

Adetokunbo, Abiodun Moses; Edioye, Ochuwa Priscillia

Article

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RESEARCH

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Response of economic growth to the dynamics of service sector in Nigeria

Abiodun Moses Adetokunbo^{1,2*} and Ochuwa Priscillia Edioye¹

Abstract

The misconception of services as being non-productive has led to the neglect of the service sector in both economic theory and applied economic researches. The Nigerian economy highly depends on the oil sector to generate revenue for the entire economy. This study examines the response of economic growth to the dynamics of the service sector in Nigeria from the windows of governance indicators. Using annual data series, endogenous growth model, and autoregressive distributed lag technique, transportation and communication service subsector is significant and positively related to economic growth. Health service subsector and transportation and communication subservice sector are significant and positively related to economic growth when governance indicators were accounted for. Interaction of the subservice sectors with governance indicators shows that none of the service subsectors were significant but were positively related to economic growth. The study shows that the activities of the education subsector have not contributed significantly to economic growth. Thus, for education to contribute positively to economic growth there is a need for increase in budgetary allocation to education subsector. Efforts made to control corruption and promote government effectiveness should be reviewed frequently to checkmate the processes of governance, so that bureaucratic processes would not hinder services from contributing significantly to economic growth.

Keywords: Services, Economic growth, Endogenous growth, Government expenditure

JEL Classification: H11, H51, H52

Introduction

The service sector is a crucial component of every country's economy, and it has been identified as a sector with the capability to become a significant driver of sustained growth in Africa [9]. The Nigerian service sector consists of several industries such as banking, retail and wholesale trade, tourism, real estate, telecommunications, motion pictures (Nollywood), information and communication technology, entertainment, and education. The service sector is currently the fastest growing sector in the world [14]. It accounts for a significant proportion of gross domestic product in most countries and makes significant contribution to the share of total employment. As of

2015, service sector contribution to Nigeria's GDP stood at about 60%, with an average of about 33% of employment share compared to 7% for industry.

A productive service sector is known to strengthen the performance of other sectors in the economy such as manufacturing [14]. This is because the sector enables and facilitates the functioning of most sectors (manufacturing, industrial sector, etc), as most of these sectors rely majorly on the service sector to supply needed functions such as banking, accountancy, information, and technology. The service sector provides supplementary outputs to manufacturing firms that are dependent on external sourcing of basic inputs such as transportation, financing, design, and communication. The growth of the service sector is primarily a product of the level of individual consumption per capita [4] and demand from the manufacturing sector. The service sector also influences the development of businesses by increasing productivity and value added. This is

*Correspondence: abiodun.adetokunbo@augustineuniversity.edu.ng; abiodun.adetokunbo@gmail.com

¹ Department of Economics, Augustine University, Ilara-Epe, Lagos State, Nigeria

Full list of author information is available at the end of the article

attainable by using highly educated and experienced workers with particular cognitive skills, thus increasing the business productivity. Although the viability and sustainability of a service sector-led growth have been questioned, one of the reasons arising from the fact that Adam Smith defined services as non-productive [10].

The Nigerian economy has disregarded the service sector, as economic activities are majorly dominated by the activities in the oil sector, thus limiting the service sector from attaining greater productivity and full employment. Nigeria has been unable to achieve sustainable development due to her continuous dependence on the oil and gas sector. The main source of the nation's revenue and foreign exchange earnings is from crude oil export, thereby making the country vulnerable to oil price volatilities. The urgent need to diversify the country's economy cannot be overemphasized, especially going by the unstable and fluctuating global oil prices in order to minimize the country's vulnerability to macroeconomic risks, such as decline in production, fall in demand and price, and also exhaust of reserves [19].

In almost all forms of economic arrangement, provision of services often comes with a significant level of government participation, either as regulators or as providers. The Nigerian government has found it difficult to excel as either regulators or providers. This is seen in the management of the Nigerian Telecommunications Limited (NITEL), and the recent case of power sector where management have been evolving frequently. The participation of the government is also shown by lack of control or laissez faire attitude towards regulating the activities of various services providers in the country.

The Nigerian service sector has been able to display impressive results despite tough economic circumstances. In 2014, Nigeria's rebased Gross Domestic Product sectoral composition shifted toward the service sector and away from the oil sector. The service sector accounted for 54.8% of the rebased GDP, with the largest contributors being wholesale and retail trade contributing 16.27%, real estate contributing 8.37%, and Information and Communication contributing 11.04% [18]. The service sector has the potential to increase economic growth in Nigeria. Diversifying and harnessing the full benefits of the service sector will reduce Nigeria's over-reliance on the oil sector, as innovations in the service sector play a crucial role in increasing both the productivity levels and also economic growth through innovation expenditures and innovation activities in general [5].

Hence, the contribution of this study to existing research is to show the extent of service subsector contribution to economic growth in relations to governance indicators knowing that there has been past misconception of services as being non-tradable, non-productive,

and unable to drive growth in an economy. Government as a major participant in the service subsector has been given priority in this study as its contribution to service subsectors was examined from the windows of government expenditure. Governance and the mode of operations of the bureaucratic system of government have a long way of impacting on the execution of planned expenditure of government as most budgeted funds do not get to into the assigned projects and sectors where they are needed.

