ANALYSIS OF LINEAR AND NON-LINEAR RELATIONSHIPS BETWEEN VALUE ADDED TAX AND ECONOMIC GROWTH IN SOME SELECTED SUB-SAHARA AFRICA COUNTRIES.

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Abstract
The study investigated the comparative analysis of linear and non-linear relationships between value added tax (VAT) and economic growth in some selected sub-Saharan Africa countries. Taxation plays a crucial role in promoting economic activity and growth. Through taxation, government ensures that resources are channeled towards important project in the society while giving succor to the weak. VAT (Value Added Tax) is a broader tax system structured to raise revenue for government. Two research hypotheses were formulated to guide the study and were tested. The data used for this study are randomly selected with consideration given to countries that have sufficient data for the sample period. 30 countries were selected among all the sub-Saharan African countries adopting the payment of value added tax from the World Bank Statistical data. The sample period span from 2012 to 2016. Micro-panel data analysis was used to analyze the formulated hypotheses on the basis of the robust check. The researcher employed one-step difference GMM method whose result was confirmed by two-step GMM method. The study however concludes that value added tax has an inverse linear relationship with economic growth. Thus, when there is a decrease in tax there will be an increase in gross domestic product per capital.

Keywords: Value Added Tax (VAT), Gross Domestic Product (GDP), Linear, Non-Linear Relationships, Sub-Saharan Africa.

Introduction
The economic growth is a gradual and steady change in the long-run which comes about by a general increase in the rate of savings and population (Jhingan, 2005). An economy is said to be growing when it increases its productive capacity which later yield more in production of more goods and services (Jhingan, 2003). Economic growth is usually brought about by
technological innovation and positive external forces. It is the yardstick for raising the standard of living of the people. It also implies reduction of inequalities of income distribution (Abomaye-Nimenibo et al 2018).

Taxation therefore, plays a crucial role in promoting economic activity and growth. Through taxation, government ensures that resources are channeled towards important projects in the society while giving succor to the less privileged. The role of taxation in promoting economic activity and growth is not felt primarily because of its poor administration (Festus & Samuel, 2007). Ojo (2008) asserted that, taxation is a concept and science of imposing tax on citizens. According to (Abomaye-Nimenibo et al, 2018), tax is itself a compulsory levy which is required to be paid by every citizen. It is generally considered as a civic duty. The imposition of taxation is expected to yield income which should be utilized in the provision of amenities, both social and security as well as create conditions for the economic wellbeing of the society. Taxation plays a crucial role in promoting economic activities, social activities and growth. Through taxation, government ensures that resources are channeled towards important projects in the society while giving support to the less privileged. Olashore and Orjih (2001) stated that taxation is useful in raising revenue, controlling the consumption of certain commodities, controlling monopoly, reducing income inequalities, improving the balance of payments as well as protecting infant industries.

Abomaye-Nimenibo (2017) is of the view that tax is a compulsory contributions made by animate and inanimate beings to government being a higher authority either directly or indirectly to fund its various activities and any refusal is meted with appropriate punishment. Abomaye-Nimenibo (2017) asserted that tax is an involuntary payment made by a resident of a state in obeisance to levy imposed by a constituted authority of a sovereign state at a particular period of time; and that Taxation is the process put in place by government (which ever tier) to exercise authority on and over the imposition and collection of taxes based on enacted tax laws with which projects are financed. Taxation is therefore seen as the transfer of resources as income from the private sector to the public sector for its utilization to achieve some if not all the nation’s economic and social goals such as provision of basic amenities, social services, educational facilities, public health, transportation ,capital formation etc.

According to Charles, Ekwe and Azubike (2018), taxation is known globally as a very strong and powerful weapon of fiscal policy and as such government of nations put structures in place to maximize revenue accruable from its various tax components. The structure of tax should be such that it is broad enough to generate revenue to finance government expenditure and various other programmes of government. The growth and development of any nation is predicated upon the availability of funds as well as other human and material resources. Economic growth can be achieved by four important determinants namely: human resources, national resources, capital formation and technological development (Dwivedi, 2004). Efficient use of these resources will help to speed up the political, economic and social activities in the country. The revenue needed is not always available, and so a potent and certain source of revenue from a well-structured tax system will obviously create the required revenue for realizing the set objectives.

