

THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Impact of Non-oil tax structure on Economic Growth in Nigeria: Further Evidence from ARDL

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Abstract:

This study seeks to determine how economic growth rate responds to changes in non-oil tax revenue in Nigeria using the ARDL framework. The study also considers the impact of the recent economic rebasing on real GDP growth rate. The study is based on quarterly data and covers the period from 1981Q1 to 2017Q3. The study specifies growth rate in real GDP to depend on previous growth rate, company income tax, value added tax, custom and excise duties and personal income tax, all as a ratio of total government revenue. A dummy variable is also included in the specification to capture the effect of economic rebasing on real GDP growth rate. The results show that the impact of previous growth rate on real GDP is not significant. However, there is evidence the recent economic rebasing exercise has a large positive impact on the real GDP growth rate. Further, there is evidence that non-oil tax revenue has no distributive lag effects on economic growth. While the growth rate is positively related to value added tax and personal income tax, it has a negative relationship with company income tax and custom and excise duties. However, only the effect of custom and excise duties is significant at 5% level. We, therefore, argues that a reduction in custom and excise duties is a good strategy for economic growth in Nigeria.

Keywords: Economic growth, Non-oil tax revenue, ARDL

1. Introduction

It is a universal truth that individuals, organizations and governments which do not earn sufficient revenue will not have any chance of economic survival. Revenue in the context of this research is the monetary income received by individuals, firms and governments from identified sources. It is a major factor of economic sustenance available to mankind. It is also incontestable that tax is the main source of government revenue all over the world. Tax is a compulsory transfer of private sector resources to government, which is mainly used to provide public goods for the wellbeing of the citizens. Individuals and corporate citizens who engage in economic activities are legally required to transfer a fraction of their current earnings to the government as tax without expecting any direct benefit from the government.

The specific reasons for tax collection by government, as posited by Ironkwe and Nnaji (2017), are for the financing of general administration, internal/external defense including maintenance of law and order, minimizing disparities in income distribution, controlling of harmful and non-essential goods, influencing of public purchasing power, servicing of national debts, subsidy implementations as well as providing critical public infrastructure such as power, roads, bridges, rail and ports. National Tax Policy (2013) defined tax as a financial charge or levy imposed on an individual or legal entity by a State. Also, taxes are compulsory levies imposed on individuals and corporate bodies for the purpose of generating revenue by the government (Bhartia, 2008; Dwivedi, 2008; Ijeh, 2008; Jhingan, 2011; Musgrave & Musgrave, 2004).

Further, for any society to develop and grow, it is necessary to provide basic infrastructure (Fagbemi & Noah, 2010). This is also the main reason why governments look for alternative means of raising funds and revenue generation. Governments also need money to implement its social programmes and provide public goods which includes infrastructural development. Murkur (2001) asserts that meeting the various societal needs require huge investments on the part of the government and the most reliable of source of funding such investments are taxation.

Governments at all levels in Nigeria have in the last four decades depended heavily on revenue and taxes from petroleum industry with minimal attention to revenue and taxes from other sectors. According to data from Central Bank of Nigeria's Statistical Bulletin 2016, between 1981 and 2016 the total revenue collected by federal government of Nigeria amounted to ₦108.14 trillion out of which ₦79.60 trillion or 74% came from oil while ₦28.54 trillion or 26% came from non-oil sources. Despite the lopsided income stream, the obvious reality in the global oil trade is that it is not market driven due to the fact that both the pricing and supplies of the commodity are subject to the manipulations of Organisation of Petroleum Exporting Countries (OPEC) in the midst of other international trade politics.

To have an insight into the research are some empirical works in Nigeria. For example, Jones, Ihendinihu and Nwaiwu (2015) found that total revenue has a long and short run equilibrium relationship with economic growth in

Nigeria. Also, Inyama and Ubesie (2016) found that the non-oil tax revenue affect Nigeria's economic growth. However, these studies are based on annual data and fail to incorporate the effect of rebasing activities of the previous administration on economic growth.

This study seeks to determine how economic growth rate responds to changes in non-oil tax revenue in Nigeria using the ARDL framework. The study also considers the impact of the recent economic rebasing on real GDP growth rate. The study is based on quarterly data and covers the period from 1981Q1 to 2017Q3, hence, it is the most recent Nigerian study on tax-growth relationship.

The remaining part of this paper has the following structure: Section 2 reviews some empirical literature on the subject matter, section 3 describes the methodology, section 4 contains empirical results and section 5 concludes the study.