The contribution of Nigerian service subsector to her economic growth is pertinent, hence the examination of service subsector from the windows of government expenditure on education, health, transportation, and communication in relation to governance indicators (control of corruption and government effectiveness). Most of the previous studies carried out analysis the contribution of the service sector without considering the governance indicators. This study employs autoregressive distributed lag (ARDL) of Pesaran et al. [20].

The subsequent sections of the study are structured as follows. Section two presents the methodology. Section three presents results and discussion. Section four presents the conclusion.

The extent to which services have been utilized as a driver to the growth of countries, particularly developing countries, has in recent times received considerable attention in the literature. Uwitonze and Heshmati [24] studied the development of the service sector over the years in Rwanda's economy. They employed the regression analysis, and their result showed the factors which have contributed to the development of the service sector. These factors can be used in forming public policy with the aim of using the service sector as a vehicle for speeding up the shift from low-income state to middle-income state. Kabeta and Sidhu [13] determined the contribution of the service sector to the growth of Ethiopia. They made use of co-integration test and the Granger causality test, and their result showed that during 1999–2005 growth periods, Ethiopian per capita GDP growth was mainly contributed by employment rate changes originated from the agricultural sector, whereas the service sector had the highest contribution in productivity but a negative contribution in employment change. However, the high growth period in per capita GDP is due to productivity growth which emanates from the service sectors specifically from the distributive service sector. Tandrayen-Ragoobur [22] examined the impact of the service sector on the economic growth of Mauritius. They adopted the ARDL model, and the result of their study revealed the existence of long-run causal relationship from the service sector to GDP per capita while short-run causality runs from per capita GDP to service

sector performance. Their findings further confirmed the stability of the relationship between service sector development and economic growth for small island economies like Mauritius.

Ehigiator [6] argued that the service sector is an escalator for new economic growth in Nigeria. His study provided an overview of the Nigerian service sector and showed the contribution of services to the growth of the Nigerian economy and also explained that it plays a more significant role than industry in the economy through its contribution to Gross Domestic Product (GDP), capital imports, and employment. He employed the vector autoregression model to carry out his analysis, which provided evidence showing the growth and contribution of Nigeria's service sector, especially the knowledge-intensive services to the economy (GDP), employment, and capital imports. He concluded on the note that the growth of services in the country is being reflected in enhancing the economic life of Nigerians. Antai et al. [2] determined the contribution of different sectors in the Nigerian economy other than the oil and gas sector. They adopted the VAR technique and were able to prove that the service sector does not only promote the level of economic growth in the economy but also connect every other sector, while GDP does not promote output growth in the services sector. Also, agricultural output is observed to be directly related to growth.

Narayan [17] analyzed the impact of tourism on Fiji's economy. He made use of the computable general equilibrium (CGE) model, and his result showed that a 10% increase in Fiji's tourism expenditure increases GDP by 0.5%, consumption by 0.72%, real national welfare by 0.67% and an improvement in the balance of payment. Linden and Mahmood [15] analyzed the long-run relationship between sectorial shares (agriculture, manufacturing, and services). They employed pooled EGLS (cross-section SUR), and the result of their analysis provided evidence that there is a two-way causality between services share growth and growth rate of GDP per capita.

Hansda [11] in his study determined the service intensity of various sectors of the economy. He employed the panel regression analysis, and the result of his analysis showed that the service sector is more of a growth-inducing sector than the industrial or agricultural sector. Therefore, in order to sustain the overall growth process, the services-led growth augurs well for the Indian economy in so far as the growth impulses originate in service vis-à-vis industry or agriculture. Mujahid and Alam [16] analyzed the process of growth in service sector and assess its potential contribution toward growth in the case of Pakistan. He employed VAR technique, and the result of his analysis proved that there is a significant relationship between service sector and trade

liberalization, and the present analysis demonstrates that trade liberalization policy is beneficial for Pakistan's service sector growth.

Hussin and Ching [12] examined the contribution of economic sectors to economic growth in Malaysia and China from the years 1978 to 2007. They employed the augmented Dickey–Fuller (ADF) unit root test, and their result showed that the service sector generated the highest contribution to Malaysian's economic growth, while manufacturing sector provided the biggest contribution to China's economic growth. Tang and Selvanathan [23] determined the casual link between foreign direct investment and tourism in China. They used the Granger causality test and VAR, and their result provided evidence that there is a unidirectional causality from foreign direct investment to tourism. They concluded that this causality has contributed to the rapid growth of tourism in China in the past 10 years.

The relationship between service sector's productivity and living standards was examined in a study by Eichen-green and Gupta [7] in Asia. Using descriptive statistics, they found a positive correlation between output share of services and income per capita, but such a relationship holds only for service activities that are usually a combination of traditional and modern services consumed majorly by households. Furthermore, their study finds that modern services not only have the highest productivity growth among the service industries, but their share in output tends to rise rapidly at high income levels. There is consistency in the assertion of authors who investigated Asia on the subject matter. A serious weakness, however, is that different methods were used in their analyses. Therefore, their results cannot be generalized.

