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## Fiscal Federalism in Nigeria: A Cluster Analysis of Revenue Allocation to States and Local Government Areas, 1999 – 2008

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*Existing literature on revenue allocation in Nigeria shows more concern for merits and demerits of sharing principles and /or formulae. Several alternatives have been proposed and will continue to be developed to address the unending agitations from beneficiaries. Contrary however, this paper analyzes two items of revenue (statutory and VAT) shared among the states including FCT and all the Local Government Areas (LGAs) between May 1999 and December 2008. The net statutory allocation after deductions was also analyzed. Using Cluster analysis to evaluate revenue allocation in Nigeria, States and LGAs exhibiting similarity in revenue received were grouped and their common features highlighted. The result of this exercise may be a pointer to resolving the issue of viability when combined with other statistics.*

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**Key Words:** Cluster Analysis, Revenue Allocation, Fiscal Federalism, Statutory Allocation, VAT.

**JEL Classification:** C38, H71, H77

### 1.0 Introduction

The importance of revenue generation, allocation as well as its distribution towards maintaining both the existing and new socio-politico-economic structure in any economy be it centrally planned, market or mixed economies cannot be overemphasized. To this end, what revenue is to an individual or a firm is what it is to the government. Thus, revenue allocation and its distribution remain a vitally sensitive issue which continues to spark off reactions from all stakeholders at all times. This is more so in the sub-Saharan region and particularly in Nigeria where ethnic plurality and language heterogeneity characterize the country's existence.

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In recent years, the issues of resource control, revenue allocation and fiscal federalism have dominated discussions at various levels of Nigeria's political debate. Like most federal systems, Nigeria has a revenue distribution system in which the federal government shares revenue with the states 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 of such commissions on revenue allocation. These were: Phillipson (1946), Hicks-Phillipson (1951), Chick (1953), Raisman (1958), Binns (1964), Dina (1968), Aboyade (1977), and Okigbo (1980). It was not until 1988 that a permanent body was created to monitor, review, and advise the federal government on RAS on a continuing basis. 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 RAS. This body is enshrined in the 1989 Constitution.

Despite these efforts, revenue allocation has remained a contentious issue among the three tiers of government in Nigeria. In the last eight years, 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. Despite the considerable increase in the number of administrative units, the rate of real economic growth has been low and the country's per capita income has declined considerably over the years compared with the level that was attained in the 1980s. As the nation operates a new era of democracy under a federal constitution, there is the need to critically review the division of functions among the various tiers of governments, as well as the revenue sharing arrangements in order to substantially improve the delivery of public goods and services as well as promote real economic growth.

The available literature on revenue allocation in Nigeria focuses mostly on justifying a particular sharing formula or proposing a new one. Notable among this category are: Phillips (1991) and Aluko (2002, 2004). Other studies including Anyanwu (1999), Aigbokhan (1999), Ebajemito and Abudu (1999), Okon and Egbon (1999), seem to discuss generally about fiscal federalism by diagnosing the Nigeria situation and proffering solutions. Hitherto, no attempt has been made to even analyse the various allocations made to all the tiers of government. Some of

the immediate puzzling issues that need to be examined critically from the previous allocations include the following:

- To what extent is similarity or difference in the revenue allocation in Nigeria distributed at the state and local government levels?
- Is the similarity or difference consistent across the basic components of the revenue allocation?

The present study aims at providing answers to these immediate questions as well as serving as a platform for raising a number of pertinent issues as basis for further research into areas that are likely to be of great interest for policy analysis, political analysts, and the parliamentarians who have responsibility for creating states. Thus, the study specifically intends to analyze and conduct a comparative analysis of revenue allocation among geo-political zones, states and local governments and attempt to classify them using cluster analytical framework. The study's contributions are in two-fold: first, employing cluster analysis to examine the state and local governments with similar (dissimilar) features in terms of revenue allocation using specific item of revenue such as statutory allocation, value-added tax, and net statutory allocation. Second, attempt is made to group these tiers of government based on financial resources available to them.

Following the introduction, the rest of this paper is structured as follows: section two presents a brief review of relevant literature on revenue allocation in Nigeria; section three presents the methodology while section four gives the analysis of results, section five provides the concluding remarks.

