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Analyzing the Impact of Value Added Tax (VAT) on Economic Growth in Nigeria

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Abstract
This study investigates the relative impact of value added tax on economic growth in Nigeria. We used Johansen cointegration test. The result of cointegration test does not provide any evidence of long-run equilibrium relationship among the variables. An unrestricted vector autoregressions (VARs) technique were employed to analyze and draw policy inferences. Impulse response functions (IRFs) and Forecast error Variance decompositions (FEVDs) were compute through 1000 Monte Carlo simulations. The results derived from the impulse response function (IRF) and forecast error variance decomposition (FEVD) imply that value added tax have positive impact on economic growth in Nigeria , where variation in this variables growth rate will causes variation in real economic activity with about 50 percent in the near future. We conclude that the policy makers in Nigeria should continues this fiscal policy with other macroeconomic indicators. Per suing this policy will enhance the Nigerian economy positively, more specifically in this time of economic crisis in the world.
Keywords: VAT, unrestricted VAR, impulse response, forecast error variance decomposition

1.0 Introduction

All economies, whether developed or developing require some degree of government intervention with a view to facilitating economic growth and development in their domains. This is particularly so as certain essential goods and services such as education, security, electricity, water and health facilities among others are mostly provided by the government. However, in providing these goods and services government has to source funds (revenue) from various sources including taxation, Ogundele (1996).

New form of taxes are selectively being introduced particularly by the developing countries so as to boost their revenue earning capacity with the aim of ensuring rapid economic growth and development of their countries. The Value Added Tax (VAT) is one of such taxes recently initiated by governments to raise revenue for smooth government operations.

In Nigeria, VAT was introduced in January 1994 after the promulgation of the Value Added Tax Decree No. 102 of 1993. Before that period, a committee was set-up by the Federal Government in 1991 to review the entire tax system in the country. Presently, the Federal Inland Revenue Service (FIRS)is responsible for collecting VAT.

There are some remarkable literature related to the used of VAR in Fiscal policy and growth. For Instance, Burgess and Stern (1993) argue that the structure of taxation in developing countries differs from that of developed. For developing countries, we have roughly two-third of tax revenue coming from indirect taxes like VAT while for developed countries two third come from direct taxes. They suggest that tax structure can change over time to maximize economic growth rate.

Kneller, *et al* (1999) studied the effect of the structure of taxation and public expenditure on the steady-state growth rate having taken into account the financing assumptions associated with the government budget constraint and their results were found consistent with the Barro (1990) model. Specifically, they found that non-discretionary taxation and productive expenditure not only exist but also enhance growth.

Williams McCarten (2005) suggested that a more detailed econometric examination focusing specifically on the collection efficiency of VAT, using an unbalanced panel of 45 countries (including a number of developed countries) for the 1970-1999 period found that VAT collection efficiency increases with urbanization, trade openness, real GDP per capita, and measures of both political stability and the 'fluidity' of political participation, but is negatively related to the agricultural share of GDP.

Folawemo and Osinubi (2006) examined the efficacy of monetary policy in controlling inflation rate and exchange instability. Ekpo (1994), and Devarajan, *et al* (1996), established positive relationship between fiscal policy (public spending) and economic growth. Lu and Zhang (2003) study of China observed that in the short-run, changes in the devaluation rate are positively correlated with the increase in the inflation rate. The findings shed some light on China's exchange rate policy reform, which was aimed at transforming its overvalued currency into a meaningful economic lever.

Ndung'u (1993) estimated a six-variable VAR—money supply, domestic price level, exchange rate index, foreign price index, real output, and the rate of interest—in an attempt to explain the inflation movement in Kenya. He observed that the rate of inflation and exchange rate explained each other. A similar conclusion was also reached in the extended version of this study (Ndung'u 1997). Other studies which have reached similar conclusions are Kamin (1996), Odedokun (1996), Elbadawl (1990), Nnanna (2002) and Lu and Zhang (2003).
Therefore, for the purpose of stimulating economic growth, some fiscal policy measures in the form of VAT for instance, is necessary to enable government finance its public activities with a view to minimizing the distortions created by the market forces and fostering economic growth and development. It is against this background that the study attempts to evaluate the impact of VAT on economic growth in Nigeria using unrestricted VAR methodology, between 1994 and 2010. The main aim of this study is to evaluate the impact of VAT on the economic growth in Nigeria from 1994 to 2010 using unrestricted VAR approach