ADB [3] showed that service sector growth tends to be higher when the level of service trade is higher, the share of urban population is larger and the age-dependence ratio is lower. It also points out that lack of human capital and restrictive regulations is the major bottleneck for developing a modern service sector. Eichengreen and Gupta [8] found the second wave of service sector growth is most apparent in countries that are open to trade, democratic, and relatively close to the major global financial centers.

Methods

Model

This study employs a modified version of Ram [21] model which is based on endogenous growth model. The model is employed because it captures most of the government expenditure variables, which can be easily disaggregated into different sectors. The model also shows how government expenditure exercises externality effects on output in the private sector. The endogenous growth

theory formed a basis for empirical models of government expenditure and growth. This is due to the fact that economic growth can arise when capital and labor are augmented by additional government input in the production function. This provides a linkage between government expenditure and economic growth.

$$\frac{dY}{Y} = \alpha \frac{I}{Y} + \beta \frac{dL_D}{L} + \mu \frac{dG}{Y} \quad (1)$$

Equation (1) corresponds to Ram [21] equation. Equation (1) forms the basic model for regression estimation. It predicts that economic growth $\left(\frac{dY}{Y}\right)$ responds to the ratio of gross investment (I) to GDP, growth of labor force $\frac{dL_D}{L}$ and the ratio change in government consumption to GDP $\left(\frac{dG}{Y}\right)$. Government expenditure may affect economic growth through the following mechanism. First, government investment in infrastructure is assumed to have a direct effect on economic growth by increasing the economy's capital stock. The second mechanism is the externality effect of government expenditure that alters economic growth indirectly by increasing the marginal productivity of privately supplied factors of production through expenditure on education, health, and other services, which contributes to human capital accumulation. The third mechanism is government expenditure on goods and services that increases the aggregate demand in the economy. The fourth mechanism is intersectoral productivity differentials which makes some sectors to be more productive than others [1].

Data description

The variables used in the study consists of government fixed capital formation (GFCF), labor force participation rate (LFPR), control of corruption (CC), government effectiveness (GE), and subsector expenditures in the service sector which includes health (HLT), education (EDU), and transportation and communication (TRC). All variables are measured in logarithm. The data used for this research were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and World Governance Indicator database.

Model specification

Following the endogenous growth theory that has been considered in the methodology of this research, the econometric model for this research is:

$$\begin{aligned} \log GDP_t = & \alpha_0 + \alpha_1 \log EDU + \alpha_2 \log TRC_t \\ & + \alpha_3 \log HLT_t + \alpha_4 \log LFPR_t \\ & + \alpha_5 \log GFCF_t + \varepsilon_t \end{aligned} \quad (2)$$

where GDP=Real Gross Domestic Product proxy for economic growth, EDU=Education Expenditure proxy for activities in education subsector, TRC=Transport and Communication Expenditure proxy for activities in transportation and communication subsector, HLT=Health Expenditure proxy for activities in health subsector, LFPR=Labor force participation rate, GFCF=Gross fixed capital formation proxy for investment, ε_t =Stochastic error term.

This study employs autoregressive distributed lag (ARDL) model in order to examine the long-run and short-run effects of the service sector on economic growth in Nigeria. The model was specified in natural logarithm form.

Model 1: Baseline ARDL model without governance indicators.

$$\begin{aligned} \Delta LGDP_t = & \vartheta_0 + \sum_{i=1}^p \alpha_i \Delta LGDP_{t-i} + \sum_{i=0}^q \beta_i \Delta LEDU_{t-i} \\ & + \sum_{i=0}^r \varphi_i \Delta LTRC_{t-i} + \sum_{i=0}^s \theta_i \Delta LHLT_{t-i} \\ & + \sum_{i=0}^t \theta_i \Delta LFPR_{t-i} + \sum_{i=0}^u \tau_i \Delta LGFCF_{t-i} \\ & + \vartheta_1 LGDP_{t-1} + \vartheta_2 LEDU_{t-1} \\ & + \vartheta_3 LTRC_{t-1} + \vartheta_4 LHLT_{t-1} \\ & + \vartheta_5 LFPR_{t-1} + \vartheta_6 LGFCF_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

From Eq. (3), Δ is the first difference operator, $-\frac{\vartheta_0}{\vartheta_1}$, $-\frac{\vartheta_2}{\vartheta_1}$, $-\frac{\vartheta_3}{\vartheta_1}$, $-\frac{\vartheta_4}{\vartheta_1}$, $-\frac{\vartheta_5}{\vartheta_1}$, $-\frac{\vartheta_6}{\vartheta_1}$, are the long-run coefficients for the intercepts and also the slope. The short-run coefficients are $\alpha_i, \beta_i, \varphi_i, \theta_i$, and τ_i , respectively. P, q, r , and s, t, u are the optimal lags on the first differenced variables. In order to capture the speed of adjustment, the error correction term λ is introduced and expressed below:

$$\begin{aligned} \Delta LGDP_t = & \vartheta_0 + \sum_{i=1}^p \alpha_i \Delta LGDP_{t-i} + \sum_{i=0}^q \beta_i \Delta LEDU_{t-i} \\ & + \sum_{i=0}^r \varphi_i \Delta LTRC_{t-i} + \sum_{i=0}^s \theta_i \Delta LHLT_{t-i} \\ & + \sum_{i=0}^t \theta_i \Delta LFPR_{t-i} + \sum_{i=0}^u \tau_i \Delta LGFCF_{t-i} \\ & + \vartheta_1 LGDP_{t-1} + \vartheta_2 LEDU_{t-1} \\ & + \vartheta_3 LTRC_{t-1} + \vartheta_4 LHLT_{t-1} \\ & + \vartheta_5 LFPR_{t-1} + \vartheta_6 LGFCF_{t-1} \\ & + \lambda_{ec_{t-1}} + v_t. \end{aligned} \quad (4)$$

