



# Internally Generated Revenue (IGR) and the Economic Viability of States in Nigeria

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## Research Article

### Abstract

**Purpose:** The purpose of this study is to investigate Internally Generated Revenue (IGR) and the Economic Viability of States in Nigeria using State Government Debt Stock. Specifically, the study seeks to determine the effect of IGR on State government expenditure.

**Methods:** Secondary data were used for this study. It used an annual panel data set spanning from 1986 to 2021 for six states each from Nigeria's six geopolitical zones. A Panel Vector Error Correction Model (PVECM) was used as the method of analysis.

**Results:** Results showed that the IGR of States in Nigeria had a positive effect on State government expenditure. The Impulse Response Function of expenditure to shocks from IGR indicates that IGR for the periods under analysis positively affected State government expenditure, increasing their expenditure profile for the majority of the period under analysis. The result of the variance decomposition test of State government total debt stock (TDS) shows that IGR had the greatest shock on the total debt stock of State governments in the country after its own shock. The findings also revealed a mixed and varied outcome, demonstrating both a positive and negative influence of IGR on the overall debt stock of the state government.

**Implications:** The study is expected to contribute to good economic management such as managing the debt load at reasonable levels, as well as adequate economic planning backed by cost-effective expenditure. It will also contribute to the economic sustainability of Nigerian states. The uniqueness of this research is obvious in its ability to address the statewide problem of over-dependence on the federal government's allocation.

**Keywords:** Internally Generated Revenue, Economic viability, Shock, Nigeria

## 1. Introduction

A lot of attention has been focused on research around the economic viability of states in Nigeria. This is because of the non-performing nature of Nigerian sub-regions and the inability of these sub-regions to meet up both growth and developmental gaps. Revenue generation and its sustainability is of paramount importance as a result of the fact that revenue represents the life wire of establishments both in developed and developing countries. The importance of revenue generation, allocation, and distribution towards maintaining both the existing and new socio-political and economic structure in any economy cannot be overemphasized (Morufu & Babatope, 2017). Revenue generation ensures financial viability which represents the ability to generate sufficient income to meet operating payments and debt commitments, and,

where applicable, to allow growth while maintaining service levels. An economy can continue to achieve its operating objectives and fulfill its mission over the long term.

Angahar & Abur (2022) put it clear that the non-oil revenue sector pulls and distributes a lot of resources for the continuous functioning of the economy. Nigeria is said to be blessed with abundant human and natural resources, but the government's priority since independence has been crude oil discovery and exportation, at the expense of other economic activities that may provide much-needed foreign exchange revenues. The constant drop in oil income has resulted in a reduction in money available for distribution to state governments. As a result, the requirement to generate money internally has become critical. This need encourages the state government to seek new sources of revenue or to become more aggressive and imaginative in collecting money from existing ones (Aimurie, 2012). According to Nwafor & Onyejiaka (2018), most democratically elected governments have increased land-based taxes to boost internal income. In recent years, the issues of resource control, revenue allocation, and fiscal federalism have dominated discussions at various levels of Nigeria's political debate (Omodero, Ekwe & Ihendinihu, 2018). Like most federal systems, Nigeria has a revenue distribution system in which the federal government shares revenue with the state and local governments. Different formulas at different times have been adopted. Similarly, at different times, ad hoc commissions have been set up to determine the allocation formulae and criteria. Between 1946 and 1979, there were eight such commissions on revenue allocation. It was not until 1988 that a permanent body was created to monitor, review, and advise the federal government continually. The new body called the National Revenue Mobilization, Allocation, and Fiscal Commission, represents a structured attempt to replace the ad hoc approaches to effecting changes in the revenue allocation in the country; this body is enshrined in the 1989 Constitution (Olofin, Olubusoye, Bello, Salisu, & Olalekan 2012).

Despite these efforts, revenue allocation has remained a contentious issue among the three tiers of government in Nigeria. Within the last decade, the 36 state governments have been at daggers-drawn with the federal government over the formulation of a revenue-sharing formula that would be acceptable to all the stakeholders. One major impact of this seemingly never-ending controversy is the fact that fiscal federalism in Nigeria has not been able to contribute optimally to social and economic development (Asimiyu & Kizito, 2014).

The institutions and processes supporting internally generated revenue among Nigerian States face significant challenges. Behind the low revenue numbers and the inability of States to meet obligations from internal sources are a series of other constraining factors. Given the state of State finances and the global downturn in commodity prices, though difficult, these challenges are not altogether insurmountable. While questions have been raised about the viability of some Nigerian States in the past, the reality is that most States in the federation can generate much more revenue internally to meet government expenses than they are doing right now given the right institutions and processes. As such, the study assesses the impact of IGR on the Economic viability of States in Nigeria.

