Total Size of Public Spending and Nigeria Economy: A Statistical Analysis

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Abstract
This study used a systematic time series econometrics approach to examine the impact of total size of public spending (proxy by Total Federal Government Expenditure) on economic growth (proxy by GDP) of Nigeria during the period 1981-2022. The data such as Total Federal Government Expenditure (TFGE) and Gross Domestic Product (GDP) were obtained from Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of Statistics (NBS). The data set were subjected to preliminary test and the ADF result revealed that all the variables were integrated at I(1) indicating a long-run relationship between the dependent and independent variables while the Error Correction Model (ECM) techniques was used to estimate the model. The result of the findings revealed that TFGE exert positive and significant impact on GDP. Therefore, the

researchers recommend that the increase total size of public spending should be channel towards the productive sector so as to give more room in enhancing sustainable economy.

Keywords: *TFGE, GDP, ADF, ECM, CBN*

INTRODUCTION

Public expenditure is claimed as the most powerful economic agent in all modern societies (Arrow and Kurz, 1970). The size and structure of public expenditure will determine the pattern and form of growth in output of the economy (Tajudeen and Ismail, 2013). In the Nigeria economy, the structure of public expenditure can be broadly categorized into recurrent and capital expenditure. Recurrent expenditure is referred to as government expenses on administration such as wages, salaries, interest on loans maintenance etc., whereas expenses on capital project like roads, airports, health, education, electricity generation etc., are referred to as capital expenditures, Obinna's study (as cited in Okoro (2013)). Furthermore, by providing new opportunities and expanding the capabilities of the masses, government spending plays an important role in ensuring sustainable economic growth (Josaphat and Oliver, 2000).

Over the years, public spending has been expanding, as in any other country of the world. This rise in government spending is due to the huge receipts from production and sale of crude oil, and the increased demand for public goods like roads, power supply, education, health, security etc.

In Nigeria, the collapse of the world oil market at early 1980's leads to decline in Total Federal Government Expenditure (TFGE) while the introduction of Structural Adjustment Programme (SAP) around the middle of 1986 also leads to a rise in TFGE. More so, the percentage contribution of Total Federal Government Expenditure (TFGE) to Gross Domestic Product (GDP) falls approximately from 8% to 6% between 1981 to1985 respectively and also increase from 8% to 12% between 1986 to 1990. These were due to change in government and introduction of SAP.

Increase in transfer payment especially debt service payment leads to increase in government spending. The percentage contribution of Total Federal Government Expenditure (TFGE) to Gross Domestic Product (GDP) falls approximately from 11% to 10% between 1991 to1992 respectively and further rise to 15% in 1993. Then, between 1994 to 1996, the ratio of TFGE to GDP falls from approximately 9% to 8% and later rise from approximately 9% to 17% between 1997 to 1999 and drastically falls to 9% in year 2000.

The introduction of economic and institutional reforms like Bank Recapitalization Policy of year 2004 and introduction of Seven Points Agenda (7PA) of year 2007 leads to increase in government expenditure. Due to these reforms, the percentage contribution of Total Federal Government Expenditure (TFGE) to Gross Domestic Product (GDP) falls approximately from 12% to 7% between 2001 to 2010 respectively.

The increase in insurgency like Boko Haram, Banditry, Herdsmen fighters, kidnapping etc, from years 2011 to 2022 leads to a rise in total government spending. The percentage contribution of Total Federal Government Expenditure (TFGE) to Gross Domestic Product (GDP) falls approximately from 7% to 5% between 2011 to 2017 respectively and later increase from approximately 10% to 12% between 2018 to 2022 respectively. The rests of this paper includes empirical literature; materials and method; results and discussion as well as conclusion.

EMPIRICAL LITERATURE

Olayungbo and Olayemi (2018) using Vector Error Correction Model for 1981-2015 Nigerian data established government expenditure have negative and significant impact on economic growth in both short and long runs.

In another study by Dudzeviˇciute,ˇSimelyte and Liuˇcvaitiene (2018) using data for eight European Union member countries found a strong positive association between public spending and economic growth.

The studies by Gupta (2018) and Diyoke, Yusuf and Demirbas (2017) revealed a strong positive correlation between government spending and economic growth.

Molefe and Choga (2017) analyzed the impact of government expenditure on economic growth in South Africa over the period 1990-2015 using VECM model. Their results suggested that government expenditures have a negative long-run relationship with economic growth.