2. Literature Review

The study by Engen and Skinner (1996) seeks to examine whether a major tax reform in US affected its long-term growth rates. Three approaches were used. First, the study uses historical data to examine the impact of tax cuts on economic growth. Second, the study evaluates the evidence on tax-growth relationship for a large sample of countries. Third, the study considers the evidence obtained from studies on labour supply, investment demand and growth in productivity based on micro-level data. The results show that a major tax reform, in which marginal and average tax rates change by 0.2% and 0.3% causes about 0.2% to 0.3% change in growth rate. The authors, however, argue that even these marginal effects can have substantial effect on living standards.

In Zealand, Branson and Lovell (2001) examine the combined effects of tax mix and tax burden on the rate of growth of real GDP from 1946 to 1995. They find that the real GDP increase of almost 17% can be achieved if the tax structure comprises a mean time varying tax burden of 22.5% and a mean time-varying tax mix of 0.54. This growth in real GDP would also be associated with a 6% decrease in tax revenue to the Government and a 27% increase in purchasing power of the remainder of the National economy.

Tosun and Abizadeh (2005) use 480 panel data observations from 24 OECD countries to consider the empirical link between tax structure and economic growth for the period from 1980 to 1999. They find that per capita GDP has a significant impact on tax structure, and that economic growth affects different tax variables differently in OECD countries. Specifically, while the shares of personal and property taxes are affected positively, shares of the payroll and goods and services are affected negatively.

In South Africa, Koch, Schoeman and Van Tonder (2005) use tax and economic data from 1960 to 2002 to study the relationship between total taxation, the mix of taxation and economic growth in South Africa. Two-stage modelling procedure is used to control for the unobserved business cycle factors. They find that decrease in tax burden is strongly correlated with increase in economic growth, and in disagreement with most empirical studies, decrease in indirect tax relative to direct tax is strongly associated with increase in economic growth potential.

Angelopoulos, Economides and Kammass (2007) use a panel data for 23 OECD countries to examine the government expenditure structure and the associated tax burden between 1970 and 2000. They find evidence of a positive relationship between share of productive government expenditure and economic growth, and that different tax rates have different impacts on economic growth.

In a panel study of 21 OECD countries over 34 years, Arnold, Brys, Heady, Johansson, Schwellnus and Vartia (2011) consider empirically whether tax policy can be used to enhance economic growth using micro-level firm and industry data. The results show that shifting the tax base from income to consumption and immovable property can enhance economic growth. Specifically, the results suggest that reduction of income taxes and increase in consumption taxes are good policies for economic growth.

Xing (2011) uses a cross-country data for 17 OECD countries from 1970 to 2004 to examine whether revenue-neutral tax structure changes can affect the long-run level of per capita income. The results based on the pooled mean group analysis suggest that moving the tax revenue base towards property tax has a positive long run effect on income per capita. However, the results fail to support the popular view that personal income tax has more growth effect than company income tax.

Ojong, Anthony and Arikpo (2016) examine the effects of petroleum profit tax, company income tax and non-oil revenue on the Nigeria economy using annual data from 1986 to 2010. They find evidence indicating that non-oil revenue has a positive effect on the Nigerian economy but the effects of both petroleum profit tax and company income tax are statistically insignificant.

More recently, Likita, Idisi and Mavenke (2018) examine the effect of non-oil revenue on economic growth in Nigeria using annual data from 1981 to 2016. The results suggest evidence of a long-run relationship between non-oil revenue variables and economic growth in Nigeria. However, individually, while company income tax, amongst others, shows a negative and significant effect on economic growth, there is no evidence of any significant effect of custom and excise duties.

3. Methodology

3.1. Data

To examine the relationship between non-oil tax revenue and economic growth in Nigeria, we use quarterly data covering the period from 1981Q1 and 2017Q3. Economic growth is measured by the growth rate in real gross domestic product while non-oil tax revenue is measured by company income tax, personal income tax, custom and excise duties and value added tax. However, because value added tax was introduced in Nigeria in 1994, its series covers from 1995Q1 to 2017Q4, giving a total of 92 observations. All non-oil tax revenue variables are expressed as a ratio of total government

revenue. Further, the growth rate in real GDP data are officially reported at quarterly frequency while non-oil revenue data are mostly reported at yearly frequency. Thus, all annual data are converted into quarterly series via the EViews' data frequency conversion window. The Central Bank of Nigeria databank is the source of data collection while EViews version 9.5 student version is used for data analysis.

