

**SRIWIJAYA INTERNATIONAL JOURNAL OF DYNAMIC  
ECONOMICS AND BUSINESS**

---

**Determination of Optimal Size of Government in  
Relation to Output Growth in Nigeria: A Monte Carlo  
Simulation Evidence**

David Umoru<sup>1</sup> and Janet A. Onimawo<sup>2</sup>

<sup>1</sup>Department of Economics, Edo University Iyamho, Edo State, Nigeria

<sup>2</sup>Department of Public Administration, Ambrose Alli University, Ekpoma, Edo State, Nigeria

<sup>1</sup>david.umoru@yahoo.com

---

**Abstract:** This paper attempted to estimate optimal size of public sector that prompts positive output growth in Nigeria based on Monte Carlo simulation of estimated parameters of an error correction model having controlled for regime effect. Our motivation derives from economic theory that absence of government could be injurious to output growth culminating in unavailability of contracts and public goods. Using different policy scenarios of public sector share in GDP, the study validates and supports the tenets of Rahn Curve that economy shrinks when government grows enormous as we found 40% public sector spending as proportion of GDP as optimal public sector size that stimulates positive growth rate of about 0.095% having controlled for regime effect. By implication, our original contribution in this study is amplified on our empirics that public sector role in Nigerian economy is less than or equal to 40%. Consequently, any size of public sector beyond forty percent is economically destructive as it capable of stimulating negative spill overs on the economy due to growing taxes and public debt repayment. Hence, public sector spending should be significantly less than forty percent or at most forty percent for purpose of economic growth. This indeed translates to enforcing responsible fiscal policy centred on forty percent public sector size.

**Keywords:** Optimal Government Size; Output Growth; Simulation Results; Error Correction; Public Sector Spending; Nigeria

---

## Introduction

Performance indicators have shown that total public spending in Nigeria have incessantly increased since 1980 when aggregate government disbursement was N1, 769,800 million and in 1990, it increased to N7, 325,000 million (CBN, 1990). In 2010, aggregate public

---

<sup>1</sup> Corresponding author

spending increased to N121, 383,300 million. In percentage terms, growth rate of public sector spending was 23.2 percent in 1980 and 41.2 percent in 1990. For these years, growth rate of GDP declined from 57.2 percent to 2.9 percent (IMF, 1990). This reported a distressing economic state as increasing government spending seems not to have simulated favorably with growing national output in Nigeria.

Comparatively in 2000, government spending was 15.5 percent and growth rate of GDP was 8.79 percent (NBS, 2000). Ten years going forward, growth rate of government spending was 2.2 percent and output growth rate was 1.5 percent respectively. This interprets another contemptible economic situation whereby rising public sector spending do not compare favorably to growing national output in Nigeria. As at December, 2019, total government expenditure in Nigeria was N18, 392.991 billion. This marks mammoth increase compared to 2018 budgeted spending of N16, 828.759 billion. According to estimates of IMF (2020), total government spending in Nigeria is estimated to stand at N30, 277.552 billion by December 2024.

Following above background, whether or not increasing public sector spending is growth enhancing is another concern in itself considering poor state of macroeconomic indicators for the period of rising public sector spending in Nigeria. This indeed goes to show that the task confronting Nigerian government with regards to fostering economic growth process cannot be overstated. Public expenditure is reputed to be a real growth device as rooted on Keynesian doctrine (Afonso, Antonio, & Davide Furceri, 2010; Nworji, Okwu, Obiwuru, & Nworji, 2012). In effect, public spending is an exogenous variable which can be applied as policy instrument to stimulate growth.

Nonetheless, the theory of optimality in economics demands for optimal public spending (Olorunfemi, 2008; Oteng-Abayie & Frimpong, 2009; Afonso & Jalles, 2011). So, there is need to anticipate that the size of public spending relative to GDP can be excessively lesser or excessively enormous. Numerous studies postulate that countries with more growth had large size of public spending while those with less growth had smaller public sector size (Brady, 2007; Tajudeen & Fasanya, 2013).

When market fails, government intervention would seem to be the panacea. Also, since government provides security and public goods and services to balance private sector provision, increasing the size of government from lesser or insignificant level must increase productivity and hence employment.

With regards to economic theory, zero government disbursements could adversely affect growth climaxing in absence of contracts and public goods (De Witte & Moesen, 2010; Rebelo, 2011). Nevertheless, as with any other dynamic supply, there will be diminishing returns to additional public sector, so a point must also be reached where increases in public spending will be less creative than if those same supply were allocated through the private sector.

More so, mismatch between economic growth and gargantuan budgetary allocations to public expenditure in Nigeria has raised major concerns and hence needs to occupy the centre of economic studies in Nigeria. In fact, Nigeria is currently suffering from substantial macroeconomic imbalances and yet how components of public sector spending influences these imbalances is imprecise.

Accordingly, there ought to be an optimal size of public sector that stimulates growth of national output. The question is, *what is the optimal size of government in Nigeria?* Most studies (Nworji, Okwu, Obiwuru, & Nworji, 2012; Mutiu, & Olusijibomi, 2013; Awomuse, Olorunleke, & Alimi, 2013; Ekesiobi, Dimnwobi, Ifebi, & Ibekilo, 2016, Adigun, 2017; Ozigbu, Ezekwe, & Morris, 2018) that reported significant positive growth effect of government spending advocated increase in government spending without empirically stipulating size of government. A small government is could be associated with economic growth benefits by circumventing extreme crowding-out effect.

Relatively, large government size could be argued to create large scale economies that obliges infrastructural development required for output growth. So, appropriate size of public sector spending essential to stimulate output growth had cyclically generate series of debatable isometrics amongst policy analysts in Nigeria following annual budget release. These jointly motivates our research interest and here lies our task to estimate a threshold of public spending that induces positive output growth in Nigeria.

Furthermore, empirical estimate of appropriate size of government for stimulating Nigeria's growth is germane to policy makers because it makes contribution to both theoretical and empirical literature regarding effect of public sector size on economic growth. The study utilizes the error correction techniques and also carried out a Monte Carlo simulation isometrics to determine the optimal size of government in Nigeria. Next, literature that reviews both theoretical and empirical channels of relation between government size and economic growth. Theoretical framework and model follows. Results and discussion of same follows and lastly, is conclusion and recommendations of the study.

## **Literature Review**

### ***Theoretical Review***

The channels of relation between government size and economic growth has not gain considerable unanimity with regards to exact direction of causality between the two as we have public sector size-led growing national output, growing national output-led public sector size, and feedback channel of effect between Keynesian and Wagner's arrows of causation. The first channel which is basically Keynesian arrow of causation epitomizes role of government in advancing output growth via regulations, production, consumption, tax revenue generation, allocations and redistributions of national resources (Häge, 2003).

Theory therefore upholds that rise in public sector spending and borrowing crowd out private spending and borrowing by equivalent proportion. In effect, smaller size of government is a reflection of strategic benefits given that governments spend tax revenues or finance spending on basis of borrowing. So, a rise in tax revenue equates reduction in private consumption by equivalent proportion of rise in taxes leaving aggregated demand unaffected and with zero wealth creation (Nyasha, & Odhiambo, 2019). However, large government sizes have been observed to generate larger scale economies with attendant provision of infrastructural development required for private sector investment.