The responsibility shouldered by the government of any nation, particularly the developing nations, is enormous. Government needs to meet these responsibilities and in meeting these responsibilities, funds are needed. Thus, in fulfilling these responsibilities, it largely depends on the amount of revenue generated by the government through various means. Manukaji (2018) stated that every economy of the world needs revenue to develop and grow. One of the
major sources of revenue to the government is taxation. Governments use tax proceeds to render their traditional functions, such as the provision of public goods, maintenance of law and order, defense against external aggression, regulation of trade and business to ensure social and economic maintenance (Out & Adejumo, 2013). Umoru and Anyiwe (2013) noted that “the policy of taxation in Nigeria is directed towards achieving some specific objectives which include amongst others revenue generation and upholding economic growth”. Tax revenue is a core instrument in the hands of the government to fulfill expenditures and it helps in acquiring sustained growth targets. The nature of taxes can help predict a growth pattern (Romer & Romer, 2010). Musgrave and Musgrave (2004) maintained that the “economic effects of taxation include micro effects on the distribution of income and efficiency of resource use as well as macro effects on the level of capacity output, employment, prices and growth”. According to Manukaji (2018), government exists in order to effectively collect taxes from available economic resources and make use of same to create economic prosperity. Charles et al, (2018) listed value added tax (VAT) as one of the taxes collected by the government to boast revenue in order to perform its responsibilities. Similarly, the governments of developed countries like Canada, United States, Netherland, United Kingdom, who derive substantial revenue from Company Income tax, Value Added Tax, Import Duties and have used same to create prosperity (Manukaji, 2018). Thus, tax revenue can be used to influence or achieve macroeconomic stability. The tax system provides an opportunity for government to collect additional revenue besides other sources of income, which is needed in discharging its pressing obligations. A good system of tax also offers itself as one of the most effective means of mobilizing a nation’s internal resources and it lends itself to creating enabling and conducive environment to the promotion of economic growth and development (Ogbonna, 2010). Thus, this makes taxation to be an important concept in theory and in practice and it has received considerable intellectual and theoretical attention in the literature.

According to Abomaye-Nimenibo, Michael and Friday (2018); Salman, (2014) the major aim of most governments in developing countries is to stimulate and guide economic and social development governments continue to strive towards developmental advancement. Importance of tax lies in its ability to generate revenue for the government, influence the consumption pattern of the people and also regulate the economy through its influence on vital aggregate economic variables such as income, employment, prices of goods and services and host of others.

In the light of the above, the study however seeks to compare the linear and non linear relationships between VAT and economic growth in some selected sub-Saharan Africa countries.

**Purpose of the Study**

The main purpose of this study is to compare the linear and non linear relationships between the VAT and economic growth in some selected sub-Saharan Africa countries.

**Research Questions**

For the purpose of this study, two research questions were raised. They include:

i. What is the nature of the linear relationship between VAT and economic growth?

ii. To what extent does non-linear relationship exist significantly in the relationship between VAT and economic growth?
Research Hypotheses

Two research hypotheses were formulated for the purpose of this study

i. There is no significant linear (either positive or negative) relationship between VAT and Economic growth in some selected sub-Saharan African countries.

ii. There is no non-linear significant relationship between VAT and economic growth in some selected sub-Saharan African countries.

Methodology

The study is a comparative study and the research design of this work is based on relationship that is, it is relationally inclined. The plan of this study is structured in a way that allows the researchers to empirically investigate the impact of value added tax on economics growth of some selected sub-Saharan African countries who are among the countries where value added tax is applicable. The population size includes all the countries in sub-Saharan African who implement value added tax policy. These countries form the population of this study for a period ranging from 2012 to 2016. The countries’ data used for this work are gotten from the World Bank statistic data website. The data used for this study are randomly selected with consideration given to countries that have sufficient data for the sample period. 30 countries were selected among all the African countries adopting the payment of value added tax from the World Bank Statistical data. The sample period span from 2012 to 2016. The parameters of the models are estimated by adopting the Diff-GMM estimator and Sys-GMM estimator on each group of the data. The three set group of data and the overall data were analyzed based on the significance, magnitude and direction of the relationship that exist between values added tax and economic group and to also know if this relationship is linear or non-linear.

