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Application of Autoregressive Distributed Lag Model to Evaluate the Effect of Government Expenditure and Revenue on Nigeria Gross Domestic Products

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ABSTRACT

Gross Domestic Product (GDP) is a monetary metric that measures the market value of all final goods and services produced within a country or group of countries over a specific time period. GDP is commonly used by governments to assess a nation's economic health. This study analyzed the impact of government expenditures (capital and recurrent) and revenues from company income tax, value-added tax (VAT), and petroleum profit tax on Nigeria's GDP. It also provided recommendations for fostering economic growth amid current economic challenges. The research employed the Autoregressive Distributed Lag (ARDL) modeling technique to evaluate the short-run dynamics and long-run relationships affecting Nigeria's economic growth over the period 1982–2022, using annual secondary data sourced from the World Bank's development indicators report (last updated January 2019). Key methods included the Augmented Dickey-Fuller (ADF) test to assess the stationarity of variables, the ARDL Bound test to identify cointegrating relationships, and the Breusch-Godfrey Serial Correlation test to check for serial correlation. The empirical findings from the ARDL error correction model indicated a significant long-run relationship between recurrent expenditures, revenues from VAT, and petroleum profit tax on Nigeria's real GDP. The negative coefficient of the error correction term (Coint Eq(-1)* = -0.323717, p-value = 0.0129) confirmed a long-term co-integrating relationship among the variables with a substantial impact on GDP. The Breusch-Godfrey test results (p-value = 0.9300) revealed no serial correlation in the selected ARDL (4) model. Additionally, the upward trend observed in Figure 4.1 highlighted growth within the study period. The study recommended strengthening policy frameworks to ensure efficient management and oversight of revenue from company income tax, VAT, and petroleum profit tax. It also emphasized the need for greater control over recurrent expenditures, given their significant impact on Nigeria's GDP. Future research was advised to utilize quarterly or monthly data with ARDL modeling as more granular data becomes available.

Keywords: Autoregressive, Lag Model, Government Expenditure, Revenue, Nigeria

INTRODUCTION

The ultimate goal of different measures of economic growth is to provide a report card for government to see how their economy is doing and measure economic performance at the instance or over time. Real gross domestic product per capita (RGDPPC) as one of the measures for economic growth is defined as the average of individual incomes in the economy adjusted for inflation i.e. taking real gross domestic product (GDP) and dividing it by the population (Jim, 2019). The relationship between economic growth and macroeconomic variables (determinants) has long been a trendy issue of discussions in the literature of economic development (Nihat, *et al*., 2013). Research on economic growth being undertaken in both theoretical and applied work, focuses on macroeconomic policies to achieve stable prices (low inflation), low levels of debt (both foreign and

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domestic), free market economy, low rate of unemployment and an open economy (Mbulawa, 2015).

The real sector of Nigeria economy has arguably been the engine of the country economic transformation over the years. Importantly, the sector has metamorphosed into an emerging industrial workhorse from a hitherto rudimentary agrarian economy that can hardly be ignored. A plethora of factors, including infrastructural gaps, inefficiencies in the public sector project management and service delivery, the resource curse of oil exploration, dysfunctional macroeconomic policy environment, among others have obviously truncated the real sector revolution (Central Bank of Nigeria, 2013). Since independence in 1960, Nigeria's overall economic performance has not been encouraging. Despite the availability of large amount of foreign exchange mainly from its oil and gas resources and huge expenditure, economic growth has been insignificant and the incidences of poverty have increased. The objective of every sovereign nation like Nigeria is to improve the standard of living of its citizenry and promote economic growth and development of the country, as observed by Udeaja and Onyebuchi (2015) the Nigerian economy, has had a volatile "growth-history". The period of 1960-70, the Gross Domestic Product (GDP) annual growth was 3.1 per cent. In the oil boom era (1970-78), GDP grew positively by 6.2 percent annually but in 1980s negative growth rates were recorded. During the period of structural adjustment 1988-1997 and liberalisation of the economic, the GDP rise at a positive rate of 4.0 percent (Ekpo and Umoh, 2004). This insignificant growth experience has been blamed mainly on the high inflation rate, a mounting fiscal deficit, increasing foreign debt and debt servicing, political instability, and, among other factors, economic mismanagement and corruption. Revenue and expenditures are the foundation of any viable business or economy, as the economy of the nation is a direct replica of the economies of its citizens. The concept of expenditure and revenue in Nigeria has to be clearly understood.