According to new growth theorists as found in works of Lucas (1988) and Romer (1986), short-run effect as well as long-run effect of government fiscal stimulation advances

economic growth in course of national development (Nyasha, & Odhiambo, 2019). Hence, Keynesian causality runs from government disbursement to economic growth via expansionary fiscal policy.

To theorists of classical and neoclassical economics, government size (small or large) impact negatively on economic growth due to crowding-out effect such that weighty rise in government intervention is a replacement of private goods/spending. This indirectly has a way of making interest rates to rise above limit and so subdue private investment. Furthermore, increase in taxes could serve to distort market prices and resource allocation.

Consequently, these class of theorists supported second channel of growing national output-led government size which is Wagner's rule (Wagner, 1958) of State size expansion that centers on exceedingly elastic increase of total government activities in relation to changes in national income and so advocates a state of economic development driving government size. Florio & Colautti (2005) though rejects Wagner's law of expansion in total State spending in Germany, US, UK, Italy and France and found logistic S-shaped curve of growth of public spending. Thus, suggesting possibility of State size convergence to a steady state.

In addition to the traditional law by Wagner, there is also Peacock & Wiseman's theory of displacement effect that provides channel of relation between government size and GDP growth. According to Peacock and Wiseman (1961), State size measured by total public spending rises increasingly during periods of social disorders exclusively war time. Legrenzi (2004) researched on Italian economy with aim of validating Peacock-Wiseman theory and found public spending was significantly determined by GDP and it was devoid of displacement influences appraised by shifts in regression intercept. Barro (1989) and Easterly (1999) found feedback response between public sector size-led growth and growth-led public sector size to the effect that government size and economic growth are reciprocally determined.

### ***Empirical Review***

In this section, we review empirical channels of relation between government size and economic growth with emphasizes on developing countries given Nigeria the country of focus is a developing nation. Nevertheless, prominent studies in Nigeria have researched on impact rather than size of government spending on economic growth and found a significant positive relationship between public expenditure and output growth in Nigeria (Emori, Duke, & Nneji, 2015; Udoka, & Anyingang, 2015; Iheanacho, 2016; and Ebong, Ogwunike, Udongwo, & Ayodele, 2016; Chinedu, Daniel, & Ezekwe, 2018).

For the period, 1977-2006, Adesoye, Maku & Atanda (2010) found long-term growth effect of rising government spending in Nigeria. Ebiringa & Charles-Anyaogu (2012) engaged in a sectorial analysis using Bound test co-integration method and reported growth effect of disaggregated government spending in Nigeria. Chude & Chude (2013) evaluated effects of public expenditure in education on growth in Nigeria from 1977 to 2012, and found significant positive effect on long-run economic growth in Nigeria.

Basing analysis on ex-post-facto research design, Adewara & Oloni, (2012) established negative impact of sectoral spreads of public sector spending on GDP growth in Nigeria.

On their part, Olulu, Erhieyovwe & Ukavwe (2014) implementing OLS technique found inverse link between public health spending and economic growth in Nigeria. Basing analysis on sample period from 1984 to 2013, Yusuf, Babalola, Aninkan & Salako (2015) adopted ARDL Bound test co-integration technique in their study and yet found no significant economic growth effect of government spending in short-run, while in long-run, government defence spending was reported to have impedes output growth and government agricultural spending stimulates output growth. Establishing findings on co-integration and ECM, Abu & Abdullahi (2010) found negative effect on economic growth following changes in government spending in Nigeria.

Conspicuous studies seems to find a negative relationship between total government size and economic growth (Davoodi, Clements, Schiff, & Debaere, 2001; Cooray, 2009; Rebero, 2011; Facchini & Melki, 2013; De Witte & Moesen, 2010; Connolly & Li, 2016).

To Folster & Henrekson (2001), ten percent rise in ratio of State spending to GDP decreases economic growth rate by 0.8 percent and as a result, established that smallest threshold State size favours economic expansion. Blanchard & Perotti (2002) found positive effect on growth of national output in America. According to Brady (2007), there is a link between expansion in size of public sector measured by increase in its public expenditures and decline in economic growth. Romero-Avila & Strauch (2008) found that total State expenditure had negative impact on economic growth rate in fifteen countries of EU from 1960 to 2001.

De Witte & Moesen (2010) established that larger public sector may imply slower economic growth but emphasizes growth was usually not the only goal. Bergh & Karlsson (2010) reported that government size had significant negative effect on GDP growth rates in twenty OECD nations. In a study of one hundred and eight nations, Afonso & Jalles (2011) reported negative contribution of government size on economic growth even in smaller nations as against larger nations.

Di Matteo (2013) finds that, on average, annual per capita GDP growth rate was maximized at 3 percent when public sector expenditure to GDP ratio is 26 percent and that there are few additional benefits once public sector reaches 30 to 35 percent of GDP. Facchini & Melki (2013) finds 30 percent optimal ratio for France with emphasis of a U-shape effect of public sector size on growth, but that the optimum will tend to vary by country. By reducing size of public sector in France from 50 to 30 percent of GDP, their model predicts average growth rate in France would increase from 1.9 to 3.2 percent.

In Malaysia, Tang (2001) utilized Johansen's multivariate test for co-integration tests and found growth measured by national income was formative factor of size of public spending. Using same method of analysis, study carried out by Abu-Bader & Abu-Qarn (2003) in Egypt showed that economic growth/development determine size of government spending thereby lending credence to demand-following rule of Wagner. In Greece and Turkey, Dritsakis (2004), growing national output-led size of public spending was supported.

In their research of Ireland, Greece, and UK, Loizides & Vamvoukas (2005) implemented error-correction models (ECMs) within a Granger-causality structure and found that government size Granger-causes economic growth in Greece. Implementing same

econometric techniques of analysis, Loizides & Vamvoukas (2005) found that economic growth was significantly responsible for rise in relative size of government in Greece.

In Philippines, work of Dogan & Tang (2006) supported national income effect of public sector size using Granger-causality technique. Also in country of Greece, Sideris (2007) for period of 1833-1938 found significant causal effect from income growth to size of public disbursement. The results of Blankenau, Simpson, & Tomljanovich (2007) supported Keynesian arrow of causation detailing economic growth effect of government size in developed and developing countries. Mohammadi, Cak, & Cak (2008) implementing Granger causality test method, validated Wagner's arrow of relationship in Turkey.

Correspondingly, in his study for Malaysian economy, Tang (2009) implemented bounds testing for co-integration and Modified Wald (MWALD) causality test and obtained empirical evidence in favor of national income as a stimulant of education, defense and government health spending. To Samudram et al. (2009), it is economic growth that causes significant changes in size of defense and education expenditure in Malaysia and not vice versa. In 2010, Taban (2010) re-visited Turkey implementing econometric methods same as that implemented by Tang (2009) together with quarterly data and found that per capita output growth drives size of public investment spending as ratio of GDP.