Model 2: Baseline ARDL Model with Governance Indicators

This study incorporates governance indicators to account to determine the extent to which these indicators matter in influencing subservice sector impact on economic growth in Nigeria. Given this purpose, control of corruption and government effectiveness percentile rank were used.

$$\begin{aligned} \Delta LGDP_t = & \vartheta_0 + \sum_{i=1}^p \alpha_i \Delta LGDP_{t-i} + \sum_{i=0}^q \beta_i \Delta LEDU_{t-i} \\ & + \sum_{i=0}^r \varphi_i \Delta LTRC_{t-i} + \sum_{i=0}^s \theta_i \Delta LHLT_{t-i} \\ & + \sum_{i=0}^t \theta_i \Delta LFPR_{t-i} + \sum_{i=0}^u \tau_i \Delta LGFCF_{t-i} \\ & + \sum_{i=0}^t \eta_i \Delta CC_{t-i} + \sum_{i=0}^u \omega_i \Delta GE \\ & + \vartheta_1 LGDP_{t-1} + \vartheta_2 LEDU_{t-1} \\ & + \vartheta_3 LTRT_{t-1} + \vartheta_4 LHLT_{t-1} \\ & + \vartheta_5 LFPR_{t-1} + \vartheta_6 LGFCF_{t-1} \\ & + \vartheta_7 CC_{t-1} + \vartheta_8 GE_{t-1} + \lambda_{ec_{t-1}} + \nu_t. \end{aligned} \quad (5)$$

From Eq. (5), CC and GE represent control of corruption and government effectiveness, respectively. $\frac{\vartheta_7}{\vartheta_1}$, $\frac{\vartheta_8}{\vartheta_1}$ are the long-run coefficients for the CC and GE, respectively. Their short-run coefficients are η_i and ω_i .

Model 3: Interactive ARDL Model

In this interactive model, the governance indicators (control of corruption and government effectiveness) were used to scale the education, health, and transportation and communication to examine the degree of interaction of these indicators with the subservice sectors. From Eq. (4), we have:

$$\begin{aligned} \Delta LGDP_t = & \vartheta_0 + \sum_{i=1}^p \alpha_i \Delta LGDP_{t-i} + \sum_{i=0}^q \beta_i \Delta LEDU * CC_{t-i} \\ & + \sum_{i=0}^q \beta_{ii} \Delta LEDU * GE_{t-i} + \sum_{i=0}^r \varphi_i \Delta LTRC * CC_{t-i} \\ & + \sum_{i=0}^r \varphi_{ii} \Delta LTRC * GE_{t-i} + \sum_{i=0}^s \theta_i \Delta LHLT * CC_{t-i} \\ & + \sum_{i=0}^s \theta_{ii} \Delta LHLT * GE_{t-i} + \sum_{i=0}^t \tau_i \Delta LFPR_{t-i} \\ & + \sum_{i=0}^u \tau_{ii} \Delta LGFCF_{t-i} + \vartheta_1 LGDP_{t-1} \\ & + \vartheta_2 LEDU * CC_{t-1} + \vartheta_{22} LEDU * GE_{t-1} \\ & + \vartheta_3 LTRT * CC_{t-1} + \vartheta_{33} LTRT * GE_{t-1} \\ & + \vartheta_4 LHLT * CC_{t-1} + \vartheta_{44} LHLT * GE_{t-1} \\ & + \vartheta_5 LFPR_{t-1} + \vartheta_6 LGFCF_{t-1} + \lambda_{ec_{t-1}} + \nu_t. \end{aligned} \quad (6)$$

From (6), β_i , β_{ii} , φ_i , φ_{ii} , θ_i and θ_{ii} are the short-run coefficients of the scaled variables of the service subsectors. ϑ_2 , ϑ_{22} , ϑ_3 , ϑ_{33} , ϑ_4 and ϑ_{44} are the long-run coefficients of the scaled variables of service subsectors.

