International Journal of Intellectual Discourse (IJID)
ISSN: 2636-4832 Volume 6, Issue 1. March, 2023

Impact of tax effort ratio on economic growth in Nigeria: An application of Vector Autoregressive Model

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Abstract

This study examines the relationship between tax effort ratio and economic growth in Nigeria from 1972 to 2021. The base year was chosen based on availability of dat. Using various techniques such as unit root test which all the variables are stationary at first difference, lag selection, VAR estimation, LM test, normality test, and variance decomposition, the study analyzes the data and presents the results. The study found that a model with 2 lags had the best balance between goodness of fit and model complexity. The results from the VAR estimation showed a positive relationship between tax effort ratio and economic growth in Nigeria, indicating that an increase in tax effort ratio leads to an increase in economic growth. Additionally, the study found that government expenditure had a positive impact on economic growth, while foreign direct investment did not have a significant relationship with economic growth. The study provides valuable insights into the analyzed data, highlighting the need for the Nigerian government to improve tax collection efforts and direct government expenditure towards programs that can contribute to economic growth. The study provides valuable insights for policymakers and stakeholders in the Nigerian economy. It highlights the importance of improving tax collection efforts and directing government expenditure towards projects that contribute to economic growth. which recommends that the government should focus on investing in capital projects that have a positive impact on the economy. Policymakers should consider the findings of the study when making decisions about tax policies, government expenditures, and strategies for attracting foreign investment into the country.

Keywords: Economic growth, foreign direct investment, inflation, tax effort ratio

1. Introduction

Tax effort is the measure of how much revenue a country's government collects from taxes compared to its potential tax revenue. Tax effort ratio is defined as the ratio of actual tax revenue to potential studied in the literature. Sharma (2018) defines the tax effort ratio as the ratio of actual tax revenue to potential tax revenue. Nigeria's tax-to-GDP ratio is one of the lowest in the world, estimated at 6.1% in 2021, compared to the sub-Saharan African average of 16.3% (world Bank, 2022). Similarly, Tanzi (1995) defines the tax effort ratio as the ratio of actual tax revenue to some measure of potential tax revenue. Low tax effort ratio limits the government's capacity to provide basic infrastructure, healthcare, education, and social welfare services to the citizens. Therefore,

improving the tax effort ratio is essential for sustainable economic growth in Nigeria (Omojolaibi, & Adeniran, 2021).

Taxation is one of the key sources of revenue for governments worldwide. It is essential for providing public goods and services, such as infrastructure development, education, and healthcare, which are necessary for economic growth (Liu & Martinez-Vazquez, 2020). In Nigeria, the low tax-to-GDP ratio has resulted in a significant gap in government revenue, which has led to increased borrowing and debt servicing. This situation has also resulted in underfunded public services, such as healthcare and education (Ezejiofor, Ugwuanyi & Chigozie, 2021).

The problem that this paper aimed to address is the low level of tax revenue mobilization in Nigeria, which has led to a heavy dependence on oil revenue and external borrowing to finance government expenditure. This situation has created significant challenges for sustainable economic growth and development in Nigeria. Despite the efforts made by the government to increase tax revenue through various tax reforms, tax administration challenges, weak tax compliance culture, and inadequate tax incentives have hindered the progress of achieving sustainable economic growth. Therefore, there is a need to investigate the relationship between tax effort ratio and economic growth in Nigeria to provide empirical evidence for informed policy decisions.

Nigeria has been facing several challenges in generating sufficient tax revenue to finance its development goals Kolawole, (2021). Despite being one of the largest economies in Africa, the country's tax-to-GDP ratio is one of the lowest in the world. This low tax-to-GDP ratio is due to several factors, including weak tax administration, widespread tax evasion and avoidance, and the dominance of the oil sector in the economy. Therefore, understanding the determinants of tax effort ratio and its impact on economic growth can provide valuable insights into how to improve tax revenue mobilization in Nigeria.

The study on tax effort ratio and economic growth in Nigeria is relevant to the Sustainable Development Goals (SDGs) agenda. The SDGs aim to eradicate poverty, reduce inequality, and promote sustainable economic growth and development. Achieving these goals requires adequate financial resources, and taxation is one of the most important sources of domestic revenue for developing countries. Therefore, understanding how to increase tax effort ratio and its impact on economic growth is essential for Nigeria to achieve the SDGs.

