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# Governance and Tax Components Dynamics in Nigeria1995-2015: A Stepwise Multiple Discriminant Analysis

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**Abstract**

A discriminant analysis was conducted to predict government expenditure –GXP during the Military, Obasanjo, Yaradua and Jonathan regimes in Nigeria from 1995 -2015. Predictor variables were CIT - Company Income Tax, PPT – Petroleum Profit Tax, VAT –Value Added Tax and CED –Customs and Excise Duty. Significant mean differences were observed for all the predictor son the dependent variable as well as significant association between groups and all predictors which accountedfor95.45% of between group variability. The structure matrix revealed only three significant editors for Function 1, namely VAT (score.970), CIT (score.874) and CED (score.812). 90.5% is the accuracy rate for the cross-validated cases in the study and is the overall model fit. Even though CIT is the second most important revenue stream after VAT in Nigeria, it is the only tax revenue not politicized by government and may be the most efficient source of government revenue. The result exposes a curious anomaly in that PPT generally held to be all important for Nigeria is the weakest and/or least important when it comes to government expenditure with loadings of a mere .153. The question to ask here is –what actually happens to the huge PPT revenue collected by the Nigerian government if it is as unimportant to government expenditure in Nigeria but subject to political influences as has been revealed by this study? We ask further, is this the secret cash-cow for private political financing by government functionaries in Nigeria over the years? The paper suggests "political corruption" must be playing unsavory role regarding the tax revenue components and recommends government stop playing "politics" with important revenue bases in Nigeria.

**Keywords:**
Public Expenditure;
Tax Revenue;
Governance;
Discriminant Analysis

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**Background to the Study**

Governments over the years have embarked on various macroeconomic policy options including fiscal policy to grow their economies. Under fiscal policy, a government uses its expenditure and revenue programs to produce desirable effects and avoid undesirable effects on national income, production and employment. Such fiscal policy may be discretionary and active, involving the conscious changes in government spending and taxes to create expansionary or contractionary effects on economic growth; or it may be non-discretionary and passive, relying on automatic built-in stabilizers to keep the economy on course, especially where taxation and spending policies are designed to achieve full employment, price stability and sustained growth of the economy. In this respect, the rate of economic growth can be affected by policy through the effect that taxation has upon economic decisions. For instance, an increase in taxation reduces the returns on investment (in both physical and human capital) and Research and Development (R&D). Lower returns mean less accumulation and innovation and hence a lower rate of growth. This is the negative aspect of taxation. However, taxation also has a positive aspect for apart from being the main source of revenue to the government for effective performance, it also encourages individuals to work, save, and invest among others.

**Statement of the Problem**

Copious studies concerning the relations between public expenditure and public revenue, of which taxation is a large part, have been carried out over the years but hardly on the singular effects of the disaggregate components of public revenue such as the different forms of taxes including company income taxes, value added taxes, petroleum taxes, customs and excise duties. Furthermore, there has been excessive increase in total public expenditure during the study period in Nigeria with not much to show for it in terms of development. In this respect, a study on Democratic Governance and Economic Development in Nigeria 1999-2015 revealed evidence that government expenditure assumes new peaks with successive election periods in Nigeria while national output as measured by real gross domestic product (RDGP) steadily declined in growth rate with successive sets of democratic government (Ako 2016). This paper therefore examines the effects of the different tax components on government expenditure before and within the current democratic dispensation in Nigeria. Such analysis may interest policy makers both in Nigeria in terms of sustainable economic development as well as in other developing economies.

**Objectives of the Study**

The main objectives of the paper are to: (a) examine the effects of tax components on government expenditure in Nigeria and (b) make appropriate recommendations. To do this, the paper will: (c) develop discriminant function(s); (d) examine whether significant differences exist among the groups in terms of the predictor variables; (e) determine which predictor variables contribute to most of the intergroup differences and (f) evaluate the accuracy of classification. Following from this background to the study, Section 2 presents the literature review while Section 3 contains the study methodology. Section 4 discusses the results while Section 5 concludes with some recommendations.

