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Abstract

In this study, annual data for 1995–2015 are employed to model government expenditure and disaggregate tax revenue in Nigeria. The analysis comprises Quantile and causal estimations. The estimated quantile parameters for government expenditure indicate variable predictor variables' effects, but the coefficients for the predictor variable -Value Added Tax is consistently positive and highly significant across board for the range of defined quantiles, 0.6 representing the democratic government of the Obasanjo regime, 0.8 representing the democratic government of the Yaradua regime and 0.95 representing the democratic government of the Goodluck Jonathan regime. Pairwise Granger causality tests indicate the Nigerian government spends in anticipation of revenue from both Customs & Excise Duty and Petroleum Profit Tax while it synchronizes spending–revenue decisions with Value Added Tax and Company Income Tax. Contrary to the public posturing of successive governments, empirical evidence indicates the Nigerian government does not synchronize Petroleum Profit Tax with government expenditure but spends in anticipation of this revenue base long established to be volatile. This is largely responsible for the government's malfunction in Nigeria. Thus, these results provide evidence to support feedback effects or the fiscal synchronization hypothesis as well as support for spend and tax theories in the relationship between government revenue and government expenditure in Nigeria. Fiscal imprudence was identified and the results brought out several anomalies in the economy and governance. The study recommends Government practice fiscal prudence and respect legal provisions of the annual budgets.

Keywords: Public expenditure, Causality, Quantile regression, Tax revenue, Fiscal administration.

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http://internationalpolicybrief.org/journals/ijasr-online-journals/intl-jrnls-of-sci-research-in-social-sciences-mgt-studies-vol3-no2-november-2018
Background to the Study

Budget imbalances (deficit or surplus) which are a common occurrence worldwide are due to government misalignment of revenue and expenditure. As a result and over the years, government expenditure and revenue have remained important interplay variables in fiscal administration (Balogun, 2017). Hence, understanding the relationship between the revenue and expenditure of government is very important especially, in addressing fiscal imbalances through appropriate fiscal policy (Eita and Mbazima, 2008). For such fiscal policy to result in any effective fiscal consolidation process requires appropriate changes in government expenditures, or revenues, or both.

In this respect, numerous studies about 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 profit taxes, customs and excise duties; hence the need for this study. Furthermore, total public expenditure rose excessively during the study period in Nigeria with not much to show for it in terms of development. In this respect, a study by Ako (2016) 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. This paper therefore examines the effects of the different tax components on government expenditure before and within the current democratic dispensation in Nigeria in order to establish any existing dynamics including causal relationships. Moreover, a proper understanding of the nexus and the trends of revenue and expenditure is critical to explaining the government’s malfunction in Nigeria.

The main objectives of the paper are to: (a) examine the disaggregate tax effects on government expenditure in Nigeria and (b) make appropriate recommendations. To do this, the paper will: (c) develop appropriate quantile(s) for use with the main model; (d) examine for different effects on the dependent variable along the quantile(s); (e) determine which predictor variables have the most effect on the dependent variable and (f) examine for causal effects among the variables. 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

Four theories in literature seek to explain the observed spending-tax revenue behavior of government. These four theories include: (a) the tax-and-spend theory or revenue-spend theory which advocates a unidirectional causation from revenue to expenditure (Friedman -1978, Buchanan and Wagner -1978, Eita and Mbazima -2008); (b) the spend-and-tax theory or spend-revenue hypothesis which advocates a unidirectional causation from expenditure to revenue (Peacock and Wiseman -1979, Anderson, Wallace and
Warner -1986, Ewing and Payne -1998, Hodroyiannis and Papapetrou -1996); (c) the fiscal synchronization hypothesis which advocates bidirectional causation or feedback effects between revenue and expenditure (Meltzer and Richard -1981, Miller and Russek -1990, Owoye -1995, Yashobanta and Behera -2012 and Takumah -2014); and (d) the fiscal neutrality or institutional separation hypothesis which advocates absence of causation between revenue and expenditure (Baghestani and McNown -1994).

Hence, these contending theories throw up three implications for the nature of the relationship between government expenditure and revenue. Firstly, if the tax-and-spend theory holds, budget deficits can be avoided by implementing policies that raise tax revenues. Secondly, if fiscal synchronization does not hold, then fiscal neutrality holds and revenue decisions are independent from expenditure decisions. Thirdly, if the spend-and-tax theory holds, existing budget deficits are cleared by raising tax revenues or by implementing policies that reduce government expenditure (Narayan and Narayan,2006).