In another study conducted for Malaysian economy utilizing ARDL technique, Chandran, Rao, & Anwar (2011) show that aggregate government spending enhances economic growth significantly from 1970 - 2006. In Sudan, Granger-causality test and ECM techniques were utilized by Ebaidalla (2013) and Keynesian public sector size-led growing national output was validated. In long-run econometric analysis, economic growth was reported to be formative factor of size of government expenditure in New Zealand by Kumar, Webber, & Fargher (2012).

Growth-led public sector spending was validated in Indian by Srinivasan (2013) basing techniques of analysis on co-integration and ECM having embraced data from 1973 to 2012. In his study, Akinlo (2013) adopted multivariate structure and reported that national income determines size of government spending in Nigeria. Within a bivariate model of estimation while utilizing JML co-integration and variance decomposition methods, Abu-Bader & Abu-Qarn (2003) found feedback effect between government size and economic growth in Syria and Israel.

Other studies that reported feedback effect between government size and economic growth include, Samudram et al. (2009) for Malaysia from 1970 to 2004, via ARDL bounds testing approach, Abu-Eideh (2015) in the Palestine from 1994 to 2013 via Granger-causality tests. Researching on thirty OECD nations, Olugbenga & Owoye (2007) reported results in favour of government size-led growth for sixteen nations, growing output-led government size for ten countries and feedback channel of relation between size of public spending and economic growth for four nations. Concisely, it suffices to deduce from reviewed literature that channel of effect between government and economic growth depends on the nationality for which analysis is carried out.

## **Methods**

Given that study was set out to estimated trivariate parsimonious error-correction equation within Granger-causality framework, we proceeded as follows to derive parsimonious ECT equation. The error correction application directly inferred by Granger theorem encompasses an ADL(1,1) model of this specification:

$$S_t = \delta_0 + \delta_1 S_{t-1} + \alpha_0 W_t + \alpha_1 W_{t-1} + \epsilon_t \quad [1]$$

$$S_t = \delta_0 + \delta_1 S_{t-1} + \alpha_0 W_t + \alpha_1 W_{t-1} + \epsilon_t + S_{t-1} - S_{t-1} + W_{t-1} - W_{t-1} + \alpha_0 W_{t-1} - \alpha_0 W_{t-1} + \alpha_1 W_{t-1} - \alpha_1 W_{t-1} \quad [2]$$

Repositioning relations, we obtain the error correction model:

$$\Delta S_t = (\alpha_1 - 1) \left[ U_{t-1} - \frac{\delta_0}{1 - \delta_1} - \frac{\alpha_0 + \alpha_1}{1 - \delta_1} W_{t-1} \right] + \alpha_0 \Delta W_t + e_t$$

$$\text{where } \epsilon_{t-1} = \left[ U_{t-1} - \frac{\delta_0}{1 - \delta_1} - \frac{\alpha_0 + \alpha_1}{1 - \delta_1} W_{t-1} \right] = ECT \quad [3]$$

Theoretically, procedure involves estimating co-integrating link, and ECM using differenced variables and lagged residuals from co-integrating relationship. In effect, variables are co-integrated when  $(\alpha_1 - 1) < 0$ , when  $(\alpha_1 - 1) > 0$  disequilibrium expands, when  $(\alpha_1 - 1) = 0$ , no error correction. Thus,  $-1$  indicates complete error correction in 1 period while  $< -1$  indicates overshooting and oscillatory adjustment. If  $\eta_t = \eta_0 + \eta_{1t}$  is a linear trend, we have  $W_t = z_t - \eta_0 - \eta_{1t}$  and  $\Delta W_t = \Delta z_t - \eta_1$ . Thus,  $\Delta S_t - \eta_1 = \alpha\beta' [S_{t-1} - \eta_0 - \eta_1(t-1)] + \Gamma_1 [\Delta S_{t-1} - \eta_1] + \dots + \Gamma_{p-1} [\Delta S_{t-p+1} - \eta_1] + e_t$

Rearranging the deterministic terms we have,

$$\Delta S_t = \phi + \alpha(\beta' \gamma') \begin{bmatrix} S_{t-1} \\ t-1 \end{bmatrix} + \Gamma_1 \Delta S_{t-1} + \dots + \Gamma_{p-1} \Delta S_{t-p+1} + \epsilon_t \quad [4]$$

$$\Rightarrow \phi + \Pi^+ S_{t-1}^+ + \Gamma_1 \Delta S_{t-1} + \dots + \Gamma_{p-1} \Delta S_{t-p+1} + \epsilon_t$$

$$\gamma' = -\beta' \eta_1, \quad \Pi^+ = \alpha(\beta' \gamma')$$

is a  $K \times (K+1)$  matrix and  $S_{t-1}^+ = \begin{bmatrix} S_{t-1} \\ t-1 \end{bmatrix}$

In this modelling, intercept  $\phi$  is unrestricted, while linear trend term can be absorbed into the co-integration link such that,

$$\Delta S_t = \phi_0 + \phi_1 t + \Pi S_{t-1} + \Gamma_1 \Delta S_{t-1} + \dots + \Gamma_{p-1} \Delta S_{t-p+1} + \varepsilon_t \quad [5]$$

Basically therefore, the trend slope parameter  $\eta_1$  is orthogonal to co-integration matrix such that  $\beta' \eta_1 = 0$  such that  $\gamma = 0$ . The model is thus specified:

$$\begin{aligned} \Delta S_t &= \phi_0 + \alpha \beta' S_{t-1} + \Gamma_1 \Delta S_{t-1} \\ &\quad + \dots + \Gamma_{p-1} \Delta S_{t-p+1} + \varepsilon_t \\ \Rightarrow \phi_0 + \Pi S_{t-1} + \Gamma_1 \Delta S_{t-1} + \dots + \Gamma_{p-1} \Delta S_{t-p+1} + \varepsilon_t \end{aligned} \quad [6]$$

The data sources include IMF, World Economic Outlook database (<http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx>), Economic Freedom of the World, Fraser Institute (<http://www.freetheworld.com/release.html>) and Worldwide Governance Indicators (<http://www.govindicators.org>).

The variables used comprise, total government spending as share of GDP was used to measure government size (in terms of resources spent, public goods and services delivered as well as social protection provided), growth rate of GDP adjusted for variations in price level (proxy for economic growth), and institutional index as measured by regime stability.

Variables are in log values. We estimated our models with different sub-periods given the resolve to control for regime effect and hence check how comparable our government size coefficient estimates are for different sub-periods of time.

## Findings

Given that we estimated trivariate error correction equation, we needed application of Johansen co-integration test method that certifies more than one co-integrating relations if it exists unlike Engle-Granger method that is based on stationary test of unit roots in residuals from single co-integrating equation. Table I reports the co-integration test results before structural adjustment. The Trace tests indicate three co-integrating relationship or vectors at 5% level of significance.