## **2. Literature Review**

### **2.1. Concept of Internally Generated Revenue (IGR)**

Internally Generated Revenue (IGR) in Nigeria is the money generated by state governments inside their jurisdiction (Igbini, 2018). Tax revenues, non-tax revenues, and other miscellaneous sources are among the different sources of internal income accessible to state governments. PAYE (Pay As You Earn), direct assessment, withholding tax, property tax, capital gains tax for individuals, sales or consumption tax, pool betting taxes, lottery and casino taxes, business premises and registration fees, development levies for taxable individuals, fees for right of occupancy on State-owned urban land, market taxes, and levies are all examples of tax income. Earnings and sales, penalties and fees, licenses, rent on government buildings, and interest repayment and dividends are all examples of non-tax income.

### 2.1.1. Economic Viability

According to Morufu & Babatope (2017), a sustainable state has a stable polity, the ability to implement a budget in full transparency, update and maintain current infrastructure, pay government personnel, and carry out planned capital infrastructural growth. A sustainable state should be able to quote savings into a consolidated fund to exist for at least three months without the assigned money from the Federation Account. If internally generated income (IGR) is considered a criterion for viability, many Nigerian states are not viable.

Economic viability, according to Asimiyu & Kizito (2014), refers to the capacity to produce enough revenue to cover operational expenses, and debt obligations, and, when relevant, allow for growth while maintaining service levels. An economy can meet its operating objectives and fulfill its mission over the long run.

## 2.2. Theoretical Literature

The study reviewed several related theoretical literature. Among them are Wagner's theory of the State, and Peacock and Wiseman's theory.

### 2.2.1 Wagner's Theory

Writing during a period of rapid urbanization and industrialization in the late nineteenth century, Wagner observed that economic development in countries undergoing industrialization was being accompanied by a growing public activity relative to the economy. He formulated a study of the economic history of the industrialization of European countries such as Britain and Germany, as well as the United States and Japan in the nineteenth century. Based on this study, he proposed a hypothesis to explain the observed phenomenon of the growth of public activity relative to the economy in industrializing economies. *Wagner & Weber (1977)*, stated their hypothesis as follows: "Historically there exists a clear tendency for an expansion of public activity together with the progress of the economy" (Biehl, 1998).

Wagner based his hypothesis on several underlying assumptions, an organic view of the state being one of them. In the light of the nationalistic purposes of the 'socialists of the chair', of which he was a prominent member, Wagner based this organic view on the principle of state intervention in many phases of national life. Biehl, (1998) translated Wagner's second edition of *Grundlegung*, 'the foundation of political economy'. In it, Wagner criticized the classical theorists because their view of the private system could not deal adequately with the entire task of economic organization and that the private system is often unable to adequately satisfy public needs. Therefore, Wagner proposed that the state is needed to enforce and develop the legal basis of the private system which represents the modern system of free competition. Wagner's organic view (emphasizing the collective economy visible in the public sector) can therefore be contrasted with the individualistic economy visible in the private system (Clark, 1940). However, Wagner argued that, in a capitalist society, both spheres of activity, public and private, satisfied a wide range of services in the economy. Wagner noted that: "In order to maximize the sum of the goods and optimize distribution, a combination of the two systems must be sought. The optimal combination will change as the context of economic activity changes" (Biehl, 1998).

In clarity, Wagner views the state, represented by government activity, as an organic part of the social and economic system, and he expected that the state would tend to grow proportionally with the growth of the economy as a whole. It appears that Wagner sees a relationship between the size of government in the economy and the total level of economic activity in that economy. This relationship is causal with causation running from the level of total activity in the economy to the level of government activity in the economy.

### **2.2.2 Peacock and Wiseman Theory**

Peacock and Wiseman (1961), hereafter referred to as P-W adopted an inductive approach to explaining the growth of government expenditure. When P-W observed that expenditures over time appeared to outline a series of plateaus separated by peaks and that these peaks coincided with periods of war and preparation for war they were led to expound the Peacock and Wiseman theory, also known as the “displacement effect” hypothesis.

The three basic propositions underlying the P-W analysis are that; (i) governments can always find profitable ways to expend available funds, (ii) citizens, in general, are unwilling to accept higher taxes, and (iii) governments must be responsive to the wishes of their citizens. From these basic tenets, P-W derives the key concept of a "tolerable burden of taxation".