## **2.0 Literature Review**

A large number of studies have been conducted on fiscal federalism and revenue allocation both in the developed and developing countries. However, the focus of majority of these studies usually revolves around examining the structure, pattern, trends and impact analysis of revenue allocation on economic growth. In a panel data analysis, Davoodi and Zou (1998) find a weakly significant negative relation between the degree of fiscal federalism and the average growth rate of GDP per capita for a sample of 46 countries over the period from 1970 to 1989. For the sub-sample of industrial countries, this effect is not significant. The negative influence for developing countries is robust though only weakly significant as well. According to these estimates, an additional decentralization of spending by 10 percent reduces the growth of real GDP per capita in developing countries by 0.7 – 0.8 percentage points.

Woller and Philipps (1998) also cannot find a robust relation between economic growth and decentralization, using a sample with a lower number of developing countries and a shorter time period.

In an empirical analysis for average economic growth of the past 25 years in a cross-section of 91 countries, Enikolopov and Zhuravskaya (2003) show that the effects of fiscal decentralization depend to a large extent on the structure of the party system as well as on the degree of “subordination” of subnational levels. According to them, especially in developing and transition countries, the age of the most important political parties is favorable to the positive effects of decentralization on economic growth. In countries with a – in this respect weaker – party system, a 10 percent increase of decentralization of revenue decreases real per capita GDP growth by 0.14 percentage-points. These results are in contrast to those of Martinez-Vazquez and McNab (2002). The latter finds that the decentralization of revenue significantly reduces the growth of real GDP per capita of developed countries, but not of the developing and transition countries.

Yilmaz (2000) analyzes the different effects of fiscal decentralization in 17 unitary and 13 federal countries for the period 1971-1990 with annual data. Decentralization of expenditures to the local level increases the growth of real GDP per capita in unitary states more strongly than in federal states. However, the decentralization to the intermediate level in federations is not significant. Thießen (2003) analyzes the average growth rates of real GDP per capita for a cross-section of 21 developed countries in the period 1973-1998 and in a parallel study (Thießen, 2003a) for a panel of 26 countries between 1981 and 1995. According to his estimates, a 10 percent increase of decentralization of expenditures increases the growth of real GDP per capita by 0.12-0.15 percentage points in high-income countries. However, the relation between federalism and economic growth might be non-linear, because the quadratic term of expenditure decentralization is significantly negative.

The empirical results concerning the impact of decentralization on economic growth for individual countries also appear to be ambiguous. To date, the discussion is limited to China, the US, and Germany. Zhang and Zou (1998) note a significantly negative effect of expenditure decentralization on economic growth in 28 Chinese provinces, using annual data between 1987 and 1993. Jin *et al.* (1999) however, report a weekly significant positive effect of expenditure decentralization on economic growth of almost the same sample of Chinese provinces over time. The most important difference between the studies is the use

of time dummies that are not included by Zhang and Zou (1998). Consequently, symmetric shocks are not adequately controlled for. Lin and Liu (2000) strengthen the result of a positive relation between decentralization and economic growth in Chinese provinces for the period 1970 to 1993 also for the revenue side. In addition, higher responsibility of public budgets at the provincial level is connected with increased economic growth. These authors also use time dummies in addition to fixed cross-section effects. The relevance of using time dummies points to the strong economic dynamics in China. The sometimes enormously high Chinese growth rates apparently cannot be captured by structural variables alone so that auxiliary variables for the individual years are necessary for correctly specifying the econometric model. Thus, for China, there might well exist a positive relation between decentralization of governmental activity and economic growth.

In a time-series analysis for the US from 1951 to 1992, Xie, Zou and Davoodi (1999) claim that the US is in a decentralization equilibrium. They ascribe this to the fact that differences in decentralization at the state or local level do not exert statistically significant effects on real GDP growth. Akai and Sakata (2002) however, offer evidence to the contrary for US states. Considering additional explanatory factors and various indicators for the degree of fiscal federalism, they find a positive influence on economic growth. If expenditure decentralization increases by 10 percent, the growth of GDP per capita increases by 1.6 to 3.2 percentage points. However, decentralization on the revenue side and indicators for fiscal autonomy of sub-national levels, measured by the share of own revenue in total revenue, do not show significant effects. Both studies might not necessarily contradict each other because of the different perspectives adopted. While the first study starts from a national perspective, the second one adopts the perspective of the single states. As mentioned in Section 2, both perspectives might well coincide with each other.

