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ASSESSING THE DETERMINANTS OF TAX REVENUE IN NIGERIA

Abstract

In view of the role of tax revenue on economic growth and development, this study empirically examined the determinants of tax revenue in Nigeria for the period 1990-2022 using ARDL model as a tool for analysis. To ensure the robustness of results, the study accounts for structural breaks in the unit root test and the co-integration analysis. The important findings of the study suggest that per capita income, exchange rate and interest rate are positive and insignificant both in the short run and long run. Trade openness is positive and insignificant in the short, while it is positively significant in the long run. Agricultural GDP is positively significant both in the long run and short run. However, inflation rate found to be significant in the short, while in the long run it's found to be insignificant. The study therefore recommends that government should invest in programs and infrastructure that support agricultural productivity and value addition, which will increase the sector's contribution to the overall tax revenues over the long run. Government should also implement policies that foster economic growth which in turn boost tax revenue. Also government should monitor inflationary pressures and adjust interest rates accordingly to support price stability which can indirectly support tax revenue by maintaining consumer purchasing power.

Keywords: ARDL, tax revenue, per capita income, interest rate, agricultural GDP

JEL Classification Code: C32, H20, D31, E43, Q10

Introduction

Tax revenue is the financial income a government receives through levies imposed on individuals, businesses, and transactions. It constitutes a significant portion of government funding, supporting public services and infrastructure. Taxation is the most important source of public revenue from the view point of certainty, consistency, and reliability (Osita, 2004). Tax is the main source of revenue for the government and it is collected from persons and businesses on their income and other profit making activities and transactions; and also serve as an instruments used in reducing the gap between the rich and the poor. (Hakim & Bujang, 2012; Chigbu & Njoku, 2015). In Nigeria, tax revenue plays a crucial role in economic development, enabling the government to invest in education, healthcare, and social programs. It also contributes to fiscal stability, allowing governments to manage budgets effectively.

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Nigerian tax revenue is a vital component of the country's fiscal landscape and a major source of government revenue, providing crucial funding for government operations and public services (Ogbonna & Appah 2016). The diverse tax structure encompasses direct taxes such as Personal and Corporate Income Tax, alongside indirect taxes like Value Added Tax (VAT) and Customs Duties. The Federal Inland Revenue Service (FIRS) and State Internal Revenue Services (SIRS) manage tax collection at federal and state levels respectively. Tax revenue in Nigeria supports infrastructure development, social welfare programs, and economic initiatives. Efforts to enhance compliance, reduce evasion, and adapt to digital taxation trends are ongoing, ensuring sustainable revenue generation for national growth.

Taxes play a pivotal role in Nigeria's economy, serving as a fundamental source of government revenue that funds essential public services and developmental initiatives. The revenue generated from taxes enables the government to invest in infrastructure, education, healthcare, and social welfare programs, contributing directly to the overall improvement of citizens' quality of life (Azubuike 2009). Importantly, taxes act as a tool for wealth redistribution and economic stability. Progressive taxes, like Personal Income Tax, help ensure that higher-income individuals contribute proportionately more to government coffers, promoting social equity. The revenue collected aids in poverty alleviation and supports marginalized communities.

The efficiency of Nigerian tax revenue collection has been a challenge, marked by issues such as tax evasion, informal economy dominance, and administrative gaps (Mansur & Gurama, 2016). Despite efforts to modernize tax systems, compliance remains an obstacle. The government's initiatives to broaden the tax base and enhance enforcement have shown some positive results. However, there's a need for sustained reforms, including better technology integration, education on tax compliance, and addressing corruption. Improving efficiency in tax revenue collection is crucial for funding public services, infrastructure, and socio-economic development, ultimately fostering a more stable and prosperous future for Nigeria.

Spotting the potentials of tax revenue and its socio-economic benefits as evidenced in many developing countries like Pakistan, Indonesia, Jordan, Nigeria, Ghana, Ethiopia, among others, this encouraged the attention of researchers with large number of studies conducted in the subject area.