It is assumed that notions about taxation remain fairly stable in peacetime. As a consequence, the limited revenue capacity of the government in peacetime prevents major increases in expenditures. Therefore, in settled times the desired government expenditures and the limits of taxation are likely to diverge. During periods of social upheaval such as war, this divergence is likely to be narrowed, permanently displacing the burden of taxation upward. The result is the attainment of a new expenditure plateau at a higher level than before the onset of the upheaval. In times of crisis formerly unacceptable revenue-raising methods will be tolerated, and (it is claimed) the higher tax tolerance will persist even after the crisis subsides, thus enabling the government to implement expenditure programs that it previously desired but could not finance. Furthermore, P-W argues that war brings into focus problems that were not identified before. This is called the inspection effect.

Although the displacement hypothesis was induced from a study of British data between 1890 and 1955, P-W claims that it gives us an approach to the subject that might be equally fruitful in studying other countries or periods. Despite their assertion of the validity of the displacement effect across countries and periods, the authors hold that they are not seeking to find universal laws, but rather "a way of looking at year-to-year changes in government spending". But, as Rosenfeld (2014) points out, this is not what they do, since there is no attempt to study cyclical variations around underlying expenditure trends in their study. Thus, the displacement effect is undoubtedly an attempt to explain why the (horizontal) trend line shifts upward in discrete steps over time. Therefore, the displacement effect is a theory about the secular behavior of government spending, comparable, for instance, to Wagner's famous "Law of expanding state activity". Even if P-W makes the reservation that the displacement effect should not be assumed to govern the growth of public expenditures in all countries at all times, one can safely conclude that the effect is assumed to apply to the two world wars.

P-W does not deny that other more permanent factors may also influence the growth of government spending. The effects of three such factors are examined by P-W, namely changes in population, prices, and unemployment (the business cycle). It is found to make little difference whether government expenditures are measured per capita or not. When the effects of price changes are removed the time pattern of spending growth remains virtually unchanged. When P-W discuss price changes their primary interest is not relative prices, but rather the possible effect of general inflation (or deflation) on public revenues through fiscal drag. Hence, the more recent emphasis in the literature on the productivity lag in public production as one of the main causes of the growth of exhaustive expenditures, however, Beck (1981) is of no concern to P-W. This is quite consistent since they presume that government expenditures are determined from the financing side, rather than via the demand for public services by the citizenry. Relative prices may be of importance in determining the composition of aggregate public spending, especially the division between exhaustive expenditures and transfer payments. However, P-W assumes that these have little or no bearing on the level of total expenditures, which they believe is determined from the revenue side. Finally, although P-W finds support for a short-run positive relationship between government expenditures and the rate of unemployment, they claim that "there was no permanent change in the level of expenditures

following upon periods of unemployment". Consequently, we may conclude that P-W finds that the pattern of expenditure development is mainly dictated by the displacement effect.

In the modern world, a number of countries are incurring public expenditure much beyond their limit, without facing a worse situation of inflationary pressure. The impact of budgetary spending on the generation of the inflationary situation; depends upon the manner and nature in which public expenditure is incurred.

Inflation is a complex economic phenomenon influenced and characterized by a number of mutually exclusive and interdependent factors. Hence we can only fairly conclude that in a market economy, increasing state activity may create inflationary pressure.

### 2.3. Empirical Literature

To assess the potential for independent revenue sources available to this tier of government, Fasoye (2020) looked at the factors that determine the Internally Generated Revenue (IGR) of State governments in Nigeria. The PAYE and road taxes were found to be the primary determinants of IGR for the States, as they appeared to be less affected by the prevalence of corrupt practices in Nigeria's public sector. This information was obtained using the Fully Modified Ordinary Least Square (FMOLS) technique. The study came to the conclusion that State governments in Nigeria have over the years fallen short of fully utilizing other internal revenue sources available to them.

Nwafor, Obineme, & Okey (2021) investigated the returns from land-based revenue and internally produced revenue after budgeting. It also contrasts the growth rates of both throughout this period, as well as the contribution of land-based revenue to the state's domestically produced revenue. Using a descriptive technique, the study discovered that Abia state failed to realize what was anticipated nearly throughout the time, that the growth rate of both has remained negative, and that the contribution of land-based tax income to domestically produced revenue was less than 5% on average. The research advocated for the creation of custom software to close leakages, decrease fraud and corruption, and encourage stakeholders to conduct a daily inventory of their income performance before the end of the year.