Table 1. **Co-integrating vector for complete sample, 1970Q1 – 2017Q4**

---

Co-integration with unrestricted intercepts and trends in the VAR  
 Co-integration LR test based on trace of the stochastic matrix  
 \*\*\*\*\*

---

List of variables included in the co-integrating vector:  
 lngdp      lngsz      lnrgm

List of eigenvalues in descending order:  
 0.13523      0.08634      0.02493  
 \*\*\*\*\*

Null	Alternative	Statistic	95% Critical Value
r = 0	r >= 1	172.5291	153.4200
r <= 1	r >= 2	152.7641	148.8600
r <= 2	r >= 3	97.1268	92.5300



r ≤ 3	r ≥ 4	51.2539	67.8900
r ≤ 4	r = 5	7.38437	9.0200
Conclusion r = 3			

Table II reports the co-integration test results before structural adjustment. The Trace test indicate one co-integrating vector at the 5% level of significance.

**Table 2. Co-integrating vector before structural adjustment, 1970Q1-1985Q4**

---

Co-integration with unrestricted intercepts and trends in the VAR  
 Co-integration LR test based on trace of the stochastic matrix  
 \*\*\*\*\*

---

List of variables included in the co-integrating vector:  
 lngdp      lngsz      lnrgm  
 List of eigenvalues in descending order:  
 0.01486    0.32156    0.72392  
 \*\*\*\*\*

Null	Alternative	Statistic	95% Critical Value
r = 0	r ≥ 1	69.3892	56.4860
r ≤ 1	r ≥ 2	42.7439	48.5321
r ≤ 2	r ≥ 3	24.1162	27.9642
r ≤ 3	r ≥ 4	5.7923	8.3791
r ≤ 4	r = 5	1.3982	5.2576

Conclusion r = 1

---

Table III reports the co-integration test results after the structural break. Two long term relations are reported at 5% level. The trace statistics value tests indicate 2 co-integrating relationship or vectors at 5% level of significance. The presence of co-integrating vector shows existence of long-run association amongst, growth of output, government size, and regime stability.

**Table 3. Co-integrating vector after structural adjustment, 1986Q1-2017Q4**

---

Co-integration with unrestricted intercepts and no trends in the VAR  
 Co-integration LR test based on trace of the stochastic matrix  
 \*\*\*\*\*

---

List of variables included in the co-integrating vector:  
 lngdp      lngsz      lnrgm  
 List of eigenvalues in descending order:  
 0.13523    0.13697    0.08634  
 \*\*\*\*\*

Null	Alternative	Statistic	95% Critical Value
r = 0	r ≥ 1	113.2543*	102.2581
r ≤ 1	r ≥ 2	79.4678*	69.5273
r ≤ 2	r ≥ 3	35.9256	37.3590
r ≤ 3	r ≥ 4	23.8732	26.5820
r ≤ 4	r = 5	1.2613	4.3296

Conclusion r = 2

---

In terms of short run dynamics of response of output growth to changes in public sector size in Nigeria, estimates of the short-run dynamics for complete sample, before structural adjustment and after structural adjustment are shown in Table IV, V and VI respectively. In the results of short-run dynamics without structural break and before structural break, the coefficient of public sector size is statistically insignificant at all lags with p-values of 0.520, 0.903 and 0.826. Though, all coefficients of public sector size are positively sign in conformity with apriori expectation but are failed significance test as revealed from the p-value.

Nevertheless, coefficients of government size in estimates of short-run dynamics after structural adjustment as in Table IV are all significant indicating a potential temporary positive impact on growth rate of increasing public sector size. The error correction term is significant with a t-ratio of -2.956 and an economic coefficient of 0.497 indicating that 49.7 percent disequilibrium in economic growth is corrected annually given changes in public sector size and regime stability. In sum, the short-run relationship of public sector share with output growth is positively significant.

Regime stability passed test of significance with a positive sign. For lag 1, the results reported a coefficient of 0.073 with a t-value of 5.098; for lag 2, the results reported a coefficient of 0.023 with a t-value of 1.986; and for lag 3, the results reported a coefficient of 0.054 with a t-value of 2.375. A stable regime contributed significantly to output growth in Nigeria. In all sub-periods of analysis, co-integrating coefficients normalized on growth rate of GDP having been adjusted for changes in price level are 1.629, 1.291 and 1.056 separately. These coefficients are all relatively significant with an elastic degree of responsiveness of output growth rate to changes in government size.

This corroborates previous studies (Maku, 2009; Ighodaro, & Oriakhi, 2010; Awomuse, Olorunleke, & Alimi, 2013; Ekesiobi, Dimnwobi, Ifebi, & Ibekilo, 2016, Adigun, 2017) that government spending stimulates significant positive effect on Nigeria's GDP growth rate. The inverse root plot of stability is reported for each sub-periods at the bottommost section of Tables 4, 5 & 6 respectively. Explicitly, no roots falls outside unit circle implying stability of estimated results for our parsimonious ECT equations.

The goodness-of-fit statistics are robust and highly plausible as shown in Tables IV, V, and VI. The diagnostic test obtained from the regression is quite impressive. For example, we obtained 56.9%, 53.1% and 79.2% adjusted R<sup>2</sup> for short-run dynamics for full sample, before structural adjustment and after structural adjustment respectively. Also, the respective F-statistics of 23.791, 25.628 and 29.862 are statistically significant at any conventional level. The standard error of regression estimate are very low indicating absence of heteroscedasticity and serial correlation in the model.

**Table 4. Short run results for complete sample, 1970Q1- 2017Q4**

```

*****
Dependent variable is dlngdp
*****

```

	Regressor	Coefficient	T-Ratio [Prob]
Intercept	-.063	-1.432[.159]	
dLngdp1	.271	3.256[.002]**	

dLngsz1	.594	3.647[.002]
dLnrgrm1	.073	5.098[.000]**
dLngdp2	.196	3.269[.000]**
dLngsz2	.047	2.523[.003]
dLnrgrm2	.023	1.986[.039]
dLngdp3	.572	7.830[.000]**
dLngsz3	.235	2.686[.006]
dLnrgrm3	.054	2.375[.003]*
ecm (-1)	-.497	-2.956[.005]*

Cointegrating coefficients normalized on gdp (standard error in parentheses)

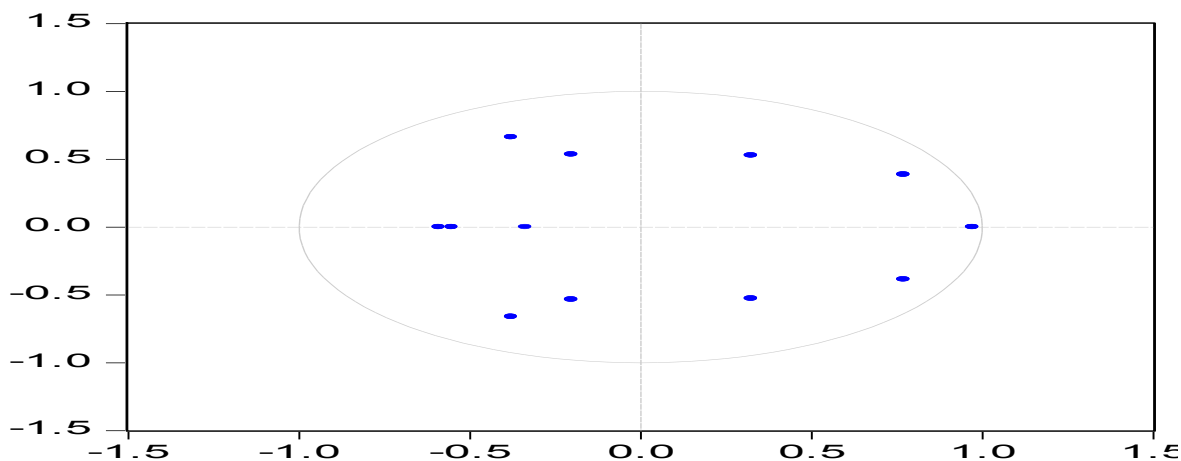
gdp	gsz	rgm
1.000	1.629	.0832
	(.035)	(1.005)

