Indirect Taxes and Infrastructural Development in Nigeria: Evidence from ARDL Approach

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Abstract

Over the years, there is a growing concern in the trends of government revenue in Nigeria; this is not unconnected with the mono-cultural nature of the economy, where more than 90 per cent of the nation's revenue is from oil. Thus, the efforts of various governments to intensify their revenue profile by diversifying into various sectors of the economy. In addition, the amount of indirect tax revenue generated by the government has been a burning issue as to whether or not the tax revenue is enough to provide for the basic infrastructure in Nigeria, it is based on the contentious issues that this thesis sought to examine the effect of government indirect tax revenue on infrastructural development in Nigeria. This study adopted ex post facto research design. The data were obtained from certified sources such as the Central Bank of Nigeria (CBN) Statistical Bulletin and Federal Inland Revenue Service (FIRS) for the 1994Q1-2018Q4 totaling one hundred (100) observations. The documents were already exposed to the scrutiny of the appropriate regulatory agencies and the data were analyzed using descriptive and inferential statistics employing the Autoregressive Distributed Lag (ARDL) model approach to cointegration. The study also revealed that v LVAT, LEXDTS, inflation rate and exchange rate have significant effect on infrastructural development in Nigeria (Adj. R^2 = 0.83, α_1 = 0.930, t test = 3.451, p = <0.05, α_2 = 0.509, t test = 4.130, p = <0.05, α_3 = 0.464, t test = 2.468, p = <0.05, and α_4 = -0.655, t test = -9.488, p = <0.05). The study concluded that indirect tax revenue has impact on infrastructural development in Nigeria. It was recommended that policies be put in place to effectively re-position value added tax to continue enhance its effectiveness on infrastructural development in Nigeria and that the country border should be well protected so as to increase the revenue from customs and excise duties

Keywords*: Infrastructural development, Indirect tax, Value added tax, Custom and excise duties, Total tax revenue*

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Background to the Study

The mono-product nature of the Nigerian economy has posed a lot of problem to the Nigerian economy, amongst which is the creeping growth rate of the Nigerian GDP. This has made it impossible for Nigeria to attain its vision in the areas of overall development of its economy. The current running Nigerian national development plan is vision 2020 and this plan has not materialized in terms of achieving its objective as a result of over-dependence on crude oil and its inherent price and demand instability (Ukpabi, 2019). Infrastructure is basic essential services that should be put in place to enable development to occur. Economic development of Nigeria can be facilitated and accelerated by the presence of infrastructure. If these facilities and services are not in place, development will be very difficult and in fact can be likened to a very scarce commodity that can only be secured at a very high price and cost. The provision and development of infrastructures has been the subject of much theoretical analysis and empirical studies. (Edun, Akinde, Olaleye, & Idowu, 2013).

This poor state of infrastructure has now engaged the attention of many African governments, especially in attracting foreign investments, as the development of infrastructural facilities is one of the determinants of foreign direct investments inflow into any economy. Nigeria with her vision of becoming one of the top 20 big economies by the year 2020 needs to take seriously her infrastructural development, according to Remi Babalola (a former Minister of state finance), the country would need over $100b of her GDP in the next 5years to develop a new platform for her infrastructural development. Most of the current infrastructural facilities in Nigeria were developed during the second national development plan between (1970- 1974). (Edun, Akinde, Olaleye, & Idowu, 2013). Olaseni and Alade (2012) further posit that Nigeria is the most populous black nation on planet earth and sets a great vision to be among the top 20 economies in the world by 2020 with a minimum GDP of $900 billion and a per capita income of no less than $4000 per annum.

Nigeria and other African Countries are today facing series of challenges when it comes to optimizing taxation revenue from indirect taxes for economic and social growth while aiming to reach development targets and infrastructural developments. The most glaring difficult challenge is how to find the optimal balance between a tax regime that is business and investment friendly while at the same time leveraging enough revenue for public service delivery which in turn makes the economy more attractive to investors. (Olaseni & Alade, 2012). Ajiteru, Adaranijo, and Bakare. (2018) stated that the revenue profile of Nigeria in the 1970s was dominated by tax revenue. Such impressive contribution then has witnessed diminishing returns from 81.6 per cent in 1970, to 72 per cent, 53.5 per cent, 42 8 per cent and 42.3 per cent in 1980, 1990, 2000 and 2007 respectively. During this period, the contribution of tax revenue to GDP was never above 24 per cent in any year, with the lowest being 7.1 per cent in 1996 and the highest of 24 per cent in 1982. While this is so, direct taxation has remained the highest contributor to this basket hovering around 28.1 per cent and 85.9 per cent within the period. Petroleum profit tax formed the bulk of this revenue from direct taxation with the highest contribution of 94.7 per cent in 1974 because the oil sector became the mainstay of the Nigerian economy.