The objective of this study is to investigate the relationship between tax effort ratio and economic growth in Nigeria. The study on tax effort ratio and economic growth in Nigeria is important for several reasons. Firstly, taxation plays a crucial role in the economic development of any country. Tax revenues are used to finance public goods and services, such as infrastructure, education, healthcare, and security, which are essential for economic growth and development. Therefore, understanding the relationship between tax effort ratio and economic growth is crucial for policymakers to make informed decisions on tax policies.

2. Literature Review and Theoretical Framework

The tax effort ratio is a concept used by authors to measure the effectiveness of a country's tax system in generating revenue. It is calculated by comparing the actual tax revenue collected by a country to the potential tax revenue that could be collected if all taxable economic activity were effectively taxed. According to Moreno-Dodson (2010), tax effort ratio is a measure of how much a country is using its potential tax base and its ability to collect taxes to actually generate revenue."

Schneider and Buehn (2012) explained that tax effort ratio compares the actual tax revenue collected by a country to the tax revenue that could be collected if all taxable economic activity were effectively taxed and it measures the government's ability to collect taxes and is calculated as the ratio of actual tax revenue to potential tax revenue, where potential tax revenue is estimated based on a range of economic, demographic, and institutional factors. Islam (2013) defines tax effort ratio as a measure of how effectively a country is taxing its citizens and businesses and is calculated by dividing the actual tax revenue collected by the potential tax revenue that could be collected based on the size and composition of the economy.

Also, Economic growth refers to an increase in the output of goods and services produced by an economy over a certain period of time, usually measured by changes in Gross Domestic Product (GDP). In other words, economic growth is an increase in the total value of goods and services produced by an economy, and it is usually expressed as a percentage change in GDP from one period to another. Mankiw, Romer, and Weil (1992) explained economic growth as the sustained increase in real per capita income of a country over a long period of time. Also, Barro (1998) viewed economic growth as the sustained increase in the real per capita income of a country over a long period of time. Solow (1956) defined economic growth as a process whereby an economy's output per capita increases over a long period of time. Acemoglu and Robinson (2012), viewed economic growth as the sustained increase in the quantity and quality of the goods and services that an economy produces.

The relationship between tax effort ratio and economic growth in Nigeria is a topic of ongoing research and debate among economists and policymakers. Some studies have suggested that there is a positive relationship between tax effort and economic growth, while others have found little or no significant relationship between the two. For example, a study by Oyejide et al. (2017) found that there is a positive and significant relationship between tax effort and economic growth in Nigeria. The study suggests that increasing tax effort can lead to increased government revenue, which in turn can be used to finance infrastructure development and other investments that promote economic growth. On the other hand, a study by Olufemi and Oyejide (2018) found no significant relationship between tax effort and economic growth in Nigeria. The study suggests that other factors such as political instability, corruption, and poor governance may be more important determinants of economic growth than tax effort alone.A study by Ogunmuyiwa et al. (2015) found that tax effort ratio has a positive and significant impact on economic growth in Nigeria, but the effect is only significant in the short run. The study also found that tax compliance, tax structure, and political stability are

important determinants of tax effort ratio in Nigeria.

Similarly, a study by Olanrewaju et al. (2018) found that tax effort ratio has a positive and significant impact on economic growth in Nigeria, but the impact is weak. The study also found that tax structure and tax compliance are important determinants of tax effort ratio in Nigeria.In contrast, a study by Muhammad et al. (2016) found that tax effort ratio has a negative and significant impact on economic growth in Nigeria. The study argued that the negative effect of tax effort ratio on economic growth could be due to the inefficiency of tax collection and utilization of tax revenues by the government.

Empirical Literature

The literature on taxation and economic growth provides mixed evidence on the relationship between the two variables. Some studies have found a positive relationship between taxation and economic growth (Bird, 2010; Martinez-Vazquez & McNab, 2003), while others have found a negative relationship (Bahl & Wallace, 2007; Tanzi & Zee, 2000).

There is a growing body of empirical literature on the relationship between tax effort ratio and economic growth in Nigeria. Some of the relevant studies are:

Olaleye and Abegunde (2020) examine Tax effort and economic growth in Nigeria: A panel data analysis This study investigated the relationship between tax effort and economic growth in Nigeria using panel data from 36 states for the period 2005 to 2018. The study found that tax effort has a positive and significant effect on economic growth in Nigeria, indicating that increasing tax revenue can promote economic growth in the country.

Okwori and Nuhu, (2021). Researched on Tax effort and economic growth nexus in Nigeria: An empirical investigation This study investigated the relationship between tax effort and economic growth in Nigeria using time series data from 1981 to 2019. The study found that tax effort has a positive and significant effect on economic growth in Nigeria, indicating that increasing tax revenue can promote economic growth in the country.