Figure 1 shows the time series plot of real GDP growth rate. One striking feature of this figure is the sudden jump or structural break in 2010Q1, which is due to the economic rebasing that took effect from that quarter. Since this structural break is large, it is worthwhile to incorporate its effect in our empirical model.

Figure 2 shows the time series plot of non-oil tax revenue variables. From this figure, while both company income tax and value added tax showed an upward trend, custom and excise duties showed a downward trend and personal income tax showed no clear direction.

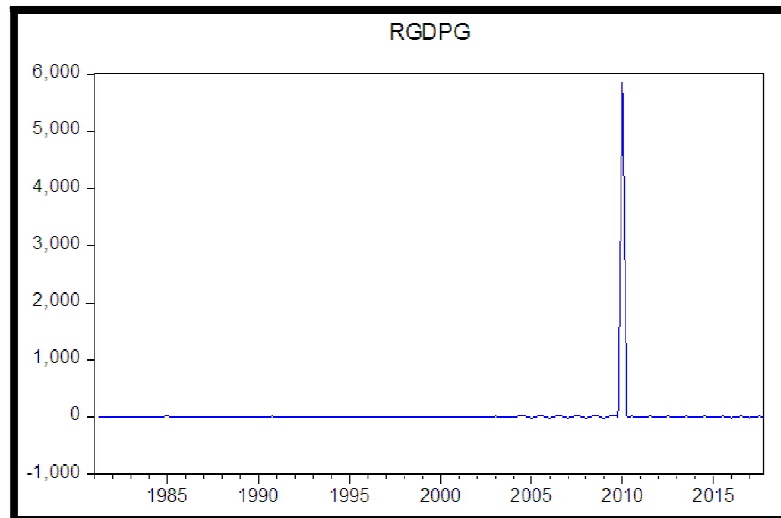


Figure 1: Real GDP Growth Rate

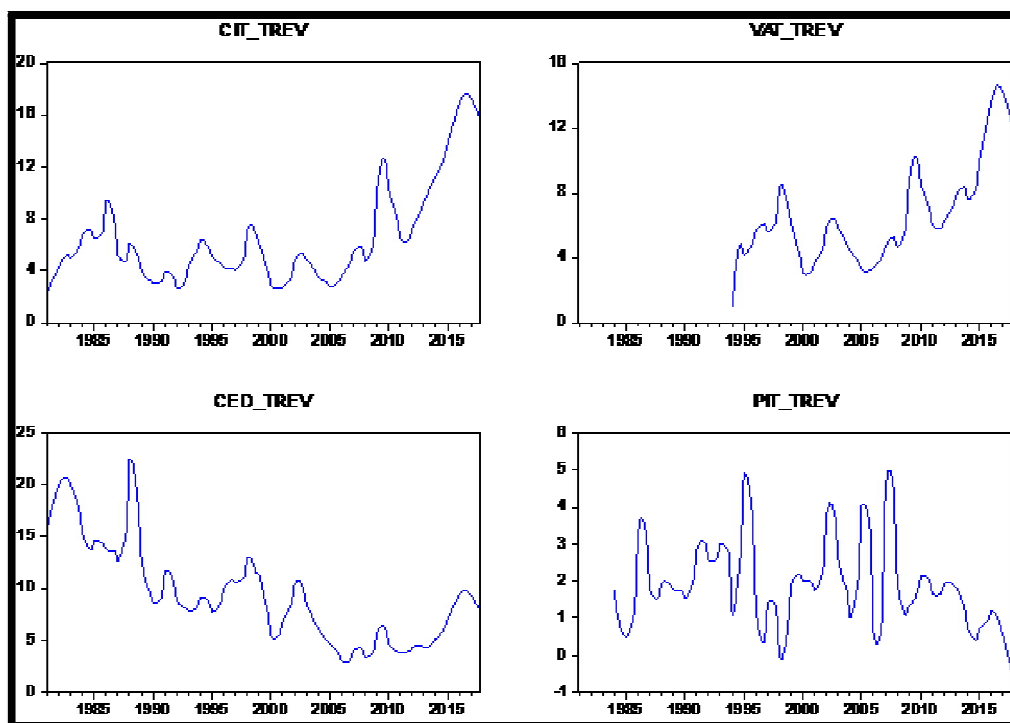


Figure 2: Non-Tax Oil Revenue Series

3.2. Empirical Framework

We employ the autoregressive distributive lag (ARDL) framework for empirical analysis. As it is well known, the ARDL framework allows for a dynamic specification of the relationships between the study variables, which is also consistent with most macroeconomic and financial time series data. The functional specification of the relationship between non-oil tax revenue variables and economic growth is given by:

$$RGDPG = f\left(\frac{CIT}{TREV}, \frac{VAT}{TREV}, \frac{CED}{TREV}, \frac{PIT}{TREV}\right)$$