**Empirical Review**

Some pertinent empirical findings in literature concerning government revenues and expenditures are summarized in Table 1 below.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Country(s)</th>
<th>Methodology</th>
<th>Main Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Konukcu-Onal and Tosun (2008)</td>
<td>Russia, Belarus, Kyrgyz Republic and Kazakhstan</td>
<td>Standard Granger causality test</td>
<td>Revenue-spend hypothesis holds for Russia and Belarus, fiscal synchronization holds for Kyrgyz Republic and Kazakhstan</td>
</tr>
<tr>
<td>Al-Zeaud (2014)</td>
<td>Jordan</td>
<td>Granger causality and Error Correction Mechanism-VECM</td>
<td>Fiscal synchronization hypothesis holds for the period 1990-2011</td>
</tr>
<tr>
<td>Luković &amp; Grbić (2009)</td>
<td>Serbia</td>
<td>Toda-Yamamoto test for Granger causality</td>
<td>Unidirectional causality from government expenditure to revenue</td>
</tr>
<tr>
<td>Ghartey (2010)</td>
<td>Jamaica, Bahamas, Barbados and Belize</td>
<td>Granger causality test</td>
<td>Mixed. Unidirectional causality and support institutional separation</td>
</tr>
<tr>
<td>Mehrara, Pahlavani and Elyasi(2012)</td>
<td>40 Asian countries</td>
<td>Granger causality test</td>
<td>Fiscal synchronization confirmed for the period 1995 - 2008</td>
</tr>
<tr>
<td>Nyamongo, Sichel, and Schoeman (2007)</td>
<td>South Africa</td>
<td>Granger causality test and Error Correction Mechanism</td>
<td>Bidirectional causality in the long-run</td>
</tr>
<tr>
<td>Wolde-Rufael (2008)</td>
<td>13 African countries including Nigeria</td>
<td>Toda-Yamamoto test for Granger causality</td>
<td>Direction of causation are mixed</td>
</tr>
</tbody>
</table>

Chang and Chiang (2009) 15 OECD countries Granger causality tests in the panel data domain Bidirectional causality i.e. fiscal synchronization for the period 1992-2006

Dada (2013) Nigeria Granger causality test and Error Correction Mechanism No causality evidence. Support for institutional separation hypothesis


Aregbeyen and Insah (2013) Nigeria and Ghana Granger causality test Fiscal synchronization hypothesis holds.

Ogujiuba and Abraham (2012) Nigeria Granger causality test and Error Correction Mechanism, Impulse Response Causality runs from government revenue to expenditure

Nwosu and Okafor (2014) Nigeria Vector Autoregression, Error Correction Mechanism Findings support spend-tax hypothesis

Edirisinghe & Sivarajasingham (2015) Sri Lanka Granger causality test and Error Correction Mechanism, Impulse Response Confirm spending-revenue hypothesis

Yashobanta and Behera (2012) India Granger causality test and Error Correction Mechanism Bidirectional causality - Fiscal synchronization

**Methods and Materials**

**The Model and Modeling Procedure**

The estimation procedure consisting of the following four steps was employed:

1. Develop appropriate quantile(s) for use with the main model. Quantiles are developed to approximate the tenure of the five government regimes of the study period such that Quantile 0.2 represents the Military regime prior to 1999, Quantile 0.6 represents the democratic government of the Obasanjo regime, Quantile 0.8 represents the democratic government of the Yaradua regime while Quantile 0.95 represents the democratic government of the Goodluck Jonathan regime. Thus, we Model the 20th, 60th, 80th and 95th Percentiles of the dependent variable – government expenditure.

2. Time series analysis to identify trends.

3. Quantile regression analysis to examine for different effects on the dependent variable along the quantile(s) and to determine which predictor variables have the most effect on the dependent variable or differentiate between the quantile(s). Although the interpretation of the coefficients is the same as for OLS, Quantile regression analysis uses linear programming methods unlike OLS and maximum likelihood to produce estimates that give more comprehensive picture of the effect of the independent variables on the dependent variable. This is achieved by producing different effects along the distribution (quantiles) of the dependent variable which is a continuous variable. Therefore, Quantile regression models the relation between a set of predictor variables and specific percentiles (or quantiles) of the response variable and it specifies changes in the quantiles.
of the response. The quantile level is the probability (or the proportion of the population) that is associated with a quantile and is often denoted by the Greek letter $\tau$, while the corresponding conditional quantile of $Y$ given $X$ is often denoted as $Q(Y/X)$. The quantile regression generally produces a distinct set of parameter estimates and predictions for each quantile level. The quantile regression parameter estimates the change in a specified quantile of the response variable produced by a one unit change in the predictor variable which allows for differentiation between quantile(s). Hence, by fitting a series of regression models for a network of values of $\tau$ in the interval $(0, 1)$, one can describe the entire conditional distribution of the response. As such, the relationship between the dependent variable and independent variables may change depending on which quantile is under consideration. The advantage here is that the Quantile regression estimates are more robust against outliers in the response measurements.