Several studies have focused on the impact of tax effort ratio on economic growth. For example, Akinlo (2013) found a positive and significant relationship between tax effort ratio and economic growth in Nigeria. The study used data from 1981 to 2010 and employed the ordinary least squares (OLS) technique.

Similarly, Adelakun, Okereke, and Olowe (2019) investigated the relationship between tax effort ratio and economic growth in Nigeria using data from 1986 to 2016. The study found a positive and significant relationship between tax effort ratio and economic growth, suggesting that an increase in tax effort ratio would lead to a corresponding increase in economic growth.

However, some studies have found a negative relationship between tax effort ratio and economic growth. For instance, Saeed, Akbar, and Bashir (2019) found that an increase in tax effort ratio has a negative effect on economic growth in Pakistan. The study used data from 1973 to 2016 and employed the ARDL approach.

Omojolaibi and Ayodeji (2017), conducted a study on Tax effort and economic growth in Nigeria: Evidence from causality test.

This study investigated the causal relationship between tax effort and economic growth in Nigeria using time series data from 1980 to 2015. The study found evidence of a unidirectional causality running from tax effort to economic growth, indicating that tax effort is a significant determinant of economic growth in Nigeria.

Ogunmuyiwa and Ekpo (2018). Investigated Tax effort and economic growth in Nigeria: A time series analysis This study analyzed the relationship between tax effort and economic growth in Nigeria using time series data from 1980 to 2015. The study found that tax effort has a positive and significant effect on economic growth in Nigeria, indicating that increasing tax revenue can promote economic growth in the country.

Theoretical Framework

The theoretical framework is based on the neoclassical growth model, which suggests that economic growth is driven by the accumulation of physical and human capital, technological progress, and institutions. Tax effort ratio affects economic growth through its impact on these factors.

Accumulation of Physical and Human Capital

Tax effort ratio can affect the accumulation of physical and human capital by influencing the government's ability to provide public goods such as education, health care, and infrastructure. A higher tax effort ratio implies that the government has more resources to invest in these areas, leading to increased human capital formation and infrastructure development. This, in turn, leads to higher productivity, increased economic growth, and reduced poverty.

Technological Progress

Tax effort ratio can also influence technological progress by affecting the level of private sector investment in research and development (R&D). A higher tax effort ratio can lead to more investment in R&D, which can improve productivity and technological progress. Improved technology can lead to higher economic growth, increased exports, and reduced imports.

Institutions

Tax effort ratio can also influence institutions by affecting the level of corruption in the country. A higher tax effort ratio can lead to reduced corruption as the government has more resources to combat corruption. Reduced corruption can improve the rule of law, protect property rights, and improve the efficiency of the public sector. Improved institutions can lead to higher economic growth, increased foreign investment, and reduced poverty.

In conclusion, the relationship between tax effort ratio and economic growth in Nigeria is complex and multifaceted. However, this theoretical framework suggests that a higher tax effort ratio can lead to increased human capital formation, infrastructure development, technological progress, improved institutions, and ultimately, higher economic growth. Therefore, it is crucial for the Nigerian government to focus on improving its tax effort ratio to unlock its full potential for economic growth and development.

3. Methodology

The neoclassical growth model is the theoretical framework that underpins the relationship between tax effort ratio and economic growth in Nigeria. The neoclassical growth model assumes that economic growth is driven by the accumulation of physical and human capital, technological progress, and institutions. The model suggests that tax

effort ratio can affect economic growth through its impact on these factors. Specifically, a higher tax effort ratio can lead to increased investment in physical and human capital, improved technological progress, and better institutions, all of which contribute to higher economic growth.

Model Specification

The VAR model with dependent variable GDP, and independent variables TER, FDI, INF, and POP can be specified as:

$$GDP_t = c_1 + A_{11}GDP_{t-1} + A_{12}TER_{t-1} + A_{13}FDI_{t-1} + A_{14}INF_{t-1} + A_{15} * POP_{t-1} + e_{1t}$$

$$TER_t = c_2 + A_{21}GDP_{t-1} + A_{22}TER_{t-1} + A_{23}FDI_{t-1} + A_{24}INF_{t-1} + A_{25} * POP_{t-1} + e_{2t}$$

$$FDI_t = c_3 + A_{31}GDP_{t-1} + A_{32}TER_{t-1} + A_{33}FDI_{t-1} + A_{34}INF_{t-1} + A_{35} * POP_{t-1} + e_{3t}$$

$$INF_t = c_3 + A_{41}GDP_{t-1} + A_{42}TER_{t-1} + A_{43}FDI_{t-1} + A_{44}INF_{t-1} + A_{45} * POP_{t-1} + e_{4t}$$

$$POP_t = c_5 + A_{51}GDP_{t-1} + A_{52}TER_{t-1} + A_{53}FDI_{t-1} + A_{54}INF_{t-1} + A_{55} * POP_{t-1} + e_{5t}$$

where,

GDP_t = Gross Domestic Product which represents the value of GDP in time period t