Nkechi & Onuora (2018) investigated the effect of internally generated revenue on the infrastructural development of the southeastern states in Nigeria. The ex-post facto design was used in the study. Secondary data were used, and they were extracted from budget estimates of each of the five South Eastern States of Imo, Abia, Ebonyi, Enugu, and Anambra state from the period 2013-2017. The study employed descriptive statistics, correlation, and linear multiple regression for data analysis and data interpretation. Findings from the study revealed that there is a significant relationship between internally generated revenue and the cost of infrastructure in the South East States as of the date of the study, thus suggesting that government should increase IGR in order to meet up the cost of infrastructure.

Amin (2018) examined the sources of revenue generation, the capacity of the Asa local government area of Kwara State in generating revenues for developmental programs, and the extent to which the generated revenues have been used for community development in the local government. The study used both primary and secondary data. Two hundred and eighteen (218) questionnaires were received and analyzed using the Statistical Package for Social Sciences (SPSS) software. The finding from the study showed that: Asa local government generates revenues from internal and external sources. External sources are the statutory allocation from federal accounts and borrowed money from the State government. The local government generated huge amounts of revenue from market rates and levies and permit fees on land and establishment. Tax enforcement is not efficient and a majority of the respondents agreed that local government officers are more efficient than consultants. The majority of the respondents agreed that generated revenue supports the availability of boreholes and well water but disagreed that the grading of roads is executed every quarter through internally generated revenue. The majority of the respondents also disagreed that the level of

development has encouraged people to pay taxes and strongly disagreed that Asa is ahead of other local governments in the provision of basic amenities and disagreed that IGR in Asa is used to build shopping complexes and modern market in Asa local government area.

Morufu & Babatope (2017) appraised the influence of IGR on the revenue profile of South Western State governments of Nigeria and how this has impacted their capital expenditure between 2006 and 2015. The research design adopted was *expo facto* and descriptive research of a survey type. The adopted descriptive statistics and OLS Multiple regression analysis to carry out its study. Three states Osun, Ondo, and Ekiti were selected from the six Southwestern states to form the sample for the study. Data were collected from secondary sources where specific variables such as State IGRs and revenue profile/total revenue and capital expenditure were extracted from the financial statements of the selected states collected from the State Government's Accountant General Offices for the period. Findings from the study showed that there was a significant difference between the major components of IGR of the sampled States except for taxes. The result of the study further revealed that there was a significant positive correlation between internally generated revenue and the revenue profile of Ekiti, Osun, and Ondo States. The study further showed that the IGR had no significant influence on the capital expenditure of Ekiti and Ondo State respectively. However, there was a significant influence of Osun state IGR on capital expenditure.

Peter & Ferdinand (2018) analyzed the relationship between internally generated revenue and capital expenditure utilization in Cross River State, Nigeria, from 2007 to 2015. Secondary data sought from the Cross River State budget office, internal revenue service, and Ministry of Finance were used for the study. Descriptive statistics were used to analyze the relationship between internally generated revenue and capital expenditure utilization in Cross River State. Findings from the study indicate that an increase in government expenditure without corresponding revenue will widen the budget deficit, stating that the Cross River State government should increase the size of its internally generated revenue to accommodate the capital expenditure of the state.

Ironkwe & Ndah (2016) investigated the impact of IGR on the performance of local governments in Rivers State. The *ex-Post Facto* research design or causal-comparative design was adopted for the study. Ogba, Egbema, and Ndoni local government councils were purposefully selected for the study. Statistical analysis was performed using data from the financial statement of the council from 2006 to 2013 sourced from the office of the auditor general for local government. A major finding of the study was that tax revenue displayed a positive but insignificant influence on road construction and maintenance. Notwithstanding the insignificant influence of tax revenue on road construction and maintenance, the study concluded that tax revenue and non-tax revenue are vital ingredients in improving the performance of local government councils in Rivers State.

Asimiyu & Kizito (2014) carried out a study titled 'the analysis of IGR and its Implications on fiscal viability of state governments in Nigeria'. The study examined the growth rate of state governments' IGR in Nigeria and also compared the growth rate of IGR in urban and rural states as well as also investigating the ability of IGR to finance state governments' expenditures. The scope of the paper covers 5 states randomly selected from the 36 states in Nigeria between 1999 and 2011. Secondary data were collected from CBN Annual Statistical Bulletin. The data were analyzed using descriptive statistics such as mean/averages, variance, percentages, tables, and charts. Findings from the study revealed that overall, the growth rate of state governments' IGR was 20.1 percent which is very low, and this growth rate of IGR is higher in rural states than in urban states. It was also discovered that the growth rate of State governments' recurrent and total expenditures was 30 percent and 34.2 percent, respectively, and these growth rates are higher than the growth rate of IGR. It was further discovered that the IGR of urban states financed a greater proportion of their recurrent and total expenditures than the IGR of rural states. A direct relationship was found to exist between the growth rates of IGR and capital expenditures.