Results and discussion

Pre-estimation analysis

The description from Table 1 shows that the average percentage of gross domestic product, education expenditure, health expenditure, transportation and communication expenditure, gross fixed capital formation, labor force participation rate, control of corruption, and government effectiveness between the years 1981 to 2018 is estimated to be approximately 17.18%, 2.78%, 1.97%, 0.93%, 3.44%, 4.01%, 12.42%, and 16.42%, respectively. All the series are positively skewed except education, health, and transportation and communication expenditure which are negatively skewed. In terms of kurtosis, all the series are lowly peaked, and hence

Table 1 Descriptive statistics of variables. Source: Author's Computation (2019)

Statistic	GDP	EDU	HLT	TRC	GFCF	LFPR	CC	GE
Mean	17.177	2.776	1.973	0.928	3.444	4.014	12.416	16.421
Minimum	16.439	− 1.819	− 3.187	− 3.449	2.651	4.003	0.505	8.612
Maximum	18.061	6.143	5.692	4.500	4.493	4.024	12.195	16.346
Standard deviation	0.561	2.778	2.946	2.534	0.546	0.007	5.478	4.831
Kurtosis	1.630	1.787	1.643	1.797	1.961	1.549	2.789	3.363
Skewness	0.344	− 0.474	− 0.329	− 0.429	0.009	0.204	0.008	0.714
Jarque–Bera (probability)	3.723 (0.155)	3.750 (0.153)	3.602 (0.165)	3.457 (0.178)	1.708 (0.425)	3.599 (0.165)	0.043 (0.979)	2.081 (0.353)
Observations	38	38	38	38	38	38	23	23

they are platykurtic except government effectiveness since they are below the threshold value of 3.

The stationarity properties of the series were examined using augmented Dickey–Fuller (ADF) and Phillips–Peron (PP) test for unit root (see Table 2). The motivation for this test is to avoid running spurious regressions that would yield misleading policy evidence with our specified models. The result of the unit root indicates that all the series are stationary at first difference, $I(1)$ and at level, $I(0)$. This mixture of order of integration suggests that autoregressive distributed lag (ARDL) approach of Pesaran et al. [20] is followed in the model estimation process (Table 3).

The bound test result shows that the computed F-statistic value for the three models is higher than the upper and lower bound critical values. It therefore confirms that the null hypothesis of no long-run relationship among variables stands rejected for the models. Hence, there is a long-run relationship among variables.

Discussion of result

In the short run as shown in Table 4, model 1 result shows that LGFCF and LLFPR are significant at 1% level of significance. The value of LGFCF is -0.118 , and it implies that a percentage increase in gross fixed capital formation will lead to about 0.118% decrease in economic growth. The value of LLFPR is 0.754, and it implies that a percentage increase in labor force participation rate will lead to about 0.754% increase in economic growth. In the long run, the result shows that LTRC at 10% level of significance. LGFCF and LLFPR are significant at 1% level of significance. The value of LTRC is 0.133, and it shows that a percentage increase in transportation and communication subsector activity will lead to about 0.133% increase in economic growth. The value of LGFCF is -0.782 , which depicts that a percentage increase in gross fixed capital formation will lead to about 0.782 decrease in economic growth. The value of LLFPR is 4.997, which depicts that a percentage increase in labor force participation rate will lead to about 4.997% increase in economic growth. The

Table 2 Summary of unit root test results. Source: Author's Computation (2019)

Variables	Augmented Dickey–Fuller (ADF)			Phillip perron (PP)		
	Level	First difference	$I(d)$	Level	First difference	$I(d)$
LEDU	3.120	-7.6725^*	$I(1)$	-3.081	-10.560^*	$I(1)$
LHLT	0.036	-9.992^*	$I(1)$	-3.867^{**}	-18.447^*	$I(0)$
LGFCF	-3.040^*	-6.232	$I(0)$	-3.040^*	-6.235	$I(1)$
LLFPR	0.224	-3.511^*	$I(1)$	-0.429	-3.4801^*	$I(1)$
LGDP	-1.504	-3.395^{**}	$I(1)$	-2.571	-3.243^{**}	$I(0)$
LTRC	-2.402	-7.961^*	$I(1)$	-2.260	-9.116^*	$I(1)$
CC	-1.7585	-4.067^*	$I(1)$	-1.886	-4.081^*	$I(1)$
GE	-2.263	-7.219^*	$I(1)$	-2.399	-7.087^*	$I(1)$

*, **, and *** implies significances at 1%, 5%, and 10%, respectively

Table 3 ARDL bounds co-integration test result. Source: Author's Computation (2019)

Models	F-statistics	Significance level (%)	Critical values $I(0)$	Critical values $I(1)$
$lgdp = (ledu, lhlt, ltrc, lgfcf, llfpr)$	14.833	10	1.81	2.93
		5	2.14	3.34
		2.5	2.44	3.71
		1	2.82	4.21
$lgdp = (ledu, lhlt, ltrc, lgfcf, llfpr, cc, ge)$	17.271	10	1.7	2.83
		5	1.97	3.18
		2.5	2.22	3.49
		1	2.54	3.91
$lgdp = (ledu * cc, ledu * ge, lhlt * cc, lhlt * ge, ltrc * cc, ltrc * ge, lgfcf, llfpr)$	9.207	10	1.66	2.79
		5	1.91	3.11
		2.5	2.15	3.4
		1	2.45	3.79

Table 4 Long-run and short-run model estimation. Source: Author's Computation (2019)