This includes studies in Pakistan (Manan, Nawaz, Ahmed & Talib, 2022; Ahmad, Ahmed, Mushtad & Nadeem, 2016), Indonesia (Maryantika & Wijaya, 2022), Jordan (Al-qudah, 2021), Ethiopia (Gobachew, Debela & Shibiru, 2017), Ghana (Aggrey, 2011; Amoh & Adom, 2017), Sierra Leone (Tarawalie & Hemore, 2021), Nigeria (Udoh, Chegwe, Nyema & Ndaburoma, 2023; Muibi & Sinbo, 2013; Agunbiade & Idebi, 2020, Okwara & Amori, 2017; Obaretin & Ohonba, 2018; Okonko, 2014; Okeke, Mbonu & Ndubuisi, 2018; Olaoye, Ogundipe & Oluwadare, 2019) among other developing countries. These studies have acknowledged a gigantic and multifaceted determinants that are found to be positive and significant in impelling tax revenue. However, the degree to which these determinants are influencing tax revenue, particularly in developing countries like Nigeria, still remains an open question.

The importance of taxes in Nigeria's economy extends beyond revenue generation. It encompasses social welfare, economic stability, and the government's ability to strategically shape and support sustainable development initiatives.

However, given the existing literature researchers have reviewed, there is few or no empirical studies on the determinants of tax revenue in Nigeria. Nigeria, like many other African countries, faces various socio-economic challenges. One of these challenges is that of low revenue (income) for the execution of both capital and recurrent expenditures. Tax revenue has historically played a significant role in supporting these areas. Therefore, the objective of the study is to assess the determinants of tax revenue in Nigeria.

This paper contributes to the body of knowledge as it serves as one of the few pieces of studies in the area as most of the studies reviewed focused on the impact of tax revenue on economic growth or on economic development. The paper is divided into five sections. The section 1 is the introduction followed by the literature review which presents literature. Section 3 presents the methodology of the study. Section 4 provides the empirical analysis and section 5 summarizes the findings of the paper and provides recommendations.

2. Literature Review

Many empirical studies have been carried out on the role of taxes to government revenue generation and economic growth and development of both developed and developing countries. For instance, Manan, Nawaz, Ahmed & Talib (2022) in their study titled assessing the determinants of tax revenue: empirical evidence from Pakistan between the periods ranging from 1980 to 2019 using ARDL Bound Testing to test the variables. The results of the study edict that increasing dependence on indirect taxation results in a negative relationship between tax revenue and national income as its incidence is on the poor, and therefore suggests that to help the economy generate more rewarding revenue generation activity, government should use established financial institutions, inclusive growth, consolidation of the money market, and a progressive tax system. Ahmad, Ahmed, Mushtaq & Nadeem (2016) also examined the socio economic determinants of tax revenue in Pakistan using annual time series data from 1975 to 2012. The study applied the Auto regressive Distributed lag (ARDL) approach to estimate long run and short run empirical coefficients of these determinants. The study concludes that Pakistan can increase its tax revenue by improving economic activity, tax compliance and decreasing informal sector and narrow tax base.

Furthermore, Maryantika and Wijaya (2022) examined the determinants of tax revenue in Indonesia with economic growth as a mediation variable using multiple linear regression to analyze the hypothesis. The results of the study disclosed that economic growth facilitates the effect of government expenditure and human development on tax revenues and therefore suggested that the government is anticipated to pay attention to policies to increase economic growth and tax revenues. Also Al-qudah (2021) studied the determinants of tax revenues: empirical evidence from Jordan, covering the period 1990-2019 and used ARDL to observe the study hypotheses. The results the study discover that per capita GDP, fiscal deficit, foreign aids and government spending are good determining factors for tax revenues in both the short run and in the long run, whereas industrial sector value added and economic openness are good determining factors only in the short run. The study suggests a decrease in government spending due to the rising tendency in the fiscal deficit and public debt, and the sustained rise in government expenditure leading to extra internal and external imbalances.