## Literature Review

### Theoretical Review

There are four theories that seek to explain the observed spending-tax revenue behavior of government. The first theory is called the tax-and-spend theory or revenue-spend hypothesis. This theory assumes that changes in tax revenues lead to changes in government expenditure. Proponents of the tax-and-spend theory include the German economist Adolph Wagner (1890) in his Law of Increasing State Activity, Milton Friedman (1978), Buchanan and Wagner (1978), Eita and Mbazima (2008). However, while some proponents contend positive causation (Friedman -1978), others contend negative causation (Buchanan and Wagner -1978); but causation is generally assumed from tax revenue to government expenditure.

The second theory is called the spend-and-tax the oryor spend-revenue hypothesis. Proponents of the tax-and-spend theory include Peacock and Wiseman (1961, 1979), Anderson,Wallaceand Warner (1986), Ewing and Payne (1998), Hodroyiannis and Papapetrou (1996). This theory assumes that increases in crisis government expenditures lead to increases in taxes as the government then tries to cover those expenditures through tax collections. However, such crisis situations could lead to permanent changes in expenditure eventually leading to the so-called displacement effect wherein the current increase in government spending leads to an increase in government revenue whereby some of the tax increases originally justified by the crisis situation become permanent tax policies. This theory generally assumes causation is from government expenditure to tax revenue.

The third theory is called the fiscal synchronization hypothesis. Proponents and supporters of the fiscal synchronization theory include Meltzer and Richard (1981), Miller and Russek (1990), Owoye (1995), Yashobanta and Behera (2012) and Takumah (2014). This theory generally assumes bidirectional or two-way causality between government expenditure and revenue and the feedback loop implies decisions on government revenues and expenditures are made simultaneously.

Finally, the fourth theory is the fiscal neutrality or institutional separation theory proposed by Baghestani and McNown (1994). According to this hypothesis none of the other three hypotheses describes the relationship between government revenues and expenditure since there is no dependence between decisions related to government expenditures and government revenues i.e. revenue decisions are made independent of expenditure decisions since executive and legislative authorities are independent. Hence, government expenditures could be determined in line with population needs, and government revenues reflect the maximum tax burden which the population is able to bear. This theory generally assumes any achievement of fiscal balance is a pure coincidence.

### Empirical Review

Widmalm (2001) finds that taxes on corporate income as a share of total tax revenue have a positive but fragile correlation with income growth. The evidence is also fragile in relation

to taxes on payrolls and social security contributions, taxes on property, and taxes on goods and services. For Fakile (2011), examining the relationship between company income tax revenue and the Nigeria economic growth indicates a significant relationship between company tax and economic growth. On the other hand, Cornelius, Ogar and Oka(2016) examined the relationship between petroleum profit tax (PPT), company income tax (CIT),non-oil revenue and the growth of Nigerian economy. His findings indicate a significant relationship for both petroleum profit tax and non-oil revenue but no significant relationship for company income tax and the growth of the Nigeria economy.

The study by Adereti, Adesina and Sanni(2011) indicated Value Added Tax (VAT) revenue had a positive and significant correlation with economic growth in Nigeria and concluded that VAT is an essential component of government income.

Similarly, Owolabi and Okwu (2011) examined the contribution of value added tax to Lagos State economy and reported that VAT revenue had a considerable contribution to the economy during the study period for the respective sectors. Furthermore, Etale and Paymaster (2016) examined the impact of companies' income tax and value-added tax on economic growth and reported that both company income tax and value-added tax have significant positive impact on economic growth. In addition, Nwosu and Okafor in 2014 reported that total government expenditure as well as capital and recurrent expenditures have long run relationships with total revenue, oil and non-oil revenue variables as well as unidirectional causalities running from expenditures to revenue variables. These findings support the spend-tax hypothesis in Nigeria indicating that changes in government expenditure instigate changes in government revenue.