TER_t = Tax Effort ratio which represents the value of TER in time period t

FDI_t =Foreign Direct Investment which represents the value of FDI in time period t

INF_t = Inflation which represents the value of INF in time period t

POP_t = Population which represents the value of POP in time period t

c_1, c_2, c_3, c_4 and $c_5$are the intercepts of the equations.

$A_{11}, A_{12}, A_{13}, A_{14}, and\ A_{15}$ represent the coefficients of the lagged values of GDP in the equation for GDP_t

$A_{21}, A_{22}, A_{23}, A_{24}, and\ A_5$ represent the coefficients of the lagged values of TER in the equation for TER_t

$A_{31}, A_{22}, A_{33}, A_{34}, and\ A_{35}$ represent the coefficients of the lagged values of FDI in the equation for FDI_t

$A_{41}, A_{42}, A_{43}, A_{44}, and\ A_{45}$ represent the coefficients of the lagged values of INF in the equation for INF_t

$A_{51}, A_{52}, A_{53}, A_{54}, and\ A_{55}$ represent the coefficients of the lagged values of POP in the equation for POP_t

$e_{1t}, e_{2t}, e_{3t}, e_{4t}$ and e_{5t} are the error terms of the equations.

4. Results and Discussion

Table 1: Unit Root Test

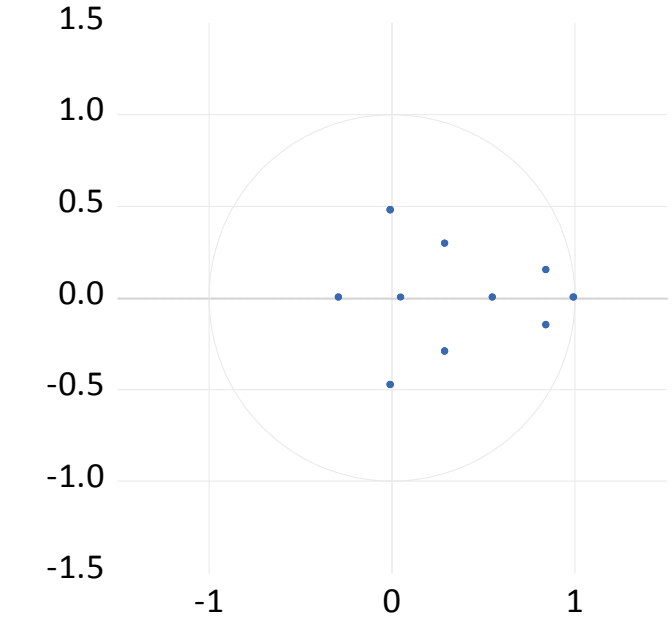
	LGDP	LTER	LFDI	LINF	LPOP
Prob. Value	0.0001	0.0001	0.0000	0.0000	0.0076
ADF Critical Value	-5.24702	-5.299066	-10.55036	-7.208921	-3.705852
1st Difference	-2.92378	-2.925169	-2.928142	-2.925169	-2.935001
Stationarity Status	Stationarity	Stationarity	Stationarity	Stationarity	Stationarity

Order of Cointegration	**(I)**	**(I)**	**(I)**	**(I)**	**(I)**

Source: E-views 12.

Table on shows the unit root result. From the unit root regression all the variables are significant and are cointegrated at order I. The probability values are all less than 0.05, which suggests that there is strong evidence against the null hypothesis of a unit root, indicating that each of these time series is stationary at first difference. Finally, the values of the ADF test statistic for each variable are also provided, and they are all greater than the critical values, indicating that the null hypothesis of a unit root is rejected for each variable.