The same argument might hold for Germany. Berthold *et al.* (2001) analyze the effects of horizontal fiscal equalization between states and supplementary federal grants on economic development of the 16 Lander in a panel analysis with annual data from 1991 to 1998. According to their estimates, higher grants in horizontal and vertical fiscal relations significantly reduce the growth of nominal GDP per capita of the Lander. Behnisch *et al.* (2002) however, find a positive effect of increasing federal activities – measured by the share of expenditure at the federal level – on total German productivity growth in a time series analysis from 1950 to 1990.

Similarly in Nigeria, a number of studies have analyzed dynamics of fiscal federalism in the country. For example, Akinlo (1999) using the OLS technique, examines the fiscal responsiveness of State governments to formal intergovernmental flows in aggregate and according to the type of central government assistance schemes. He finds that state governments' Fiscal expenditure was stimulated by federal grants during the period of analysis. More importantly various grants examined were found to have positive effects on the expenditure profiles of the state governments. Above all, statutory grants appear to account for the most stimulative effect of federal funds on total state governments' capital and recurrent expenditure.

Aigbokhan (1999) also employs the OLS technique to investigate the fiscal decentralization on economic growth in Nigeria. The study finds evidence of high concentration ratio of both expenditure and revenue. It also finds evidence of mismatch in spending and taxing responsibilities with states being harder hit. In a similar vein, Jimoh (2003) provides concrete statistical evidence on the impact of the extent of decentralization of government expenditures and/or revenue collection on the levels of economic activities in Nigeria. Based on regression analysis, the paper finds that more decentralized governance, especially in terms of increased local governments and increased transfer of revenues to lower tiers of government would stimulate economic activities and/ or economic growth. It also suggests that the major determinants of the prevalence of poverty in Nigeria are economic and population growths.

Akujuobi and Kalu (2009) focus on the role of the financing sources of Nigerian State governments in the financing of their real asset investments. Using the OLS technique, the paper finds that Federal allocation and stabilization fund are significant in the financing of real asset investments at both 5% and 1% levels of significance. Internally-generated revenue (IGR), loans (LNS), Grants (GT) and value added tax (VAT) are found insignificant in the financing of the real asset investments of Nigerian state governments for the period 1984-2008. Our work differs from the previous studies as we evaluate statistically the extent of similarities or dissimilarities in revenue allocation at the state and local government levels. This provides some statistical evidence for any observed variations in the revenue allocation in Nigeria and also raises other pertinent issues that may provide basis for future research.

### **3.0 Methodology**

Cluster Analysis is a statistical technique that seeks to organize information about variables so that relatively homogeneous groups, or "clusters," can be formed. The clusters formed with this family of methods should be highly internally homogenous (in terms of similarity proximity, resemblance, or association features) and highly externally heterogeneous (that is, unrelated to members of other clusters).

Cluster analysis is a useful technique for classifying similar and dissimilar objects and has continued to gain prominence in social sciences where the geography of data forms an integral part of scientific analysis.

The computational procedure for cluster analysis includes data collection and selection of the variables for analysis, generation of a similarity matrix, decision about number of clusters and interpretation and validation of cluster solution. Fortunately, however, there are standard statistical packages such as STATA that can perform cluster analysis.

In this study, cluster analysis was carried out to examine the states and local governments with similar (dissimilar) features in terms of revenue allocation. We have used data covering revenue allocation to all the states and local governments in Nigeria. The specific variables of interest for our cluster analysis are statutory allocation, value-added tax, and net statutory allocation.

### **4.0 Analysis of Cluster Results**

#### **4.1 A Cluster Analysis for Statutory Allocation in Nigeria**

Our cluster analysis for statutory allocation was carried out separately for states and local governments in Nigeria. For the state governments, we specified the arrangement of statutory allocation into four clusters to see the similarity or dissimilarity in state governments' statutory allocation in Nigeria. For the purpose of this analysis, we have regarded FCT Abuja as a state in the North Central zone. Tables 1 and 2 below show the results of our cluster analysis involving four clusters.