Government expenditure remains an important instrument utilized in the process of development. It plays a pivotal role in the functioning of any economy at almost all stages of growth and development. Most developing and developed countries today use public expenditure to improve income distribution, direct the allocation of resources in desired areas, and influence the composition of national income (Assi et al., 2019; Vtyurina, 2020; World Bank, 2008). In developing countries for instance, the variation in government spending pattern is not only projected to guarantee stabilization but also to spur economic growth and expand employment opportunities (World Bank, 2015). Hence this study aimed to utilize autoregressive distributed lag (ARDL) cointegration technique to evaluate the effects of government capital expenditure, recurrent expenditure and revenue generated from Value Added Tax (VAT), Company Income Tax (CIT) and Petroleum Profit Tax (PPT) on GDP in Nigeria, from 1982-2022. This model examines the pattern of the government capital and recurrent expenditure, revenue generated and Nigeria gross domestic product from 1982-2022 and also utilizes Autoregressive Distributed Lag model, Cointegration technique to determine few components of revenue generated and government expenditures that have significant influence on economic growth in Nigeria. Additionally, the model investigate the long and short term influence of revenue generated and government expenditure on economic growth in Nigeria.

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LITERATURE REVIEW

Empirical Review

Idris and Bakar (2017) examined the relationship between government expenditure and economic growth with the aim of establishing a stable relationship. To estimate the existence or otherwise of the equilibrium relationship among the examined variables the study employed an ARDL model. The data covered a period of thirty-five (35) years from 1980 to 2015.The result from the ARDL estimation indicated an existence of positive and long-run equilibrium relationship between economic growth and government expenditure in Nigeria. Akanbi (2018) investigated Government expenditure in Nigeria: the study employed trend analysis to evaluate the determinants and trends government expenditure in Nigeria. The study used time series data from 1974 to 2016. It was discovered that capital and recurrent expenditure were resilient to shocks in total government spending and, also, total government expenditure was confirmed to be resilient to shocks in capital and recurrent spending. Kanayo, *et al*, (2016) examined the long run relationship between government expenditure and economic growth in Nigeria. Johansen co-integration analysis was employed in testing the long run relationship while Vector Error Correction Model (VECM) was used to test the short and long run adjustments. Granger causality effect test was adopted to analyze the effect of government expenditure on economic growth. The long run test revealed the evidence of a long run relationship between government expenditure and economic growth in Nigeria. The vector error correction model analysis suggested the possibility of Nigeria achieving a steady level of growth if preference is given to capital expenditure more than recurrent expenditure. The granger causality effect result obtained showed that recurrent and capital expenditure which have significant effect on economic growth in Nigeria.

Government expenditure

Government expenditure is the money spent by the government out of its revenue to meet various needs of the economy (Adigwe, Anyanwu & Udeh, 2016). The concept of government expenditure emanates from the activities of government which includes paying for and providing goods and services, investment in material and human capital as well as transfers. According to Ukwueze (2018) public expenditures can be disaggregated or classified into subheadings, such as recurrent expenditures and capital expenditures. The recurrent expenditures are expenditures or purchases of stationeries, wages and salaries of workers, fuel, electricity bills and other bills, etc. Capital expenditures are constructions undertaken by the government on roads, bridges, health centres, schools, military installations and hardware, etc. the author is of the view that the concept of public expenditures arose from the perspective that any expenditure undertaken by the government is public. Government expenditures are also called public sector spending, public expenditures, or government purchases. From the above views, it is assumed that government has sufficient revenue to expend.

Economic growth

Economic growth refers to increase in a country's potential GDP, although this differs depending on how national product has been measured. Economic growth must be sustained for a developing economy to break the circle of poverty. Countries usually pursue fiscal policy to achieve accelerated economic growth. Tanzi (1994) observes that fiscal policy applies to the use of fiscal instruments (taxation and spending) to influence the working of the economic system in order to

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maximize economic welfare with the overriding objective of promoting long-term growth of the economy.