According to Okoror and Onatujeh (2018), oil has dominated Nigeria's revenue structure and its share in federally collected revenue rose from 26.3 per cent in 1970 to 81.8 per cent, 72.6 per cent and 76.3 per cent in 1979, 1989 and 1999, respectively. It has accounted for over 70 per cent of the revenue profile of Nigeria in the last two decades. Instead of transforming the existing revenue base, fiscal management has merely transited from one primary product-based revenue to another with attendant reduction of the contribution of taxation to total government revenue and thus, economic growth. This neglect of other sectors has exposed the economy to the vagaries of the international oil market. The bulk of Nigeria's economic problems emanate from this mono-economic nature. (Ajiteru, Adaranijo, & Bakare, 2018).

Literature Review
Theoretical Review
This section discuses theory relevant to this study and particularly, the Social Contract Theory is relevant to the study.

Social Contract Theory
This theory was said to have been postulated in the political philosophy of a renowned scholar, Thomas Hobbes. The social contract theory has since then been a scholarly discussed among scholars up to the contemporary period. The theory is both a theory of morality and at the same time theory of the state. The theory on the basis of morality and the government attempts to provide philosophical basis for the existence of the state and offers justification for political obligation. The theory regards the government in managing tax on behalf of the society who elected them as the product of a contract. It offers a rational framework for reconciling the imperatives of government authority with the rights and obligation of the masses.

Furthermore, the social contract theory says that Nigerian state and her resources should be administered on the basis of common shared principal of justice, the utilization of the revenue should be used judicious applied for the economic development of the masses. The theory, social contract theory has been defined as a sort of hypothetical or contractual arrangement between the society and the state. The theory draws some several philosophers, who had made some postulations, who include (Hobbes, 2005) each has argued and explained social contract theory in diverse manner. Hobbes (2005) opined that how the world and its society would look not be vivid and but bleak account without social contract, suggesting that social contract is important and plays a big role in moral actions.

Relevance of Social Contract Theory to This Study
The philosophies of social contract theory is relevant to this study as this calls for readiness and willingness of the leaders, who should make proper usage of tax revenue to better the lots of the society, and ensure adequate provision of basic needs, towards the economic growth of the economy. This should be the priority of the elected leaders rather than busily involved in mere politicking with the resources meant for use by the people, being wasted, diverted to private business. They should see their elected position to provide good durable and quality roads, reliable electricity supply, good salary system, qualitative education for the citizens. That the priority of leadership in service of humanity.

Empirical Review

Like all forms of taxes, VAT collected and distributed between Federal, State and local Governments are surest means of financing developmental infrastructures. Alavuotunki, Haapanen and Pirttilä, 2019; Ibadin and Oladipipo, 2016; Ihenyen and Ebipanipre, 2014; lzedonmi and Okunbor, 2014; Onaolapo, Fasina and Adegbite, 2014; Abdul-Rahman, Joshua and Ayorinde, 2013; Adereti, Adesina and Sanni (2011) are some of the studies that have reviewed the effect of valued added taxes on economic growth and infrastructural development in Nigeria.

Alavuotunki, Haapanen and Pirttilä (2019) and Sok-Gee, Zulkufly, and Mohd Zaini (2017) examined the impact of VAT on inequality, public spending and government revenue while Alavuotunki, Haapanen and Pirttilä (2019) reported that value added tax caused inequality in income based and there was no effect on consumption inequality, this result is in contrast to Sok-Gee, Zulkufly, and Mohd Zaini (2017) who noted that VAT enhanced government spending on economic growth and that government spending promotes economic growth as well as VAT system moderating can improve democratic and legislative strength of government.

