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GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH IN NIGERIA: COINTEGRATION ANALYSIS AND CAUSALITY TESTING

Inuwa Nasiru
Gombe State University
NIGERIA.
ninuwa@yahoo.com

ABSTRACT

This study investigates the relationship between government expenditure (disaggregated into capital and recurrent) and economic growth in Nigeria over the period(1961-2010). It employs the Bounds Test approach to co-integration based on unrestricted Error Correction Model and Pair wise Granger Causality tests. The results fromthe Bounds Test indicate that there exists no long-run relationship between government expenditure and economic growth in Nigeria only when real GDP is taken as dependent variable. In addition, the causality results reveals that government capital expenditure granger causes economic growth. While no causal relationship was observed between government recurrent expenditure and economic growth. Therefore, the policy implication of this findings is that any reduction in capital expenditure would have a negative repercussions on economic growth in Nigeria.

Keywords: *Bounds Test, Causality, Capital expenditure, Recurrent expenditure*

INTRODUCTION

Public expenditure is an important instrument for a government to control the economy. Economistshave been well aware of its effects in promoting economic growth. The general view is that public expenditure either recurrent or capital expenditure,notably on social and economic infrastructure can be growth-enhancing although the financingof such expenditure to provide essential infrastructural facilities-including transport, electricity,telecommunications, water and sanitation, waste disposal, education and health-can begrowth-retarding (Olukayode, 2009).

The relationship between government expenditure andeconomic growth has continued to generate series ofcontroversies among scholars in economic literature. Thenature of the impact is in conclusive While some authorsbelieved that the impact of government expenditure oneconomic growth is negative or non-significant (Taban,2010; Vu Le and Suruga, 2005), others believed that the impact ispositive and significant (Alexiou, 2009; Belgrave and Craigwell, 1995).

The purpose of this study is to empirically re-examine the effect ofgovernment spending on the economic growth in Nigeria. Though the goal of the study is similar to those ofprevious studies in this area of research (Omotor, 2004; Olukayode, 2009; Ighadaro and Okriakhi, 2010; Loto, 2011), the method of analysis is different at least intwo ways. First, the study examines the disaggregate of government capital expenditure and recurrent government expenditure on economic growth. Second, the model uses time series data, and has been estimated by Autoregressive Distributed Lag (ARDL) bound estimation technique, which is fairly new and advanced estimation methodsof time series.

Following the introduction, the rest of the paper is organized into four sections. Section two presents the literature review. In section three, the data and methodologyare presented. Results anddiscussions are done in section four and the paper concludes in section five with concluding remarks.

LITERATURE REVIEW

There have been quite a number of empiricalstudies analysing the impact of public expenditureson economic growth so far. The results, however, are varied as different analysis techniques and datasamples are adopted

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The first school can be named for those whosupport the idea that public expenditure has a negativeimpact on economic growth.Taban (2010) examined government spending and economic growth for the period 1987:Q1 to 2006:Q4 and applied bounds testing approach and MWALD Granger causality test. The author found that the share of government spending and share of investment to GDP are negative impacts on economic growth in the long run. Similarly, Ighodaro and Okiakhi (2010) used time series data for the period 1961 to 2007 and applied cointegration test and Granger causality test to examine government expenditure disaggregated into general administration and community and social services in Nigeria. The results revealed negative impact of government expenditure on economic growth.

Moreover, Vu Le and Suruga (2005) investigated the simultaneous impact of public expenditure foreign direct investment (FDI) on economic growth from a panel of 105 developing and developed countries for the period 1970 to 2001 and applied fixed effects model and threshold regression techniques. Their main findings were categorized into three: FDI, public capital and private investment play roles in promoting economic growth. Secondly, public non-capital expenditure has a negative impact on economic growth and finally, excessive spending in public capital expenditure can hinder the beneficial effects of FDI.