*Diagnostics for short run results for complete sample, 1970Q1- 2017Q4*

R-Squared	0.635
R-Bar-Squared	0.569
DW-statistic	2.000
S.E. of Regression	0.005
F-stat.	23.791[.000]
Mean of Dependent Variable	6.389

*Note.* \* Significant @ 0.05; \*\* Significant @ 0.01

**Inverse Roots of AR Characteristic Polynomials**



**Table 5. Short run results before structural adjustment, 1970Q1-1985Q4**

\*\*\*\*\*

Dependent variable is dlngdp

\*\*\*\*\*

	Regressor	Coefficient	T-Ratio [Prob]
Intercept	.349	9.542[.000]**	
dLngdp1	.268	2.346[.002]*	
dLngsz1	.024	0.027[.659]	
dLnrgrm1	.129	2.567[.005]*	
dLngdp2	.047	3.594[.000]**	

dLngsz2	-.052	-.026[.573]
dLnrgm2	.063	3.475[.000]**
dLngdp3	.185	2.962[.003]*
dLngsz3	-.009	-1.369[.920]
dLnrgm3	.053	6.724[.000]**
ecm (- 1)	-.529	-3.028[.000]**

Cointegrating coefficients normalized on gdp (standard error in parentheses)

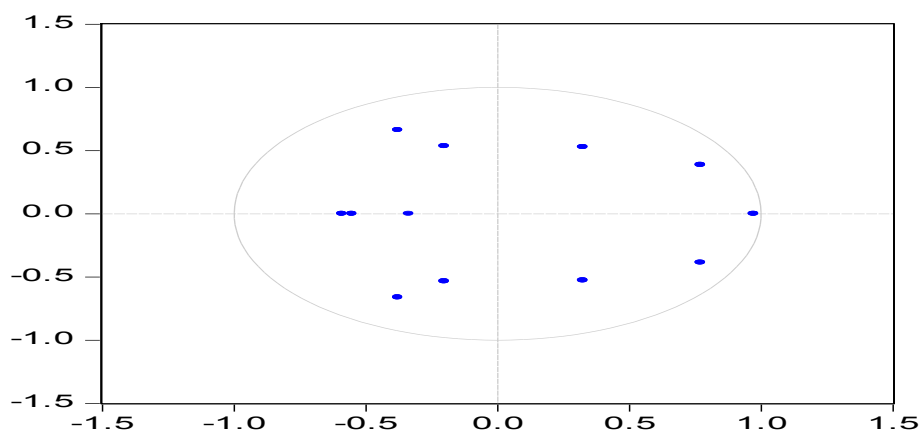
gdp	gsz	rgm
1.000	1.291	.063
	(.675)	(.298)

*Diagnostics for short run results before structural adjustment 1970Q1-1985Q4*

R-Squared	0.600
R-Bar-Squared	0.531
DW-statistic	1.992
S.E. of Regression	0.002
F-stat.	25.628[.000]
Mean of Dependent Variable	9.359

Note. \* Significant @ 0.05; \*\* Significant @ 0.01

**Inverse Roots of AR Characteristic Polynomial**



**Table 6. Short run results after structural adjustment, 1986Q1-2017Q4**

\*\*\*\*\*

Dependent variable is dlngdp

\*\*\*\*\*

	Regressor	Coefficient	T-Ratio [Prob]
Intercept	-.135	1.492[.165]	
dLngdp1	.271	4.569[.000]**	
dLngsz1	.064	2.573[.012]*	
dLnrgm1	.298	1.996[.015]	
dLngdp2	.127	2.187[.012]*	
dLngsz2	0.012	7.349[.000]**	
dLnrgm2	.023	3.562[.001]**	
dLngdp3	.016	3.109[.001]**	
dLngsz3	-.115	3.002[.001]**	
dLnrgm3	.002	2.594[.003]*	

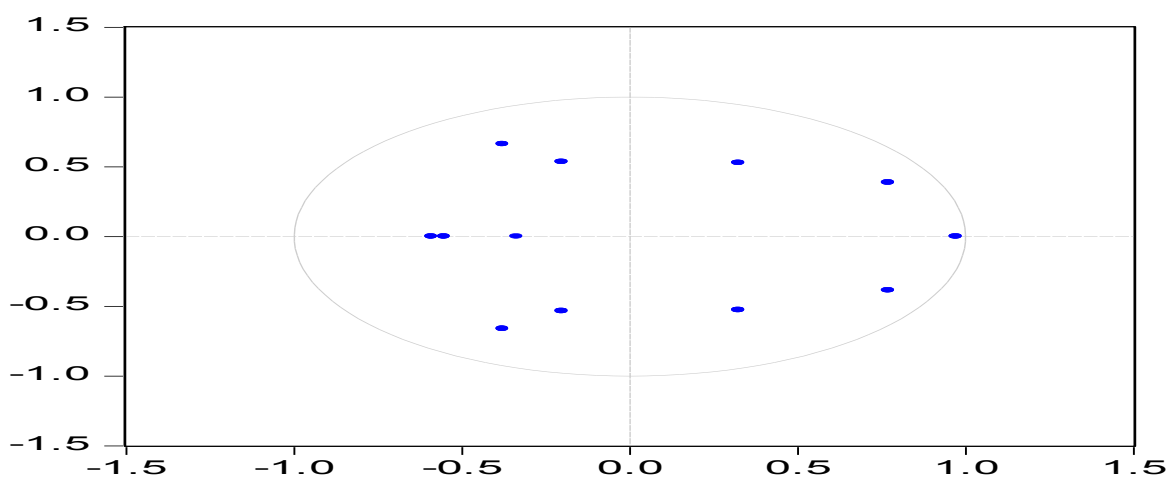
e <sub>cm</sub> (-1)	-0.793	-6.231[.000]**
Cointegrating coefficients normalized on gdp (standard error in parentheses)		
gdp	gsz	rgm
1.000	1.056	.092
	(.675)	(.075)

*Diagnostics for short run results after structural adjustment, 1986Q1-2017Q4*

R-Squared	0.796
R-Bar-Squared	0.792
DW-statistic	2.009
S.E. of Regression	0.000
F-stat.	29.862[.000]
Mean of Dependent Variable	12.438

Note. \* Significant @ 0.05; \*\* Significant @ 0.01

**Inverse Roots of AR Characteristic Polynomial**



On Simulation analysis, summary statistics for the historical simulation obtained in the study are presented in Table VII below. The simulation is for the period 2019Q1 to 2024Q4.