Asaolu, Olabisi, Akinbode and Atebiosu (2018) examined the existing relationship between tax revenue heads and economic growth in Nigeria. The study covered 1994 to 2015 and secondary data was derived from Central Bank Bulletin and Annual Reports of Company. Tax revenue was proxied with value added tax, petroleum profit tax, company income tax, custom and excise duty while economic growth was proxied with Gross domestic product. The result revealed that Value Added Tax and Custom and Excise Duty had a significant relationship with economic growth while Company Income Tax showed a negative significant relationship and Petroleum Profit Tax had no significant relationship to growth, Ibadin and Oladipipo (2016) using the same parameters agreed that Custom and Excise Duty had a positive and significant effect on Nigerian economic development between 1981- 2014 and on Value Added Tax for the same period. Both studies asserted that revenue from taxation remains the life line of every economy including Nigeria and recommended the reorganisation of the Nigerian Tax System to reduce tax evasion and avoidance and proceeds from Tax must be used for infrastructural development. The studies noted that government should encourage honesty from the custom duty offices as corruption was prevalent in the sector and recommended further study in estimating the Custom duty tax gap as it will have a significant effect if it is closed in the economy.

Inyiama and Ubesie (2016) and Joseph, Ikechukwu and Amah (2016) focused their studies on custom duties and its contribution to tax revenue on the Nigeria Economy along with other indirect taxes, the results empirically revealed that Custom and Excise Duty and Value Added Tax significantly effect on the total tax collected in Nigeria for period ranging from 1994 to 2014 . Joseph, Ikechukwu & Amah (2016) revealed a positive significant relationship between Gross Domestic Product and Value Added Tax, also Custom and Excise Duty demonstrated a positive effect on the Gross Domestic Product. The study concluded that Value Added Tax and Custom and Excise Duty as indirect taxes contribute to economic growth in Nigeria. The

study recommended the government should take deliberate effort in ensuring prompt payment of taxes and tax loopholes should be estimated and closed while revenue generated from this source should be used to finance infrastructural projects.

Salami, Apelogun, Omidiya and Ojoye (2015) also empirically reviewed the impact of Petroleum Profit Tax, Company Income Tax, Value Added Tax and Custom and Excise Duty on the Nigerian economy for years 1976 to 2006 and noted that Custom and Excise Duty has a significant positive relationship with the economy , this position aligns with earlier studies but contracts the position of Ebiringa and Emeh (2012) who asserted that Custom and Excise Duty was negatively related to Gross Domestic Product and thus had no significant relationship to economic growth in Nigeria.

Ogundare (2016) examined an exploratory study of the Role of Taxation in Generating Adequate Revenue for Nigeria. The study concludes among others that more attention should be given to the taxation of informal sector especially the actualization of the Presumptive Tax Regime; and bring to the tax net most of the companies and individuals that are not yet paying taxes. Madugba, Michael and Kalu (2015) examined Corporate Tax and Revenue Generation: Evidence from Nigeria. The study tested the relationship between Petroleum Tax Income on Total Consolidated Revenue and the relationship between Companies Income Tax on Total Consolidated Revenue. Pearson correlation and simple regression was used to analyse the time series data collected from Central Bank of Nigeria Annual Statistical Bulletin from 1981 to 2014. The result of the correlation showed a positive significant relationship between Petroleum Tax Income and Total Consolidated Revenue. Also, it showed a positive significant relationship between Companies' Income Tax (CIT) and Total Consolidated Revenue. The regression result revealed a negative significant relationship between Petroleum Tax Income and Total Consolidated Revenue and Companies Income Tax and Total Consolidated Revenue. The study therefore recommends that federal government should reduce the tax incentives granted to petroleum companies in Nigeria as well as non-petroleum companies as this will increase the amount of tax revenue generated through corporate taxes in Nigeria. Also, the tax rate of non-petroleum companies should be increase as this will create room for more revenue from such source.