Gross Domestic Product (GDP)

Gross Domestic Product is the monetary value of goods and services produced in an economy during a period of time irrespective of the nationality of the people who produced the goods and services. It is calculated without making deductions for depreciation. GDP at Current Basic Prices (i.e. Nominal GDP) equals GDP at Current Market Prices less indirect taxes net of subsidies. GDP at Constant Basic Prices (otherwise known as the real GDP) equals GDP at Market Prices less indirect taxes net of subsidies. Classified as confidential; GDP at Current Market Prices equals GDP at Current Basic Prices plus indirect taxes net of subsidies. This is GDP valued at the market prices which purchasers pay for the goods and services they acquire or use. It is collected from World Bank, 2019.

Tax Revenue

According to Attama N. (2004), tax revenue is defined as the revenues collected from taxes on income and profits, social security contributions, taxes levied on goods and services, payroll taxes, taxes on the ownership and transfer of property, and other taxes. Total tax revenue as a percentage of GDP indicates the share of a country's output that is collected by the government through taxes. It can be regarded as one measure of the degree to which the government controls the economy's resources. The tax burden is measured by taking the total tax revenues received as a percentage of GDP. This indicator relates to government as a whole (all government levels) and is measured in million USD and percentage of GDP. Anyanwu (1997) define tax revenue as a compulsory transfer or payment from private individual, institutions or groups to the government. The classical economist was of the view that the only objective of tax revenue was to generate revenue for the government. But with the change in circumstances and ideologies, the aim of taxes has changed. These days apart from raising revenue, tax is levied to affect consumption, production and distribution with a view to achieving social welfare through economic development.

Value Added Tax (VAT)

The concept Value-Added Tax has been given different definitions by different authors and writers. According to American Dictionary Value Added Tax (VAT) is a form of indirect sales tax paid on products and services at each stage of production or distribution, based on the value added at that stage and included in the cost to the ultimate consumer. Value-added tax is a tax that is added to the price of goods or services. The abbreviation VAT is also used. A value-added tax, known in some countries as a goods and services tax, is a type of tax that is assessed incrementally. It is levied on the price of a product or service at each stage of production, distribution, or sale to the end consumer. In a bid to have a near perfect system in the country a major landmark was made in the area of adopting value-added tax (VAT) in January through the VAT Act NO 102 of 1993, with effective date of 1st January 1994 based on the report of Sylvester Ugo led study group set up in 1991by the government to review the system of indirect taxes in Nigeria (Odusola, 2006).

The Act repealed the sales tax Act, 1986. The sales tax lasted only for six (6) years before it was repealed. The Act is now known as VAT Act Cap. V1, LFN 2004. It was last amended in 2007, (ICAN 2009). The precedence for the introduction of VAT in Nigeria was based on the fact that taxation as an instrument of fiscal policy is vital in generating revenue to finance the activities of the government, redistribute

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income, stabilizing the economy as well as stimulating growth and development. This view was quoted by Adereti, Sanni & Adesina (2011).

Petroleum Profit Tax

Petroleum taxation is the instrument of choice for sharing wealth between host governments and international oil companies. It is a direct tax, levied annually on net profit of a petroleum tax payer, who is carrying on the business of petroleum exploration and production PPT is a tax on the income of companies engaged in upstream petroleum operations in lieu of CIT. CIT (1990). (Jibrin, Success & Ifurueze; 2012). Petroleum profits tax means the tax imposed upon the sale of Hydrocarbons under the Petroleum Profits Tax Act of 1959, as amended. The administration of petroleum profit tax in Nigeria has mainly been focused on revenue generation to the detriment of stimulating economic growth and development (Ogbonna, 2009). Adegbie (2009) averred that oil sector is the main hub of the Nigeria economy and need to be sustained if the country is to achieve real economic growth. The institutional capacity to administer petroleum profit taxes (PPT) is applicable to these companies engaged in petroleum operations as define above.

Company Income Tax (CIT)

According to American Dictionary, a corporate tax, also called corporation tax or company tax, is a direct tax imposed on the income or capital of corporations or analogous legal entities. Many countries impose such taxes at the national level, and a similar tax may be imposed at state or local levels. Company income tax is one of the taxes levied in Nigeria in line with constitutional demands. Company Income Tax (CIT) was introduced in Nigeria in 1961. The original law (Company Income Tax) has been amended many times and is currently codifies as the Company Income Tax Act 1990 (CITA) (Odusola, 2006).