### 3. Methodology

Secondary data was employed for this study. It used an annual panel data set spanning 1986 to 2021 for six states each from Nigeria's six (6) geopolitical zones. Taraba State from North East, Enugu State from South East, Kaduna State from North West, Kogi State from North Central, Lagos State from South West, and Rivers State from South-South. For each year, the data were sourced collectively from each State's Finance Ministry, the National Bureau of Statistics (NBS), and Nigeria's Budgets Figures.

A Panel Vector Error Correction Model (PVECM) was used as the method of analysis to carry out the 1<sup>st</sup> and the 2<sup>nd</sup> objectives of this study which were to determine the effect of IGR on the expenditure of selected States in Nigeria and to assess the effect of IGR in managing the total debt stock of selected states the country.

The PVECM is an appropriate modeling strategy when the variables are co-integrated. It is useful when a long-run forecast is desired. If non-stationary time series data are integrated of the first order or are co-integrated, PVECM is used to examine both the short-run and the long-run dynamics of the variables. Hence, PVECM is a restricted VAR model. The PVECM is a variant of the least square regression approach that focuses on the lags of both the dependent and the independent variables in a model.

#### 3.1. Model Specification

As a result, the study employed IGR, State government spending, and State government total debt stock for the selected States within the nation in its model specification, which was modified and built from the study by Nkechi and Onuora (2018). The variable ordering for determining the impact of IGR on the fiscal viability of Nigerian state governments is as follows: IGR, total debt stock (TDS), and finally spending (EXPEN).

Two empirical models were specified in line with the empirical objectives of this study. Specified in VECM form, each of the variables is a function of itself and other variables in the model as given in Equations 1 and 2:

$$EXPEN_t = \alpha_0 + \sum_{t=0}^p \alpha_1 EXPEN_{t-1} + \sum_{t=0}^p \alpha_2 IGR_{t-1} + \sum_{t=0}^p \alpha_3 TDS_{t-1} + \varepsilon_t \quad (1)$$

$$TDS_t = \beta_0 + \sum_{t=0}^p \beta_1 TDS_{t-1} + \sum_{t=0}^p \beta_2 IGR_{t-1} + \sum_{t=0}^p \beta_3 EXPEN_{t-1} + \varepsilon_t \quad (2)$$

*Apriori Expectation: IGR, EXPEND > 0, TDS < 0.*

where,  $\alpha_0$ , and  $\beta_0$  are the intercepts of Equations 1 and 2, respectively;  $\alpha_1$  to  $\alpha_3$ , and  $\beta_1$  to  $\beta_3$  are the coefficients of the variables, while  $\varepsilon_t$  in each equation represents the error term. *IGR* represents Internally Generated Revenue, *EXPEN* stands for expenditure, and *TDS* represents total debt stock.

The structural causal framework for this study can be written in the PVECM and matrix format as shown in Equation 3:

$$\begin{bmatrix} \Delta IGR_{it} \\ \Delta TDS_{it} \\ \Delta EXPEN_{it} \end{bmatrix} = \begin{bmatrix} \alpha_{1j} \\ \alpha_{2j} \\ \alpha_{3j} \end{bmatrix} + \sum_{k=1}^{q=1} \begin{bmatrix} \beta_{11ik}(L)\beta_{12ik}(L)\beta_{31ik}(L) \\ \beta_{21ik}(L)\beta_{22ik}(L)\beta_{23ik}(L) \\ \beta_{31ik}(L)\beta_{32ik}(L)\beta_{33ik}(L) \end{bmatrix} \begin{bmatrix} \Delta IGR_{it-k} \\ \Delta TDS_{it-k} \\ \Delta EXPEN_{it-k} \end{bmatrix} + \begin{bmatrix} \lambda_{1j} ECT_{it-1} \\ \lambda_{2j} ECT_{it-1} \\ \lambda_{3j} ECT_{it-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \\ \varepsilon_{3it} \end{bmatrix} \quad (3)$$

Where, *IGR*, *TDS*, and *EXPEN* are as earlier defined, and these variables alternate in taking the dependent and explanatory variable positions in the model,  $\Delta$  is the first difference operator ( $I-L$ );  $i=1, \dots, N$ ;  $t=1, \dots, T$ ;  $\alpha_s$ ,  $\beta_s$  and  $\lambda_s$  ( $j=1, \dots, 3$ ) are parameters to be estimated;

$\varepsilon_{jt}$  ( $j=1, \dots, 3$ ) are white noise error terms;  $ECT_{it-1}$  are the lagged values of the error correction terms from the co-integration regressions, while  $\lambda_s$  are speed of adjustment along the long-run equilibrium path.