The study by Nwaoha, Onwuka and Ejem (2017) showed that total federal government expenditure exerts positive and significant influence on GDP during the study period.

Idris and Bakar (2017) and Ihugba and Njoku (2017) found positive impact of government expenditure on output growth. Chimobi (2016) investigated national income and government expenditure nexus in Nigeria and found that there is stable long run relationship between the fiscal variable and economic growth.

Churchill, Ugur and Yew (2016) investigated the nexus between public spending and output growth, the result upheld the conventional belief that large government size is detrimental to growth.

Oktayer and Oktayer (2012) investigated the nexus between public spending and output growth using Turkish data for the period 1950-2010 and found no long run co-integration between the variables of interest.

Schaltergger and Torgler (2007) study the case of Switzerland from 1981 to 2001 and found that there exists negative relationship between the government size and economic growth.

Chiung-Ju (2006) estimates the long-run relationship between government expenditure and output and found that there exists no long-run relationship between these variables.

Lauda (1983) examined the effect of government expenditure on economic growth for a sample of 96 countries and found that government expenditure exerts a negative effect on real output.

Some studies suggesting that government expenditure has negative effect on output growth (Abu & Abdullahi, 2010; Devarajan, Swaroop & Zou, 1996; Ḟolster & Henrekson, 2001; Gukat & Ogboru, 2017; Nurudeen & Usman, 2010; Saidu & Ibrahim, 2019; Segun & Adelowokan, 2015). In contrast, other studies established that government expenditure promotes output growth and development of a country (Aigbeyisi, 2013; Akanbi, 2014; Ahuja & Pandit, 2020; Awode & Akpa, 2018; Nyarko-Asomani,et al., 2019; Bose, Haque & Osborn, 2007; Jibir & Aluthge, 2019a; Jibir & Babayo, 2015; Srinivasan, 2013).

MATERIALS AND METHOD

This study used a systematic time series econometrics approach to examine the impact of total size of public spending on economic growth of Nigeria during the period 1981-2022. In order to arrive at a robust result and unbiased analysis, the researchers employed secondary data obtained from Central Bank Nigeria (CBN) Statistical Bulletin and National Bureau of Statistics (NBS). Such data includes, Total Size of Public Spending proxy by Total Federal Government Expenditure (TFGE) and Economic Growth proxy by Gross Domestic Product (GDP). The Augmented Dickey Fuller (ADF) unit root test is used to verify the stationarity of the variables and Engle Granger Cointegration test to determine the number of cointegration equations among the variables. Error Correction Model (ECM) is also used to check the speed of adjustment from short-run to long-run equilibrium.

The model is specified in the functional form as follows:

$GDP = f(TFGE)$ …….. (1)
The functional transformation of the model is thus:

$GDP = f(TFGE) + \mu$ …….. (2)

Therefore, the mathematical form of the model is thus:

$GDP = b_0 + b_1 TFGE + \mu$ …… (3)

Where:

GDP = Gross Domestic Product (Proxy of Economic Growth)

TFGE = Total Federal Government Expenditure (Proxy of Total Size of Public Spending)

b_0 = Constant

b_1 = Estimator

μ = Stochastic term
Hence, the expectation of the estimator is $b_1 > 0$.
The parsimonious error correction model is stated as thus:
$\Delta GDP = b_0 + b_1 \Delta TFGE_{t-1} + b_2 ECT_{t-1} + \mu_t$ ..... (4)

Where ECT = Error Correction Term.

RESULTS AND DISCUSSION

This part covers the Augmented Dickey Fuller (ADF) unit root test, Engle Granger Cointegration Test, Error Correction Model and Discussion.

i. Augmented Dickey Fuller (ADF) Unit Root Test

Time series data are prone to spurious regression, to ensure their stationarity, ADF unit root test is carried out. The result is presented in the table 2 below.

Table 1. ADF Unit Root Test Result

Variables	ADF Test Statistic	5% Critical Value	Order of integration	Probability
Δ(GDP)	-4.771442	-3.562882	1(1)	0.0597
Δ(TFGE)	-5.413549	-3.562882	1(1)	0.0084

Source: Authors' Compilation, 2024.