**Methods and Materials**

**Definition of Variables**

The categories of the variables are defined and specified as follows:

**Table 1:** Definition of Variables

| Variable | Definition |
|---|---|
| GXP: Specified as a discrete and censored or limited dependent variable | Dummy of 4 Categories for Government Expenditure/Governance: 1 (Military regime) if before 1999 democratic government; 2 (Obasanjo regime) if during 1st set of democratic government; 3 (Yaradua regime) if during 2ndset of democratic governmentand 4(Jonathan regime) if during 3rd set of democratic government. |
| PPT | Petroleum Profit Tax |
| VAT | Value Added Tax |
| CIT | Company Income Tax |
| CED | Customs & Excise Duty |

**The Model and Modeling Procedure**

In order to investigate the relationship that exists between the independent variable and explanatory variables, the study employs both list wise and stepwise Multiple

Discriminant Analyses (MDA) using computer software IBM SPSS 23. This statistical technique is used to classify the set of observations into pre-defined groups and to analyze data when the criterion or dependent variable is categorical (dichotomous or multichotomous) and the predictor or independent variables are metric, i.e. interval or ratio in nature. The discriminant analysis is to study the relationship between group membership and the variables used to predict the group membership. This will identify the independent variable (s) that have a strong relationship to group membership in the categories of the dependent variable and also derive the discriminant function (s). The attraction of Discriminant analysis is that it provides an objective assessment of differences, determines which variables account the most for the differences and lends insight into the role of individual variables. However and for brevity, only the stepwise version of the MDA is fully reported.

**Specification of the Discriminant Model**

The discriminant function is specified and estimated as follows:

$$Z_{GXP} = \alpha + \omega_1 PPT + \omega_2 CIT + \omega_3 VAT + \omega_4 CED \dots\dots\dots (1)$$

Where:

- $Z_i$= Discriminant (Predicted) Z score of the discriminant function for Dependent variable $DV_i$.
- $\alpha$= Intercept or constant.
- $\omega_i$= Discriminant coefficient or weight for the Independent variables.

**Data Sources**

Secondary annual data for the period 1995-2015 is obtained from the Central Bank of Nigeria, National Bureau of Statistics, Federal Ministry of Finance and pertinent derivatives there from.

**Results and Discussion**

**Descriptive Statistics**

**Table 2:** Descriptive Statistics

| | N | Range | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| GXP | 21 | 3.0 | 1.0 | 4.0 | 2.476 | 1.0779 | .200 | .501 | -1.174 | .972 |
| PPT | 21 | 4322.6 | 42.8 | 4365.4 | 1550.385 | 1401.4420 | .716 | .501 | -.660 | .972 |
| CIT | 21 | 1195.0 | 12.3 | 1207.3 | 368.417 | 388.5705 | .916 | .501 | -.526 | .972 |
| VAT | 21 | 788.3 | 7.3 | 795.6 | 311.956 | 290.6866 | .646 | .501 | -1.222 | .972 |
| CED | 21 | 547.9 | 18.3 | 566.2 | 243.881 | 166.7806 | .559 | .501 | -.654 | .972 |
| Valid N (listwise) | 21 | | | | | | | | | |

Table 2 above presents descriptive statistics for the data used. From this table on average, PPT contributes the most tax revenue, more than the other three sources of tax revenue combined and about four times the nearest other contributor –CIT. The PPT contribution is followed by CIT, VAT and CED in descending order. On the whole, there is much variation in the amount of tax revenue from the various sources. While PPT revenue contributes the most, it equally has the highest standard variation but while CED contributes the least revenue, it also has the least standard deviation. This shows that greater attention needs to be paid to the CED revenue source as it appears to be a more stable source of revenue. Furthermore, the skewness is highest for CIT followed by PPT which could reflect the vagaries of Nigeria's economic fortune with its highs and lows captured in the four segments of the study period.

**Discriminant Model (Equation 1)Results**

The results of the discriminant analysis estimation of Model 1 are presented and discussed below.

**Overall Significance of the Discriminant Function(s):**

The Overall Significance of the Discriminant Function(s) is obtained by determining whether or not there is a statistically significant relationship between the independent variables and the dependent variable. T**he results presented in Table 3** provides strong statistical dance of significant differences (p<.000) between means of dependent variable groups for government expenditure (Military, Obasanjo, Yaradua and Jonathan regimes) for all the independent variables (PPT, CIT, VAT and CED) included in the discriminant analysis for this model. This indicates all the predictors are relevant to discriminating between the groups of years where government expenditure in Nigeria (GXP) indicates Military, Obasanjo, Yaradua or Jonathan regimes with VAT producing highest value F. However, the Pooled Within-Group Matrices (Table4) do not support use of all these independent variables as inter-correlations are generally not low.