Brief on the Concept and history of taxation in Nigeria
The history of taxation in Nigeria predated the colonial era. Before independence, local and the then regional governments administered majority of the taxes in the country independently. These taxes were imposed under various tax Ordinances passed by local authorities. Examples of such include 1940 Direct Taxation Ordinance Passed in the western region 1943 Direct Taxation in the Eastern region; the Pay As You Earn (PAYE) introduced in the Eastern and Western regions in 1956 and 1961 respectively. Similarly, Adebayo (1986) also observes that taxation in Nigeria especially before the Raisman Fiscal committee of 1958 was regional affair. In the North, the system of direct taxation had existed even before the advent of colonial rule particularly as there was sufficient and stable administration mostly based on the Islamic system. Thus, in this part of the country several forms of taxations such as the Zakkah, Jangali, Shukka-Shukka and Kudin Khasa existed particularly on agricultural activities.
However, the modern day taxation in Nigeria can be traced back to the work of a committee set up and headed by Mammam, (1999) to review the Nigerian taxation in 1958. The committee recommended for the removal of most of the role exercised by the local authorities as tax administrators. Other major changes introduced by the committee dwelled largely on the Companies Income Tax Act (CITA) and Income Tax Management Act (ITMA) (Adebayo, 1986). Thus, the history of taxation in Nigeria cannot be complete without the mentioning of the Rusiman committee of 1958. This is particularly so since before the 1958 most of the taxes in the country were essentially administered by local and regional governments. For instance, as at that time, direct taxes existed in the East and Western regions, with poll tax collected in the North (Ogundele, 1996).
The administration of different types of taxes and rates at regional and local levels especially the direct taxation was abolished when in 1961 the Income Tax Management Act (ITMA) was enacted. The Act was aimed at making taxation uniform all over the country.

2.0 Materials and Method

Data Source, Variables and their measurement
The first step in developing a VAR model is to make a choice of the macroeconomic variables that are essential for the analysis. In this study, therefore, in An Evaluation of the Impact of Value Added Tax (VAT) on Economic Growth in Nigeria, we used three related variables. The key variables that will be use are real gross domestic product (GDP), Value added tax (VAT) and Nigeria Oil revenues. **GDP Growth Rate**: This is the annual percentage change in the level of real GDP. It will be used as a measure of economic growth. Using GDP growth rate as a proxy for economic growth has been widely adopted by several researchers (Omoke and Ugwuanyi, 2010 for example).The variable will be used as a dependent variable. **Value Added Tax (VAT)**: This is the total annual turnover from value added tax. In Nigeria, VAT represents 5% of any consumption expenditure charged at each stage of production. This variable will be expressed in millions of Nigerian Naira and will serve as our independent variable. **Oil revenues (OILR):** This is total annual revenues collected by government from Oil (Petroleum and related). This variable will be expressed in millions of Nigerian Naira and will serve as our control independent variable. The data sets used for this analysis is the annual series of the selected relevant macroeconomic variables from 1994 to 2010. The choice of the starting time in this sample is informed by the fact that VAT was introduced in Nigeria in 1994. The data was extracted from the Central Bank of Nigeria, Statistical Bulletin, 2010.

Model Specification
Sims's (1980) seminal work introduces unrestricted vector autoregressions (VARs) that allows feedback and dynamic interrelationship across all the variables in the system and appears to be highly competitive with the large-scale macro-econometric models in forecasting and policy analysis. The choice of variables of interest do not

required a prior theoretical assumption, according to Sims (1980) the VAR approach does not require any prior theoretical framework for model identification and allows every variable to influence the other variables.
we formulate the model:

$$LGDP_t = a_0 + a_1 LVAT_t + a_2 LOILR_t + u_t \quad (1)$$

Where LGDP is the natural log of real Gross domestic product, LVAT is the natural log of Value Added Tax and LOILR is the natural log of Oil revenues, u_t is unobservable error term, a_0 is constant and $a_1, a_2,$ are coefficient to be estimated.
The variables GDP, VAT and OILR are incorporated into the model in their natural logs. This is to enable us index all the variables and to aid interpretation of results. Lutkepohl and Kratzig (2004), reveal that constructing a model for the logs is likely to be advantageous because the changes in the log series display a more stable variance than the changes in the original series.
The General basic model of VAR (*p*) has the following form

$$y_t = \mu + \psi D_t + A_1 y_{t-1} + ... + A_p y_{t-p} + u_t \quad (2)$$

where y_t is the set of *K* time series variables $y_t = (y_{1t}, ..., y_{Kt})'$, A_i's are (*K* × *K*) coefficient matrices, μ is vector of deterministic terms , D_t is a vector of nonstochastic variables such as economic intervention and seasonal dummies and $u_t = (u_{1t}, ..., u_{Kt})'$ is an unobservable error term. Although the model (2) is general enough to accommodate variables with stochastic trends, it is not the most suitable type of model if interest centers on the cointegration relations. The VECM form