**Table 1: Cluster Analysis of Statutory Allocation in Nigeria by States**

Range of Allocations (N Billion)	Cluster	Rank of Clusters	States	No. of States	Remark
174.81 – 184.84	Cluster 3	1	FCT Abuja, Kano, Lagos	3	Highest Beneficiaries
139.68 – 161.79	Cluster 4	2	Bauchi, Benue, Borno, Jigawa, Kaduna, Katsina, Niger, Oyo, Rivers	9	
120.58 – 131.95	Cluster 1	3	Adamawa, Akwa Ibom, Anambra, Cross River, Delta, Edo, Enugu, Imo, Kebbi, Kogi, Ogun, Ondo, Osun, Plateau, Sokoto, Taraba, Yobe, Zamfara	18	
101.30 – 117.46	Cluster 2	4	Abia, Bayelsa, Ebonyi, Ekiti, Gombe, Kwara, Nassarawa	7	Least Beneficiaries

**Source:** Computed by the authors

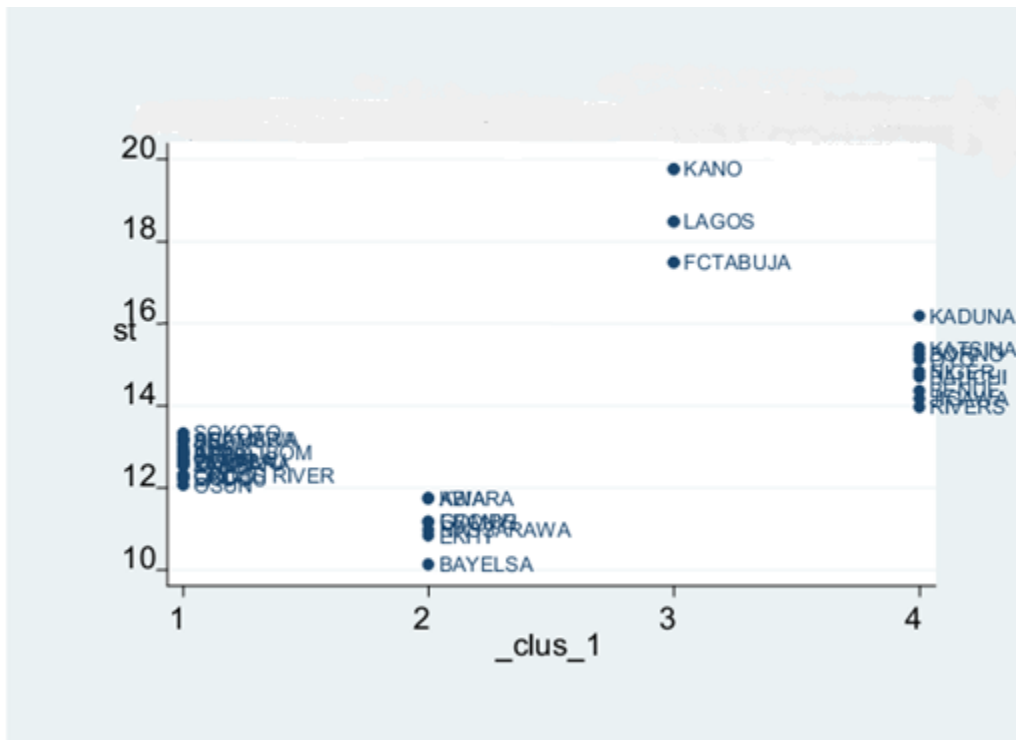
Table 1 shows the distribution of the clusters by states. The table depicts the extent of similarity and dissimilarity in the statutory allocation among states in Nigeria. The first and second values in the column under the range of allocations represent the allocation to the state with the minimum and maximum allocation in the cluster. The clusters of highest and least beneficiaries of statutory allocation have 3 and 7 states respectively. It is interesting to know that 18 (50%) of the states fall within cluster 3. Table 2 shows distribution of the states within each cluster according to geopolitical zones. None of the states from NE, SE and SS geopolitical zones is listed in the cluster of highest beneficiaries of statutory allocation. It is also very obvious from the table that SE geopolitical zone alone

has no representation in the first and second cluster. On this basis, the zone could be regarded as the least beneficiary in respect of statutory allocation.