**Table 3:** Tests of Equality of Group Means

| | Wilks' Lambda | F | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| PPT | .224 | 19.622 | 3 | 17 | .000 |
| CIT | .081 | 64.661 | 3 | 17 | .000 |
| VAT | .048 | 111.439 | 3 | 17 | .000 |
| CED | .067 | 79.322 | 3 | 17 | .000 |

**Table 4:** Pooled Within-Groups Matrices

| | | PPT | CIT | VAT | CED |
|---|---|---|---|---|---|
| Correlation | PPT | 1.000 | -.064 | .188 | .029 |
| | CIT | -.064 | 1.000 | .864 | .670 |
| | VAT | .188 | .864 | 1.000 | .647 |
| | CED | .029 | .670 | .647 | 1.000 |

From the table of eigenvalues (Tables 5A-B), the first discriminant function (Function1) which is the most capable in differentiating the groups reports canonical correlation of. 979 in Table 5A for list wise MDA indicatingthemodelexplains95.84% of the variation in the grouping variable, i.e. whether government expenditure in Nigeria (GXP) indicates Military, Obasanjo, Yaradua or Jonathan regimes and canonical correlation of.977 in Table 5Bfor stepwise MDA indicatingthemodelexplains95.45% of the variation in the grouping variable. These eigenvalues give information about the effectiveness of the discriminant functions and like Wilks' lambda, indicate the strength of relationship between entities in the solution and provides an index of over all model fit which is then interpreted as being the proportion of variance explained ($R^2$).

**Table 5A:** Eigenvalues

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 22.994[a] | 95.3 | 95.3 | .979 |
| 2 | .925[a] | 3.8 | 99.1 | .693 |
| 3 | .205[a] | .9 | 100.0 | .413 |

a. First 3 canonical discriminant functions were used in the analysis.

**Table 5B:** Eigenvalues

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 20.837[a] | 96.4 | 96.4 | .977 |
| 2 | .776[a] | 3.6 | 100.0 | .661 |

a. First 2 canonical discriminant functions were used in the analysis.

From the table of Wilks' lambda (Tables 6A-B), the Function1 in Table 6A for listwise MDA has significant discriminating power ($p < .000$) and only 1.8% of the variance is not explained by group differences and the Function1 in Table 6B for stepwise MDA also has significant discriminating power ($p < .000$) and only 2.6% proportion of the total variance in the discriminant scores is not explained by differences among the groups. The statistically significant discriminating powers ($p < .000$) imply we can conclude there is a relationship between the dependent groups and the independent variables.

**Table 6A:** Wilks' Lambda

| Test of Function(s) | Wilks' Lambda | Chi-square | df | Sig. |
|---|---|---|---|---|
| 1 through 3 | .018 | 64.316 | 12 | .000 |
| 2 through 3 | .431 | 13.471 | 6 | .036 |
| 3 | .830 | 2.989 | 2 | .224 |

**Table 6B:** Wilks' Lambda

| Test of Function(s) | Wilks' Lambda | Chi-square | df | Sig. |
|---|---|---|---|---|
| 1 through 2 | .026 | 62.186 | 6 | .000 |
| 2 | .563 | 9.764 | 2 | .008 |

**Contribution of Predictor Variables:**
The contribution of predictor variables is determined by identifying the statistically significant variables. The statistical tests of the coefficients of individual independent variables are obtained from the stepwise method of variable selection. From the output of Table 3 above, there was a statistically significant difference in dependent variable groups for all the four independent variables included in the discriminant analysis, but we see in Table 7 that there are significant differences for other variables which after the stepwise procedure, did not enter the discriminant functions: CIT -Company Income Tax and PPT –Petroleum Profit Tax. Thus, we see that VAT –Value Added Tax and CED –Customs and Excise Duty are the two most important predictors.