#### 4. Analysis of Result

##### 4.1. Panel VECM Estimation

The panel unit root tests and the descriptive statistics were carried out as the pre-estimation test for this study.

##### 4.1.1 Panel Unit Root Test

The panel unit root test was carried out in Table 1 using the Levin, Lin, and Chu (LLC) and the Im, Pesaran, and Shin (IPS) tests, which assume a common unit root process and an individual unit root process respectively to assess the stationary of the panel data.

**Table 1: Results of Unit Root Test**

Variable	Order	LLC Test	IPS Test
IGR	1(0)	3.72848 (0.9999)	-3.49234 (0.9998)
	1(1)	-4.38387** (0.0000)	-3.20565** (0.0007)
TDS	1(0)	3.80070 (0.9999)	4.14222 (1.0000)
	1(1)	-5.97324** (0.0000)	-2.93249** (0.0017)
EXPEN	1(0)	0.79258 (0.7860)	1.13996 (0.8728)
	1(1)	-4.96795** (0.0000)	-2.85798** (0.0021)

\*\* indicates a 5% significance level. P-values are in parentheses. Automatic lag length selection based on Schwarz Info Criterion.

Source: Author's Computation using E-views.

The result of the panel unit root test of all the variables were presented in Table 1. A test is stationary where its critical value is statistically less than the 5% level.

The result of both the Levin, Lin, and Chu (LLC) and the Im, Pesaran, and Shin (IPS) tests indicated that the panel data set of IGR, TDS, and EXPEN for both tests were all not stationary at levels (1(0)). They were all stationary at their first difference for both the LLC and the IPS. These tests indicated that the panel data set for this study met the stationarity condition for carrying out the panel VECM procedure.

##### 4.1.2 Descriptive Summary Statistics

The result in Table 2 provides a useful summary of descriptive statistics.

**Table 2: Descriptive Statistics**

	IGR	TDS	EXPEN
Mean	69.58317	169.5578	209.5832
Maximum	398.7300	965.4200	796.7200
Minimum	2.220000	12.53000	43.27000
Std. Dev.	105.3256	222.2505	196.4191
Skewness	1.777945	2.385514	1.341900
Kurtosis	4.965882	8.076103	3.801411
Jarque-Bera	41.27260	121.3238	19.61260
Probability	0.000000	0.000000	0.000055

Source: Author's Computation using E-views.

Given the mean values of each data set, evidence of variations was observed in the data set as shown by the difference between the minimum and maximum values of both distributions; further confirmation of this is the reported high standard deviation values for the panel data set. The skewness of the dataset indicated that

slight deviations from the mean were positively skewed for all three data-set. The kurtosis indicated that all three data-set were platykurtic, indicating the presence of extreme outliers in the data sets. Additionally, the probability of the Jarque-Bera statistics conducted at the 5% level indicated that all three data sets were not normally distributed. However, following Ashcraft (1998), a multivariate framework does not require the normality assumption.

#### 4.1.3 Optimal Lag Length Selection Result

The lag length selection criterion to determine the optimal lag structure to employ in carrying out the panel VECM analysis is presented in Table 3. This test used the lag length selected by the Schwarz information criterion (SIC) for its estimation.

**Table 3: Optimal Lag Length Selection Criteria Result**

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-536.1717	NA	2.86e+09	30.28732	30.68320	30.42549
2	-503.6778	54.15658*	7.82e+08	28.98210	29.77386*	29.25844*
3	-493.7523	14.88824	7.61e+08*	28.93068	30.11832	29.34520
4	-484.3758	12.50201	7.81e+08	28.90977*	30.49329	29.46246

\* indicates lag order selected by the criterion

Source: Author's Computation using E-views.

Where, LR: sequential modified LR test statistic (each test at 5% level),

FPE: Final prediction error, AIC: Akaike information criterion,

SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Following the optimal lag structure selected by the SIC in Table 2, this study adopted 2 lags in carrying out the panel VECM analysis.