The findings above, however, have been challengedby numerous other works.Alexiou (2009) using pooled time series and cross-section data for 7 countries in the South Eastern Europe (SSE) spanning from 1995 to 2005. The results indicates that out of five variables used in the estimation, government spending as dependent variable on capital formation, development assistance, private investment and a proxy for trade-openness all have positive and significant effect on economic growth, in contrast of population growth whose found to be statistically insignificant. Theinconsistent relationship between public expenditureand economic growth is also supported by the findingsof Olukayode (2009) investigated the impacts of government expenditure on economic growth in Nigeria using time series data from 1977 to 2006 and adapting Ram (1986) model in which government expenditure is disaggregated in private investment, human capital investment, government investment and consumption spending at absolute levels. The results showed that all the expenditures have positive effect on economic growth.

Another study by Jiranyakul and Brahmasrene (2007) investigated the relationship between government expenditures and economic growth in Thailand for the period 1993 to 2006 and employed Standard Granger Causality test and Ordinary Least Square (OLS) method. The results showed a unidirectional causality from government to economic growth without feedback. Furthermore, estimation from the ordinary least square confirmed the strong positive impact of government expenditure on economic growth during the period of investigation. Bose *et al.* (2003) also examined the effects of government expenditure for a panel of 30 developing countries over the decades of 1970s and 1970s with a particular focus on sectoral expenditures and employed Seemingly Unrelated Regression technique. Their results revealed that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth with the exception of current expenditure which is insignificant. Furthermore, Dilrukshini (2002) analyzed the relationship between public expenditure and economic growth in Sri Lanka over the period 1952 to 2002 and applied Johansen cointegration technique and Granger causality test. The findings suggests that the growth of public expenditure in Sri Lanka is not directly dependent and determined by economic growth.

Some studies also found mixed results on the impact of government expenditure on economic growth, for instance, Deverajan*et al.* (1996) shed light on the composition of public expenditure and economic growth for the panel of 43 developing countries from 1970 to 1990 and applied Ordinary Least Squares. The findings suggests that increase in the share of current expenditure has positive and statistically significant growth effects. By contrast , capital as a component of public expenditure has a negative impact on economic growth. These results implies that developing countries governments' have been misallocating public expenditure in favor of capital expenditures at the expense of current expenditures. Also, Belgrave and Craigwell (1995) examined the impact of government expenditure on economic growth disaggregating the level of government on economic growth into functional and economic categories of Barbados for the period 1969-1992 and employed Augmented Dickey Fuller

and Engle and Granger cointegration technique. Their results revealed that there is a positive relationship between capital expenditure, agriculture, housing and community, road, communication and health expenditures on economic growth respectively. However, the effects of education and current expenditure are negative.

A recent study using time series data for the period 1962 to 2007 for Lebanon and applied Johansen cointegration technique to examined the nature of government expenditure and its impact on economic growth, Saad and Kalakech (2009) found that government spending on education has a positive impact in the short run. While, expenditure on defence and health are negatively correlated in the long run and insignificant in the short run. Finally, expenditure on agriculture is found to be insignificant in both cases. In a more recent study, Loto (2011) investigated the impact of sectoral government expenditure on economic growth in Nigeria for the period 1980-2008 and applied Johansen cointegration technique and error correction model. The results inferred that in the short run expenditures on agricultures and education were negatively related to economic growth. However, expenditures on health, national security, transportation, and communication were positively related to economic growth, though the impacts were not statistically significant.

DATA AND METHODOLOGY

Annual time series data were collected on real GDPproxied for economic growth and government expenditure disaggregated into government capital expenditure and recurrent expenditure. The annual data covers the period 1970 to 2010. The choice of thisperiod was guided by data availability considerations. The data were obtained from the Central Bank of Nigeria Statistical Bulletin 2011.

Autoregressive Distributed Lag (ARDL)bounds testing approach developed by Pesaran et al. (2001) for testing the existence of a cointegration relationship has certain econometric advantages in comparison to other single cointegrationprocedures (Engle and Granger, 1987; Johansen and Juselius, 1990). Firstly,endogeneity problems and inability to test hypotheses on the estimated coefficients in thelong-run associated with the Engle-Granger (1987) method are avoided. Secondly, the longand short-run parameters of the model in question are estimated simultaneously. Thirdly, theeconometric methodology is relieved of the burden of establishing the order of integrationamongst the variables and of pre-testing for unit roots. The ARDL approach to testing for theexistence of a long-run relationship between the variables in levels is applicable irrespectiveof whether the underlying regressors are purely I(0), purely I(1), or fractionally integrated.Finally, as for the small samples, the bounds testingapproach are far superior to that of multivariate cointegration . Theapproach, therefore, modifies the Auto-Regressive Distributed Lag (ARDL) framework whileovercoming the inadequacies associated with the presence of a mixture of I(0) and I(1)regressors in a Johansen-Juseliustechnique.