In the table of Variables "Entered/Removed" (Table 7A) shown below, at step 1, CED –Customs and Excise Duty had the strongest individual relationship with the dependent variable groupings. At step 2, the variable CIT -Company Income Tax, when combined with CED –Customs and Excise Duty had the strongest overall relationship with the dependent variable groupings. At step 3, VAT –Value Added Tax, when combined with CIT -Company Income Tax, and CED –Customs and Excise Duty had the strongest overall relationship with the dependent variable groupings. At step 4, the removal of the variable CIT -Company Income Tax was able to increase the discrimination between dependent variable groupings as shown in Tables 7A-B.

**Table 7A:** Variables Entered/Removed[a,b,c,d]

| Step | Entered | Removed | Min. D Squared | | Exact F | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Statistic | Between Groups | Statistic | df1 | df2 | Sig. |
| 1 | CED | | 5.726 | 2.0 and 3.0 | 15.270 | 1 | 17.000 | .001 |
| 2 | CIT | | 9.692 | 1.0 and 2.0 | 12.162 | 2 | 16.000 | .001 |
| 3 | VAT | | 10.824 | 1.0 and 2.0 | 8.490 | 3 | 15.000 | .002 |
| 4 | | CIT | 7.742 | 1.0 and 2.0 | 9.715 | 2 | 16.000 | .002 |

At each step, the variable that maximizes the Mahalanobis distance between the two closest groups is entered.

a. Maximum number of steps is 8.

b. Maximum significance of F to enter is .05.

c. Minimum significance of F to remove is .10.

d. F level, tolerance, or VIN insufficient for further computation.

**Table 7B:** Wilks' Lambda

| Step | Number of Variables | Lambda | df1 | df2 | df3 | Exact F | | | | Approximate F | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Statistic | df1 | df2 | Sig. | Statistic | df1 | df2 | Sig. |
| 1 | 1 | .067 | 1 | 3 | 17 | 79.322 | 3 | 17.000 | .000 | | | | |
| 2 | 2 | .034 | 2 | 3 | 17 | 23.723 | 6 | 32.000 | .000 | | | | |
| 3 | 3 | .020 | 3 | 3 | 17 | | | | | 16.385 | 9 | 36.657 | .000 |
| 4 | 2 | .026 | 2 | 3 | 17 | 27.881 | 6 | 32.000 | .000 | | | | |

**Direction of Relationships**

The pattern of the relationships between the dependent variable groups and the independent variables is determined by examining the pattern of means for the predictor variables, using the Group Statistics table (Table 8). From this output, the mean for PPT – Petroleum Profit Tax is higher for all the specification groups (Military, Obasanjo, Yaradua and Jonathan regimes), indicating a greater importance of this tax revenue source in respect of government expenditure. The means for the three other statistically significant variables: CIT -Company Income Tax, VAT –Value Added Tax and CED –Customs and Excise Duty are higher for the Jonathan regime group, indicating greater importance of these variables to the Jonathan regime even more than the total group.

However, if we consider only the variables selected by the stepwise procedure, a different pattern is exposed. While the mean for CED –Customs and Excise Duty is higher for the specification groups Military and Obasanjo regimes, indicating a greater importance of this tax revenue source in respect of government expenditure, the mean for VAT –Value Added Tax is higher for the specification groups Yaradua and Jonathan regimes again indicating a greater importance of this tax revenue source in respect of government expenditure for their regimes.