Where;

RGDPG = Growth rate in real GDP

$\frac{CIT}{TREV}$ = The ratio of company income tax to total government revenue

$\frac{VAT}{TREV}$ = The ratio of value added tax to total government revenue

$\frac{CED}{TREV}$ = The ratio of custom and excise duties to total government revenue

$\frac{PIT}{TREV}$ = the ratio of personal income tax to total government revenue

The econometric parameterization of the above functional model is given as follows:

$$RGDPG_t = \beta_0 + \beta_1 RGDPG_{t-1} + \beta_2 \frac{CIT}{TREV_t} + \beta_3 \frac{CIT}{TREV_{t-1}} + \beta_4 \frac{VAT}{TREV_t} + \beta_5 \frac{VAT}{TREV_{t-1}} + \beta_6 \frac{CED}{TREV_t} + \beta_7 \frac{CED}{TREV_{t-1}} + \beta_8 PIT_t + \beta_9 \frac{PIT}{TREV_{t-1}} + \beta_{10} DREBASE + u_t \quad (2)$$

where u_t is the classical error disturbance term, β_0 is the regression intercept that captures the long-term average value of the dependent variable when a zero restriction is imposed on all the explanatory variables, $\beta_1, \beta_2, \dots, \beta_{10}$ are the slope parameters that capture the various effects of the explanatory variables. However, because economic growth is autoregressive, β_1 captures own effect on real GDP while β_2 and $\beta_2 + \beta_3$ respectively capture the short run and intermediate or long run effect of company income tax. Similarly, the short run and intermediate effect of value added tax are captured in β_4 and $\beta_4 + \beta_5$ respectively while the short run and intermediate effect of custom and excise duties are captured in β_6 and $\beta_6 + \beta_7$ respectively. Also, while the short run effect of personal income tax is captured in β_8 , its intermediate effect is captured in $\beta_8 + \beta_9$. We also include an economic rebasing dummy variable, DREBASE in the model so that β_{10} captures the effect of economic rebasing which took effect in the first quarter of 2010. Specifically, DREBASE = 1 for 2010Q1 observation or 0 for other observations.

Further, our model is a simple ARDL specification that includes only one lagged value of the dependent variable and each of the explanatory variables as additional right-hand side variables. However, like other time series models with dynamic regressors, the appropriate lag length in our ARDL model would be determined based on Schwarz information criterion.

To avoid the autocorrelation and heteroskedasticity problems, the Newey-West HAC standard errors and covariance are used. These standard errors are robust even in the presence of autocorrelation and heteroskedasticity in the model (Brooks, 2008).

4 Empirical Analysis and Results

4.1. ADF Unit Root Tests

Table 1 shows the ADF unit root tests for RGDPG, $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$. The unit root test is conducted on both the level data and the first difference data, and the popular Schwarz information criterion (SIC) is employed for optimum lag selection. Column A presents the variables, column B presents the level data test, column C presents the first difference test and column D presents the order of integration.

ADFTau-statistic (p-value)			
A	B	C	D
Variable	@Level	@First difference	Integration
LRGDP	-12.0218 (0.0000)	-	I(0)
$\frac{CIT}{TREV}$	-1.6935 (0.7493)	-5.0099 (0.0003)	I(1)
$\frac{VAT}{TREV}$	-2.8550 (0.1820)	-5.3953 (0.0001)	I(1)
$\frac{CED}{TREV}$	-2.4895 (0.1202)	-4.8100 (0.0001)	I(1)
$\frac{PIT}{TREV}$	-2.2563 (0.4542)	-4.9502 (0.0005)	I(1)

Table 1: ADF Unit Root Tests for RGDPG, $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$
Source: E Views ADF Test Output

From column B of table 1, the ADF tau-statistic is associated with a zero p-value for RGDPG, indicating that the test is highly significant. Thus, the hypothesis that RGDPG has a unit root is strongly rejected. By contrast, the ADF tau-statistic is associated with a very high p-value for $\frac{CIT}{TREV}$ (p-value = 0.7493), $\frac{VAT}{TREV}$ (p-value = 0.1820), $\frac{CED}{TREV}$ (p-value = 0.1202) and $\frac{PIT}{TREV}$ (p-value = 0.4542), indicating that the test is insignificant in each case. Thus, the hypothesis of unit root is not rejected for those series. From column C, the ADF tau-statistic is associated with almost a zero p-value for $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$.