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + ... + \Gamma_{p-1} \Delta y_{t-p+1} + \mu + \psi D_t + u_t \quad (3)$$

where

$$\Pi = \sum_{i=1}^{p} A_i - I \qquad \text{and} \qquad \Gamma_i = -(A_{i+1} + ... + A_p)$$

Unit root test
Since we are using times series data sets for the analysis, it is important that we first test the data sets for stationarity properties. Hence, to examine the stationarity properties of the data sets, we use a variety of units root tests. The motivation behind the assortment of tests is to obtain reliable and consistent results.
First, the Augmented Dickey Fuller (ADF) tests and Phillips-Perron (PP) tests are used to check whether each data series is integrated and has a unit root. This study employs the Phillips and Perron (1988) test, since the possibility of the presence of structural breaks makes the ADF test unreliable for testing stationarity. The presence of a structural break will tend to bias the ADF test towards non-rejection of the null hypothesis of a unit root.

The test specification for Augmented Dickey-Fuller (ADF) Test and Phillips-Perron(PP) test using (4) is given by

$$H_0 : \Pi = 0 \quad \text{and} \quad H_a : \Pi < 0$$

The ADF test-statistic and the ADF normalized bias statistic are

$$ADF_t = \frac{\hat{\Pi}}{SE(\hat{\Pi})} \quad and \quad ADF_n = \frac{T(\hat{\Pi})}{1 - \sum_{j=1}^{p-1} \Gamma_j}$$

The null hypothesis of non-stationary is rejected if the value of t-statistic is less than the critical value. Thus, in addition to the traditional tests of Dickey-Fuller and Phillips-Perron, we also employ the Kwiatkowski, Phillips, Schmidt and Shin‟s (KPSS) test designed to overcome the problems of low power and size distortions inherent in the traditional tests (Madalla and Kim, 1998)

3.0 Results and Discussions
The Time plots of almost all the series in Figure 1 shows a strong upward trend movement. In addition we can notice some fluctuations in some of the series more specifically Oil revenues. These plots (VAT and OILR) show some unidentified outliers at time points. Generally, formal tests have to be performing in order to confirm these properties.

Unit Root Tests

Before using the data in the estimation of VAR, we need to know time series properties of all the variables. Accordingly, a series of unit root test, such as Augmented Dickey-Fuller (ADF, 1981) and Phillips-Perron (PP, 1988), are used to determine the order of integration for each series.

Table 1: ADF and PP Test at Levels

ADF TEST						
	With constant			With constant & trend		
Variables	t- statistic	5% C.V	Prob.*	t-statistic	5% C.V	Prob.*
LGDP	0.958309	-3.081002	0.9932	-1.847659	-3.759743	0.6309
LVAT	3.378859	-3.119910	1.0000	1.916536	-3.828975	1.0000
LOILR	-0.655367	-3.081002	0.8294	-3.420174	-3.733200	0.0839
PP TEST						
LGDP	2.092780	-3.065585	0.9996	-1.654893	-3.733200	0.7234
LVAT	15.21305	-3.065585	0.9999	2.672705	-3.733200	1.0000
LOILR	-2.044167	-3.065585	0.2670	-3.408269	-3.733200	0.0855

Lag length for ADF and PP tests are decided based on Akaikes information criteria (AIC)
* MacKinnon (1996) one-sided p-value

Using The ADF tests and PP tests, all other variables possess unit roots at their levels since each reported t-statistic is not smaller than their respective critical values.

Analysis using VAR in level

Sims (1988), Sims, Stock, and Watson (1990), Leeper, Sims, and Zha (1996), Bernanke and Mihov (1997), argue that differencing throws away valuable information and the standard asymptotic tests are still valid even if the VAR is estimated in levels. Following the above literature, variables are allowed to enter in the VAR in their levels form. In this regard level VAR will be estimated and use for further analysis.

Optimal lag length selection

Table below presents the evidence based on the VAR Lag Order Selection Criteria.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8.222397	NA	0.000897	1.496320	1.637930	1.494811
1	37.04486	66.39197*	7.41e-06*	-3.339314*	-2.772874*	-3.345348*
2	43.07329	6.430329	1.34e-05	-2.943105	-1.951835	-2.953664

* indicates lag order selected by the criterion
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

In Table 2, Sims' (1980) modified Likelihood Ratio test and the Akaike Information Criteria recommended by Ozcicek and McMillin (1999) and other remaining criteria suggested a lag order of one.