#### 4.1.4 Panel Co-Integration Tests

In Table 4, the Pedroni and Kao residual co-integration tests were conducted to determine the existence of a long-run relationship in the model. Both tests were conducted at the 5% level of significance.

**Table 4: Co-integration Test**

Test	Type	Statistics
Pedroni Test	Panel v-Statistic	1.631437 (0.0514)
	Panel rho-Statistic	0.939224 (0.8262)
	Panel PP-Statistic	-0.536854** (0.0253)
	Panel ADF-Statistic	-1.872801** (0.0305)
	Group rho-Statistic	1.807583 (0.9647)
Kao Test	Group PP-Statistic	-2.841693** (0.0022)
	Group ADF-Statistic	-2.629962** (0.0043)
	ADF t-Statistics	-2.899562** (0.0019)

\*\*denotes significance at the 5% level. P-values are in parentheses

Source: Author's Computation using E-views

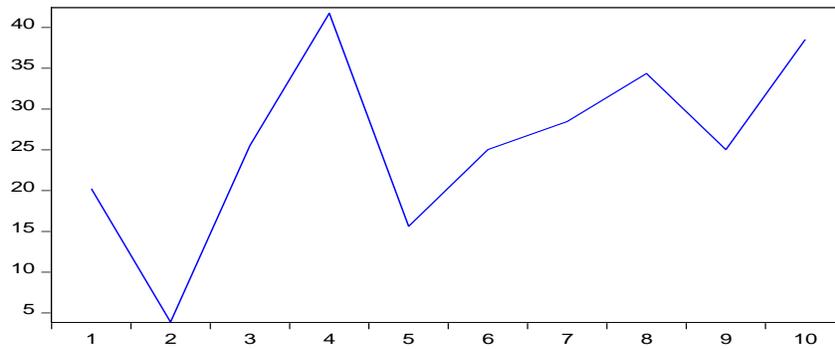
For the Pedroni residual co-integration test result, 4 out of 7 of its test statistics were statistically significant, while the Kao residual co-integration test result had a statistically significant  $t$  statistic. Consequently, the results of both the Pedroni and Kao co-integration test result showed evidence of a co-integrating relationship among the variables in the model, therefore, a dynamic panel data model using the VECM analysis is estimated.

#### 4.1.5 Impulse Response Test

The Impulse Response Function (IRF) traces out the time path of the various shocks on the variables contained in the VAR system. It shows the time path of the response of the variable to shocks in itself and shocks to other variables in the model. The IRFs are very useful in analyzing the interactions among variables in a VAR environment. The impulses represent the reactions of the variables to shocks hitting the system. The interpretation for the IRFs is split into 10 periods to effectively trace the effect of shocks on variables over time. The responses of the variables of interest for this study are presented and interpreted in Figures 1 and 2.

#### 4.1.6. Response of Expenditure to Shocks from IGR

Figure 1 shows the response of expenditure (*EXPEN*) to shocks from IGR as presented in periods 1 to 10.

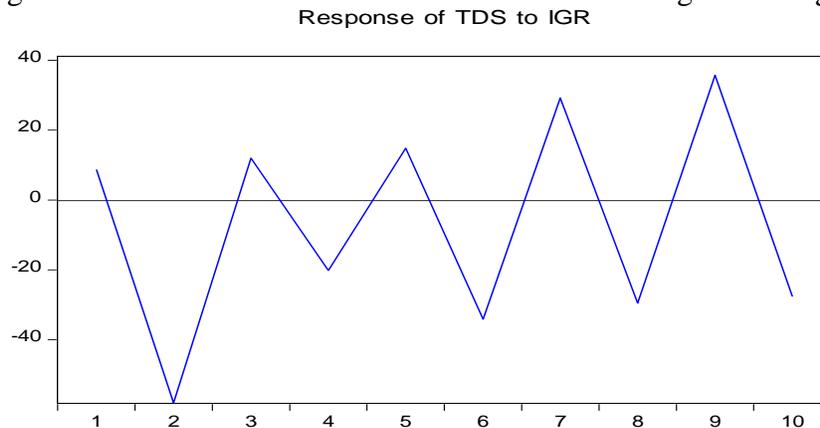


**Fig. 1: Response of Expenditure to Shocks from IGR**

For the 10 periods in this IRF, the IGR of States in Nigeria had a positive effect on State government expenditure. The graph of expenditure in this IRF showed certain degrees of periods of highs and lows. Period 2 represented the lowest period where IGR had the least effect on State government expenditure. With IGR recording its highest value on State government expenditure in period 4, reaching a value of 40, its lowest value stayed above 15 after this period, indicating that IGR steadily had a positive effect on State government expenditures depending on the amount of IGR available for spending. This IRF function of expenditure to shocks from IGR indicates that IGR for the periods under analysis positively affected State government expenditure, increasing their expenditure profile for the majority of the period under analysis.