Another study by Gobachew, Debela & Shibiru in 2017 on the determinants of tax revenue in Ethiopia using quantitative research method on time series data set for the years 1999/2000 to 2015/2016 discloses that,

industry sector share to GDP, per capita income and trade openness as measured by share of export and import to GDP have significant positive effect on tax revenue whereas; agriculture sector share to GDP and annual rate of inflation have significant and negative effect on tax revenue as measured by share of tax revenue to GDP. In his study on the determinants of tax revenue, evidence from Ghana using quarterly data from 1988 to 2008 using ARDL approach to cointegration, Aggrey (2011) revealed that government expenditure is vital in generating tax revenue in the long run whereas it has an adverse outcome in the short run on tax revenue for the period under study and recommends that the government of Ghana increase its spending in the productive sectors that would influence positively on all forms of taxes that would eventually lead to an increase in tax revenue.

Amoh and Adom (2017) in their study on the determinants of tax revenue growth of an emerging economy - the case of Ghana during the years 1975 to 2015 based on the time series empirical strategy and ARDL estimation techniques confirmed the contention that government consumption spending negatively affects tax revenue growth. Tarawalie and Hemore (2021) analyzed the determinants of tax revenue in Sierra Leone: based on the ARDL context during the years 1990 to 2020 revealed that the long run analysis shows that real GDP, openness and official development assistance are the main determinants of tax revenue in Sierra Leone. They further recommend that government should invest in growth augmenting sectors such as agriculture, health, education, energy and telecommunication; and warrant a politically constant environment for private sector investment.

Mansur, Ansari and Moradi (2016) in their study titled “determinants of tax revenue: does liberalization boost or decline It?” using a panel of 83 countries spanning the periods between 1990 to 2012, using generalized method of moment regression to test the hypothesis. The outcomes of dynamic panel estimation display that more trade liberalization is complemented by more tax revenue. Therefore, the study recommends the need for suitable macroeconomic policy to improve the trade liberalization in order to hasten government revenue. Ihuarulam, Sanusi and Oderinde (2021) studied the macroeconomic determinants of tax revenue in Economic Community of West African States. The study employed panel data analysis on six ECOWAS countries’ data set spanning the period of 2005 to 2019. The results study showed that inflation and economic growth were positively related to tax revenue; a unit increase in either of the two led to a rise in government tax revenue. They therefore recommended that the ECOWAS countries should prudently manage their macroeconomic setting to enhance tax revenue.

Addison and Levin (2018) examined the determinants of tax revenue in Sub-Saharan Africa using an unbalanced panel dataset of 39 countries for the period 1980 to 2005. The study revealed that the overall tax to GDP ratio is higher in more open and less agricultural dependent economies, less populated and peaceful nations. They therefore suggest that if formal activities are growing faster than the agricultural sector, countries in Sub-Saharan Africa will benefit in terms of higher tax-revenue.

Okonkwo (2015) studied the determinants of taxation in Nigeria for the period 1980 to 2014 adopting ordinary least squared technique in analyzing the data. The results of the study discovered that income, money supply, interest rate and inflation are significant determinants of taxation in Nigeria. The study therefore recommended

that government should reinforce the tax collection process and review the tax policies occasionally to withstand tax income in Nigeria.

Muibi and Sinbo (2013) also examined the macroeconomic determinants of tax revenue in Nigeria for the period 1970 to 2011 using error correction mechanism to establish both the long run and short run relationships among the variables. The result of the empirical analysis revealed that tax revenue is significantly reactive to changes in income level, exchange rate and inflation rate. The study concludes that macroeconomic uncertainty and level of economic activities are the key drivers of tax buoyancy and tax effort in Nigeria.

Udoh, Chegwe, Nyema and Ndaburoma (2023) examined the macroeconomics determinants and public revenue generation in Nigeria spanning the period of 1993 to 2022. The study employed descriptive statistics, linear regression technique and correlation to analyze the data. The study established that macro-economic or determinants (share of agriculture, per capita income and foreign direct investment) have a statistical significant effect on government revenue in Nigeria. The study recommended that the government should endeavor to develop the economy in order to increase the average income of its citizens to motivate “ability to pay” principle of tax on and voluntary compliance in country. Clement, Ayobolawale and Oladimeji (2009) also assessed the impact of tax revenue and economic development in Nigeria 2003 to 2017. This study discovered that companies’ income tax, petroleum profit and value added tax have a long run impact on the economic development of Nigeria and resolved that taxation has a significant long run relationship with Nigeria’s economic development. The study therefore recommended that government should not increase companies’ income tax rate because, instead it should increase the value added tax because it has the potentiality to improve economic development of Nigeria.