**Table 7. Historical simulation results**

Endogenous Variable	Theil's Inequality Coefficient	Decomposition of Theil's Inequality Bias Proportion	Variance Proportion	Covariance Proportion	Root Mean Squared Error (%)	Correlation Coefficient
lngdp	0.013	0.000	0.001	0.012	0.128	0.761
lngsz	0.057	0.000	0.002	0.055	0.062	0.692
lnrgm	0.089	0.000	0.004	0.085	0.005	0.869

Table VII shows correlation coefficient of 0.761 between actual and simulated series for output equation while the root-mean-square simulated error is 12.8 percent. The Theil's inequality coefficient between actual and simulated output series is 0.013 which lies between 0 and 1. Given that the coefficient is close to zero, it thus signifies that the simulated output series tracks the actual output series.

Tables VIII, IX and X reports policy simulation results for 40%, 50% and 60% policy scenario namely, changes in public sector share of output. The results of the controlled solution, that is, base line are without changes in exogenous policy variable, (gsz) while disturbed solution encompasses solution with changes in policy variables on output

growth. In effect, we examined how changes in public sector share of GDP affect economic growth.

**Table 8. Simulation for 40% increases in public sector share on GDP**

<b>Endogenous Variable</b>	<b>Years</b>	<b>Controlled Solution</b>	<b>Disturbed Solution</b>
lngdp	2019Q1	0.2375	0.2337
	2019Q2	0.3409	0.3429
	2019Q3	0.3522	0.3562
	2019Q4	0.3556	0.3591
	2020Q1	0.3791	0.4123
	2020Q2	0.3921	0.4230
	2020Q3	0.4511	0.4533
	2020Q4	0.4026	0.4421
	2021Q1	0.3721	0.3839
	2021Q2	0.3815	0.3912
	2021Q3	0.4123	0.4233
	2021Q4	0.4556	0.4025
	2022Q1	0.3627	0.4637
	2022Q2	0.3556	0.4837
	2022Q3	0.3522	0.3725
	2022Q4	0.3556	0.3856
	2023Q1	0.3627	0.3917
	2023Q2	0.3615	0.4215
	2023Q3	0.3522	0.4138
	2023Q4	0.3556	0.4381
	2024Q1	0.3627	0.3972
	2024Q2	0.3615	0.4253
	2024Q3	0.3522	0.4361
	2024Q4	0.3615	0.4918

**Table 9. Simulation for 50% increases in public sector share on GDP**

<b>Endogenous Variable</b>	<b>Years</b>	<b>Controlled Solution</b>	<b>Disturbed Solution</b>
lngdp	2019Q1	0.2562	0.2511
	2019Q2	0.2543	0.2423
	2019Q3	0.2568	0.2843
	2019Q4	0.2637	0.2569
	2020Q1	0.2589	0.2537
	2020Q2	0.2594	0.2541
	2020Q3	0.2543	0.2543
	2020Q4	0.2568	0.2569
	2021Q1	0.2637	0.2537
	2021Q2	0.2589	0.2541
	2021Q3	0.2594	0.2643
	2021Q4	0.2543	0.2769
	2022Q1	0.2568	0.2537
	2022Q2	0.2637	0.2641
	2022Q3	0.2589	0.2543

2022Q4	0.2594	0.2769
2023Q1	0.2543	0.2547
2023Q2	0.2568	0.2591
2023Q3	0.2637	0.2543
2023Q4	0.2589	0.2569
2024Q1	0.2594	0.2537
2024Q2	0.2543	0.2541
2024Q3	0.2568	0.2543
2024Q4	0.2637	0.2569

**Table 10. Simulation for 60% increases in public sector share on GDP**

<b>Endogenous Variable</b>	<b>Years</b>	<b>Controlled Solution</b>	<b>Disturbed Solution</b>
lngdp	2019Q1	0.3791	0.3521
	2019Q2	0.3683	0.3546
	2019Q3	0.3542	0.3962
	2019Q4	0.4265	0.3987
	2020Q1	0.3481	0.3525
	2020Q2	0.4152	0.3943
	2020Q3	0.3242	0.3962
	2020Q4	0.3965	0.3921
	2021Q1	0.3781	0.3175
	2021Q2	0.4752	0.3943
	2021Q3	0.3342	0.3962
	2021Q4	0.3265	0.3971
	2022Q1	0.3971	0.3805
	2022Q2	0.4052	0.3943
	2022Q3	0.3742	0.3962
	2022Q4	0.4865	0.3987
	2023Q1	0.3381	0.3875
	2023Q2	0.4152	0.3943
	2023Q3	0.3242	0.3962
	2023Q4	0.4465	0.3987
2024Q1	0.4581	0.3875	
2024Q2	0.4652	0.3943	
2024Q3	0.3942	0.3162	
2024Q4	0.4165	0.3915	

Table XI shows negative multiplier effects of public sector size for most part of the period of analysis for 50% and 60% policy scenarios. These indeed indicate negative growth effect. For the 40% policy scenario, the dynamic multiplier of increase in public sector size at first quarter of 2019 is -0.0095. For the remaining most period, the dynamic effect became positive. In fourth quarter of 2024, the dynamic output multiplier grew to 0.3258. In fact, the policy simulation results indicate forty percent as optimal size of public sector spending required for inducing growth of national output in Nigeria.

So, constantly maintaining 40% of GDP as public sector spending over the period of 2019Q1 to 2024Q4, economy grows by 0.095% on average as against growth decline of 0.00065% for 50% and 0.01123% growth for 60% public sector sizes respectively. Policy

implication is that forty percent public sector spending as a share of national economic output is the optimal public sector size in stimulating output growth in Nigeria.

**Table 11. Dynamic multiplier effect of changes in public sector size**

<b>Years</b>	<b>40% output multiplier</b>	<b>Dynamic multiplier</b>	<b>50% output multiplier</b>	<b>Dynamic multiplier</b>	<b>60% Dynamic output multiplier</b>
2019Q1	-0.0095		-0.0102		-0.0270
2019Q2	0.0050		-0.0240		-0.0137
2019Q3	0.0100		0.0550		0.0420
2019Q4	0.0087		-0.0136		-0.0278
2020Q1	0.0830		-0.0104		0.0044
2020Q2	0.0773		-0.0106		-0.0209
2020Q3	0.0055		0.0000		0.0720
2020Q4	0.0987		0.0002		-0.0044
2021Q1	0.0295		-0.0200		-0.0606
2021Q2	0.0243		-0.0096		-0.0809
2021Q3	0.0275		0.0098		0.0620
2021Q4	-0.1328		0.0452		0.07060
2022Q1	0.2525		-0.0062		-0.0166
2022Q2	0.3203		0.0008		-0.0109
2022Q3	0.0508		-0.0092		0.0220
2022Q4	0.0750		0.0350		-0.0878
2023Q1	0.0725		0.0008		0.0494
2023Q2	0.1500		0.0046		-0.0209
2023Q3	0.1540		-0.0188		0.0720
2023Q4	0.2063		-0.0040		-0.0478
2024Q1	0.0862		-0.0114		-0.0706
2024Q2	0.1595		-0.0004		-0.0709
2024Q3	0.2097		-0.0050		-0.0780
2024Q4	0.3258		-0.0136		-0.0250

## **Conclusion**

The study attempted to estimate optimal size of public sector spending that induces growth rate of national output in Nigeria under an economically stable regime using ECM approach together with Monte Carlo simulation. The empirical evidence from the analysis in the study upholds that public sector size of forty percent of GDP is an effective tool in macroeconomic management in Nigeria in presence of a stable regime.