hence, strongly rejecting the unit root null hypothesis. Therefore, $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$ all are stationary at first difference. All things considered, while RGDPG is integrated at order zero or I(0), $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$ all are integrated at order 1 or I(1). Thus, the use of ARDL model for empirical analysis has been justified

4.2. ARDL Estimation Results

Table 2 presents the correlation matrix for $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$, which helps to examine intercorrelation between the tax revenue variables. Figure 2 shows the model selection based on Schwarz information criterion, which elects the model that minimizes its value. The ARDL estimation results are presented in table 3. The estimation is also based on Newey-West standard errors which are robust to both heteroskedasticity and autocorrelation. Table 4 presents the model fit statistics.

Correlation	$\frac{CIT}{TREV}$	$\frac{VAT}{TREV}$	$\frac{CED}{TREV}$	$\frac{PIT}{TREV}$
$\frac{CIT}{TREV}$	1.0000			
$\frac{VAT}{TREV}$	0.9454 (0.0000)	1.0000		
$\frac{CED}{TREV}$	0.1306 (0.2046)	0.2829 (0.0052)	1.0000	
$\frac{PIT}{TREV}$	-0.4298 (0.0000)	-0.4316 (0.0000)	-0.1725 (0.0927)	1.0000

Table 2: Correlation matrix for $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$; p-value in bracket
Source: EViews output

Variable	Beta	p-value
RGDPG(-1)	4.42E-07	0.9973
$\frac{CIT}{TREV}$	-0.185454	0.4416
$\frac{VAT}{TREV}$	0.354365	0.2612
$\frac{CED}{TREV}$	-0.339012	0.0178
$\frac{PIT}{TREV}$	0.018037	0.9831
DREBASE	5872.353	0.0000
Constant	3.092646	0.3328

Table 3: ARDL Estimation Results (DV = RGDPG)
Source: Eviews Output

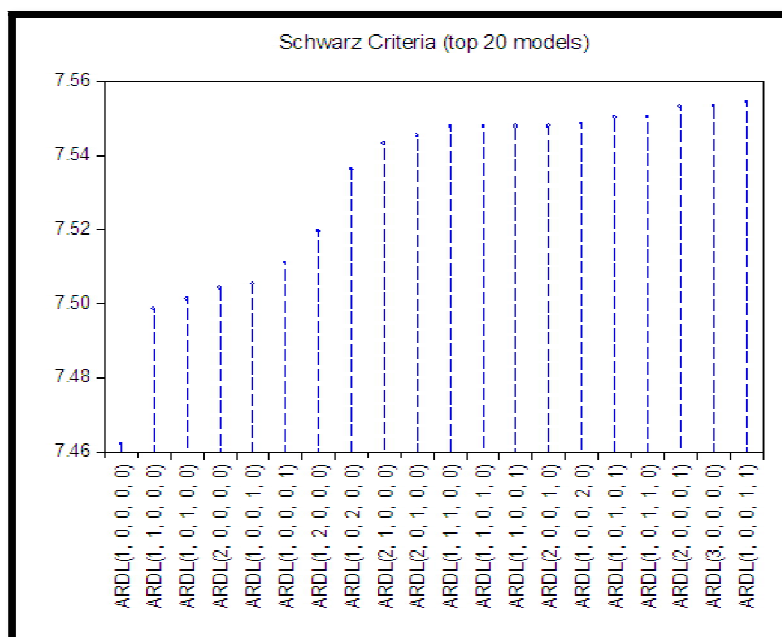


Figure 3: ARDL Model Selection

Statistic	Value
R-squared	0.999805
Adjusted R-squared	0.999792
F-statistic	76122.40
Prob(F-statistic)	0.000000
Durbin-Watson stat	2.048864