Findings of the study

Table 1: Linear relationship between VAT and economic growth using Sys-GMM

<table>
<thead>
<tr>
<th></th>
<th>Coeff</th>
<th>Std-error</th>
<th>z-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loggdp(-1)</td>
<td>4833373</td>
<td>0.099298</td>
<td>4.87</td>
<td>0.000</td>
</tr>
<tr>
<td>Logvat</td>
<td>-0.0761305</td>
<td>0.0293558</td>
<td>-2.59</td>
<td>0.010</td>
</tr>
<tr>
<td>Logrev</td>
<td>0.1883169</td>
<td>0.0951077</td>
<td>1.98</td>
<td>0.048</td>
</tr>
<tr>
<td>Logexp</td>
<td>-0.116076</td>
<td>0.0590842</td>
<td>-1.96</td>
<td>0.049</td>
</tr>
</tbody>
</table>

Notes: The sample includes 30 countries for 5 time periods, for a total of 150 observations. There are no time dummies but all the models include the constant term.

The system GMM result of the model estimated is reported in the table above for all the countries under investigation. As seen in the model, the coefficient of GDP at lag 1, value added tax, government revenue and government expenditure are approximately 0.48, -0.08, 0.19 and -0.12 respectively. These results imply that value added tax and government expenditure have an inverse relationship with GDP while government revenue has a positive effect on economic growth. Notwithstanding, the probability values of these variables are all significant at 5 percent level of significance. Meaning the regress has a linear significant relationship with the regressor. Therefore, a decrease in value added tax will increase GDP in
these countries. The validity of this result will be confirmed using the one-step difference GMM.

Table 1b: Linear relationship between GDP and VAT using One-Step Difference GMM

<table>
<thead>
<tr>
<th>Coeff</th>
<th>Std-error</th>
<th>z-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loggdp(-1)</td>
<td>0.6238907</td>
<td>0.144975</td>
<td>4.30</td>
</tr>
<tr>
<td>Logvat</td>
<td>-0.0748046</td>
<td>0.0295626</td>
<td>-2.53</td>
</tr>
<tr>
<td>Logrev</td>
<td>0.1926005</td>
<td>0.0957772</td>
<td>2.01</td>
</tr>
<tr>
<td>Logexp</td>
<td>-0.1181336</td>
<td>0.0594867</td>
<td>-1.99</td>
</tr>
<tr>
<td>AR(1)</td>
<td>-2.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR(2)</td>
<td>-0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sargan</td>
<td>50.65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: The sample includes 30 countries for the period of five years, a total of 150 observations.

One-step difference GMM results with the associated post estimation test were carried out. The coefficient of GDP at lag 1, value added tax, government revenue, government expenditure, AR(1), AR(2) and Sargan statistics for one-step difference GMM are approximately 0.62, -0.07, 0.19, -0.12, -2.27, -0.47 and 50.65 respectively. With probability values of 0.00, 0.01, 0.04, 0.05, 0.02, 0.64 and 0.00 respectively. It is obvious that value added tax and government expenditure have negative relationship with growth. However, government revenue has a positive relationship with growth. This result is line with the system GMM result in table 1. Therefore, there is a linear relationship between growth and value added tax as it seen in their probability values. The coefficient of the first order autocorrelation is larger than the coefficients of the second order autocorrelation (AR) in this model. The associated probability value for first order autocorrelation is below 5 percent, meaning that there is presence of serial correlation, while that of the second order is larger than 5 percent, showing that there is no serial correlation between the instruments and the disturbance term in the absence of the heterogeneity. The Sargan test in this model has a very low probability value of 0.00, proposing that the instruments of the model are invalid. We now examine if there is presence of non-linear relationship in the instruments under investigation.