To examine the relation of tax revenue on economic growth in Nigeria over the period 1981 to 2019, Agunbiade and Idebi (2020) employed the Vector Error Correction Model. The analysis supports the findings that the influence of the shock in the indirect tax and direct tax on GDP growth does not perish out over the specified period under deliberation. Therefore, the study suggested that in order to increase tax revenue, there should be a comprehensive base tax strategy, centering on all key areas of the tax system with quantifiable outcomes. Okara and Amori (2017) also study the impact of tax revenue on economic growth in Nigeria for the period of 1994-2015 employing ordinary least square. The study reveals that tax revenue have significant impact on Nigerian economic growth and recommends that in order to attract direct and indirect taxes, government should spread the main revenue source from crude oil to other sectors of the economy like agriculture and extractive industries.

Obaretin and Ohonba (2018) studied tax revenue and economic growth in Nigeria for 34 years (1981 to 2014) and used ordinary regression method to analyse the data. The result of the analysis submits the uniformity of the response of GDP to tax derivatives and therefore supports tax-economic growth linkage in line with the endogenous growth theory. The study recommended that the various subcomponents of both direct and indirect tax should be proficiently collected and used to improve the overall living standard of the people and taxation should be made more active to encourage its role in terms of Nigerian sustainable economic growth. Etim, Austin, Nsima and Asogwe (2020) also examined the empirical analysis of the relationship between tax revenue

components and economic growth in Nigeria over the period between 1980 to 2018. The data collected were analyzed using descriptive and inferential statistics. The study established that tax revenue components play an important role in economic growth in Nigeria and recommended that government policies concerning taxation in Nigeria should be handled with discretion to boost intervening activities for the improvement of economic growth.

Ojong, Anthony and Arikpo (2016) all examined the impact of tax revenue on economic growth in Nigeria employing ordinary least square of multiple regression models establish the relationship between the variables. The outcome of the analysis exposed that there is a significant relationship between petroleum profit tax and non-oil tax with the Nigerian economic growth and recommend that social amenities should be provided by the government to all nooks and crannies of the country as well as engaging in a complete re-organization of the tax administrative machineries by the government. However, Emmanuel and Stephen (2021) researched on the tax revenue and Nigeria economic growth for the period 2003-2017. The study employed stata computer software to analyze the data collected. The result of the analysis shown that oil tax revenue has a positive but no significant relationship with Nigeria economic growth, while non-oil tax revenue have significant relationship with Nigeria economic growth and therefore recommends that government should reduce the wide spread corruption and leakages prevailing in tax administration in Nigeria.

3. Methodology

This study adopted time-series data. The study uses ARDL bound testing to get the long-term and short-term relationship between both the dependent and the independent variables. To achieve the purpose of the study, secondary data were employed spanning from 1990 to 2022 collected from various sources such as World Bank Development Indicators and CBN Statistical Bulletin.

Research Variables

The dependent variable in this study is tax revenue (TAXR). The per capita income (PCIN), inflation rate (INFR), exchange rate (EXCR), interest rate (INTR), trade openness (TROP) and agricultural GDP (AGDP) formed the independent variables.

Model Specification

The following model was developed based on previous literature.

$$TAXR = f(PCIN, INFR, EXCR, INTR, TROP, AGDP) \quad (1.1)$$

$$TAXR = \alpha + \beta_1 PCIN + \beta_2 INFR + \beta_3 EXCR + \beta_4 INTR + \beta_5 TROP + \beta_6 AGDP + \varepsilon \quad (1.2)$$

Where α is an intercept term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 are parameters.

ϵ = Error term

4.0 Results and Discussion

Result presentation, analysis, interpretation and discussion of findings are the main focus of this section.

4.1 Descriptive Statistics

The table below shows the descriptive statistics of determinants of tax revenue in Nigeria.

Table 1. Descriptive Statistics.