**Table 2: Cluster Analysis by Geo-political Zones**

Cluster	Geo-political Zone						Number of States
	North West (NW)	North East (NE)	North Central (NC)	South West (SW)	South East (SE)	South-South (SS)	
Cluster 1	3	3	2	3	3	4	18
Cluster 2	0	1	2	1	2	1	7
Cluster 3	1	0	1	1	0	0	3
Cluster 4	3	2	2	1	0	1	9

Source: Computed by the Authors



**Figure 1: Cluster Analysis of Statutory Allocation to States in Nigeria**

In the same vein, we conducted cluster analysis for statutory allocation to local governments (LGs) in Nigeria. We specified the arrangement of statutory allocation into ten clusters (because of the large number of LGs in Nigeria) in order to see clearly the similarity or dissimilarity in local governments statutory allocation in Nigeria. The results are presented in the graph below. The graph shows the existence of a strong similarity in statutory allocation of some local governments (as shown in each cluster) as well as a strong dissimilarity among the clusters (when one compares one cluster to the other).

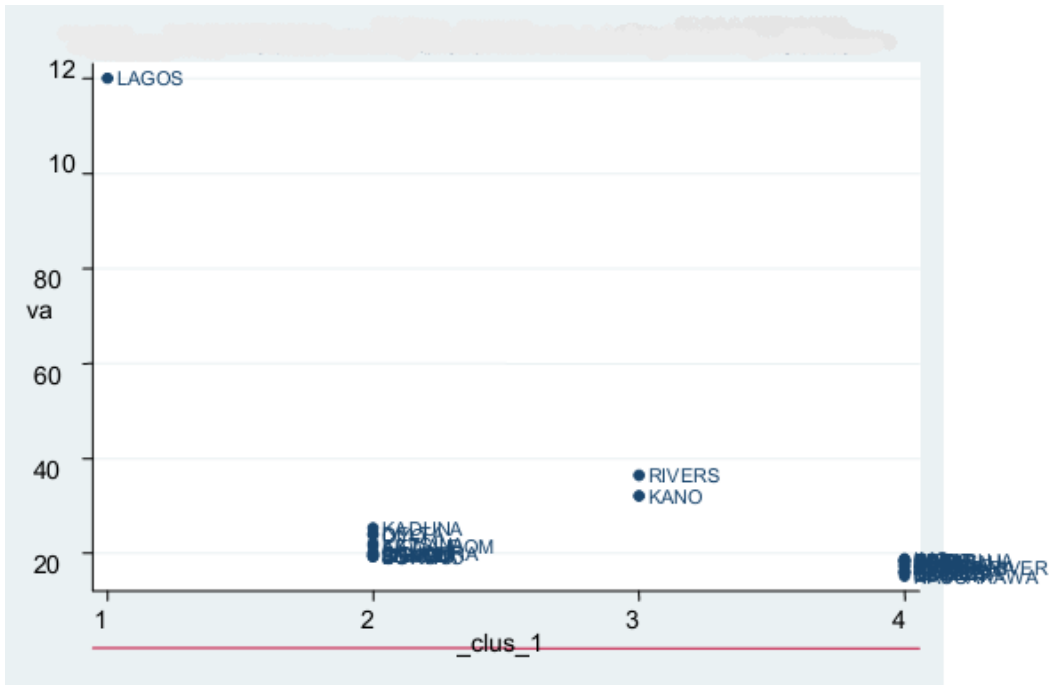


**Figure 2:** Cluster Analysis of Statutory Allocation to LGs in Nigeria

Like what we observed in figure 1 and 2 also shows that a very small number of LGs occupy the extreme cases (that is, highest and lowest statutory allocation). Cluster 2 shows that as low as 7 LGs out of 776 LGs fall within the range of values for the highest statutory allocation. Similarly, cluster 4 depicts that just about 13 LGs fall within the range of values for the lowest statutory allocation. In terms of the number of LGs constituting the clusters, it is seen that cluster 8 has the highest number of LGs (179 LGs to be precise) followed by cluster 2 has the least with 7 LGs respectively. Overall, a good number of LGs in Nigeria have similar features in terms of statutory allocation.

### 4.2 A Cluster Analysis for Value Added Tax in Nigeria

Like statutory allocation, cluster analysis for value added tax (VAT) was carried out separately for states and local governments in Nigeria. For the state governments, we also specified the arrangement of VAT into four clusters to see the similarity or dissimilarity in allocation. The tables 3 and 4 and the graph below show the results of our cluster analysis involving four clusters.