The result of the ADF test as presented in **table 1**, shows that the variables GDP and TFGE are integrated of order one, lag one, 1(1), all at 5% level of significance. That is, they are integrated of the same order. In other words, GDP and TFGE are found to be stationary at first difference. Thus, the model follows integrating process. Therefore, this conclusion is informed because the ADF test statistic for difference one (1) is more negative than the critical values at 5% level of significance.

ii. Engle Granger Cointegration Test

The result of the test is presented in the table 2 below:

Table 2: Engle-Granger cointegration

Date: 04/05/24 Time: 16:20
Series: GDP TFGE
Sample: 1981 2022
Included observations: 42
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C

Automatic lags specification based on Schwarz criterion
(maxlag=9)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
GDP	-1.507369	0.0011	-5.424834	0.0099
TFGE	-1.111811	0.8800	-4.584547	0.7536

*MacKinnon (1996) p-values.

Source: Authors' Compilation, 2024.

The result in **table 2** above indicates the presence of 1 co-integrating equations at 5% level of significance for the GDP model and therefore confirms the existence of long-run equilibrium relationship between GDP and its independent variable (TFGE). The conclusion is based on the values of t-prob. against values of z-prob. at 5% significance level.

iii. Error Correction Model

The parsimonious error correction model results are presented in the table 3 below:

Table 3. Parsimonious Result of GDP Model

Dependent Variable: d(GDP,1)
Method: Least Squares
Date: 04/05/24 Time: 16:23
Sample: 1981 2022
Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.397148	3090.998	2.716646	0.0097
D(TFGE,1)	9.044359	0.449143	2.013693	0.0000
ECM(-1)	-0.164058	0.038962	3.156494	0.0026

R-squared	0.510212	Mean dependent var	4.147760
Adjusted R-squared	0.507968	S.D. dependent var	5.593403
S.E. of regression	16968.60	Akaike info criterion	22.36257
Sum squared resid	1.159810	Schwarz criterion	22.44531
Log likelihood	-467.6139	Hannan-Quinn criter.	22.39289
F-statistic	6.054961	Durbin-Watson stat	2.105091
Prob(F-statistic)	0.000005		

Source: Authors' Compilation, 2024.

The parsimonious result in **table 3** above shows that the model has a fair-fit as the coefficient of determination (R-squared) is 51% with no autocorrelation as suggested by Durbin-Watson (D.W) statistic. Hence, the overall regression is also highly significant. The error correction model (ECM) coefficient is negatively signed and significant. This implies that about 16% deviation from the long-run equilibrium relationship between GDP and its determinant is corrected every one year.

There is therefore empirical evidence that there exist a long-run relationship between GDP and independent variable (TFGE).

iv. Discussion

The result in **table 3** above revealed that TFGE has positive and significant impact on GDP. This meets the a priori expectation that a unit increase in total size of public spending will lead to an approximately 9 units increase in GDP. This result conform the findings of Gupta (2018), Dudzeviˇciuṫe,ˇSimelyṫe and Liuˇcvaitieṅe (2018), Diyoke, Yusuf and Demirbas (2017), Nwaoha, Onwuka and Ejem (2017), Idris and Bakar (2017) and Ihugba and Njoku (2017).

CONCLUSION

The sole aim of this study is to examine the impact of total size of public spending on economic growth of Nigeria during the period 1981-2022 using Error Correction Model (ECM). Analysis from the estimation suggests that all the variables were stationary at first difference, thus, there exist a long-run relationship between total size of public spending and economic growth. TFGE has positive and significant impact on GDP. This implies that as TFGE rises, GDP will also rise. Therefore, the researchers recommend that the increase total size of public spending should be channel towards the productive sector so as to enhance the sustain economy.

