | 33.68651 |
| Schwarz criterion | 39.67254 | Hannan-Quinn | 35.70062 |
| Rho | 0.326381 | Durbin-Watson | 1.276918 |

**Note: (***) (**)** implies statistically significant at 1% and 5% levels respectively.
**Source:** Computer output.

**Table 4: LM Test for Autocorrelation Up to Order 1**

LM test for autocorrelation up to order 1 -
Null hypothesis: no autocorrelation
Test statistic: LMF = 3.70972
with p-value = P(F(1,28) > 3.70972) = 0.0643049

**Source:** Computer output.

**Table 5a.: Error Correction Model Estimates**

**Method: OLS, using observations 1978-2009 (T = 32)**
**Dependent variable: d_l_RGDP**

| | Coefficient | Std. Error | t-ratio | p-value | |
|---|---|---|---|---|---|
| Const | 0.0967929 | 0.0620395 | 1.5602 | 0.13036 | |
| d_l_PGC | -0.00968842 | 0.0884836 | -0.1095 | 0.91362 | |
| d_l_DYT | 0.213178 | 0.0670664 | 3.1786 | 0.00369 | *** |
| d_l_KE | -0.246743 | 0.144718 | -1.7050 | 0.09968 | * |
| ECT_1 | -0.41707 | 0.150168 | -2.7774 | 0.00984 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.100037 | S.D. dependent var | 0.337262 |
| Sum squared resid | 2.069920 | S.E. of regression | 0.276882 |
| R-squared | 0.412976 | Adjusted R-squared | 0.326009 |
| F(4, 27) | 4.748676 | P-value(F) | 0.004952 |
| Log-likelihood | -1.594415 | Akaike criterion | 13.18883 |
| Schwarz criterion | 20.51751 | Hannan-Quinn | 15.61808 |
| Rho | 0.061566 | Durbin-Watson | 1.753392 |

**Note: (***) (*)** implies statistically significant at 1% and 10% levels respectively.
**Source:** Computer output.

**Table 5b.: Error Correction Model Estimates**

**Method: OLS, using observations 1978-2009 (T = 32)**
**Dependent variable: d_l_PGC**

| | Coefficient | Std. Error | t-ratio | p-value | |
|---|---|---|---|---|---|
| const | 0.23887 | 0.122412 | 1.9514 | 0.06146 | * |
| d_l_RGDP | -0.116464 | 0.346795 | -0.3358 | 0.73960 | |
| d_l_DYT | 0.161903 | 0.13682 | 1.1833 | 0.24699 | |
| d_l_KE | -0.124352 | 0.3273 | -0.3799 | 0.70697 | |
| ECT2_1 | -0.398879 | 0.159583 | -2.4995 | 0.01882 | ** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.242751 | S.D. dependent var | 0.616941 |
| Sum squared resid | 8.426502 | S.E. of regression | 0.558653 |
| R-squared | 0.285836 | Adjusted R-squared | 0.180034 |
| F(4, 27) | 2.701607 | P-value(F) | 0.051618 |
| Log-likelihood | -24.05637 | Akaike criterion | 58.11273 |
| Schwarz criterion | 65.44141 | Hannan-Quinn | 60.54198 |
| rho | 0.008262 | Durbin-Watson | 1.948701 |

**Note: (*) (**)** implies statistically significant at 10% and 5% levels respectively.
**Source:** Computer output.