The bounds testingapproach to cointegration involves investigating the presence of along-run equilibrium relationship using the following UECMframeworks:

$$\Delta \ln RGDP_t = \alpha_1 + \sum_{i-i}^{k} \alpha_2 \Delta InRGDP_{t-1} + \sum_{i-i}^{k} \alpha_3 \Delta InCEXP_{t-1} + \sum_{i-1}^{k} \alpha_4 \Delta InREXP_{t-1} + \psi_1 InRGDP_{t-1} + \psi_2 InCEXP_{t-1} + \psi_1 InREXP_{t-3} + \varepsilon_{1t\ldots 1}$$

$$\Delta \ln CEXP_t = \alpha_1 + \sum_{i-i}^{k} \alpha_2 \Delta InCEXP_{t-1} + \sum_{i-i}^{k} \alpha_3 \Delta InRGDP_{t-1} + \sum_{i-1}^{k} \alpha_4 \Delta InREXP_{t-1} + \psi_1 InCEXP_{t-1} + \psi_2 InRGDP_{t-1} + \psi_3 InREXP_{t-3} + \varepsilon_{2t\ldots 2}$$

$$\Delta \ln REXP_t = \alpha_1 + \sum_{i-i}^{k} \alpha_2 \Delta InREXP_{t-1} + \sum_{i-i}^{k} \alpha_3 \Delta InRGDP_{t-1} + \sum_{i-1}^{k} \alpha_4 \Delta InCEXP_{t-1} + \psi_1 InREXP_{t-3} + \psi_2 InRGDP_{t-1} + \psi_2 InCEXP_{t-1} + \varepsilon_{2t\ldots 3}$$

where Δ is the first difference operator, lnRGDP t is the naturallogarithm of economic growth, lnCEXP t is thenatural logarithm of capital expenditure, and lnREXP t is the naturallogarithm of recurrent expendituret. The residuals (ε 1t ,ε 2t ,ε 3t) areassumed to be normally distributed and white noise.From Eqs. (1)–(3), the F-test can be used to examine whether along-run equilibrium relationship exists between the variables, bytesting the significance of the lagged level variables (H 0 :$\psi_{1=}\psi_{2=}\psi_{3=}$ 0). The computed F-statistics for cointegration are denotedas F_{RGDP}(RGDP/CEXP,REXP), F_{CEXP}(CEXP/RGDP,REXP), and F_{REXP}(REXP/RGDP,CEXP) for each equation,respectively. Pesaran et al. (2001) tabulated two sets of criticalvalues. The first set of critical values is called lower-bounds criticalvalues, and the second set of critical values is known as upperboundscritical values. According to Pesaran et al. (2001), the nullhypothesis of no cointegration is rejected if the calculated F-statisticis

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more than the upper-bound critical values. On the other hand, ifthe calculated F-statistic is less than the lower-bound criticalvalues, we cannot reject the null hypothesis and hence the variablesare not cointegrated. Finally, the decision about cointegration isinconclusive if the calculated F-statistic falls between the lowerandupper-bound critical values.

'Granger-causality' indicates causality in the prediction sense rather than in astructural sense. It begins with an assumption that 'the future cannot cause the past';if event X occurs after event Y, then X cannot Granger cause Y (Granger 1969).Therefore, in order to test whether government expenditure causes economic growth, thefollowing bivariate equation is estimated

$$\Delta y i = \alpha_1 + \sum_{i-1}^{m} \beta_1 \Delta y_{t-1} + \sum_{j-1}^{n} \lambda \Delta \beta_2 x_{t-1} + \nu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

where y_t = log(RGDP); x_t = log(GOVEX); y_t is the economic growth proxied by RGDP; $x_t$is the government expenditure disaggregated into capital and recurrent expenditure; and Δis the first difference operator.The presence of Granger-causality depends on the significance of the Δx_{t-j} terms inEquation (4) government expenditure causes GDP if the current value of Δy is predicted better byincluding the past values of Δe than by not doing so