Public sector spending within neighbourhood of forty percent in Nigeria builds positive national output. Such share of public sector spending stimulates further rise in aggregate demand thereby causing an enormous final increase in GDP than the initial injection. This is a plausible reality given the fact that the Nigerian economy is not at full capacity. Hence, multiplier effect of 40 percent public sector size would tend to crowd in the private sector leading to net increase in economic growth. The contribution to knowledge is accentuated



on our empirics that public sector role in Nigerian economy is less than or equal to 40%. So, any size of public sector beyond forty percent is economically damaging. This could be due to various harmful effects of taxation, costly financing choices, cost of market distortion and public debt repayment.

A case in point is that noted by Adigun (2017) that with huge revenue shortfall, Federal public sector's borrowing required to fund capital projects was estimated at N1.6 trillion in 2017. Consequently, financing capital budget had always necessitated higher than estimated borrowing with deleterious effects for interest rates and interest costs. So, a growing public sector size above forty percent is contrary to Nigeria's economic growth either because public sector becomes oversized or because monies are misapplied. In such cases, cost of government exceeds benefit.

Subsequently, public sector spending should not exceed the level which maximizes the rate of real GDP growth rate in Nigeria. Public sector spending should be significantly less than or equal to forty percent for purpose of national growth of output. In effect, Nigerian government should enforce a responsible fiscal policy based on forty percent public sector size. Should the government spends forty percent of GDP in a productive way by enforcing contracts and restructuring economy it spawns rate of return higher than that of the private sector and the Nigerian economy profits.

## References

- Abu, N. & Abdulahi, U. (2010). "Government Expenditure and Economic Growth in Nigeria, 1970-2008: A Disaggregated Analysis", *Business and Economic Journal*, 4(3), 237-330.
- Abu-Bader, S., Abu-Qarn, A. S. (2003). Government expenditures, military spending and economic growth: Causality evidence from Egypt, Israel, and Syria. *Journal of Policy Modeling*, 25, 567-583.
- Abu-Eideh, O. M. (2015). Causality between public expenditure and GDP growth in Palestine: An econometric analysis of Wagner's Law. *Journal of Economics and Sustainable Development*, 6, 189-199.
- Adesoye A. B., Maku O. E. & Atanda A. A. (2010). Dynamic Analysis of Government Spending and Economic Growth in Nigeria. *Journal of Management and Society*, 1(2), 27-37, December
- Adewara S. O. & Oloni E. F. (2012). Composition of public expenditure and economic growth in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 3(4), 403-407.
- Adigun, I. (2017). "Is Nigerian growth public spending-spurred?" *Asian Journal of Economic Modelling* 5(3), 354 - 363.
- Afonso, A., & Davide Furceri, G. (2010). Government size, composition, volatility and economic growth. *European Journal of Political Economy*, 26(4), 517-532.
- Afonso, A., & Jalles, J. T. (2011). *Economic performance and government size*. European Central Bank Working Paper Series No. 1399, November.
- Ahmad, N., Ahmad, F. (2005). Does government size matter? A case study of D-8 member countries. *Pakistan Economic and Social Review*, XLIII, 199-212.
- Akinlo, A. E. (2013). Government spending and national income nexus for Nigeria. *Global Journal of Business Research*, 7(1), 33-41.

- Alexiou, P. C. (2009). Government spending and economic growth: econometric evidence from the south eastern Europe. *Journal of Economic and Social Research*, 2, 1-16.
- Al-Faris, A. F. (2002). Public expenditure and economic growth in the Gulf Cooperation Council countries. *Applied Economics*, 34, 1187-1195.
- Awomuse, Bernard O., Olorunleke, Kola & Alimi, R. Santos (2013). The effect of federal government size on economic growth in Nigeria, 1961-2011. *Developing Country Studies*, 3(7), 68-76. July.
- Afzal, M., Abbas, Q. (2010). Wagner's Law in Pakistan: Another look. *Journal of Economics and International Finance*, 2(1), 12-19.
- Bagdigen, M., & Cetintas, H. (2003). Causality between public expenditure and economic growth: The Turkish case. *Journal of Economic and Social Research*, 6(1), 53-72.
- Barro, R. J. (1989). *Economic growth in a cross section of countries* (NBER Working Paper No.3120). Cambridge, MA: National Bureau of Economic Research.
- Brady, K. K. (2007). *State government size and economic growth: A panel data analysis of the United States over the period 1986-2003*. Pittsburgh: Duquesne University.
- Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *Quarterly Journal of Economics* 117(4), 1329 - 68.
- Bergh, A., & Karlsson, M. (2010). Government size and growth: accounting for economic freedom and globalization. *Public Choice* 142(1-2), 195 - 213.
- CBN (1990). *Statistical Bulletin*. www.cenbank.org.
- Chandran, G., Rao, R., & Anwar, S. (2011). Economic growth and government spending in Malaysia: A re-examination of Wagner and Keynesian views. *Economic Change and Restructuring*, 44, 203-219.
- Chinedu, U. A., Daniel, O. C., & Ezekwe, U. C. (2018). Sectoral spreads of government expenditures and economic growth in Nigeria (1980-2017): An approach of error correction model. *International Journal of Academic Research in Economics and Management Sciences*, 7(4), 180 - 195.
- Chude, N. P., & Chude, D. I. (2013). Impact of government expenditure on economic growth in Nigeria. *International Journal of Business and Management Review*, 1(4), 64-71.
- Connolly, M., & Li, C. (2016). Government spending and economic growth in the OECD countries. *Journal of Economic Policy Reform*, 19(4), 386-395.
- Cooray, A. (2009). Government expenditure, governance and economic growth. *Comparative Economic Studies*, 5(1), 401- 418.
- Davoodi, H., Clements, B., Schiff, J., & Debaere, P. (2001). Military spending, peace dividend, and fiscal adjustment. IMF Staff Papers, 48(2), 290-316.
- De Witte, K., & Moesen, W. (2010). Sizing the government. *Public choice*, 145(2), 39-55.
- Di Matteo, L. (2013), *Measuring government in the Twenty-first Century: An international overview of the size and efficiency of public spending*. Fraser Institute, Canada.
- Dogan, E., & Tang, T. C. (2006). Government expenditure and national income: Causality tests for five South East Asian countries. *International Business and Economics Research Journal*, 5(1), 49-58.
- Ebaidalla, E. M. (2013). Causality between government expenditure and national income: Evidence from Sudan. *Journal of Economic Cooperation and Development*, 34(4), 61-76.
- Ebiringa O. F. & Chalse-Anyaogu N. B. (2012). Impact of Government Sectoral Expenditure on Economic Growth of Nigeria. *International Journal of Economic Research*, 3(6), 82 - 92.