MATERIALS AND METHODS

The study utilizes autoregressive distributed lag (ARDL) cointegration technique to evaluate effects of government expenditure and revenue generation on GDP in Nigeria, from 1982-2022. This scope was chosen because of the availability of relevant data and sufficient scope to influence policy decisions in the country. These data were sourced from the CBN data bank, and data will be analyzed using STATA, GRETL and Eview statistical software. The ex-post facto research design was adopted for the study. The ex-post facto research design was employed because secondary data were used for the study, the population of this study relates to the entire tax revenue and the Gross Domestic Product (GDP) in Nigeria from 1982-2022.

The sample of this study is made up of Company Income Tax (CIT), Petroleum Profit Tax (PPT), Value Added Tax (VAT) revenues. The other exogenous variable is government capital and real expenditures. While the endogenous variable is Gross Domestic Product (GDP), for the period of 1982-2022.

Model Specification

The general model of the ARDL (p, q) is as follows:

$$y_t = \varphi + \sum_{i=0}^{p} \alpha_i y_{t-i} + \sum_{i=0}^{q} \beta_t x_{t-i} + \varepsilon_t \ldots \qquad (3.0)$$

Or broken down as:

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$$y_t = \varphi + \alpha_i y_{t-1} + \alpha_2 y_{t-2} \ldots + \alpha_p y_{t-p} + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \ldots + \beta_q x_{t-q} \varepsilon_t \ldots \quad (3.1)$$

Where:

y_t: Endogenous variable (GDPt)

y_{t-i}: Lag of the endogenous variable (GDPt-i)

x_t: Exogenous variables ($\text{CAPITAL EXPENDITURE}_t$, $\text{REAL EXPENDITURE}_t$, VAT_t, CIT_t, PPT_t)

x_{t-i}: Lag of the Exogenous variable ($\text{CAPITAL EXPENDITURE}_{t-i}$, $\text{REAL EXPENDITURE}_{t-i}$, VAT_{t-i}, CIT_{t-i}, PPT_{t-i})

p: Optimal lag order associated with the endogenous variable in years

q: Optimal lag order associated with the exogenous variable in years

φ: Constant

α_i: Coefficient for endogenous variable (coefficients for short-run)

β_i: Coefficient for exogenous variable (coefficient for long-run)

ε_t: Error Term

Stationary Test (Augmented Dicker Fuller) (ADF)

Time series data is said to be stationary when its value tends to revert to its long-run average value and its other properties like the variance and co-variance of the data series are not affected by the change in time (i.e. time invariant) (Shrestha and Bhatta, 2018). The most common method for testing unit root for parametric analyses is the Augmented Dickey Fuller (ADF) test. Let's assume we have a series y_t for testing unit root. ADF model tests unit root as follows:

$$\Delta y_t = \alpha + \beta_t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots\cdots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \quad (3.3)$$

Where α is a constant, β the coefficient on a time trend and p the lag order of the autoregressive process. Imposing the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modeling a random walk and using the constraint $\beta = 0$ corresponds to modelling a random walk with a drift. And t is time period (1982-2022).

The test statistic value is calculated as:

$$\tau = \frac{\hat{\gamma}}{\sigma_{\hat{\gamma}}}$$

Where: $\hat{\gamma}$ is the estimated coefficient and $\sigma_{\hat{\gamma}}$ is the standard error in the coefficient estimate

The null-hypothesis for an ADF test is

$H_0: \gamma = 0$ vs $H_1: \gamma < 0$

Where H_0: is the null hypothesis (has unit root) and H_1: Does not have unit root. The test statistics value τ is compared to the relevant critical value for the Dickey Fuller Test. If the test statistic is less than the critical value, we reject the null hypothesis and conclude that no unit-root is present. We can also judge present of unit root using p-value; we reject the null hypothesis if p-value is less than the level of significant of the study (α). The ADF Test does not directly test for stationarity, but indirectly through the existence (or absence) of a unit-root. Decision rule:

If t* > ADF critical value, ==> Do not reject null hypothesis, i.e., unit root exists.

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If t* < ADF critical value, ==> reject null hypothesis, i.e., unit root does not exist.

Using the usual 5% threshold, differencing is required if the p-value is greater than 0.05.