**Table 8:** Group Statistics

| GXP | | Mean | Std. Deviation | Valid N (listwise) | |
|---|---|---|---|---|---|
| | | | | Unweighted | Weighted |
| 1.0 | PPT | 57.580 | 17.3966 | 4 | 4.000 |
| | CIT | 22.368 | 8.6079 | 4 | 4.000 |
| | VAT | 23.973 | 12.9789 | 4 | 4.000 |
| | CED | 42.083 | 18.2440 | 4 | 4.000 |
| 2.0 | PPT | 941.370 | 699.6770 | 8 | 8.000 |
| | CIT | 113.386 | 66.4790 | 8 | 8.000 |
| | VAT | 125.198 | 60.1588 | 8 | 8.000 |
| | CED | 170.571 | 51.3195 | 8 | 8.000 |
| 3.0 | PPT | 1878.525 | 684.6063 | 4 | 4.000 |
| | CIT | 492.300 | 148.3183 | 4 | 4.000 |
| | VAT | 431.350 | 114.7346 | 4 | 4.000 |
| | CED | 282.350 | 29.5998 | 4 | 4.000 |
| 4.0 | PPT | 3456.540 | 996.0038 | 5 | 5.000 |
| | CIT | 954.200 | 191.1572 | 5 | 5.000 |
| | VAT | 745.640 | 64.1208 | 5 | 5.000 |
| | CED | 491.840 | 61.2981 | 5 | 5.000 |
| Total | PPT | 1550.385 | 1401.4420 | 21 | 21.000 |
| | CIT | 368.417 | 388.5705 | 21 | 21.000 |
| | VAT | 311.956 | 290.6866 | 21 | 21.000 |
| | CED | 243.881 | 166.7806 | 21 | 21.000 |

**Estimated Discriminant Functions:**

**Table 9:** Canonical Discriminant Function Coefficients

| | Function | |
|---|---|---|
| | 1 | 2 |
| VAT | .011 | -.015 |
| CED | .007 | .027 |
| (Constant) | -5.097 | -1.855 |

Unstandardized coefficients

The discriminant function(equation) for Function 1 obtained from Table 9 is given as follows: $Z_{GXP} = .011VAT + .007CED - 5.097 \ldots\ldots\ldots (2)$

The structure matrix table (Table 10) shows the correlations of each variable with each discriminant function, and identifies the largest loadings for each discriminant function and indicates that for Function 1, VAT –Value Added Tax, CIT -Company Income Tax, and CED –Customs and Excise Duty are the important variables with loadings of .970, .874 and .812 respectively. However, the stepwise estimation removes CIT -Company Income Tax loading on the discriminant function and does not use it in the analysis even though its

loading factor shown by the structure matrix (.874) is higher than that of CED –Customs and Excise Duty (.812). This could imply that although CIT -Company Income Tax is clearly not the weakest predictor, it is not associated with government expenditure groupings but a function of some other un-assessed factors.

Should we interpret these groupings as political groupings in Nigeria, the result indicates even though CIT -Company Income Tax is the second most important revenue stream after VAT –Value Added Tax in Nigeria, it is the only tax revenue not politicized by government and may be the most efficient source of government revenue in Nigeria. This result is in tune with the earlier findings of Ako (2016) that government expenditure assumes new peaks with successive election periods in Nigeria. This result also exposes a curious anomaly in the Nigerian economy in that PPT – Petroleum Profit Tax generally held to be all important for Nigeria is the weakest and/or least important when it comes to government expenditure with loadings of a mere .153. The question to ask here is –what actually happens to the huge PPT – Petroleum Profit Tax revenue collected by the Nigerian government if it is as unimportant to government expenditure in Nigeria but subject to political influences as has been revealed by this study? We ask further, is this the secret cash-cow for private political financing by government functionaries in Nigeria over the years? It appears "corruption" must indeed be playing a big role when it comes to this tax revenue component in Nigeria.

**Table 10:** Structure Matrix

| | Function | |
|---|---|---|
| | 1 | 2 |
| VAT | .970* | -.242 |
| CIT[b] | .874* | -.067 |
| CED | .812* | .584 |
| PPT[b] | .153 | -.163* |

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions Variables ordered by absolute size of correlation within function

*. Largest absolute correlation between each variable and any discriminant function

b. This variable not used in the analysis.

**Confusion-Matrix Analysis**

The classification or confusion matrix analysis provides information on the overall Model fit as indicated in Table 11. The results for both the list wise and stepwise estimations were largely similar but the stepwise result had better cross validation which produces amore reliable discriminant function and is reported here. From the classification results of Table 11, the over all predictive accuracy of the discriminant function or the 'hit ratio 'for the cross-validated cases is 90.5%. The calculated hit ratio achievable by chance if two samples are equal in size is a 50/50 chance. Acceptable hit ratio for most researchers is 25% higher than that due to chance(i.e. 75%) so we accept this result of the overall model fit as valid.