Okwori and Ochinyabo (2014) investigates A Log Linear Assessment of the Effect of Value Added Tax (VAT) on Revenue Generation in Nigeria. The study adopted simple regression model analysis using log linear data of Real Gross Domestic Product, Value Added Tax Revenue and Private Consumption Expenditure from 1994 to 2012. the study found a positive 0.186 tax elasticity and buoyancy which is desirable. This result shows that VAT is not only a viable taxation tool in Nigeria but also has great potential to generate adequate revenue for the Nigeria Government. But, government as an element of the package included numerous exemptions, generous concessions, and arbitrary waivers especially for unproductive ventures. This has greatly affected revenue base, leaving high annual budget deficits, and an extremely poor fiscal performance. This also has implications for proper VAT threshold which raises concerns of abuse and high cost, sharply leading to revenue losses and poor response of VAT to GDP growth. The study therefore recommends that there is a need to consider the technology of the tax collection.

Oseni (2014) investigates Multiple Taxation as a Bane of Business Development in Nigeria. The study examines the appropriateness of multiple taxes in developing nations like Nigeria. The study also used content analysis method to highlight challenges that are peculiar to Nigeriaand the study concludes that introducing taxes that are not backed by laws to the investors will lead to disinvestment. Izedonmi & Okunbor (2014) assessed the Roles of Value Added Tax in the Economic Growth of Nigeria. Time series data on the Gross Domestic Product (GDP), Value Added Taxes Revenue, Total Tax Revenue and Total (Federal Government) Revenue from 1994 to 2010 sourced from Central Bank of Nigeria (CBN) were analysed, using both simple regression analysis and descriptive statistical method. The study findings showed that VAT revenue accounts and total revenue account for as much as 92% significant variations in Gross Domestic Product (GDP). It further concludes that both economic variables fluctuated greatly over the period though VAT revenue was more stable, which means VAT is a veritable source of government revenue, and that government should concentrate more to block all the administrative loopholes affecting VAT collections in Nigeria.

Methodology

Following the review of the theoretical literature of the social contract theory of Hobbes, 2005; the specification for examining the impact of indirect tax revenue on infrastructural development in Nigeria is given as:

$$LINFDEV_t = \alpha_0 + \alpha_1 LVAT_t + \alpha_2 LEXDTS_t + \alpha_3 INFR_t + \alpha_4 LEXR_t + \varepsilon_t \quad (1)$$

Equation (1) is the long-run determinants of government infrastructural facilities. LINFDEV is the logarithm of infrastructural facilities measured as the total capital expenditure, LVAT is the logarithm of value added tax; LEXDTS is defined as the logarithm of custom and excise duties, INFR is the inflation rate and LEXR is the natural logarithm of the nominal exchange rate. Value added tax; custom and excise duties and exchange rate is expected to be positive. Thus the values for $\alpha_1, \alpha_2 \; and \; \alpha_4$ should be positive. The inflation rate is a measure of opportunity cost and the value of α_3 is expected to be negative and ε is the error term.

To distinguish the short-run effects of infrastructural development from their long-run effects, equation (2) is specified in an error–correction modeling form. Following Pesaran et al.'s (2001) bounds testing approach and rewrite (1) as follows:

$$\Delta LINFDEV_t = \alpha + \sum_{i=1}^{n1} \beta_i \Delta LINFDEV_{t-k} + \sum_{i=0}^{n2} \delta_i \Delta LVAT_{t-k} + \sum_{i=0}^{n3} \varphi_i \Delta LnLEXDTS_{t-k}$$
$$+ \sum_{i=0}^{n4} \omega_i \Delta INFR_{t-k} + \sum_{i=0}^{n5} \gamma_i \Delta LEXR_{t-k} + \rho_0 + \rho_1 LVAT_t + \rho_2 LEXDTS_t + \rho_3 INFR_t$$
$$+ \rho_4 LEXR_t + \mu_t (2)$$

To test for cointegration, the Pesaran et al. (2001) F-test for joint significance of the lagged level variables was used. Once cointegration is established, estimates of $\rho_1 - \rho_4$ normalized on ρ_0 will yield the long-run effects of all exogenous variables. The short-run effects are reflected by the estimates of coefficients attached to first-differenced variables. It should be

noted that equation (2) assumes that value added tax, custom and excise duties, inflation rate and exchange rate symmetric effects on infrastructural development in Nigeria

The data used to achieve the stated major and specific objectives were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the Federal Inland Revenue Service (FIRS) for the period covering 1994Q1-2018Q4 representing 100 observations.