4. Pairwise Granger Causality tests to examine for causal effects among the variables.

**Variable Definitions**
The categories of the variables GXP, PPT, CIT, VAT and CED are defined and specified in Table 2.

**Table 2: Definition of Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>GXP</td>
<td>Government Expenditure/Governance</td>
</tr>
<tr>
<td>PPT</td>
<td>Petroleum Profit Tax</td>
</tr>
<tr>
<td>CIT</td>
<td>Company Income Tax</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
<tr>
<td>CED</td>
<td>Customs &amp; Excise Duty</td>
</tr>
</tbody>
</table>

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

**Results and Discussion**

**Trend Analysis**
Figure 1 below plots the series used for this study and indicates multiple trends that were generally upwards although the trend in Petroleum Profit Tax can be described as erratic in line with the whims and caprices of the global oil market. It is clear from Figure 1 that the trends in Government Expenditure and Petroleum Profit Tax are in synch and far apart from the other trends. From this analysis also, it appears the astronomical growth in Government Expenditure within six growth bands is fueled largely by the growth in Petroleum Profit Tax within the study period.
Diagnostic Test
Result of the cumulative sum (CUSUM) test of Stability for the Model is presented in in Figure 2 below. This indicates stability in the coefficients over the sample period as the plot of the CUSUM statistic falls inside the critical bands of the 5% confidence interval of parameter stability.

Quantile Regression Results
Coefficient estimates for the 5th, 20th, 60th, 80th, 95th quantile regression and the linear regression coefficient estimates for government expenditure are presented in Table 3 below.
From the Table 3 results, three predictors (Petroleum Profit Tax, Company Income Tax & Customs & Excise Duty) have negative relationship with Government Expenditure for linear regression. However, only two predictors (Petroleum Profit Tax & Company Income Tax) largely have negative relationship with Government Expenditure for quantile regression since the third affected predictor (Customs & Excise Duty) is only found with a negative coefficient in the 95th quantile representing the Jonathan regime. Furthermore, one of the predictor variables (Petroleum Profit Tax -PPT) is shown to have inconsistent negative relationship with Government Expenditure, for in the 60th quantile representing the Obasanjo regime, the relationship is indicated to be positive. In addition, even though the coefficient for the predictor variable PPT is not significant for the linear regression, it is shown to be highly significant for the 5th and 80th quantiles representing Military and Yaradua regimes respectively. This result could be interpreted to mean that within the study period, increases in Petroleum Profit Tax only had a positive effect on government expenditure during the Obasanjo regime in the 60th quantile but the effect was not significant.

This result exposes another curious anomaly in the Nigerian economy in that PPT – Petroleum Profit Tax generally held to be all important for Nigerian economy and shown to largely run parallel to government expenditure in Figure 1 trend analysis aboveis empirically shown to have a negative relationship with government expenditure. When this result is read together with the trend analysis above, a sad but unavoidable truth is established. Even though Nigeria could largely finance her expenditure from the proceeds of the Petroleum Profit Tax over the years, this was not done (the negative relationship) and hence Nigeria continues to be kept in debt bondage by unscrupulous leaders. The only positive relationship recorded was for the Obasanjo regime in the 60th quantile and could be a reflection of the fact this regime paid off Nigeria's lingering debts and made some judicious use of the proceeds. In the same vein, going by the size and significance of the coefficients, the Yaradua regime in the 80th quantile was the worst culprit in mismanaging oil proceeds in Nigeria while the Jonathan regime had the lowest mismanagement quotient for PPT proceeds. Moreover, the negative signs for these tax components provide evidence of succeed in governments in Nigeria habitually spending in anticipation of tax revenue.