	LTAXR	LPCI	INFR	EXCR	INTR	TROP	LAGDP
Mean	4477.390	7.560932	18.25827	121.6749	7.523086	0.010645	8.197916
Median	4382.546	7.557917	12.38103	127.2299	7.403750	0.005792	8.604525
Maximum	11116.85	7.893406	72.83550	306.9210	11.06417	0.050969	10.37049
Minimum	98.10240	7.264739	5.388008	8.038285	3.268333	0.002580	4.669334
Std. Dev.	3842.395	0.237153	16.89390	88.82773	1.677064	0.012077	1.707054
Skewness	0.302619	0.076666	2.076087	0.587832	0.002000	2.160391	-0.625782
Kurtosis	1.633267	1.361349	6.157484	2.781039	3.377468	6.547869	2.235621
Jarque-Bera	2.792841	3.385861	34.01281	1.787665	0.178123	39.07065	2.688362
Probability	0.247481	0.183980	0.000000	0.409085	0.914789	0.000000	0.260753
Observations	30	30	30	30	30	30	30

Source: Author’s Computation using (E-views 10)

The descriptive statistics presented in table 4.1 above shown that the average tax revenue, inflation rate, interest rate, exchange rate, trade openness, per capita income and agricultural GDP for the period under study stood at 4477.390, 7.560932, 18.25827, 121.6749, 7.523086, 0.010645 and 8.197916, respectively. The table similarly stated maximum and minimum values of 11116.85 and 98.10240 for tax revenue, 7.893406 and 7.264739 for inflation rate, 72.83550 and 5.388008 for interest rate, 306.9210 and 5.388008 exchange rates, 11.06417 and 3.268333 for trade openness, 0.050969 and 0.002580 for per capita income and 10.37049 and 4.669334 for agricultural GDP respectively. Also the table revealed that all the variables used for the study are positively skewed (with the exception of agricultural GDP, -0.625782) with skewness statistics of 0.302619, 0.076666, 2.076087, 0.587832, 0.002000 and 2.160391 for tax revenue, inflation rate, interest rate, exchange rate, trade openness and per capita income respectively. Furthermore, the Jarque-Bera statistics shows that all the variables were normally distributed as their P-values were greater than 5% probability level.

4.2. Unit Root Test

Table 2: ADF Unit Root Test

Variables	Order of Integration	Included in the Model	ADF Test Statistics	MCKinnon Critical Value
LTAXR	1(1)	Intercept	-5.433400	5% = -2.960411
INFR	1(0)	Trend and intercept	-3.639251	5% = -3.562882
INTR	1(0)	Intercept	-3.943310	10% = -2.622989
EXCR	1(1)	Intercept	-5.306888	10% = -2.619160
TROP	1(0)	Trend and intercept	-3.643431	5% = -3.562882
LPCIN	1(1)	Intercept	-4.071756	5% = -2.963972
LAGDP	1(0)	Trend and intercept	-5.134987	10% = -3.212361

Source: Author's Computation using (E-views 10)

Table 2 shows that inflation rate (INFR), interest rate (INTR), trade openness (TROP) and agricultural GDP (AGDP) are each integrated at order zero or 1(0) while tax revenue (LTAXR), exchange rate (EXCR) and per capita income (LPCIN) are each integrated at order one or 1(1).

Table 3: Phillips- Perron (PP) Test statistics

Variables	Order of Integration	Included in the Model	PP Test Statistics	MCKinnon Critical Value
LTAXR	1(1)	Intercept	-5.433400	5% = -2.960411
INFR	1(1)	Intercept	-8.022248	10% = -2.619160
INTR	1(0)	Intercept	-6.086869	5% = -2.957110
EXCR	1(1)	Intercept	-5.306888	5% = -2.960411
TROP	1(1)	Intercept	-7.699153	10% = -2.619160
LPCIN	1(0)	Trend and Intercept	-5.134987	10% = -3.212361
LAGDP	1(0)	Trend and intercept	-5.134987	10% = -3.212361

Source: Author's Computation using (E-views 10)

From table 3 above, interest rate (INTR), per capita income (LPCIN) and agricultural GDP (AGDP) are each integrated at order zero or $I(0)$ while tax revenue (LTAXR), inflation rate (INFR), exchange rate (EXCR) and trade openness (TROP) are each integrated of order one or $I(1)$.