EMPIRICAL RESULT

Unit Root Test Results

Prior to analyzing the estimated results using ARDL approach to cointegration, we first begin by investigating the non-stationarity (the presence ofunit roots) in all variables by applying the Augmented Dickey–Fuller (ADF) test.These tests examine the null hypothesis that the considered variable has a unitroot versus the alternative hypothesis that the variable is stationary. However, anecessary but not sufficient condition for co integration is that each of thevariables should be integrated of the same order, and the order must be greaterthan or equal to one. The ADF tests results presented in table (1) clearly revealsthat all the government expenditure variables along with the selected growth variable areintegrated at order 1, 1(1), i.e., they become stationary after first differencing.

Table 1.Unit Root Test Results

	ADF test	
Variables	*Levels*	*First Differenced*
LRGDP	-1.119608	-5.068260*
LCEXP	-0.646905	-4.250762*
REXP	-0.239493	-5.561145*

Source: author's calculation using EVIEWS, * indicates 1% level of significant

Results of Bounds Tests

The results of the bounds test for cointegration, are reported inTable 2. The bounds test indicates that cointegration is absent onlywhen LRGDP is the dependent variable. This is because F_{RGDP}(RGDP/CEXP,REXP) islower than the lower bound critical value at the5% level of significance and this is true only when there is no constant and timetrend. However, the bounds tests indicate that when LCEXP and LREXP are the dependent variables, F_{CEXP}(CEXP/RGDP,REXP) and F_{REXP}(REXP/RGDP,CEXP) are higher than the higher bound critical value at the 5% level. Therefore, there is cointegration when these variables are treated as the dependentvariable.

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Table 2.Bounds Test Results

F-Statistic	*Critical Values at 5%*	*Lower bound*	*Upper bound*
F_{RGDP}(RGDP/CEXP,REXP)=1.8098		2.8812	4.0250
F_{CEXP}(CEXP/RGDP,REXP)=7.0098			
F_{REXP}(REXP/RGDP,CEXP)=5.1306			

Source: author's calculation

Results of Granger Causality Tests

The Granger causality tests conducted is reported in table 3, the results show an evidence of unidirectional causality that runs from government capital expenditure to economic growth proxied by RGDP. The decision on the direction of causality was made from probability values of the tests. However, the Granger causality of the government recurrent expenditure and economic growth reveals that there is no causal relationship between government recurrent expenditure and economic growth. This may be attributed to inappropriate recurrent expenditure by Nigerian Government which makes it to have insignificant impact on economic growth.

Table 3.Pairwise Granger Causality Tests

Sample: 1961 2010

Lags: 1

Null Hypothesis:	*Obs*	*F-Statistic*	*Probability*
CEXP does not Granger Cause RGDP	49	3.04184	0.08782
RGDP does not Granger Cause CEXP		0.00025	0.98736
REXP does not Granger Cause RGDP	49	1.42305	0.23902
RGDP does not Granger Cause REXP		0.00199	0.96463

Source: author's calculation

CONCLUSION

In this study, we set out to empirically investigate the empirical relationship between government expenditure (disaggregated into capital and recurrent) and economic growth proxied by real GDP in Nigeria, using annual time seriesdata from 1961 to 2010. Some econometric tools are employed to explore the relationshipbetween these variables. The study examines stochastic characteristics of each time seriesby testing their stationarity using Augmented Dickey Fuller (ADF) test. Then, therelationship between government expenditure and economic growth is examined usingBounds Test proposed by Pesaranet al. (2001) and Pairwise Granger causality tests. The results fromthe Bounds Test indicate that there exists no long-run relationship between government expenditure and economic growth in Nigeria only when real GDP is taken as dependent variable. In addition, the causality results reveals that government capital expenditure granger cause economic growth. While no causal relationship was observed between government recurrent expenditure and economic growth.

According to empirical findings of this study, one may tentatively suggest that thegrowth of public expenditure in Nigeria is not directly dependent on and determined byeconomic growth as Wagner's Law indicates. However, causality results reveals that reduction in government capital expenditure would have a negative repercussions on economic growth in Nigeria.

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