Moreover, the Discriminant function excels at identifying groups1 and 4 – the Military and Jonathan regimes, both in the original and cross-validated cases which report 100% correct classification for both regimes. Group 2 –the Obasanjo regime was classified with slightly better accuracy (87.5%)than Group 3 –the Yaradua regime(75.0%) although these groups are also classified significantly better than expected by chance alone and therefore valid for inference. In addition, the proportion of misclassifications for both Group 2 –the Obasanjo regime (12.5%)and Group 3 –the Yaradua regime(25.0%) do not differ significantly from chance and could be easily due to the overlapping regime start and end dates.

**Table 11:** Classification Results[a,c]

| GXP | | | Predicted Group Membership | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1.0 | 2.0 | 3.0 | 4.0 | Total |
| Original | Count | 1.0 | 4 | 0 | 0 | 0 | 4 |
| | | 2.0 | 1 | 7 | 0 | 0 | 8 |
| | | 3.0 | 0 | 1 | 3 | 0 | 4 |
| | | 4.0 | 0 | 0 | 0 | 5 | 5 |
| | % | 1.0 | 100.0 | .0 | .0 | .0 | 100.0 |
| | | 2.0 | 12.5 | 87.5 | .0 | .0 | 100.0 |
| | | 3.0 | .0 | 25.0 | 75.0 | .0 | 100.0 |
| | | 4.0 | .0 | .0 | .0 | 100.0 | 100.0 |
| Cross-validated[b] | Count | 1.0 | 4 | 0 | 0 | 0 | 4 |
| | | 2.0 | 1 | 7 | 0 | 0 | 8 |
| | | 3.0 | 0 | 1 | 3 | 0 | 4 |
| | | 4.0 | 0 | 0 | 0 | 5 | 5 |
| | % | 1.0 | 100.0 | .0 | .0 | .0 | 100.0 |
| | | 2.0 | 12.5 | 87.5 | .0 | .0 | 100.0 |
| | | 3.0 | .0 | 25.0 | 75.0 | .0 | 100.0 |
| | | 4.0 | .0 | .0 | .0 | 100.0 | 100.0 |

a. 90.5% of original grouped cases correctly classified.

b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

c. 90.5% of cross-validated grouped cases correctly classified.