**Figure 3:** Cluster Analysis of VAT in Nigeria by States

Table 3 shows the distribution of the clusters by states. The table depicts the extent of similarity and dissimilarity in VAT among states in Nigeria. It is very striking to see that Lagos alone is in the cluster of top beneficiary of VAT allocation. The extent of the gap between its cluster and the next cluster can be seen in Figure 3. Lagos is clearly a leading beneficiary of VAT allocation for obvious reasons which include large population and level of industrialization. The second cluster has two states – Kano and Rivers while majority (21) is in cluster 4. This is a clear indication of the low level of industrialization and even capacity to generate fund internally in all the 21 states. By looking at the distribution of the clusters by geo-political zones (table 4), it can be seen that NW states benefited more than other zones while NC dominates the cluster of least beneficiaries.

**Table 3: Cluster Analysis of VAT Allocation in Nigeria by States**

Range of Allocations (N Billion)	Cluster	Rank of Clusters	States	No. of States	Remark
119.94	Cluster 1	1	Lagos	1	Highest Beneficiary
32.16 – 36.47	Cluster 3	2	Kano, Rivers	2	
19.20 – 25.41	Cluster 2	3	Akwa Ibom, Anambra, Bauchi, Benue, Borno, Delta, Enugu, Jigawa, Katsina, Ogun, Oyo, Kaduna, Sokoto	13	
15.23 – 18.63	Cluster 4	4	Abia, Adamawa, Bayelsa, Cross River, Ebonyi, Edo, Ekiti, FCT Abuja, Gombe, Imo, Kebbi, Kogi, Kwara, Nasarawa, Niger, Ondo, Osun, Plateau, Taraba, Yobe, Zamfara	21	Least Beneficiaries

In the same vein, we conducted cluster analysis for VAT to local governments (LGs) in Nigeria. Similarly, we specified the arrangement of VAT into ten clusters. The results are presented in Figure 4.

**Table 4: Cluster Analysis of VAT Allocation by Geo-political Zones**

Cluster	Geo-political Zone						Number of States
	North West (NW)	North East (NE)	North Central (NC)	South West (SW)	South East (SE)	South South (SS)	
Cluster 1	0	0	0	1	0	0	<b>1</b>
Cluster 2	4	2	1	2	2	2	<b>13</b>
Cluster 3	1	0	0	0	0	1	<b>2</b>
Cluster 4	<b>2</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>21</b>

The graph shows the existence of a strong similarity in VAT for virtually all local governments in Nigeria (as shown in each cluster) as well as a strong dissimilarity among the clusters (that is, moving from one cluster to the other).