Results
Descriptive Statistics
This presents the descriptive statistics presented in table 1, and they are the mean, median, maximum, minimum and standard deviations, Skewness, Kurtosis and Jacque-Bera.Quarterly data for twenty five years were used from 1994Q1-2018Q4 for Nigeria. The rationale behind the use of quarterly data is premised on the fact that for time series observation it is expected that the total number of observation should be greater than or equal to 30. Thus, variables for the study were interpolated using EVIEWS 10. The second rationale for using quarterly data was that the one of the regressor - value added tax data starts from 1994. In this section, the dependent variable infrastructure development is proxy with the natural logarithm of total capital expenditure of the government (LINFDEV), the independent variable is indirect taxes and they are the natural log of value added tax (LVAT) and the custom and excise duties (LEXDTS). The control variables are the logarithm of exchange rate (LEXR) and inflation rate (INFR).

Table 1: Descriptive Statistics

Variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob	Obs
LINFDEV	12.44	12.45	14.61	10.17	0.74	0.35	1.47	2.83	0.12	100
LEXDTS	13.03	13.28	16.16	5.45	1.69	-1.84	0.29	1.66	0.30	100
LVAT	10.74	10.75	11.78	7.64	0.81	-0.88	1.83	2.58	0.15	100
LEXR	4.62	4.87	5.75	2.38	0.84	-0.08	1.05	2.95	0.12	100
INFR	16.24	11.92	83.55	-0.75	15.47	0.97	1.59	1.45	0.48	100

Notes: Table 1 shows the mean, median, maximum, minimum, standard deviation, skewness, kurtosis and Jarque-Bera test for normality of the variables. The dependent variable is the natural logarithm of infrastructure development (LINFDEV). The independent variables are the logarithms of value added tax (LVAT) and the custom and excise duties (LEXDTS). The control variables are the logarithm of exchange rate (LEXR) and inflation rate (INFR) for the period 1994Q1-2018Q4in Nigeria. The estimation process was facilitated using Eviews 10.

Pearson Correlation
This sub-section discusses the degree of association between the variables of interest of the study. The correlation between logarithms of value added tax (LVAT) and custom and excise duties tax gap (LEXDTS), exchange rate (LEXR) and inflation rate (INFR) with the logarithm of infrastructural development (LINFDEV) for the period 1994Q1-2018Q4in Nigeria. The results in table 2 show that value added tax and custom and excise duties and

exchange rate have a positive association with infrastructural development, The implication of these results is that increases in value added tax and custom, excise duties and exchange rate will lead to increases in infrastructural development in Nigeria. In sharp contrast, there is evidence that inflation has a negative relation with infrastructural development; this implies increases in inflation rate will lead to decrease in infrastructural development in Nigeria

Table 2: Correlation Matrix for Tax Revenue and Gross Domestic Product

Variables	LINFDEV	LEXDTS	LVAT	LEXR	INFR
LINFDEV	1				
LEXDTS	**0.69**	1			
LVAT	**0.24**	**0.46**	1		
LEXR	**0.24**	**0.70**	**0.58**	1	
INFR	**-0.57**	**-0.86**	**-0.52**	**-0.52**	1

Notes: Table 2 shows the Pearson pair wise correlation matrix. The dependent variable is the natural logarithm of infrastructural development (LINFDEV) The independent variables are the logarithms of value added tax (LVAT) and the custom and excise duties (LEXDTS). The control variables are the logarithm of exchange rate (LEXR) and inflation rate (INFR) for the period 1994Q1-2018Q4 in Nigeria. The estimation process was facilitated using Eviews 10. The correlations are below the major diagonal and the bold coefficients denotes statistical significant at 1 and 5 per cent. The estimation process was facilitated using Eviews 10.**Result of the Stationary Test**

The time series properties of the variables were examined using the Augmented Dickey Fuller (ADF) and the Phillip-Perron unit root tests and the result is presented in Table 3. The results show that infrastructural development, custom and excise duties and exchange rate were stationary in their first differences, while inflation rate and value added tax were stationary at levels at 5 per cent level of significance. It should be noted that because of the different order of integration of the variables, the autoregressive distributed lag (ARDL) model approach to cointegration of Pesaran and Pesaran (2001) which allows for the of combination of levels and first difference stationary variables were used.