In addition, the coefficients for the predictor variable VAT –Value Added Tax is consistently positive and highly significant across board whereas the coefficient for the

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<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Linear (OLS) Regression</th>
<th>Quantile Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5th</td>
<td>20th</td>
</tr>
<tr>
<td>Intercept</td>
<td>316.8***</td>
<td>175.4***</td>
</tr>
<tr>
<td>PPT</td>
<td>-</td>
<td>-0.065***</td>
</tr>
<tr>
<td>VAT</td>
<td>10.75***</td>
<td>9.399***</td>
</tr>
<tr>
<td>CED</td>
<td>-0.071</td>
<td>0.418***</td>
</tr>
</tbody>
</table>
predictor variable Customs & Excise Duty –CED produced the best positive and highly significant effect in the 80th quantile representing the Yaradua regime. All in all, the 80th quantile representing the Yaradua regime produced the most significant effects on government expenditure whether positive or negative for all predictor variables. The estimated parameter quantile plots for government expenditure presented in Figure 3 further signpost how variable the predictor variables' effects are and they also highlight that a linear regression might not be an optimal solution to assess this relationship.

Figure 3: Estimated Parameter Quantile Plots for Government Expenditure
The result of the Pairwise Granger Causality test in Table 4 above shows that there are strong bidirectional causalities between Government Expenditure and Company Income Tax, between Government Expenditure and Value Added Tax, between Company Income Tax and Value Added Tax and between Company Income Tax and Customs & Excise Duty. The results also show strong unidirectional causality from Government Expenditure to Petroleum Profit Tax, from Petroleum Profit Tax to Company Income Tax, from Value Added Tax to Customs & Excise Duty and from Government Expenditure to Customs & Excise Duty. This implies the Nigerian government spends in anticipation of revenue from both Customs & Excise Duty and Petroleum Profit Tax while it synchronizes spending–revenue decisions with Value Added Tax and Company Income Tax. Thus, the results provide evidence to support feedback effects or the fiscal synchronization hypothesis as well as support for spend and tax theories in the relationship between government revenue and government expenditure in Nigeria and generally align with the findings of Peacock and Wiseman -1979, Anderson, Wallace and Warner -1986, Ewing and Payne -1998, Hodroyiannis and Papapetrou -1996 on spend and tax theory; Meltzer and Richard -1981, Miller and Russek -1990, Owoye -1995, Yashobanta and Behera -2012 and Takumah -2014 on the fiscal synchronization hypothesis.
Specifically for Nigeria, the result support the findings of Balogun (2017), Aregbeyen and Insah (2013), Nwosu and Okafor (2014) but is at variance with the findings of Dada (2013), Ogujiuba and Abraham (2012).

Furthermore, this result throws up another anomaly in the Nigerian governance space. Given the touted pre-eminence of Petroleum Profit Tax as a revenue source and given the known volatility of global oil markets, one would ordinarily expect the Nigerian government to ensure this is a revenue source that is brought into fiscal synchronization but empirical evidence here clearly shows that is not the case; contrary to the public posturing of successive governments. The Nigerian government at annual budgetary sessions regularly indicates one thing but empirical evidence here paints a contrary picture and this is evidence obtained from a time period covering five successive governments, four of which are democratic. Clearly therefore, the continuation of such fiscal imprudence in governance is a large factor as to why Nigeria remains development challenged to date.

Conclusion and Recommendations

Conclusion

In this study, annual data for 1995–2015 are employed to model government expenditure and disaggregate tax revenue in Nigeria. The analysis comprises Quantile and causal estimations. The estimated quantile parameters for government expenditure indicate variable predictor variables' effects, but the coefficients for the predictor variable -Value Added Tax is consistently positive and highly significant across board for the range of defined quantiles, 0.6 representing the democratic government of the Obasanjo regime, 0.8 representing the democratic government of the Yaradua regime and 0.95 representing the democratic government of the Goodluck Jonathan regime. Pairwise Granger causality tests indicate the Nigerian government spends in anticipation of revenue from both Customs & Excise Duty and Petroleum Profit Tax while it synchronizes spending–revenue decisions with Value Added Tax and Company Income Tax.

Contrary to the public posturing of successive governments, empirical evidence indicates the Nigerian government does not synchronize Petroleum Profit Tax with government expenditure but spends in anticipation of this revenue base long established to be volatile. This is largely responsible for the government's malfunction in Nigeria. Thus, these results provide evidence to support feedback effects or the fiscal synchronization hypothesis as well as support for spend and tax theories in the relationship between government revenue and government expenditure in Nigeria. Fiscal imprudence was identified and the results brought out several anomalies in the economy and governance.

Recommendations

The study recommends Government practice fiscal prudence and respect legal provisions of the annual budgets.
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