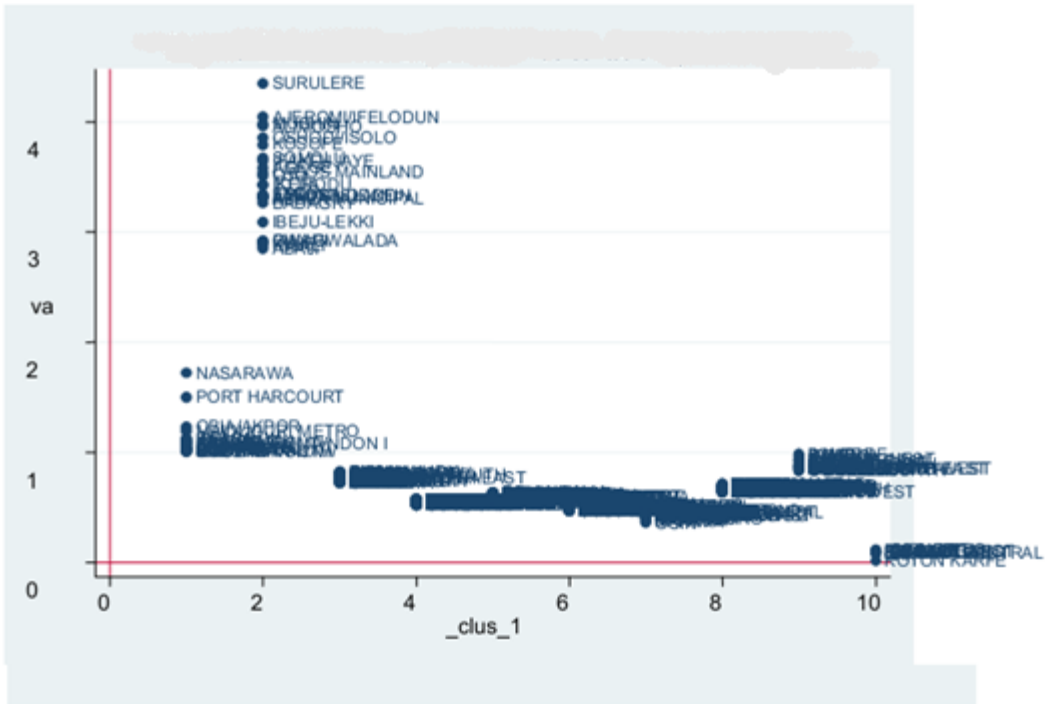
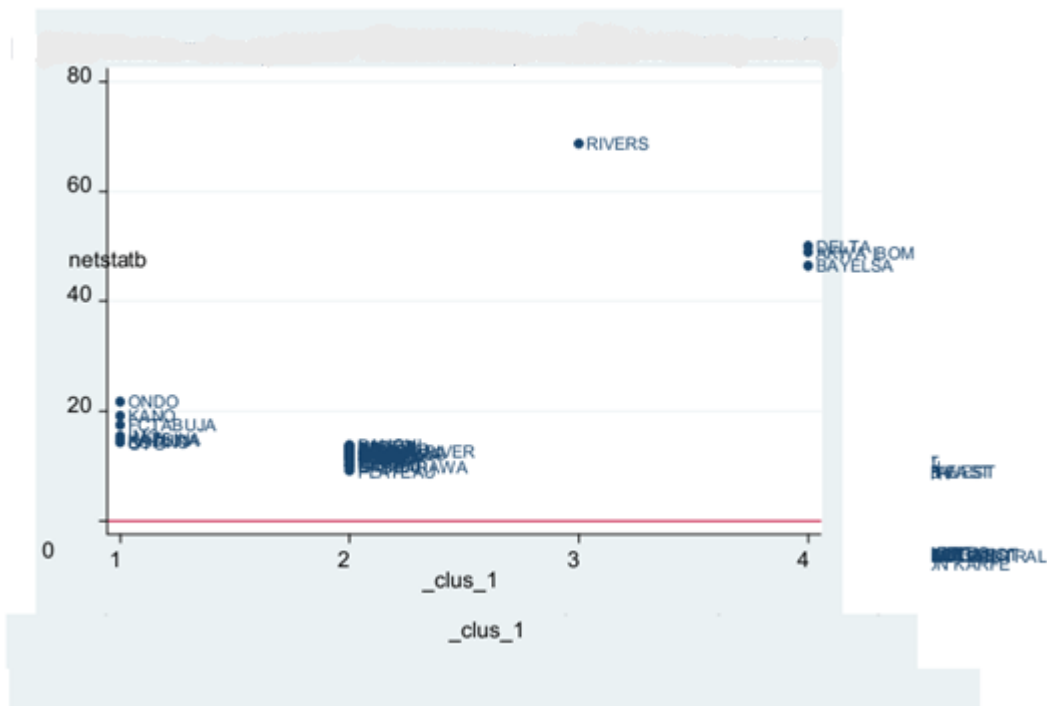


Figure 4: Cluster Analysis for VAT in Nigeria by LGs

Like what we observed in figure 3, figure 4 also shows that a very small number of LGs occupy the extreme cases (that is, highest and lowest VAT). Cluster 2 shows that as low as 26 LGs out of 776 LGs fall within the range of values of the highest VAT beneficiaries and it is dominated by LGs in Lagos State. This trend can also be attributed to the earlier reasons adduced for VAT allocation to States in which Lagos is the highest beneficiary. Similarly, cluster 10 depicts that just about 13 LGs fall within the range of values of the lowest VAT beneficiaries dominated by North Central. This also confirms our earlier evidence and in fact gives an indication that North Central seems to be the least industrialized in the Country. In terms of the number of LGs constituting each cluster, it is seen that cluster 6 has the highest number of LGs (165 LGs to be precise) and cluster 10 has the lowest with 13 LGs. Overall, a good number of LGs in Nigeria have similar features in terms of VAT.

### 4.3 A Cluster Analysis of Net Statutory Allocation in Nigeria

Like statutory allocation and VAT, our cluster analysis for net statutory allocation (netstat) was carried out for states in Nigeria. The intention actually is to ascertain the impact of derivation fund and charges on debt incurred by some states on the available funds at their disposal. For the state governments, we also specified the arrangement of netstat into four clusters to see the similarity or dissimilarity in state netstat allocations. Tables 5 and 6 as well Figure 5 show the results of our cluster analysis.