**Figure 1:** Prediction Accuracy

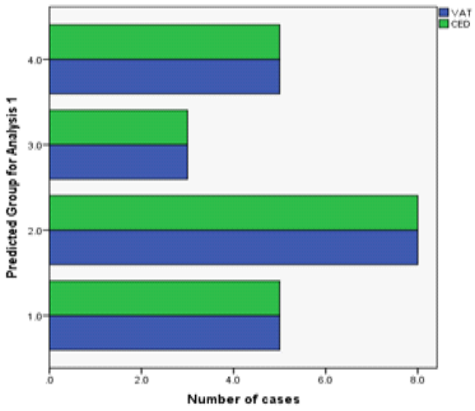



**Figure 2:** Variable Importance

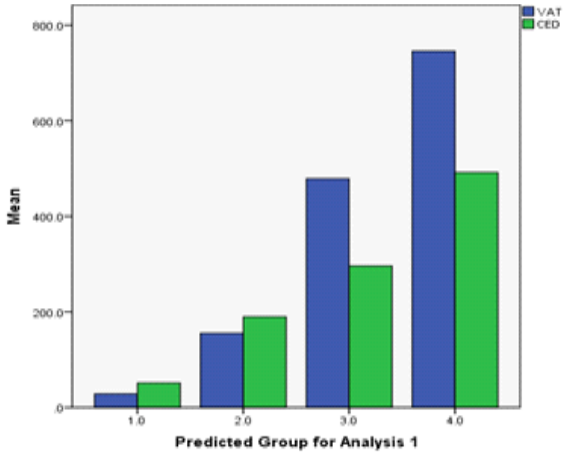
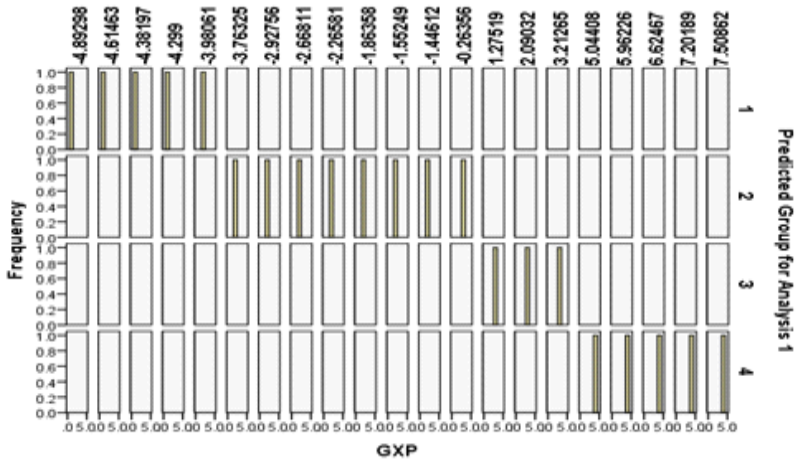



**Figure 3:** Group Predictions
Discriminant Scores from Function 1 for Analysis 1



Moreover, the visual demonstrations of the effectiveness of the discriminant function are captured in Figures 1-3 above. Figure 1 indicates predicted group accuracy while Figure 2 indicates the variable importance. From Figure 2, VAT –Value Added Tax appears more important in the Yaradua and Jonathan regimes while CED –Customs and Excise Duty appears more important in the Military and Obasanjo regimes which are in line with discussions on direction of relationships above. Figure 3 are histograms illustrating the distribution of the discriminant function scores for the four groups with very minimal overlap of the graph sand box plots which show that the function does discriminant well, as the previous tables indicated.

**Conclusion and Recommendations**

**Conclusion**

In discriminant analysis was conducted to predict government expenditure –GXP during 21 years of Military, Obasanjo, Yaradua and Jonathan regimes in Nigeria from 1995 -2015. Predictor variables were CIT -Company Income Tax, PPT – Petroleum Profit Tax, VAT –Value Added Tax and CED –Customs and Excise Duty. Significant mean differences were observed for the entire predictor son the dependent variable. The discriminant function revealed a significant association between group sand all predictors, accounting for 95.84% of between group variability for the list wise estimation and 95.45% of between group variability for the stepwise estimation. A closer analysis of the structure matrix revealed only three significant predictors for Function 1, namely VAT (score.970), CIT (score.874) and CED (score.812)with PPT a poor predictor. However, the stepwise estimation removes CIT loading on the discriminant function and does not use it in the analysis even though its loading factor (.874)is higher than that of CED (.812). This could imply that although CIT is clearly not the weakest predictor, it is not associated with government expenditure groupings but a function of some other un-assessed factors.

Should we interpret these groupings as political groupings in Nigeria, the result indicates even though CIT is the second most important revenue stream after VAT in Nigeria, it is the only tax revenue not politicized by government and may be the most efficient source of government revenue in Nigeria. This result also exposes a curious anomaly in the Nigerian economy in that PPT generally held to be all important for Nigeria is the weakest and/or least important when it comes to government expenditure with loadings of a mere .153. The question to ask here is –what actually happens to the huge PPT revenue collected by the Nigerian government if it is as unimportant to government expenditure in Nigeria but subject to political influences as has been revealed by this study? We ask further, is this the secret cash-cow for private political financing by government functionaries in Nigeria over the years? It appears "political corruption" must indeed be playing a big role when it comes to this tax revenue component in Nigeria. 90.5% is the accuracy rate for the cross-validated cases in the study and is the overall model fit.

**Recommendations**

The study recommends the following:

1. Government should identify the various ways by which the affected tax revenue components are serially politicized and rendered inefficient since they are obviously important in funding government expenditure.
2. The apparent serious "corruption" playing a big role in the Petroleum Profit Tax revenue component in Nigeria should be addressed since this tax revenue seems to be used largely to service private political agendas of government functionaries.

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