Table 3: Result of the Unit Root Test

Variables	ADF	PP	Remarks
LINFDEV	-2.896	-2.281	
ΔLINFDEV	-8.193***	-8.215***	I(1)
LEXDTS	-1.835	-2.383	
ΔLEXDTS	-3.826***	-6.030***	I(1)
LVAT	-2.282	-4.481***	I(0)
ΔLVAT	-4.923***	-8.468***	I(1)
LEXR	-2.233	-1.989	
ΔLEXR	-6.775***	-6.883***	I(1)
INFR	-4.552***	-4.452***	I(0)
ΔINFR	-4.347***	-4.662***	I(1)

Source: Researcher's Computation, (2020)

Notes: Table 3 presents the unit root test. The dependent variable is the natural logarithm of infrastructural development (LINFDEV The independent variables are the logarithms of value added tax (LVAT) and the custom and excise duties (LEXDTS). The control variables are the logarithm of exchange rate (LEXR) and inflation rate (INFR) for the period 1994Q1-2018Q4in Nigeria. The estimation process was facilitated using Eviews 10. The critical value at 5 for intercept and trend is -3.50 and for intercept alone is -2.93. ** and *** indicates significant at 5 and 1 per cent respectively.

Hypothesis Testing
Research Objective: determine the controlling effect of exchange rate and inflation on the effect of indirect tax revenue on Infrastructural development in Nigeria.

Research Question: What is the controlling effect of exchange rate and inflation on the effect of indirect tax revenue on Infrastructural development in Nigeria?

Research Hypothesis: Exchange rate and inflation does not have significant effects of indirect tax revenue on infrastructural Development in Nigeria.

Table 4: Full Information on the Effects of Indirect Tax Revenue on Infrastructural Development

Panel A: Long Run Estimates

Dependent Variable: LINFDEV				
Variable	Coefficient	S.E	t-stat	Prob
LVAT	0.930	0.269	3.451	0.001
LEXDTS	0.509	0.123	4.130	0.000
LEXR	0.464	0.188	2.468	0.030
INFR	-0.655	0.069	-9.488	0.000
C	7.114	7.449	0.955	0.342
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	1.284	0.175	7.340	0.000
D(LINFDEV(-1))	0.519	0.083	6.281	0.000
D(LINFDEV(-2))	0.184	0.083	2.227	0.029
D(LVAT)	0.146	0.043	3.369	0.001
D(LEXDTS)	0.132	0.033	4.030	0.000
D(LEXR)	0.031	0.014	2.171	0.033
D(INFR)	-0.041	0.012	-3.324	0.001
ECM(-1)	-0.151	0.021	-7.287	0.000
Panel C: Diagnostic Tests		**Statistic**	**Prob.**	
Bound Test		13.029	0.000	
Serial Correlation		0.960	0.388	
Heteroscedasticity		0.593	0.841	
Linearity Test		0.144	0.706	
Adjusted R-Square		0.831		
		CUSUM	CUSUMSQ	
Stability Test		Stable	Stable	
F-Statistics		238.482	0.000	

Notes: Table 4 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between indirect tax revenue and infrastructural development. The dependent variable is the logarithm of infrastructural development proxy with total government capital expenditure (LINFDEV), while the independent variables are the value added tax (LVAT) and custom and excise duties (LEXDTS) and the control variables are exchange rate (LEXR) and inflation rate (INFR).

Interpretation
Based on the estimated model in Table 4.6, the estimated equation is given as

$$LINFDEV_t = \alpha_0 + \alpha_1 LVAT_t + \alpha_2 LEXDTS_t + \alpha_3 INFR_t + \alpha_{4L} EXR_t + \varepsilon_t$$

$$LINFDEV_t = 7.114 + 0.930 LVAT_t + 0.509 LEXDTS_t - 0.655 INFR_t + 0.464 EXR_t$$

Bound Test
Using the bound test to ascertain the possibility of long-run relationship, the results show that the bound test statistics of 13.029 is statistically significant at 5 per cent level. This is because the statistics of 6.035 is greater that the critical values of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables there are possibility of a long-run cointegrating relationship. Based on the possibility of a long-run relationship between indirect tax revenue and infrastructural development, the study then estimate the long-run and the short-run elasticity. The empirical results for the model for the effects of indirect tax revenue and infrastructural development, in the short and long run are reported in Table 4.