4.3 Bound Test Results

Table 4. Bound Test

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	3.620902	10%	2.33	3.25
K	6	5%	2.63	3.62
		2.5%	2.9	3.94
		1%	3.7	4.39

Source: Author’s Computation using (E-views 10)

To find the co-integration between the study variables, the Bound test was used. The results in table 4 shown that the value of F Statistics is (3.620902) which is greater than the upper bound value $I(1)$ at a significance level of 1%, which means there is a long run relationship between (TXR) and the independent variables (LPCIN, INFR, EXCR, INTR, TROP and LAGDP).

4.4 ARDL Long Run Results

Table 5. ARDL Long Run results

Dependant Variable (LTAXR) Variables	Coefficient	Std. Error	t-Statistics	Prob.
LPCI	6.038037	3.702669	1.630725	0.1269
INFR	-0.320901	0.186614	-1.719593	0.1092
EXCR	0.018435	0.010666	1.728327	0.1076
INTR	0.084884	0.066311	1.280080	0.2229
LAGDP	1.774798	0.437336	4.058204	0.0014
TROP	481.4724	284.0837	1.694826	0.1139
@TREND	-0.468994	0.228862	-2.049244	0.0612

Source: Author’s Computation using (E-views 10)

To estimate the long-term relationship between (LTAXR) and the independent variables (LPCI, INFR, EXCR, INTR, LAGDP and TROP), the Selected Model: ARDL (1, 0, 1, 1, 0, 2, 2) has been estimated. The results revealed in table 5 that (LPCI) has a positive and insignificant impact on tax revenue, this means that an increase in (LPCI) by 1% will lead to an increase in (LTAXR) by 6 units, other things being equal. This credited to the fact that as incomes increases, individuals tend to spend more, leading to higher consumption taxes like VAT. Also, higher incomes often accompany formal employment, making it easier for the government to collect income taxes. Additionally, with more disposable income, people are also more likely to invest, contributing to capital gains taxes and other investment-related revenues. Moreover, a growing economy

fueled by higher per capita income attracts foreign investment, further boosting tax revenue. Overall, an increase in per capita income can lead to a more robust tax base, enhancing government revenue in Nigeria. The finding is in line with the finding of Gobachew et al. (2018); Alqudah, (2029); Boukberch et al. (2019) and Kitessa & Jewaria (2018).

The results also revealed that (INFR) has a negative and insignificant impact on (LTAXR), this means that an increase in (INFR) by one unit will lead to a decrease in (LTAXR) by 0.32 unit this is due the fact that inflation erodes purchasing power, reducing consumer spending and economic activity. This, in turn, can lead to lower tax revenue from consumption-based taxes like VAT. Additionally, inflation can distort income measurements, affecting the assessment of taxable income and potentially reducing income tax revenue. Moreover, inflationary pressures can create uncertainty, discouraging investment and hindering economic growth, further constraining tax revenue generation. This finding is in consistent with the finding of Gobachew et al. (2018).

For EXCR, the results showed that it affects LTAXR positively and insignificantly in Nigeria with coefficient value of (0.02), meaning that an increase in (EXCR) by one unit will lead to an increase in (LTAXR) by 0.02 unit. This is due to the fact that a depreciating local currency can inflate the value of imports, increasing customs duties and other tariffs, thereby boosting tax revenue. Thus, the exchange rate's impact on tax revenue in Nigeria hinges on its effects on trade dynamics and economic activity. The finding is in line with that of Saibu and Olatunbosun (2013).

The results of ARDL in the long term also showed that (INTR) has a positive and insignificant effect on (LTAXR) in Nigeria with coefficient of (0.08) unit. This indicates that an increase in (INTR) by one unit will lead to an increase in tax revenue by 0.08 unit, other things remain constant. This is due to the fact that the rate of interest is moderately low in Nigeria during the period under study because lower interest rates stimulate borrowing and investment, fueling economic growth and potentially increasing tax revenue. This finding is in line with the finding of Kitessa & Jewaria (2018).