Co-integration Test (ARDL Bounds Test)

There is co-integration between two or more variables if there exist a form of equilibrium relationship spanning the long-run (Shrestha and Bhatta, 2018). The Bounds test is guided by the assumption of stationary variables at level I(0), at first difference I(1) and never at second difference I(2) (Giles, 2013). To perform the bounds test for co-integration, the conditional ARDL (p, q_1, q_2, q_3) model with 4 variables. This will be the hypothesis for the bounds test:

$H_0: b_{ji} = 0 \qquad where\ j, i = 1,2,3,4$

$H_1: b_{ji} \neq 0$

i.e. The null hypothesis is saying that the coefficient of the long-run equation are all equal to zero which implies there is no co-integration against the alternative hypothesis which say the coefficient of the long-run equation are all not equal to zero, which implies there is co-integration. If we are unable to reject the null hypothesis, then we can only specify the short-run model otherwise we go ahead to specify a standard ARDL model. If there is no co-integration, the ARDL (p, q_1, q_2) models will be specified as:

$$\Delta In(RGDP)_t = a_{01} + \sum_{i=1}^{p} a_{1i}\,\Delta In(GDP)_{t-1} + \sum_{i=0}^{q1} a_{2i}\,\Delta In(CAPITAL\ EXP)_{t-1} + \sum_{i=0}^{q2} a_{3i}\,\Delta In(REAL\ EXP)_{t-1} + \sum_{i=0}^{q3} a_{4i}\,\Delta In(VAT)_{t-1} + \sum_{i=0}^{q4} a_{5i}\,\Delta In(CIT)_{t-1} + \sum_{i=0}^{q5} a_{6i}\,\Delta In(PPT)_{t-1} + \varepsilon_t \quad (3.4)$$

If there is co-integration, the error correction model (ECM) representation is specified as:

$$\Delta In(RGDP)_t = a_{01} + \sum_{i=1}^{p} a_{1i}\,\Delta In(GDP)_{t-1} + \sum_{i=0}^{q1} a_{2i}\,\Delta In(CAPITAL\ EXP)_{t-1} + \sum_{i=0}^{q2} a_{3i}\,\Delta In(REAL\ EXP)_{t-1} + \sum_{i=0}^{q3} a_{4i}\,\Delta In(VAT)_{t-1} + \sum_{i=0}^{q4} a_{5i}\,\Delta In(CIT)_{t-1} + \sum_{i=0}^{q5} a_{6i}\,\Delta In(PPT)_{t-1} + \lambda(ECT)_{t-1} + \varepsilon_t \quad (3.5)$$

Where:

i λ is speed of adjustment parameter with a negative sign which shows convergence in the long-run else the model is explosive

ii ECT is the error correction term, the ordinary least squares (OLS) residuals series from the long-run co-integrating regression

iii a_{1i}, a_{2i}, a_{3i} are the short-run dynamic coefficient of the model's adjustment long-run equilibrium

Where we have the differences (Δ), it captures the short-run and where we have the ECT, it captures the long-run. The short-run causal effect is represented by the statistical significance of the t-statistic on the explanatory variables (short-run coefficients). If the t-statistic of the coefficients is significant, then we can know the direction of causality from the regressor to the dependent variable (Giles, 2013). The long-run causal effect is captured by the significance of the λ, which is the parameter for the error correction term (ECT). If λ is significant then it tells us that there is long-run causality among the variables.

Normality Test for Residuals (Histogram and Jarque-Bera Test)

In order to ensure that our model satisfies the assumption of classical normal linear regression model, it is important to check one

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of the assumptions known as the normality of the disturbance term, ε_t. The Jarque-Bera (JB) test of normality is an asymptotic test based on OLS residuals. It computes the skewness and kurtosis measures of the OLS residuals and uses the following test statistic:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (3.11)$$

Where:

n = sample size

s =skewness coefficient

k =kurtosis coefficient

The null hypothesis states that the residuals are normally distributed. If the p-value of the JB statistic in the application is sufficiently low, which can occur if the value of the statistic is very different from zero, one can reject the hypothesis that the residuals are normally distributed but with a reasonably high p-value, which will occur if the value of the statistic is close to zero, we do not reject the normality assumption (Gujarati, 2004).