Table 2: Non-Linear Relationship between GDP and VAT using the System GMM

<table>
<thead>
<tr>
<th>Coeff</th>
<th>Std-error</th>
<th>z-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logvat</td>
<td>0.0916881</td>
<td>0.1072149</td>
<td>0.86</td>
</tr>
<tr>
<td>logvat2</td>
<td>-0.1832502</td>
<td>0.1861684</td>
<td>-0.98</td>
</tr>
<tr>
<td>logvat3</td>
<td>0.0395193</td>
<td>0.0725452</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Notes: The sample includes 30 countries for the period of five years, a total of 150 observations.
In the table above, one-step system GMM is applied to test if the instruments in the model are non-linear or not. And it was discovered that these instruments have the following coefficient values with their respective probability values. Thus, the coefficient of logvat, squared of logvat and cube of logvat are approximately 0.09, -0.18 and 0.04 with associated probability values of 0.39, 0.32 and 0.59 respectively. It is clear that the probability values are too large debunking the assumption that the instruments are nonlinear, meaning they are linear. The evidence of this result will be further verify using the one-step difference GMM in the following table 2b.

**Table 2b: Non-Linear Relationship between GDP and VAT using the One-Step Difference GMM**

<table>
<thead>
<tr>
<th></th>
<th>Coeff</th>
<th>Std-error</th>
<th>z-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logvat</td>
<td>1.507156</td>
<td>1.009051</td>
<td>1.49</td>
<td>0.135</td>
</tr>
<tr>
<td>logvat2</td>
<td>-1.205113</td>
<td>1.977483</td>
<td>-0.61</td>
<td>0.542</td>
</tr>
<tr>
<td>logvat3</td>
<td>0.0725933</td>
<td>0.7813257</td>
<td>0.09</td>
<td>0.926</td>
</tr>
<tr>
<td>AR(1)</td>
<td>-0.05</td>
<td></td>
<td></td>
<td>0.957</td>
</tr>
<tr>
<td>AR(2)</td>
<td>-1.48</td>
<td></td>
<td></td>
<td>0.138</td>
</tr>
<tr>
<td>Sargan</td>
<td>2.20</td>
<td></td>
<td></td>
<td>0.532</td>
</tr>
</tbody>
</table>

Notes: The sample includes 30 countries for the period of five years, a total of 150 observations.

The one-step Difference GMM is adopted in table 2b to verify the result of the one-step system GMM. From the table the coefficient of logvat, squared of logvat and cube of logvat are approximately 1.51, -1.21 and 0.07 with associated probability values of 0.13, 0.54 and 0.92 respectively. These variables have high coefficient and probability values implying that the relationship between value added tax and GDP in all the selected sub-saharah African countries are characterized with non-linear relationship. This is in consonant with the one step system GMM above. The post estimation tests for first and second order autocorrelation are also conducted and their probability values are 0.96 and 0.14 accordingly. The first and second order have negative coefficient values. Considering their probability values there is no problem of serial correlation in the models since these values are above 5 percent level of significance. Meaning the common error term is not correlating with the explanatory variables. Thus, this model is the best specification for this study. Looking at the Sargan statistic, it has a very high probability value of 0.53. suggesting that the instruments of the model are strong.

**Conclusion**

Regarding the findings of all the selected sub-Sahara countries, it is concluded that value added tax has an inverse linear relationship with economic growth. Thus, when there is a decrease in tax there will be an increase in gross domestic product per capital. The study also concludes that for both high income per capital countries and moderate income per capital countries, economic growth has negative but significant relationship with value added tax in these countries. While for low income per capital countries this relationship though negative but it is not significant.
Recommendations
Based on the findings of this study, the researchers therefore suggest the following recommendations:

i. The policy makers in these countries should try to reduce value added tax. Since the reduction will lead to increase in per capital income of its citizens.

ii. The tax administrators in each of these countries should ensure, through commitment to service, that the operations of companies that attract VAT are properly declare for this purpose so that the proceed mobilized through VAT could be significant enough to promote economic growth.

iii. Finally, the cost of administration and mobilizing funds through VAT should be kept very economical. The government of each of these countries should have a platform that resist wasteful spending by tax administrators.

References
Jhinghan M.L. (2003), Macro-economic theory (11thRevised Edn), Delhi: VrindaPublications Ltd.