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APPENDIX 1

Total Federal Government Expenditure and GDP 1981-2022

YEAR	TFGE(₦'Billion)	GDP(₦'Billion)	% of TFGE/GDP
1981	11.4	139.31	8.183188572
1982	11.9	149.05	7.983898021
1983	9.6	158.75	6.047244094
1984	9.9	165.85	5.969249322
1985	13	187.83	6.921152106
1986	16.2	198.12	8.176862508
1987	22	244.68	8.991335622
1988	27.7	315.62	8.776376655
1989	41	414.86	9.882852046
1990	60.3	494.64	12.19068413
1991	66.6	590.06	11.28698776
1992	92.8	906.03	10.24248645
1993	191.2	1,257.17	15.20876254
1994	160.9	1,768.79	9.09661407
1995	248.8	3,100.24	8.025185147
1996	337.2	4,080.07	8.264564088
1997	428.2	4,418.71	9.690611061
1998	487.1	4,805.16	10.13701937
1999	947.7	5,307.36	17.85633535
2000	701.1	7,062.75	9.926728257
2001	1,018	8,234	12.36263569
2002	1,018.20	11,501	8.852796821
2003	1,226	13,556.97	9.043318677
2004	1,504.20	18,124.06	8.29946491
2005	1,919.70	23,121.88	8.302525573
2006	2,038	30,375.94	6.709257393
2007	2,450.90	34,964.21	7.009739388
2008	3,240.80	39,954.21	8.111285394
2009	3,453	43,461.46	7.944970095
2010	4,194.60	55,469.35	7.562013977
2011	4,712.10	63,713.36	7.3957801
2012	4,605.30	72,599.63	6.343420758
2013	5,185.30	81,009.96	6.400817875
2014	4,587.40	90,136.98	5.089365097
2015	4,988.90	95,177.74	5.241666802

2016	5,858.60	102,575.42	5.711504764
2017	6,456.70	114,899.25	5.619444861
2018	13,786.90	129,086.91	10.68032382
2019	15,535.50	145,639.14	10.66711874
2020	17,557.40	154,252.32	11.38225992
2021	19,965	176,075.50	11.33888588
2022	24,431.21	202,365.03	12.07284183

Source: CBN Statistical Bulletin, 2022; NBS, 2019.
TFGE = Total Federal Government Expenditure
GDP = Gross Domestic Product
CBN = Central Bank of Nigeria
NBS = National Bureau of Statistics

APPENDIX 2

UNIT ROOT OF GDP 1(1)
Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.771442	0.0597
Test critical values:	1% level	-3.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 03/28/24 Time: 16:25
Sample (adjusted): 1984 2022
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.199801	0.258997	-4.771442	0.0456
D(GDP(-1),2)	-0.250451	0.225423	-1.111027	0.2741
C	-1783.675	1493.225	-1.194512	0.2403
@TREND("1981")	159.0404	105.4267	1.508540	0.1404

R-squared	0.196234	Mean dependent var	673.8418
Adjusted R-squared	0.127339	S.D. dependent var	3296.960
S.E. of regression	3079.898	Akaike info criterion	19.00010
Sum squared resid	3.32E+08	Schwarz criterion	19.17072
Log likelihood	-366.5019	Hannan-Quinn criter.	19.06131
F-statistic	2.848333	Durbin-Watson stat	1.916785
Prob(F-statistic)	0.051434		

Source: Authors' Compilation, 2024.

APPENDIX 3

UNIT ROOT OF TFGE 1(1)
Null Hypothesis: D(TFGE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.413549	0.0084
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TFGE,2)
Method: Least Squares
Date: 03/28/24 Time: 16:26
Sample (adjusted): 1992 2022
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TFGE(-1))	1.849402	4.472021	0.413549	0.6838
D(TFGE(-1),2)	-3.026681	4.357406	-0.694606	0.4957
C	-562.6941	1488.943	-0.377915	0.7097
@TREND("1981")	42.09883	90.40414	0.465674	0.6467

R-squared	0.711589	Mean dependent var	143.8681
Adjusted R-squared	0.544614	S.D. dependent var	1693.130
S.E. of regression	1142.563	Akaike info criterion	17.20458

Sum squared resid	24803546	Schwarz criterion	17.75967
Log likelihood	-254.6710	Hannan-Quinn criter.	17.38553
F-statistic	4.261654	Durbin-Watson stat	2.254874
Prob(F-statistic)	0.002821		

Source: Authors' Compilation, 2024.

APPENDIX 4

Engle-Granger cointegration
Date: 04/05/24 Time: 16:20
Series: GDP TFGE
Sample: 1981 2022
Included observations: 42
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=9)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
GDP	-1.507369	0.0011	-5.424834	0.0099
TFGE	-1.111811	0.8800	-4.584547	0.7536

*MacKinnon (1996) p-values.

Intermediate Results:

	GDP	TFGE
Rho – 1	-0.132313	-0.111818
Rho S.E.	0.087777	0.100573
Residual variance	83124237	1083919.
Long-run residual variance	83124237	1083919.
Number of lags	0	0
Number of observations	41	41
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution

Source: Authors' Compilation, 2024.