As for agricultural GDP (LAGDP), the results showed that it has a positive and significant impact in the long run on tax revenue (LTAXR) in Nigeria with coefficient of 1.77, and the significance of 1%. This means that an increase in agricultural GDP by one unit will lead to an increase in tax revenue (LTAXR) by 01.77 units. This is because a robust agricultural sector generates income for farmers and agricultural-related businesses, contributing to overall economic growth. This, in turn, can lead to increased tax revenue through various channels. Higher agricultural GDP can stimulate rural development, leading to increased employment and income, thereby expanding the tax base. Additionally, a booming agricultural sector boosts domestic production, reducing the need for costly imports and potentially increasing tax revenue from tariffs. The finding is in consistent with the finding of Kitessa and Jewaria (2018).

Long run results in Table 5 also revealed that trade openness (TROP) have a positive and non-significant relationship with tax revenue (LTAXR) in Nigeria with coefficient of 481.47. The positive relationship is due the fact that an increase in trade openness by one unit will leads to an increase in trade openness by 481.47 unit, this is because increased trade openness can lead to higher import volumes, resulting in higher customs duties and tariffs, thus boosting tax revenue. Also, trade openness can stimulate economic growth and increase

consumption, leading to higher tax revenue from consumption-based taxes like VAT. This finding is consistent with the finding of Alqudah (2029); Boukbech, *et al.*, (2019) and Gobachew *et al.* (2018).

4.5. Estimate Short run Error Correlation Model Using ARDL Approach

Since the long run relationship is established, the next step is to estimate the short run dynamic within the ARDL framework.

Table 6. ARDL Error Correction Regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFR)	-0.102643	0.033729	-3.043179	0.0094
D(EXCR)	0.002962	0.002253	1.314591	0.2114
D(LAGDP)	0.577195	0.303701	-1.900539	0.0498
D(TROP)	16.3938	49.74655	3.364932	0.0051
ECM _{t-i}	-0.627969	0.094068	-6.675698	0.0000

Source: Author’s Computation using (E-views 10)

R-squared = 0.718691 F-statistic = 7.299452 (0.000211)

Durbin-Watson = 1.803506 Adjusted R-squared = 0.620233

The mean error correction model in table 6 above shows that, the error correction term is well specified and it is significant at 5 percent level of significance. This supports the earlier conclusion that taxation and its regressors are truly co-integrated. The speed of adjustment is the coefficient of the error correction term (ECM). It also indicates how the movement of the long-run equilibrium is corrected in the short-run. The explanatory variables included in the model explained 62 percent of the variability in taxation. The co-efficient of the ECM term is -0.62. The negative sign is an indication of the existence of a long-run equilibrium relationship between taxation and the variables that influence its short run movement which were used in the model. In fact, there is a fairly high speed of adjustment of 62 percent between the short run and long run equilibrium behavior of taxation and its determinants. Hence, it is of a good fit. The F-statistics measuring the joint significance of all the regressors in the model is statistically significant at 1 percent level. Also, the Durbin-Watson statistic of 2.80 is an indication of the absence of autocorrelation in the model.

However, the coefficients of exchange rate and trade openness show that, with a unit increase in exchange rate, trade openness and agricultural GDP, tax rate increase by 0.002962, 167.3938 and 0.577195 respectively. Moreover, the coefficient of inflation rate show that with a unit increase in inflation rate, tax rate decreases by 0.102643.

Diagnostic and significance tests were conducted on the variables in order to examine the robustness of the ARDL estimation. The results are presented below:

Table 7: Model Diagonastic Test

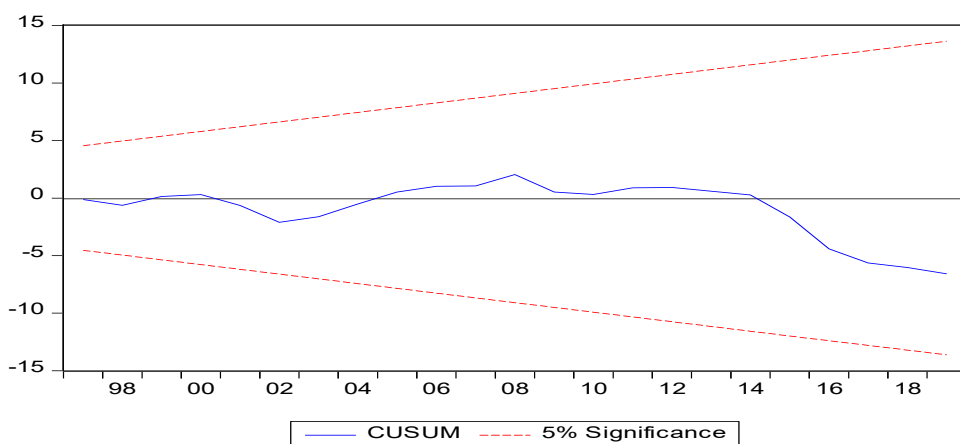
Diagnostic test techniques	Statistics	Probabilities
Serial correlation LM test	0.803652	0.664240
Heteroscedasticity	2.471243	0.556009
Normality test	1.162404	0.559226
Ramsey reset test	0.139270	0.7155

Source: Author’s Computation using (E-views 10) 2024

Table 7 above indicates that the model passes all the diagnostic tests. It also indicates that there is no evidence of serial correlation and it is normally distributed. Furthermore, the model passes the tests for heteroscedasticity and linearity.

The study further used cumulative sum (CUSUM) to test the stability of the model as proposed by Brown *et al.* (1975). If the plots of CUSUM statistics stay within the critical bonds of five percent level of significance, the null hypothesis of all coefficients in the given regression are stable cannot be rejected.

Figure 1: Stability Test



Source: Author’s Computation using (E-views 10) 2024

Cusum test showed that the model is stable as it lies within the defined threshold at 5 percent level of significance and the coefficients are consistent over time.

5.0. CONCLUSION AND RECOMMENDATIONS

The main objective of this study is to empirically assess the determinants of tax revenue in Nigeria using time series data spanning between 1990 to 2022. Autoregressive Distributed Lag (ARDL) bound testing approach to co-integration is employed. The analysis reveals that there is long run relationship between (LPCI, INFR, EXCR, INTR, TROP and LAGDP) and LTAXR in Nigeria which confirms the results of co-integration equation that indicates a long run relationship (co-integration between the study variable).

The analysis revealed that the values of per capita income, exchange rate and interest rate have positive insignificant impact on tax revenue in Nigeria both in the long run and short run while trade openness have positive significant impact in the long run, while in the short run, it has a positive insignificant. However, agricultural GDP has a positive significant in both long run and short run. The positive impact of per capita income is due to the fact that increasing in the value of LPCI will increase individuals' purchasing power leading to higher consumption taxes like value added tax. While its insignificant might be as a result of high inequality in Nigeria. The positive impact exchange rate is due the fact that depreciating in Nigerian currency (Naira) inflates the value of imports, increasing customs duties and other tariffs, thereby boosting tax revenue. Also, the positive impact of interest rate is as a result of moderate interest rate in Nigeria during the period under study, this is because lesser interest rates stimulate borrowing and investment, fueling economic growth and hypothetically increasing tax revenue.

The positive impact of trade openness is due to the fact that increasing in trade openness leads to higher import volumes, resulting in higher customs duties and tariffs, consequently boosting tax revenue. The positive impact of agricultural GDP is due to the fact that strong agricultural sector creates income for farmers and agricultural-related businesses, contributing to overall economic growth, which in turn, can lead to increased tax revenue through various channels. The analysis results show that inflation rate have a negative insignificant in the long run and negative significant in the short run this is due to the fact that inflation erodes purchasing power thereby reducing consumer spending and economic activity which in turn in turn, can lead to lower tax revenue from consumption-based taxes like.

Therefore, the study recommended that government should invest in programs and infrastructure that support agricultural productivity and value addition, thereby increasing the sector's contribution to the overall tax revenues over the long run term. Government should also implement policies that foster economic growth, as growing economy generates higher incomes, which in turn can boost tax revenue. The study however recommended that government should implement policies that promote inclusive economic growth, aiming to reduce income inequality and lift the lower income earners of the population. This will not only improves societal wellbeing but can also lead to increased tax revenue as more individuals move in to higher income brackets. Government should also monitor inflationary pressures and adjust interest rates accordingly to support price stability, which can indirectly support tax revenue by maintaining consumer purchasing power.

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