Bound testing

The ARDL Bound test for Co-integration compares the F-statistic value to the upper I(1) and lower I(0) critical bound values as shown in table 4.8, to determine the existence of co-integration among the variables. Here the rule of thumb is, there exist no presence of co-integration among the variables if the F-statistic is less than the lower critical bound I(0). And there is co-integration if the F-statistic value is greater than the upper critical bound I(1) and the result is said to be inconclusive if the F-statistic value falls in between the lower I(0) and upper I(1) bound critical value.

RESULTS AND DISCUSSION

Table 1 shows the summary statistics of the average annual data on the effect expenditure and revenue on Nigeria GDP from 1982 to 2022. The result based on expenditure shows that capital expenditure (CEES) has larger average input of 178021 Billion. And for revenue we observed that Petroleum Profit Tax (REVENPPT) has the largest input with an average of 139322 Billion followed by revenue from Value Added Tax (REVENVAT) with an average of 47557.4. And over the period studied we have an average GDP of 3.80671e+006 Billion.

Table 1 Summary Statistics, using the observations 1982 – 2022.

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
GDP	3.80671e+006	216798.	6.93223e+006	5281.10	2.47127e+007
CEES	178021.	3629.40	524486.	15.5000	3.23580e+006
REES	39767.4	1419.00	87022.2	25.9500	340194.
REVENVAT	47557.4	2676.90	86282.8	18.2900	346072.
REVENCIT	25656.4	6506.70	42512.9	11.3000	211758.
REVENPPT	139322.	14074.6	229665.	358.100	744294.

Most time series are characterised by unit roots hence nonstationary. However, they usually achieve stationarity when differenced in most cases (Kocenda and Cerny, 2014).

A pre-condition for ARDL modelling is to carry out a unit root test to ensure the time series is stationary. For this purpose, the study uses Augmented Dickey-Fuller (ADF) method to conduct the test for unit roots. The stationarity test reported in Table 1 showed that the time series variables did not attain stationarity at levels since the P-values are greater than 0.05. The variables may become stationary after first difference.

DOI: 10.56892/bima.v8i4B.1210

Table 2: Augmented Dickey-Fuller test.

	GDP	CEES	REES	**REVVAT**	**REVCIT**	**REVPPT**
Test statistic: tau	2.41688	-5.42785	7.51959	4.88569	0.953717	9.17104
P-value	0.113	5.378e-005	1.000	1.000	0.9962	1.000

The result from Table 2 shows the first deference of the endogenous and exogenous series studied. From the table the result shows that the series attain stationarity after first difference since the respective variables P-values are less than 0.05.

Table 3: Augmented Dickey-Fuller test after first deference

1st deference of the Series	GDP	CEES	REES	**REVVAT**	**REVCIT**	**REVPPT**
Test statistic: tau	6.87406	-7.15572	3.94087	5.05071	-5.72925	2.23895
P-value	0.0301	1.248e-010	0.0126	0.0050	5.22e-007	0.0140

The result from Table 3 shows model selection criteria. From the table the result shows that model 1 with ARDL (4) is the best model for modelling the effect of expenditure and revenue on Nigeria GDP since it has the lowest AIC = 28.484364, BIC = 28.919747 and HQ = 8.637857. The respective R-square for each model is shown in the table.

Table 4: Model Selection Criteria Table.

Dependent Variable: GDP

Model	**LogL**	**AIC***	**BIC**	**HQ**	**Adj. R-sq**	**Specification**
1	-516.960738	28.484364	28.919747	28.637857	0.997875	ARDL(4)
2	-519.667620	28.576628	28.968473	28.714772	0.997628	ARDL(3)
3	-530.124681	29.087821	29.436127	29.210615	0.995969	ARDL(2)
4	-533.465127	29.214331	29.519099	29.321776	0.995332	ARDL(1)

Table 4 shows the result of the Autoregressive Distributed Lag (ARDL) model. The result from the table shows that GDP at lag (1, 2 3 and 4) have significant influence on GDP since their respective p-values = (0.0014 0.00278, 0.0334 and 0.0489) are less than 0.05. The result also shows that recurrent expenditure (REES) also have significant influence on GDP with p-value = 0.0003is less than 0.05. Result based on revenues shows that, revenue from Value Added Tax (REVENVAT) and revenue from Petroleum Profit Tax (REVENPPT) have significant influence on GDP at its level since their p-values = 0.0005 and 0.0199 are less than 0.05 respectively. The value of the R-square statistic = 0.998 shows the efficiency of the model.