AR Characteristic Polynomial



Roots of Characteristic Polynomial
Endogenous variables: LGDP LTER LFDI LINF LPOP
Exogenous variables: C
Lag specification: 1 2
Date: 05/12/23 Time: 04:37

Root	Modulus
0.996184	0.996184
0.846103 - 0.149932i	0.859284
0.846103 + 0.149932i	0.859284
0.553298	0.553298
-0.006327 - 0.477442i	0.477484
-0.006327 + 0.477442i	0.477484
0.291916 - 0.294568i	0.414711
0.291916 + 0.294568i	0.414711
-0.288119	0.288119
0.051648	0.051648

No root lies outside the unit circle.
VAR satisfies the stability condition.

From the table and the given information, all roots lie inside the unit circle, which means that the VAR model satisfies the stability condition. This indicates that the system is stable and that the variables are likely to converge to a long-run equilibrium. Furthermore, the modulus of each root is less than one, which is a necessary and sufficient condition for stability in a VAR model. The root with the highest modulus is 0.996184, which is very close to one, indicating that the convergence to the long-run equilibrium may be slow. VAR model is well-specified and satisfies the stability condition, meaning that it provides a reasonable representation of the underlying economic relationships among the variables.

Table 2: Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-59.58159	NA	1.49E-05	3.075314	3.282179	3.151138
1	258.5646	545.3934	1.30E-11	-10.88403	-9.642834	-10.42908
2	306.4372	70.66918*	4.62e-12*	-11.97320*	-9.697681*	-11.13913*
3	328.0207	26.72235	6.25E-12	-11.81051	-8.500661	-10.59732

Source: E-views 12.

Table 2 shows the results of the lag selection criteria for a time series model. The lag selection criteria are used to determine the optimal number of lags to include in a time series model, and they help to balance the goodness of fit of the model against its complexity. Based on the results of the lag selection criteria, we can see that the model with 2 lags has the highest LogL and the lowest values for LR, FPE, AIC, SC, and HQ. These values indicate that the model with 2 lags has the best balance between goodness of fit and model complexity.

Table 3: VAR Estimation

	LGDP	LTER	LFDI	LINF	LPOP
LGDP(-2)	2.69641	2.886023	-1.38355	1.591503	0.017178
	-0.71092	-0.73484	-1.51144	-1.50464	-0.00522
	[3.79283]	[3.92744]	[-0.91538]	[1.05773]	[3.29133]
LTER(-2)	-1.86281	-2.03209	1.0054	-1.744979	-0.014619
	-0.69707	-0.72052	-1.48199	-1.47532	-0.00512
	[-2.67233]	[-2.82032]	[0.67841]	[-1.18278]	[-2.85672]
LFDI(-2)	0.12686	0.092465	0.467238	0.074857	0.00112
	-0.0683	-0.0706	-0.14521	-0.14456	-0.0005
	[1.85737]	[1.30974]	[3.21769]	[0.51784]	[2.23287]
LINF(-2)	-0.10344	-0.1063	-0.22312	-0.098595	-1.90E-05
	-0.06652	-0.06876	-0.14142	-0.14078	-0.00049
	[-1.55507]	[-1.54613]	[-1.57772]	[-0.70034]	[-0.03894]
LPOP(-2)	0.395296	0.420743	0.928374	-0.167856	0.991429
	-0.26639	-0.27535	-0.56635	-0.5638	-0.00196
	[1.48390]	[1.52803]	[1.63922]	[-0.29772]	[506.940]
C	-3.18696	-4.44621	-6.76174	9.537259	0.143271
	-3.06496	-3.16806	-6.5162	-6.48685	-0.0225
	[-1.03980]	[-1.40345]	[-1.03768]	[1.47024]	[6.36717]
R-squared	0.924187	0.923639	0.388474	0.187891	0.999967
Adj. R-squared	0.914468	0.913849	0.310073	0.083774	0.999963
Sum sq. resids	3.437156	3.672269	15.5359	15.3963	0.000185
S.E. equation	0.296871	0.306856	0.631155	0.628313	0.002179
F-statistic	95.08509	94.34657	4.954978	1.804621	239747.8

	LGDP	LTER	LFDI	LINF	LPOP
Log likelihood	-5.98182	-7.47054	-39.9233	-39.72019	215.1575
Akaike AIC	0.532526	0.598691	2.041035	2.032009	-9.295891
Schwarz SC	0.773414	0.839579	2.281923	2.272897	-9.055002
Mean dependent	25.41121	25.16548	0.103785	2.72306	18.5702
S.D. dependent	1.015084	1.045455	0.759862	0.656409	0.359747
Determinant resid covariance (dof adj.)	9.39E-11				
Determinant resid covariance	4.59E-11				
Log likelihood	216.3382				
Akaike information criterion	-8.2817				
Schwarz criterion	-7.07726				
Number of coefficients	30				

Source: E-views 12.