**Figure 5:** Cluster Analysis for Net-Statutory Allocation in Nigeria by States

The netstat is determined by subtracting charges on debt incurred by each state from its gross allocation. The gross allocation actually is the sum of statutory allocation, derivation fund and VAT. The cluster analysis as presented in tables 5 and 6 for the netstat in Nigeria by states reflects the significant impact of derivation fund and charges on debt incurred by some states as virtually all the states of the Niger Delta (South- South geo-political zone) occupy the range of values for high netstat (see tables 5 and 6). Specifically, table 5 shows that cluster 3 with 1 state (Rivers) occupy the highest range of values of netsat followed by

cluster 4 with 3 states (Akwa Ibom, Bayelsa and Delta), cluster 1 with 8 states and cluster 2 with 25 states.

These findings suggest that the oil producing states seem to receive the largest net statutory allocation even far above the highest industrialized state in Nigeria – Lagos. The single factor responsible for this trend is the Derivation fund allocated to the oil producing states.

**Table 5: Cluster Analysis of Net Statutory Allocation in Nigeria by States**

<b>Range of Allocations (N Billion)</b>	<b>Cluster s</b>	<b>Rank of Cluster s</b>	<b>States</b>	<b>No. of States</b>	<b>Remark</b>
686.69	Cluster 3	1	Rivers	1	Highest Beneficiary
465.12 – 500.51	Cluster 4	2	Balyesa, Akwa Ibom and Delta	3	
142.96 – 217.18	Cluster 1	3	Borno, FCT Abuja, Imo, Kaduna, Kano, Katsina, Ondo, Oyo	8	
91.41 – 137.97	Cluster 2	4	Abia, Adamawa, Anambra, Bauchi, Benue, Cross River, Ebonyi, Edo, Ekiti, Enugu, Gombe, Jigawa, Kebbi, Kogi, Kwara, Lagos, Nassarawa, Niger, Ogun, Osun, Plateau, Sokoto, Taraba, Yobe, Zamfara	25	Least Beneficiaries



**Table 6:** Cluster Analysis of VAT Allocation by Geo-political Zones

Cluster	Geo-political Zone						Number of States
	North West (NW)	North East (NE)	North Central (NC)	South West (SW)	South East (SE)	South-South (SS)	
Cluster 1	3	1	1	2	1	0	8
Cluster 2	4	5	6	4	4	2	25
Cluster 3	0	0	0	0	0	1	1
Cluster 4	0	0	0	0	0	3	3

By looking at the distribution of the clusters by geo-political zones (Table 6), it can be seen that all the geopolitical zones are represented only in clusters 2 while clusters 3 and 4 featured only the SS zone, cluster 1 featured all the geo-political zones excluding the SS.

Unlike what we observed in Tables 2 and 3, Tables 5 and 6 show that a very large number of states occupy one of the extreme cases (that is, the lowest netstat). Cluster 2 shows that 25 states out of 37 fall within the range of values for the lowest netstat. This observation may not be unconnected with the fact that just about 6 out of the 37 states in Nigeria are eligible for the derivation fund that often shoots up the gross allocation for these states. Overall, a good number of States in Nigeria have similar features in terms of statutory netstat.

## 5.0 CONCLUDING REMARKS

Though, a large body of study exists on fiscal federalism and revenue allocation both in the developed and developing countries but with the bulk of these studies focusing majorly sharing principles and formulae. This paper however, analyzed allocations since the inception of the third republic to examine the distribution pattern among the states and the LGAs. The results from cluster analysis showed that a small number of states constituting each of the clusters in terms of statutory allocation, VAT and net statutory allocation occupied the range of values for highest and lowest allocations. Specifically, the SE zone was found to be the least beneficiary of statutory allocation. In the case of VAT, NW zone benefited more than other zones while NC dominates the cluster of least beneficiary states. The story changed completely in the case of net statutory allocation. The oil producing

states received the largest net statutory allocation even above the most industrialized state in Nigeria – Lagos simply because of the derivation fund enjoyed solely by them. Nonetheless, a good number of LGs in Nigeria have similar features in terms of both statutory allocation and VAT. Subsequent analysis hopes to combine other statistics to examine the question of state and local government viability.

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