Table 5: Autoregressive Distributed Lag (ARDL) Model

Dependent Variable: GDP
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 4
Selected Model: ARDL(4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP (-1)	0.811884	0.227885	3.562690	0.0014
GDP (-2)	0.857023	0.261150	3.281732	0.0028
GDP (-3)	-0.503962	0.224757	-2.242253	0.0334
GDP (-4)	-0.488661	0.236917	-2.062579	0.0489

DOI: 10.56892/bima.v8i4B.1210

CEES	-0.212386	0.140217	-1.514688	0.1415
REES	-9.613972	2.308789	-4.164075	0.0003
REVEN_CIT	3.364520	2.293952	1.466691	0.1540
REVEN_PPT	5.000520	1.270821	3.934873	0.0005
REVEN_VAT	11.15005	4.506810	2.474045	0.0199
C	-60724.03	74956.86	-0.810120	0.4250

R-squared	0.998406	Mean dependent var	4217496.
Adjusted R-squared	0.997875	S.D. dependent var	7184540.
S.E. of regression	331212.0	Akaike info criterion	28.48436
Sum squared resid	2.96E+12	Schwarz criterion	28.91975
Log likelihood	-516.9607	Hannan-Quinn criter.	28.63786
F-statistic	1879.114	Durbin-Watson stat	2.597701
Prob(F-statistic)	0.000000		

The result from table 5 shows that the F-statistic value = 11.422695 is greater than the upper critical bound value at all the significance levels (F-statistic value = 11.422695 > I(1) = 3.8 at 10%, 4.6 at 5%, 5.39 at 2.5% and 6.44 at 1% respectively). Thus, we concluded that there exists a unique long-run relationship among the variables.

Table 6: ARDL Long Run Form and Bounds Test

Dependent Variable: D(GDP)

Selected Model: ARDL(4)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	11.422695	10%	3.8	3.8
K	0	5%	4.6	4.6
		2.5%	5.39	5.39
		1%	6.44	6.44
Actual Sample Size	37		Finite Sample: n=40	
		10%	3.955	3.955
		5%	4.96	4.96
		1%	7.22	7.22
			Finite Sample: n=35	
		10%	3.98	3.98
		5%	4.945	4.945
		1%	7.35	7.35

CONCLUSION

In the quest to evaluate the effects of capital expenditure, recurrent expenditure, revenue from company income tax, revenue from Value Added Tax and revenue from Petroleum Profit Tax on GDP in Nigeria from 1982 to 2022 using ARDL cointigration technique. The result shows that more input from expenditure is realized on capital expenditure with an average of 178021 billion on GDP. And for revenue it was shown that Petroleum Profit Tax with an average of

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139322 billion has the largest input on GDP in the studied period as shown in the the summary statistics.

The result based on trend analysis reviles that a sharp upward increase on the activities of expenditure and revenue generation in Nigeria from 1982-2022 as shown in figure 1. The result from Augmented Dickey-Fuller test for stationarity shows that the studied macroeconomic variables are not stationary. They become stationary after first difference. The result from the autoregressive distributed lag model shows that the lag values of GDP at lag (1, 2 3 and 4) have significant influence on GDP with p-values = (0.0014 0.00278, 0.0334 and 0.0489) less than 0.05. The result from the ARDL model also shows that recurrent expenditure has significant influence on GDP with p-value = 0.0003. from the same model we observed that revenue from Value Added Tax (REVENVAT) and revenue from Petroleum Profit Tax have significant influence on GDP with p-values = 0.0005 and 0.0199 respectively. The analysis from Bound test show that the macroeconomic variables studied have a long run relationship with Nigeria gross domestic products. The study, hence conclude that the studied macro-economic variables of expenditure and revenue in Nigeria have a long run relationship on Nigeria gross domestic products.

Recommendation

This study recommends that, there should be an improved policy framework that support the efficient supply and supervision from the governments on revenue from company income tax, revenue from value added tax and revenue from petroleum profit tax since it has significant influence on Nigeria economic growth. Based on expenditure we recommend to the government to look into recurrent expenditure as it has significant effect on the economic growth. This study also advocates that future researchers should consider the use of ARDL modeling using quarterly or monthly data as more data becomes available.

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