Cointegration Test

Cointegration was an essential test in this study since all the variables were found to be non-stationary. If the variables were cointegrated, a cointegrated VAR approach (VECM) will be used; otherwise, a level VAR approach will be used for non-stationary variables. The results of the cointegration tests are reported in Table 3and 4.

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.576231	22.44250	29.79707	0.2745
At most 1	0.406717	9.564001	15.49471	0.3158
At most 2	0.109093	1.732736	3.841466	0.1881

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.576231	12.87850	21.13162	0.4635
At most 1	0.406717	7.831265	14.26460	0.3961
At most 2	0.109093	1.732736	3.841466	0.1881

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The cointegration tests in Table 3 show the existence of no cointegration using both the Trace and Maximum-Eigen value tests. Their respective probability is greater than 0.05 (choosing alpha level).

Residual Test

After estimation has been carried out, and certain results have been obtained, we implement a series of tests for the purpose of figuring out how adequate our model is. The residual tests are: Lagrange-multiplier (LM) test for autocorrelation, and AR root of characteristic polynomial.

Table 4: Roots of Characteristic Polynomial

Root	Modulus
0.971391	0.971391
0.710639	0.710639
0.323579	0.323579

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

Table 5: VAR Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	5.407702	0.7974
2	4.885893	0.8441
3	12.56364	0.1834

Probs from chi-square with 9 df.

Table 4 lists all the eigenvalue of the companion matrix, which meet the mathematical stability condition as all of them are obviously less than one in absolute value.

VAR Residual Serial Correlation LM Tests in Table 5 shows that High p-values (greater than 0.05) indicate that we can accept the null at conventional significance levels (α=5%, 1%). Rough inference is that autocorrelation is not present at all the lag order. This is indicative of efficient estimates of coefficients (minimum variance property hold) and cannot distort hypothesis testing procedure through wider confidence intervals.

Impulse Response Functions (IFR)

Impulse Response Functions (IRFs) are one of the useful tools of the VAR approach for examining the interaction between the variables in this study. They reflect how individual variables respond to shocks from other variables in the system. The response forecast period is ten years to enable us capture both the long term and short term responses.