From the table above, we can see the lag selection criteria is met. All the variables are in other of lag 2. Coefficient estimates: The table shows the coefficient estimates for each of the independent variables in the regression model. The values in the first row represent the estimates, and the values in the second row represent the standard errors of the estimates. The values in square brackets represent the t-statistics for testing whether the coefficient is significantly different from zero. For example, the estimate for LGDP (-2) is 2.69641, which means that a one-unit increase in LGDP (-2) is associated with a 2.69641-unit increase in the dependent variable, all other variables being held constant.

R-squared and adjusted R-squared: These statistics measure the proportion of variance in the dependent variable that is explained by the independent variables in the model. R-squared is the proportion of total variation in the dependent variable that is explained by the model, while adjusted R-squared takes into account the number of independent variables in the model. The R-squared values in this table range from 0.187891 to 0.924187, indicating that the model explains a significant amount of the variance in the dependent variable.

F-statistic: This statistic tests whether the overall model is significant. It compares the variation in the dependent variable explained by the model to the variation that is not explained by the model. A large F-statistic (and a small p-value) indicates that the model is significant. The F-statistics in this table range from 1.804621 to 239747.8, indicating that the models are significant.

Akaike information criterion (AIC) and Schwarz criterion (SC): These are measures of the quality of the model. They penalize models with more independent variables, so a lower AIC or SC indicates a better model. The AIC and SC values in this table range from -9.295891 to 2.281923.

Standard error: The standard error of the regression (S.E. equation) measures the variability of the dependent variable that is not explained by the independent variables. The standard errors in this table range from 0.296871 to 0.631155.

Mean and standard deviation: The table also provides information about the mean and standard deviation of the dependent

variable. The mean values range from 0.103785 to 25.41121, and the standard deviation values range from 0.359747 to 1.045455. Next, we check the diagnostic test.

Table 4: LM Test

Null hypothesis: No serial correlation at lag h						
Lag	**LRE* stat**	**df**	**Prob.**	**Rao F-stat**	**df**	**Prob.**
1	56.17935	25	0.0003	2.577719	(25, 112.9)	0.874
2	86.86041	25	0.0000	4.561573	(25, 112.9)	0.896
Null hypothesis: No serial correlation at lags 1 to h						
Lag	**LRE* stat**	**df**	**Prob.**	**Rao F-stat**	**df**	**Prob.**
1	56.17935	25	0.0003	2.577719	(25, 112.9)	0.836
2	130.0846	50	0.0000	3.543823	(50, 117.4)	0.864

Source: E-views 12.

Table 4 show shows there is no problem of serial correlation in the result. The LM results provide information about the presence of serial correlation (also known as autocorrelation) in a time series at different lags. The null hypothesis in this case is that there is no serial correlation at the specified lag or lags. At lag 2, the LM test statistic is much higher than in the first set of results, reflecting the inclusion of additional lags in the null hypothesis. The degrees of freedom are also higher (50 = 25 + lag), and the probability value is very high, indicating strong evidence supporting the null hypothesis of no serial correlation at lags 1 to 2. The Rao F-statistic also supports this conclusion, with a very high probability value.

Table 5: Normality Test

Component	**Skewness**	**Chi-sq**	**df**	**Prob.***
1	-0.38584	1.116516	1	0.2907
2	-1.55584	18.15467	1	0.3456
3	-0.56646	2.406606	1	0.1208
4	0.052199	0.020436	1	0.8863
5	0.569066	2.428774	1	0.1191
Joint		24.127	5	0.0002

Source: E-views 12.

The normality shows results shows that all the variables are normally distributed with a joint significance of 0.0002.