The Long-Run Dynamics
The estimated long-run coefficients (elasticities) for the UECM model are given in the tables Panel A of Tables 4. In the long run, there is evidence that value added tax, custom and excise duties and exchange rate have positive relationship with infrastructural development, while inflation rate has a negative relation with infrastructural development. This implies that increases in value added tax, custom and excise duties and exchange rate will lead to increase in the infrastructural development in Nigeria, while increases in inflation rate will lead to a decrease in infrastructural development. Furthermore, there is evidence of a long-run significant relationship that value added tax and custom and excise duties, exchange rate and inflation rate with infrastructural development in Nigeria (LVAT = 0.930, t-test= 3.451, $\rho<0.05$, LEXDTS= 0.509, t-test= 4.130, $\rho<0.05$; LEXR = 0.464, t-test =2.468 $\rho<0.05$ and INFR = -0.655, t-test= -9.488, $\rho<0.05$). This implies that value added tax and custom and excise duties, exchange rate and inflation rate are significant factors influencing changes in with infrastructural development in Nigeria. Studies in conformity with this study includes but not limited to Adereti, Sanni and Adesina (2011), Nwosu and Okafor (20l4), Ezu and Okoh (2016), Worlu and Emeka (2012). Okafor (2012), Ebiringa and Emeh (2012), Asaolu, Olabisi, Akinbode & Alebiosu (2018), Ibadin & Oladipipo (2016), Inyiama & Ubesie (2016), and Joseph, Ikechukwu & Amah (2016).

To test the research hypothesis of the study, the F-statistics of 238.482 was used and it is statistically significant at 5 per cent level, thus on the overall, the null hypotheses that exchange rate and inflation does not have significant effects of indirect tax revenue on infrastructural

development in Nigeria was rejected and accept the alternative hypothesis that exchange rate and inflation have significant effects of indirect tax revenue on infrastructural development in Nigeria.

Also, a 1 per cent increase in value added tax, custom and excise duties and exchange rate will lead to 0.930, 0.509 and 0.464 per cent increase in infrastructural development in Nigeria respectively in the long run; while a 1 per cent increase in inflation rate will lead to a decrease of 0.655 in infrastructural development in Nigeria.

Short-run Dynamics
The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

The result shows that in the short-run only value added tax, custom and excise duties, exchange rate and inflation rate have significant relationship with infrastructural development. In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of Table 4 is negative and statistically significant (ECM= -0.151, t-test = -7.287, p<0.05). This implies that deviations from infrastructural development' equilibrium path are corrected by nearly 15 per cent over the following quarter. In other words, the adjustment process is relatively okay in Nigeria. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between indirect tax revenue and infrastructural development in Nigeria.

The Adjusted R-square is 0.83; this implies that value added tax, custom and excise duties exchange rate and inflation rate explains about 83 per cent changes in infrastructural development, while the remaining 17 per cent were other factors affecting changes in infrastructural development but were not captured in the model.

Post-Estimation test
For the validity and reliability of the parameter estimates and to be able to draw valid conclusions based on the results, five types of residual test and conducted. First, is the serial correlation test which is used to test for the possibility of the error term being uncorrelated? Second is to check if the finite variances of the error terms are equal. This assumption is referred to as the homoscedasticity. A violation of this assumption is referred to as heteroscedasticity. Third, is the normality test, which is a test for the degree of asymmetry and flatness and peakness of the distribution, a non-significance of the Jarque-Bera test implies normality. Fourth, is the linearity test, which is used to test if the model is linearly specified, the non-significance of the Ramsey RESET test implies the model is linear specified. Fifth, is the stability test, where the CUSUM and CUSUMSQ are used. For the stability of the estimated model, the plot of CUSUM and CUSUMSQ statistic must stay within a 5% significance level portrayed by two straight lines.