Variables	Model 1 Coefficient (prob.)	Model 2 Coefficient (prob.)	Model 3 Coefficient (prob.)
LEDU	−0.034 (0.774)	−0.227 (0.139)	−
LHLT	0.010 (0.940)	0.249 (0.072)***	−
LTRC	0.133 (0.081)***	0.128 (0.041)**	−
LGFCF	−0.782 (0.000)*	−0.641 (0.012)*	−1.277 (0.000)*
LLFPR	4.997 (0.000)*	4.898 (0.000)*	5.433 (0.000)*
CC	−	0.014 (0.028)**	−
GE	−	−0.022 (0.021)**	−
LEDU*CC	−	−	−0.035 (0.308)
LEDU*GE	−	−	0.0310 (0.214)
LHLT*CC	−	−	0.0621 (0.211)
LHLT*GE	−	−	−0.069 (0.108)
LTRC*CC	−	−	−0.016 (0.528)
LTRC*GE	−	−	0.0371 (0.128)
D(LEDU)	−0.005 (0.780)	−0.048 (0.115)	−
D(LHLT)	0.001 (0.941)	0.0525 (0.068)***	−
D(LTRC)	0.001 (0.869)	0.000 (0.990)	−
D(LGFCF)	−0.118 (0.012)*	−0.080 (0.225)	−0.086 (0.137)
D(LLFPR)	0.754 (0.001)*	−4.365 (0.253)	0.737 (0.004)*
D(CC)	−	0.003 (0.021)**	−
D(GE)	−	−0.002 (0.080)***	−
D(LEDU*CC)	−	−	−0.005 (0.285)
D(LEDU*GE)	−	−	0.003 (0.322)
D(LHLT*CC)	−	−	0.008 (0.168)
D(LHLT*GE)	−	−	−0.005 (0.172)
D(LTRC*CC)	−	−	−0.0021 (0.505)
D(LTRC*GE)	−	−	0.002 (0.137)
ECT(−1)	−0.151 (0.002)*	−0.211 (0.004)*	−0.136 (0.009)*

*, **, and *** implies significances at 1%, 5%, and 10% respectively

ECT (−1) is negative and significant. The ECT (−1) of −0.151 is the speed of adjustment from the short-run equilibrium to the long-run equilibrium. This means that 15% of the error is corrected in each time period. This speed of adjustment implies that it will take approximately 15% of disequilibria from the previous year shocks to converge to its long-run equilibrium in its current period.

In model 2, the short-run result shows that LHLT, CC, and GE are significant at 10%, 5%, and 10% level of significance, respectively. The value of LHLT which is 0.053 implies that a percentage increase in health subsector activity will bring about 0.053 increase in economic growth. The value of CC which is 0.003 implies that a unit increase in control of corruption will bring about 0.003% increase in economic growth. The value of GE which is −0.002 implies that a unit increase in government

effectiveness will bring about 0.002% decrease in economic growth. In the long run, LHLT, LTRC, LGFCF, LLFPR, CC, and GE are significant at 1%, 5%, 1%, 1%, 5%, and 5% respectively. The value of LHLT which is 0.249 implies that a percentage increase in health subsector activities will lead to about 0.249% increase in economic growth. The value of LTRC which is 0.128 implies that a percentage increase in transportation and communication subsector activities will lead to a percentage 0.128 increase in economic growth. The value of LGFCF which is −0.641 implies that a percentage increase in gross fixed capital formation will bring about 0.641% decrease in economic growth. The value of LLFPR which is 4.898 implies that a percentage increase in labor force participation rate will lead to about 4.898% increase in economic growth. The value of CC which is 0.014 implies that a unit increase in control of corruption will bring about 0.014% increase in economic growth. The value of GE which is −0.022 implies that a unit increase in government effectiveness will lead to about 0.022% decrease in economic growth. The ECT (−1) is negative and significant. The ECT (−1) of −0.211 is the speed of adjustment from the short-run equilibrium to the long-run equilibrium. This means that 21% of the error is corrected in each time period. This speed of adjustment implies that it will take approximately 21% of disequilibria from the previous year shocks to converge to its long-run equilibrium in its current period.

In model 3, the short-run result shows that only LLFPR is significant at 1%. The value of LLFPR which is 0.737 depicts that a percentage increase in labor force participation rate will lead to about 0.737% increase in economic growth. In the long run, LGFCF and LLFPR are significant at 1%. The value of LGFCF shows that a percentage increase in gross fixed capital formation will lead to about 1.277 decreases in economic growth. The value of LLFPR shows that a percentage increase in labor force participation rate will lead to about 5.433% increase in economic growth. The ECT (−1) is negative and significant. The ECT (−1) of −0.136 is the speed of adjustment from the short-run equilibrium to the long-run equilibrium. This means that 13% of the error is corrected in each time period. This speed of adjustment implies that it will take approximately 13% of disequilibria from the previous year shocks to converge to its long-run equilibrium in its current period.

From the analysis across the three models examined, it was evident that gross fixed capital formation which was a proxy for investment in the study is negatively related to economic growth in both the short run and long run. Hence, from this, it could be adduced that more investment as examined from this study does not bring about more economic growth (Table 5).