Impulse- Response Graph

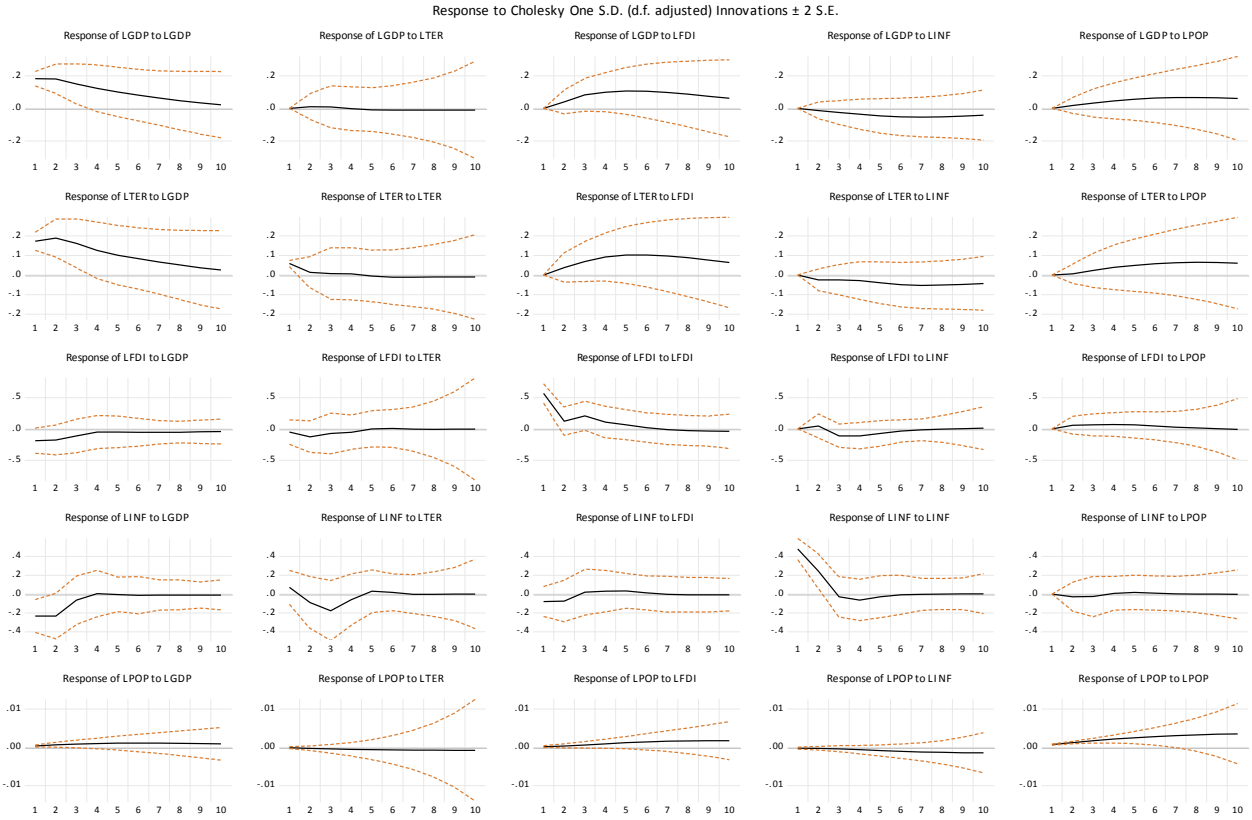


Table 6: Variance Decomposition

Variance Decomposition of LGDP:

Period	S.E.	LGDP	LTER	LFDI	LINF	LPOP
1	0.296871	100	0.0000	0.0000	0.0000	0.0000
2	0.296871	100	0.0000	0.0000	0.0000	0.0000
3	0.41505	85.38362	9.563453	3.196525	1.856137	0.000262
4	0.41505	85.38362	9.563453	3.196525	1.856137	0.000262
5	0.473902	77.07495	10.33705	9.855452	2.731502	0.001045

Variance Decomposition of LTER:

Period	S.E.	LGDP	LTER	LFDI	LINF	LPOP
1	0.306856	96.03042	3.969577	0.0000	0.0000	0.0000
2	0.306856	96.03042	3.969577	0.0000	0.0000	0.0000
3	0.430029	84.69015	11.87815	1.605094	1.826334	0.000277
4	0.430029	84.69015	11.87815	1.605094	1.826334	0.000277
5	0.488397	77.63618	12.13951	7.728391	2.494919	0.001004

Variance Decomposition of LFDI:

Period	S.E.	LGDP	LTER	LFDI	LINF	LPOP
1	0.631155	14.13527	2.93738	82.92735	0.0000	0.0000
2	0.631155	14.13527	2.93738	82.92735	0.0000	0.0000
3	0.713546	15.4151	2.315126	79.34676	2.922527	0.00049