The results revealed that the successive error terms are not serially correlated because the probability value of F-statistic of 0.960 is not significant. is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated model for indirect tax revenue and infrastructural developmentin Nigeria. Also the heteroscedasticity results show that the statistic of 0.593 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus there is evidence that the covariance of the error terms has a constant finite variance.

In addition, the Ramsey Reset Test, F-statistics of 0.144 is not significant the model is correctly specified and that there is a linear relationship between indirect tax revenue and infrastructural development in Nigeria. Also, the CUSUM and the CUSUMSQ reported in Panel C, show that that the estimated model is stable; because the plot of CUSUM and CUSUMSQ statistic stays within a 5% significance level portrayed by two straight lines.
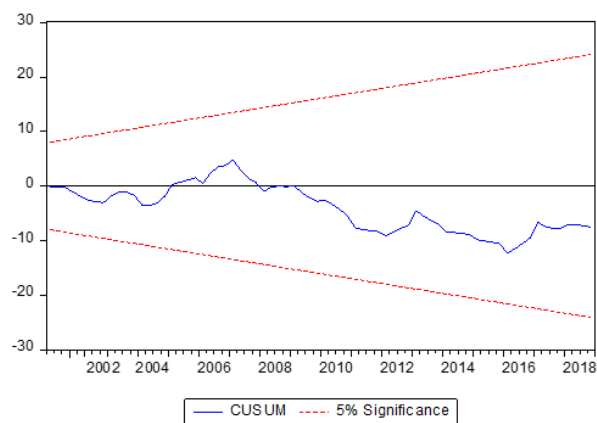

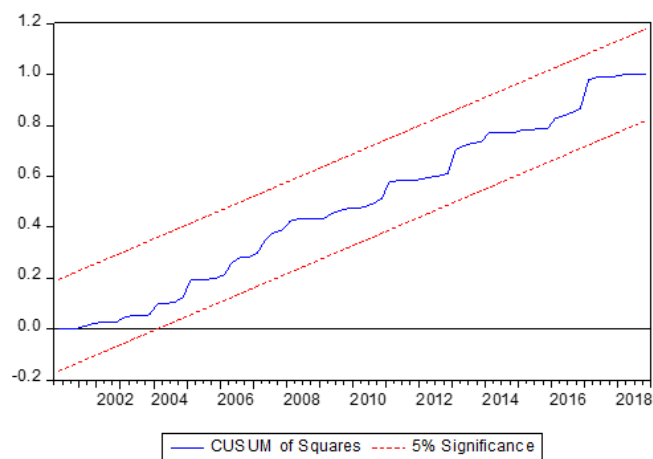**Figure 1:** Stability Test - Plots of Cumulative Sum of Residual

Figure 2: Stability Test - Plots of Cumulative Sum of Square Residual

Conclusion and Recommendation

The study examined the effect of indirect tax revenue and infrastructural development in Nigeria for the period 1994Q1-2018Q4. The preliminary test such as the correlation coefficient and the unit root test were used. The Pearson correlation coefficient results showed that value added tax, custom and excise duties and exchange rate have a positive association with infrastructural development, while inflation has a negative relation with infrastructural development. The condition for examining the long-run cointegrating relationship is that the series must be stationary. Using a battery of unit root test, the ADF and the PP test, the results revealed that the series were stationary at level and in their first differences. Owing to the different order of integration of the series, the Autoregressive distributed Lag (ARDL) model was used to examine if there is a short run and long run cointegrating relationship. The results shows that in the long run, there is evidence that positive significant relationship for value added tax, custom and excise duties and exchange rate with infrastructural development, while inflation rate has a negative significant relation with infrastructural development. Thus, there is evidence of a long-run significant relationship that value added tax and custom and excise duties, exchange rate and inflation rate with infrastructural development in Nigeria.

The study recommends that policies should be put in place to effectively re-position Value Added Tax to continue enhance its effectiveness on infrastructural development in Nigeria. In the light of the recent Finance Act 2019, where the value added tax increased from 5 per cent to 7.5 per cent government should ensure effective tax policy, law and administration that will translate into more infrastructural development. Also, the country border should be well protected so as to increase the revenue from customs and excise duties, and as such proliferation of sub-standard and adulterated goods should be banned in the Nigeria territories through proper enforcement and investigation. The government should intensify efforts in its revenue drive.

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