- Ebong, F., Ogwunike, F., Udongwo, U., & Ayodele O. (2016). Impact of Government expenditure on economic growth in Nigeria: A disaggregated analysis. *Asian journal of Economics and Empirical Research*, 3(1), 113-121.
- Emori, E. G., Duke, S. B., & Nneji, I. D. (2015). Impact of public expenditure on economic growth in Nigeria. *International Journal of Scientific Research and Management (IJSRM)*, 3(2), 3694-3700.
- Facchini, F., & Melki, M. (2013). Efficient government size: France in the 20th century. *European Journal of Political Economy*, 31(2), 1-14.
- Florio, M., & Colautti, S. (2005). A logistic growth theory of public expenditures: A study of five countries over 100 years. *Public Choice* 122(3), 355 - 93.
- Fosler, S., & Henrekson, M. (2001). Growth effects of government expenditure and taxation in rich countries. *European Economic Review*, 26(8), 1501-1520.
- Frimpong, J. M., & Oteng-Abayie, E. F. (2009). Does the Wagner's hypothesis matter in developing economies? Evidence from three West African Monetary Zone (WAMZ) countries. *American Journal of Economics and Business Administration*, 1(2), 141-147.
- Huang, C. J. (2006). Government expenditures in China and Taiwan: Do they follow Wagner's Law? *Journal of Economic Development*, 31(3), 139-148.
- Iheanacho, E. (2016). The contribution of government expenditure on economic growth of Nigeria Disaggregated Approach. *International Journal of Economics & management sciences*, 5(5), 1- 9.
- Ighodaro, C. A. U., & Oriakhi, D. E. (2010). "Does the relationship between government expenditure and economic growth follow Wagner's law in Nigeria?" *Annals of University of Petrosani Economics*, 10(2), 185-198.
- IMF (1990). *World economic outlook*.  
<http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx>
- IMF (2020). *World economic outlook*.  
<http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx>
- Islam, A. M. (2001). Wagner's Law revisited: Cointegration and exogeneity test for the USA. *Applied Economic Letters*, 8(2), 509-515.
- Kumar, S., Webber, D. J., & Fargher, S. (2012). Wagner's Law revisited: Cointegration and causality tests for New Zealand. *Applied Economics*, 44(3), 607-616.
- Lamartina, S., & Zaghini, A. (2011). Increasing public expenditure: Wagner's law in OECD countries. *German Economic Review*, 12(1), 149-164.
- Loizides, J., & Vamvoukas, G. (2005). Government expenditure and economic growth: Evidence from trivariate causality testing. *Journal of Applied Economics*, 8(3), 125-152.
- Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(3), 3- 42.
- Maku, K. E. (2009). *Does government spending spur economic growth in Nigeria?* Munich: MPRA.
- Mohammadi, H., Cak, M., & Cak, D. (2008). Wagner's hypothesis: New evidence from Turkey using the bounds testing approach. *Journal of Economics Studies*, 35(2), 94-106.
- Muti, A. O., Olusijibomi, A. (2013). A public expenditure and economic growth nexus: further evidence from Nigeria. *Journal of Economics and International Finance*, 5(3), 146 -154.
- NBS (2000). *Annual Abstract of Statistics*
- Nworji, I. D., Okwu, A. T., Obiwuru, T. C., & Nworji, L. O. (2012). Effects of public expenditure on economic growth in Nigeria: A disaggregated time series analysis. *International Journal of Management Sciences and Business Research*, 1(7), 2226-8235.

- Nyasha, S. & Odhiambo, N.M. (2019). Government Size and Economic Growth: A Review of International Literature.
- Olorunfemi, S. (2008). Public investment and economic growth in Nigeria: An autoregressive model. *Journal of International Finance and Economics*, 11(1), 50-67.
- Oteng-Abayie, E. F., & Frimpong, J. M. (2009). Size of government expenditure and economic growth in three WAMZ countries. *Business Review*, 29(3), 172-175.
- Ozigbu, J. C., Ezekwe, C. I. & Morris R. E. (2018). Size and growth of public investment in Nigeria: implications for real sector development. *Global Journal of Arts, Humanities and Social Sciences*, 6(11), 18-33, November.
- Peacock, A. T., & Wiseman, J. (1961). "Front matter, the growth of public expenditure in the United Kingdom." In the growth of public expenditure in the UK, Princeton University Press.
- Rauf, A., Qayum, A., & Zaman, A. (2012). Relationship between public expenditure and national income: An empirical investigation of Wagner's Law in case of Pakistan. *Academic Research International*, 2(1), 533-538.
- Ray, S., & Ray, I. A. (2012). On the relationship between government's developmental expenditure and economic growth in India: A cointegration analysis. *Advances in Applied Economics and Finance*, 1(2), 86-94.
- Rebelo, C. L. (2011). When is the government spending multiplier large? *Journal of Political Economy*, 119(2), 1329-1368.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(3), 1002-1037.
- Romero-Avila, D., & Strauch, R. (2008). Public finances and longterm growth in Europe: Evidence from panel data analysis. *European Journal of Political Economy* 24(1), 172 - 91.
- Samudram, M., Nair, M., & Vaithilingam, S. (2009). Keynes and Wagner on government expenditures and economic development: The case of a developing economy. *Empirical Economics*, 36(2), 697-712.
- Sedrakyan, G. S., & Varela-Candamio, L. (2019). Wagner's Law vs. Keynes' hypothesis in very different countries (Armenia and Spain). *Journal of Policy Modeling*, 41(5), 747-762.
- Sideris, D. (2007). Wagner's law in 19th century Greece: A cointegration and causality Analysis. Bank of Greece Working Paper No. 64, Athens: Bank of Greece.
- Srinivasan, P. (2013). Causality between public expenditure and economic growth: The Indian case. *International Journal of Economics and Management*, 7(2), 335-347.
- Taban, S. (2010). An examination of the government spending and economic growth nexus for Turkey using the bound test approach. *International Research Journal of Finance and Economics*, 48(3), 184-193.
- Tang, C. F. (2009). An examination of the government spending and economic growth nexus for Malaysia using the leveraged bootstrap simulation approach. *Global Economic Review*, 38(2), 215-227.
- Tajudeen, E., & Fasanya, I. O. (2013). Public expenditure and economic growth in Nigeria: evidence from autoregressive distributed lag specification. *Zagreb International Review of Economics & Business*, 16(1), 79-92.
- Thabane, K., & Lebina, S. (2016). Economic growth and government spending nexus: Empirical evidence from Lesotho. *African Journal of Economic Review*, IV(1), 86-100.
- Udoka, C., & Anyingang, R. A. (2015). The effect of public expenditure on the growth and development of Nigerian economy (1980-2012). *International Review of Management and Business Research*, 4(3), 824-835.

- Verma, S., & Arora, S. (2010). Does the Indian economy support Wagner's law? An econometric analysis. *Eurasian Journal of Business and Economics*, 3(5), 77-91.
- Wagner, A. (1958). The nature of fiscal policy. In R. A. Musgrave, & A. T. Peacock, *classics in the theory of public finance*. London: Macmillan.
- Wu, S. Y., Tang, J. H., & Lin, E. S. (2010). The impact of government expenditure on economic growth: How sensitive to the level of development? *Journal of Policy Modeling*, 32(2), 804-817.