Table 4: Model Fit Statistics

Source: E views Output

From table 2, the correlation coefficient of 0.9454 indicates that there is a strong positive correlation between $\frac{CIT}{TREV}$ and $\frac{VAT}{TREV}$. The correlation coefficients of 0.1306 and 0.2829 indicate that there is also a positive but weak correlation between $\frac{CIT}{TREV}$ and $\frac{CED}{TREV}$ and between $\frac{CED}{TREV}$ and $\frac{VAT}{TREV}$. However, the correlation coefficients of -0.4298 and -0.4316 indicate that there is a moderate negative correlation between $\frac{CIT}{TREV}$ and $\frac{PIT}{TREV}$ and between $\frac{PIT}{TREV}$ and $\frac{VAT}{TREV}$, while the correlation coefficient of -0.1725 indicates that there is a weak negative correlation between $\frac{PIT}{TREV}$ and $\frac{CED}{TREV}$. These results imply that although, the explanatory variables all have a common denominator (TREV), they are, however, not perfectly correlated. Thus, there is no evidence of multicollinearity in our empirical model.

From figure 3, the minimum value of SIC is 7.4762 and the corresponding ARDL model is ARDL(1,0,0,0). Thus, a model with one lagged value of RGDPG as additional regressor is the optimum description of the relationship between growth rate in real GDP and the tax revenue variables. This implies that while the real GDP growth rate is autoregressive, its relationship with $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$, $\frac{CED}{TREV}$ and $\frac{PIT}{TREV}$ is only contemporaneous. In other words, the effect of non-oil tax revenue on real GDP growth rate is not lagged or does not extend to the next period or quarter.

From table 3, the beta on RGDPG ($\beta = 4.42E-07$, p-value = 0.9973) is positive but insignificant, indicating that real GDP growth is a positive but insignificant function of its own one period lagged value. The beta on DREBASE is 5872.35 with a zero probability (p-value = 0.0000), indicating the observed structural break in real GDP growth rate has a large positive impact on the growth series. Thus, the rebasing exercise that took effect from 2010Q1 positively and significantly affected economic growth, measured by growth rate in real GDP. The constant term of 3.0926, with a p-value of 0.3328 indicates that in the absence of the main explanatory variables, quarterly growth rate in real GDP does not depend on its own long run average or any other factor.

Also, from table 3, the coefficients of -0.1854 and -0.3390 indicate that RGDPG is negatively related to both $\frac{CIT}{TREV}$ and $\frac{CED}{TREV}$, while the coefficients of 0.3543 and 0.0180 indicate that $\frac{VAT}{TREV}$ and $\frac{PIT}{TREV}$ both have positive relationship with RGDPG. However, while the p-value of 0.0178 indicate that the effect of $\frac{CED}{TREV}$ is significant at 5% level, the p-values of 0.4416, 0.2612 and 0.9831 indicate that the effects of $\frac{CIT}{TREV}$, $\frac{VAT}{TREV}$ and $\frac{PIT}{TREV}$ all are insignificant at all conventional levels.

From table 4, we can see that the estimated ARDL model for RGDPG is very well fitted, with the Adjusted R-square (0.9997) being almost one and the F-statistic (p-value = 0.0000) being highly significant. This shows that the estimated model captures most of the observed variation in growth rate in real GDP. The results of the fitted ARDL model for RGDPG are also not spurious as the non-spurious condition ($R^2 = 0.999 < DW = 2.048$) for time series analysis is met (see Granger and Newbold (1974)). Also, as stated earlier, our estimation is based on Newey-West HAC standard errors, so our results are robust to both heteroskedasticity and autocorrelation. Therefore, there is no specification problem for the estimated ARDL model.

5. Conclusions

This study seeks to determine how economic growth rate responds to changes in non-oil tax revenue in Nigeria using the ARDL framework. The study also considers the impact of the recent economic rebasing on real GDP growth rate. The study is based on quarterly data and covers the period from 1981Q1 to 2017Q3. The study specifies growth rate in real GDP to depend on previous growth rate, company income tax, value added tax, custom and excise duties and personal income tax, all as a ratio of total government revenue. A dummy variable is also included in the specification to capture the effect of economic rebasing on real GDP growth rate.

The results show that the impact of previous growth rate on real GDP is not significant. However, there is evidence that the recent economic rebasing exercise has a large positive impact on the real GDP growth rate. Further, the results show that the relationship between non-oil tax revenue and economic growth has no lagged effects. While the growth rate is positively related to value added tax and personal income tax, it has a negative relationship with company income tax and custom and excise duties. However, only the effect of custom and excise duties is significant at 5% level. The results contradict, amongst others, the recent findings of Likita, Idisi and Mavekenke (2018) that custom and excise duties have no significant effect on economic growth. The study, therefore, argues that a reduction in custom and excise duties is a good strategy for economic growth in Nigeria.

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