Table 5 Diagnostic tests results. Source: Author's Computation (2019)

Tests	Model 1	Model 2	Model 3
BG serial correlation	3.077 (0.900)	0.0110 (0.891)	0.014 (0.907)
BPG Heteroskedasticity	1.938 (0.010)	0.391 (0.934)	0.328 (0.979)
Normality	4.281 (0.118)	0.134 (0.935)	26.188 (0.000)
Ramsey RESET	0.227 (0.637)	0.0509 (0.827)	0.707 (0.0487)

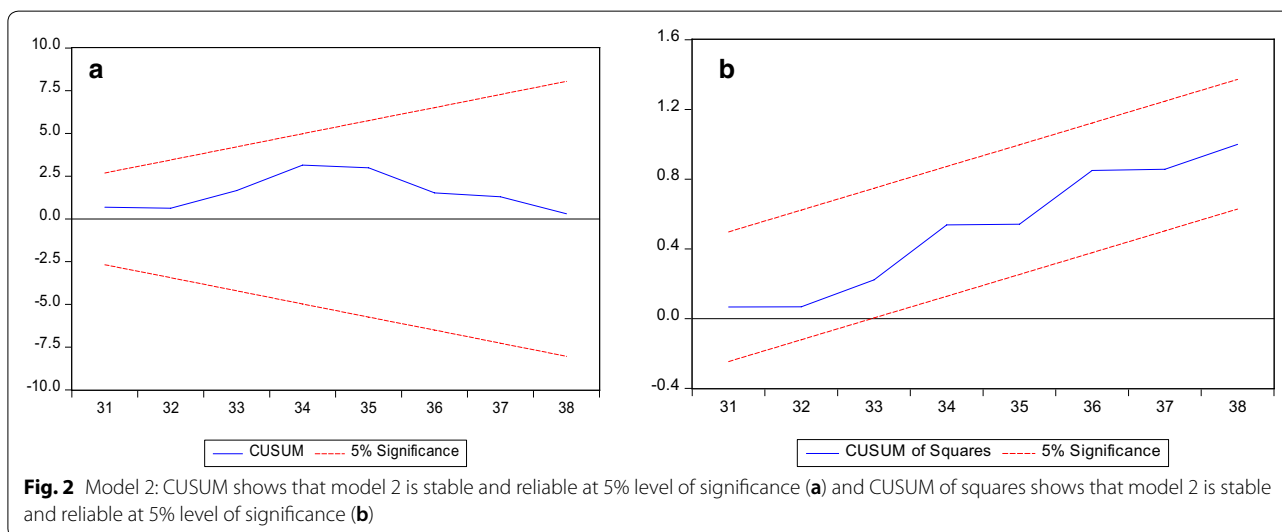
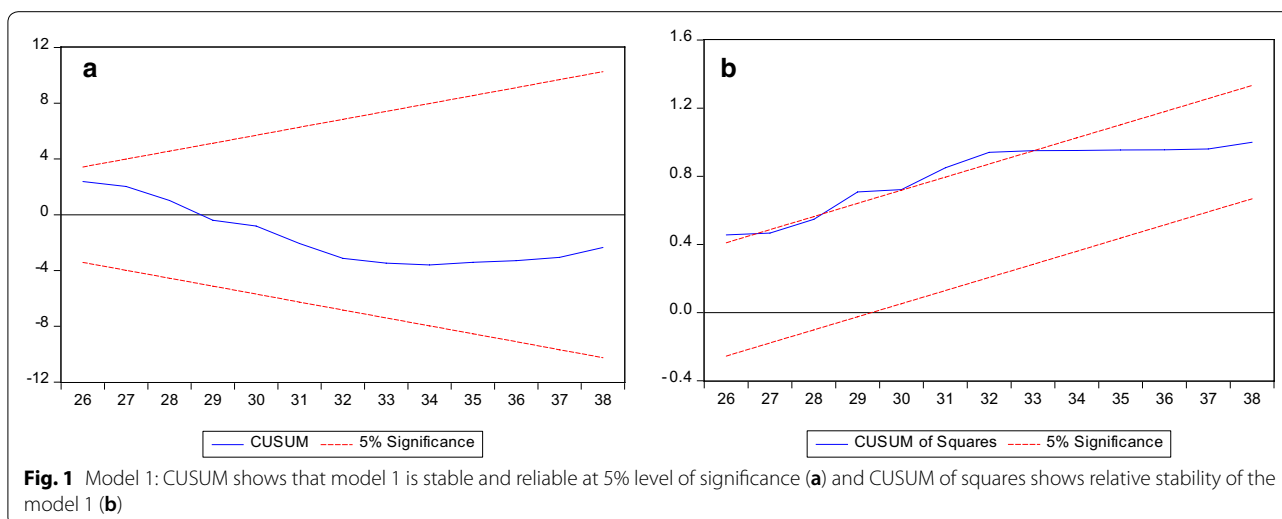
Prob. value in parenthesis