#### 4.1.7. Response of Expenditure to Shocks from IGR

The IRF of the state government's total debt stock to shocks from IGR is given in Figure 2.



**Fig. 2: Response of Total Debt Stock to Shocks from IGR**

The IRF in Figure 2 produced a mixed and varied outcome, demonstrating both a positive and negative influence of IGR on the overall debt stock of the state government. The graph demonstrated that IGR

lowered the overall debt stock of Nigerian state governments during some periods, while the opposite was true for others. Except for periods 1, 3, 5, 7, and 9, impulse response shocks from IGR to state government total debt stock lowered state debt stock. A significant portion of this IRF suggests that IGR achieved the expected impact of decreasing the entire debt stock of the State government, as anticipated a priori.

Periods in the graph where IGR increased State government total debt stock are symptomatic of State governments' significant dependence on anticipated IGR to satisfy income and spending mismatches. As a result of increasing IGR predictions for the selected periods, state government borrowing rose. This IRF, on the other hand, revealed that IGR was an essential income route for managing State government debt commitments.

#### 4.1.8. Variance Decomposition of State Government Total Debt Stock

The variance decomposition of State government total debt stock (*TDS*) for the Panel VECM estimation is presented in Table 5.

**Table 5: Variance Decomposition of TDS**

Period	<i>S.E.</i>	<i>IGR</i>	<i>TDS</i>	<i>EXPEN</i>
1	41.16372	4.510123	95.48988	0.000000
2	77.68338	57.18509	41.63026	1.184643
3	83.88741	51.08650	47.45564	1.457860
4	90.32240	49.04948	47.12135	3.829172
5	99.36300	42.76446	53.79056	3.444983
6	108.1712	46.01805	49.92777	4.054176
7	118.3788	44.51747	51.84215	3.640373
8	125.4220	45.20027	50.12107	4.678661
9	136.9660	44.70268	51.00890	4.288426
10	142.8035	44.86821	49.87907	5.252719

Source: Author's Computation using E-views.

Figure 5 shows the result of the variance decomposition test of State government total debt stock (*TDS*), which shows that IGR had the greatest shock on the total debt stock of State governments in the country after its shock. The findings revealed that shocks to the IGR produced increased variation in the overall debt stock of state governments. In period 2, shocks from IGR to state government total debt stock were as high as 57 percent. In comparison to *EXPEN* shocks, which had the greatest value of 5% shocks to *TDS*, IGR was shown to be an essential variable in controlling the indebtedness of Nigerian state governments. This FEVD test result demonstrates that IGR is a feasible fiscal device for addressing the sustainability of state government debt.

## 5. Conclusion and Recommendation

The Panel VECM impulse response and variance decomposition test findings indicated that state government IGR had a favorable influence on state expenditure. Furthermore, the impact of IGR on state government spending was somewhat low, with IGR increasing state government spending by up to 35%. Finally, the empirical findings led to the conclusion that IGR had a mixed and variable influence on state government total debt stock, demonstrating both a positive and negative effect of IGR on state government total debt stock. The findings revealed that IGR lowered the total debt stock of Nigerian state governments during some periods, while the opposite was true for others.

To attain economic sustainability, states must increase their IGR to transition away from the culture of states' reliance on the Federation Allocation Account Committee (FAAC). Along these lines, increasing the tax base and implementing correct accounting standards for IGR collection across the country's states would be beneficial. Furthermore, good economic management methods such as managing the debt load at

reasonable levels, as well as adequate economic planning defined by cost-effective expenditure objectives, will contribute to the economic sustainability of Nigerian states. The Variance Decomposition test result indicates that IGR has a 57 percent influence on the overall debt stock of the state. It, therefore, provides an essential fiscal instrument for managing state government debt obligations in Nigeria.

## 6. Limitations and Directions for Future Research

This study is limited to the six states of Nigeria focusing on the State Government Debt Stock and IGR on State government expenditure. The study did not consider other areas to ascertain the economic viability of states in Nigeria. They also concentrated on a sample area of six states; each from Nigeria's six geopolitical zones. Thus, this study is limited to a small geographical scope to be generalized to the entire country. The researchers, therefore, suggest that other studies be done with the same variables in other States of Nigeria for a wider context. In addition, other variables can be added to the model to make it more comprehensive and robust.

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