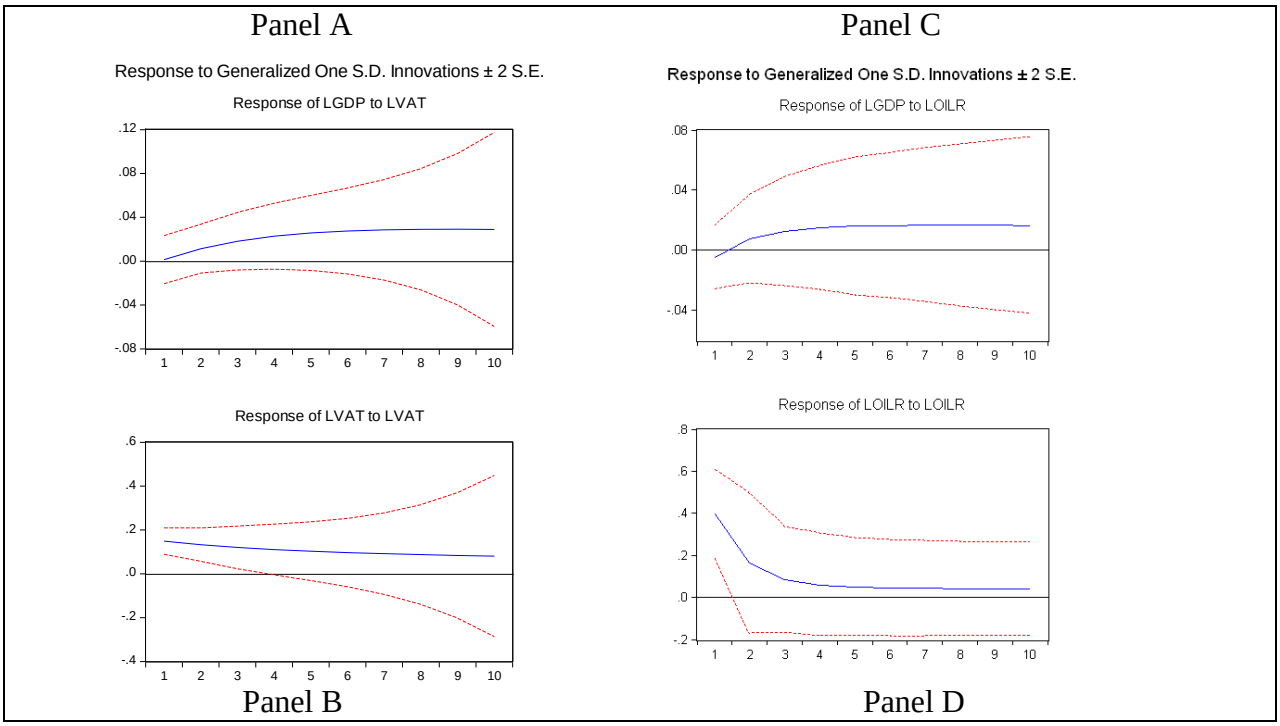

Figure 2: Impulse response to shock to Value added Tax and shock to Oil revenues

The Panel A of Figure 2 shows the response of real GDP to the shock in the value added tax (VAT). Here, real GDP rises quickly and significantly within the first two years, although at initial is around the value zero. The positive response of real GDP to the value added tax innovation continues up to the study period of 10 years. The panel B of Figure 2 show the response of value added tax to itself. In this case, it has a positive response more specifically at the early years. The responses gradually reduce with small magnitude in the later periods.

The Panel C of Figure 2 shows the response of real GDP to the shock in the Oil revenues (OILR). The real GDP in the first year responded negatively, but later in the second rises to a new positive level and the positive response continuous in this way up to period 10. The panel D of Figure 2 shows the response of Oil revenues to itself. In this case, it has a positive response more specifically at the early years (one to two years). The responses gradually reduce to a new positive level with very small magnitude starting from year three to the end of ten years periods.

Forecast Error Variance Decomposition

Forecast error Variance decompositions are presented in Table 6, which help identify the main channels of influence for individual variables. The table below reflects the contribution by other variables to the variance of Real GDP. The numbers under each variable represent the percentage of variance of the variable analyzed that was attributable to the particular variable (real GDP) over a 10 year period.

Table 6: Variance decomposition of Gross domestic product

Period	S.E.	LGDP	LVAT	LOILR
1	0.035856	100.0000	0.000000	0.000000
2	0.046926	91.71626	4.878033	3.405704
3	0.055624	80.23128	13.25081	6.517912
4	0.063533	69.26063	22.24636	8.493016
5	0.070955	59.99797	30.39507	9.606965
6	0.077920	52.54814	37.25072	10.20114
7	0.084416	46.65192	42.84404	10.50404
8	0.090437	41.98785	47.36392	10.64822
9	0.095995	38.27300	51.01989	10.70711
10	0.101112	35.28389	53.99523	10.72087

Cholesky Ordering: LGDP LVAT LOILR

The interest here is, to examine the impact and predictive ability of value added tax and oil revenues on real GDP. Table 6 throws further light on the relationships among the Variables of study. According to Table 6, real GDP accounted for its contemporary variance from its own innovations with about 100 per cent in the first year. The contributions of real GDP itself reduced over ten years with increasing reasonable contribution from other two variables. There was significant variation caused by both value added tax and revenue in later periods. VAT accounted about 5 to 54per cent variation in the real GDP variability, while oil revenue increasingly contributes from 3 to about 11 percent of real GDP variance. Value added tax caused the most variations to GDP over the long term.

5.0 Conclusion

We estimate a VAR in levels using one lag of each variable and having a constant. The results of the estimation show that R-squared is equal to 0.992027, this means that the explanatory variables account for approximately 99 percent variation in real GDP in Nigeria. In Nigeria, the highest predictive information about growth rate comes from the GDP itself, since the estimated coefficient is statistically significant while the rest are not.

The outcome of IRF suggests that any positive shocks in value added tax and oil revenues will increase the growth rate (or output growth) in Nigeria. The results of FEVD imply that value added tax variable explains most of the forecast error variance of real GDP, with about 5 to 54 per cent variation in the real GDP, where oil revenues are less with 3 to about 11 percent of real GDP variance. But by using the impulse response function and forecast error variance decomposition we have founded that the value added tax has positive impact in the Nigerian growth rate(real GDP) and with more than 50 percent contribution in the variance decomposition of real GDP in the 10 years period. In view of this, the policy makers in Nigeria should continue this fiscal policy with other macroeconomic indicators. Per suing this policy will enhance the Nigerian economy more specifically in this time of economic crisis.

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