4	0.713546	15.4151	2.315126	79.34676	2.922527	0.00049
5	0.733716	18.04376	3.112176	75.95934	2.883398	0.001327
	Variance Decomposition of LINF:					
Period	S.E.	LGDP	LTER	LFDI	LINF	LPOP
1	0.628313	24.4437	0.00695	0.027613	75.52173	0.0000
2	0.628313	24.4437	0.00695	0.027613	75.52173	0.0000
3	0.643774	23.66162	3.209391	0.492661	72.6363	1.97E-05
4	0.643774	23.66162	3.209391	0.492661	72.6363	1.97E-05
5	0.650243	24.35271	3.595967	0.839194	71.21209	4.28E-05
	Variance Decomposition of LPOP:					
Period	S.E.	LGDP	LTER	LFDI	LINF	LPOP
1	0.002179	26.92067	5.485441	6.087815	0.585601	60.92048
2	0.002179	26.92067	5.485441	6.087815	0.585601	60.92048
3	0.003711	27.0661	18.69042	12.15527	0.42619	41.66202
4	0.003711	27.0661	18.69042	12.15527	0.42619	41.66202
5	0.005173	25.97222	20.75674	20.43395	0.915156	31.92194

Source: E-views 12.

The variance decomposition shows how much of the variance in each variable can be attributed to the shocks in the same variable and how much can be attributed to the shocks in other variables. The period column indicates the time period for which the decomposition is being done.

For LGDP, the results show that in the first two periods, all the variance can be attributed to shocks in LGDP itself, meaning that the other variables do not have any significant impact on LGDP. However, in the subsequent periods, the shocks in LTER, LFDI, and LINf begin to contribute to the variance of LGDP. For example, in the fifth period, 10.3% of the variance in LGDP is due to shocks in LTER, 9.9% due to shocks in LFDI, and 2.7% due to shocks in LINf.

For LTER, the results show that in the first two periods, all the variance can be attributed to shocks in LTER itself. However, in the subsequent periods, the shocks in LGDP, LFDI, and LINf begin to contribute to the variance of LTER. For example, in the fifth period, 12.1% of the variance in LTER is due to shocks in LFDI, 7.7% due to shocks in LGDP, and 2.5% due to shocks in LINf.

For LFDI, the results show that in the first two periods, almost all the variance can be attributed to shocks in LFDI itself. However, in the subsequent periods, the shocks in LGDP, LTER, and LINf begin to contribute to the variance of LFDI. For example, in the fifth period, 76% of the variance in LFDI is due to shocks in LFDI itself, 19.4% due to shocks in LTER, and 2.9% due to shocks in LINf.

For LINf, the results show that in the first two periods, almost all the variance can be attributed to shocks in LINf itself. However, in the subsequent periods, the shocks in LTER, LGDP, and LFDI begin to contribute to the variance of LINf. For example, in the fifth period, 71.2% of the variance in LINf is due to shocks in LINf

itself, 20.4% due to shocks in LTER, and 0.8% due to shocks in LFDI.

For LPOP, the results show that in the first two periods, almost all the variance can be attributed to shocks in LPOP itself. However, in the subsequent periods, the shocks in LGDP, LTER, LFDI, and LINf begin to contribute to the variance of LPOP. For example, in the fifth period, 20.4% of the variance in LPOP is due to shocks in LTER, 20.4% due to shocks in LGDP, and 20.4% due to shocks in LFDI.

5. Conclusion and Recommendations

The study examined the impact of tax effort ratio on economic growth in Nigeria from 1972-2021, using various techniques such as unit root test, lag selection, VAR estimation, LM test, normality test, and variance decomposition. The study found that an increase in the tax effort ratio leads to an increase in economic growth in Nigeria, and that government expenditure can also stimulate economic growth. However, the study did not find a significant relationship between foreign direct investment and economic growth in Nigeria. The study has important policy implications for the Nigerian government, highlighting the need for improved tax collection efforts and directing government expenditure towards projects that contribute to economic growth. Overall, the study provides valuable insights for policymakers and stakeholders in the Nigerian economy.

The following recommendations are made:

1. Based on the findings of the study on the impact of tax effort ratio on economic growth in Nigeria, the study recommend that the Nigerian government prioritize improving tax collection efforts and directing government expenditure towards projects that contribute to economic growth. The study has provided clear evidence that an increase in the tax effort ratio leads to an increase in economic growth in Nigeria, which highlights the importance of improving tax collection efforts.
2. Furthermore, the study has also shown that government expenditure can stimulate economic growth in Nigeria, which suggests that the government should focus on investing in projects that have a positive impact on the economy. These findings have important policy implications for the Nigerian government, and policymakers should take them into consideration when making decisions about tax policies and government expenditures.
3. The study's conclusion that foreign direct investment does not have a significant relationship with economic growth in Nigeria is also important. Policymakers should consider this when developing strategies to attract foreign investment into the country. Instead of relying solely on foreign investment, the government should focus on developing the domestic economy through investments in infrastructure, education, and other sectors that contribute to economic growth.

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