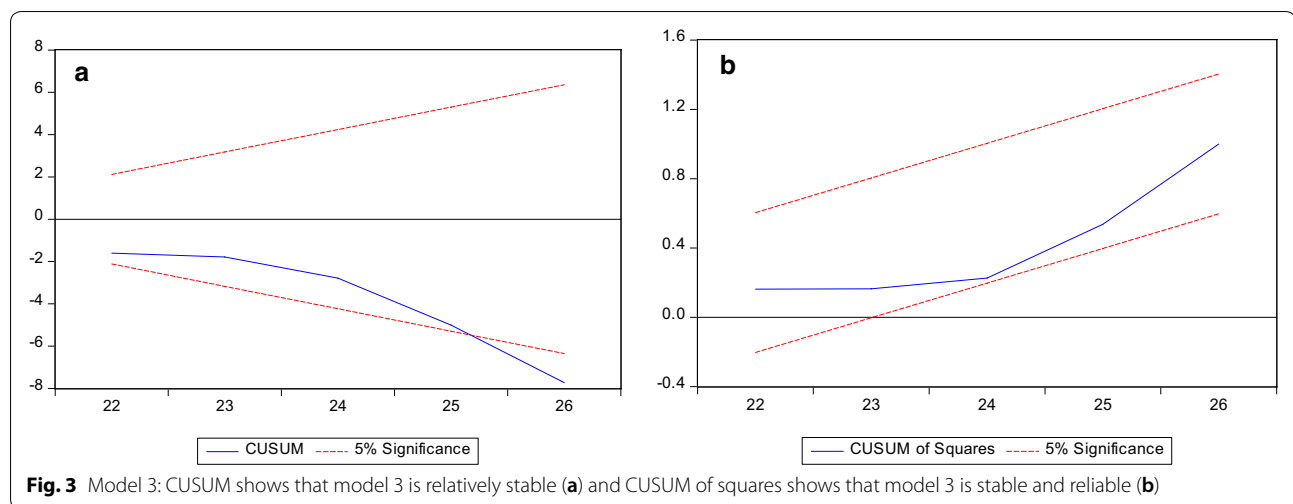
The F-test and the probability value for the Breusch–Godfrey serial correlation and Breusch–Pagan–Godfrey heteroscedasticity confirm the null hypothesis of no serial correlation and no heteroscedasticity (except for model 1) of the residual. The null hypothesis of normality cannot be rejected (except for model 3) since the probability value is greater than 5% level of significance. The null hypothesis of linearity of Ramsey RESET test does

not stand rejection (except for model 3) as its probability value is greater 5% level of significance. The CUSUM and CUSUM of squares (Figs. 1, 2, 3) for all the models shows the results are stable and reliable within 5% level of significance.

Summary of findings

In the short run, the study revealed that labor force participation rate has a significant positive relationship with economic growth without the inclusion and interaction with governance indicators. Meanwhile, gross fixed capital formation has a significant negative impact on economic growth without the inclusion and interaction with governance indicators. With the inclusion of governance indicators, health expenditure, control of corruption, and government effectiveness have significant impact on economic growth, but this is without the interaction of governance indicators with the service subsectors.





Furthermore, with the interaction of governance indicators with service subsectors, labor force participation rate has a significant positive impact with economic growth in Nigeria.

The long-run results show that transportation and communication and labor force participation rate have a significant positive relationship with economic growth, while gross fixed capital formation has a negative impact on economic growth without the inclusion and interaction with governance indicators. The inclusion of governance indicators shows that health subsector activities, transport and communication subsector activities, gross fixed capital formation, control of corruption, and government effectiveness have significant impact on economic growth. When governance indicators were used as a scalar for the service subsectors, it shows that gross fixed capital formation and labor force participation rate have a significant impact on economic growth while the service subsectors were insignificant.

Conclusion

The objective of the study was to examine the responsiveness of economic growth to the dynamics of the service sector in Nigeria, using an annual data sources from the Central Bank of Nigeria Statistical Bulletin, World Governance Indicator and the International Labour Organization over the year 1981 to 2018. The variables in this study includes education expenditure, health expenditure, transportation and communication expenditure, gross fixed capital formation, labor force participation rate, control of corruption, and government effectiveness. The study utilized the augmented Dickey–Fuller test, and the Phillip Perron test to determine the stationarity of the variables. The test results

showed that the variables are integrated of order zero $I(0)$ and one $I(1)$, and as a result the autoregressive distributed lag (ARDL) model was employed. Three different models were examined using the ARDL model.

The study shows that labor force participation rate, gross fixed capital formation, health subsector, control of corruption, and government effectiveness affect economic growth in the short run. Transportation and communication subsector, health subsector, labor force participation rate, gross fixed capital formation, control of corruption, and government effectiveness affect economic growth in the long run. The study shows that the activities of the education subsector have not contributed significantly to economic growth. Thus, for education to contribute positively to economic growth there is need for increase in budgetary allocation to education subsector. Efforts made to control corruption and promote government effectiveness should be reviewed frequently to checkmate the processes of governance, so that bureaucratic processes would not hinder services from contributing significantly to economic growth.

Abbreviations

ARDL: Autoregressive distributed lag; NITEL: Nigeria Telecommunications Limited; VAR: Vector autoregressive; GDP: Gross domestic product; GFCF: Government fixed capital formation; LFPR: Labor force participation rate; CC: Control of corruption; GE: Government effectiveness; HLT: Health; EDU: Education; TRC: Transportation and communication.

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Authors' contributions

Both authors contributed to the completion of this article from conceptualization to the concluding remark. Hence, all authors have read and approved the manuscript.

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The data used for this research were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and World Governance Indicator database.

Competing interest

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Author details

¹ Department of Economics, Augustine University, Ilara-Epe, Lagos State, Nigeria. ² Department of Economics, Babcock University, Ilisan-Remo, Ogun State, Nigeria.

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