



An Empirical Evidence of the Impact of Government Tax Revenue on Nigerian Public Debt

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Abstract

Objective The major objective of this paper is to examine the existence of a mutual consensus on the effect of tax revenue and non-tax revenue on public debt in Nigeria.

Design/methodology – The study uses documentary research design. Data was collected using secondary method of data collection from Debt Management office and Bureau of statistics and Central Bank of Nigeria statistical bulletin data bank. Ordinary Least Square Multi regression model was used in analyzing the data

Results – The research found out that there is a negative an insignificant relationship between tax revenue, non-tax revenue and interest rate in relation to Nigerian public debt. Moreover, the paper found out that exchange rate and population rate had significant and positive relationship with Nigerian public debt.

Limitation/Suggestion – The implication of the study is that, the contribution of tax revenue to the reduction of public debt is minimal as could be shown from the results. While, non-tax revenue contributed more than tax revenue in public debt reduction in Nigeria. In addition, increase in exchange rate, and population rate contributed more to increase in public debt, while, an increase in interest rate does not increase public debt but rather it discourages the government from collecting more debt and push the government to go for other revenue sources that where not assessed. The study recommended that; government should harness untapped taxes to increase tax revenue generation to pay interest on loan and principal. Must of the information at the researcher disposal used for the study was for 15 years, from 2003 to 2018. Thus, studies need to be conducted involving more year like from 20 years upward to see whether it will change the result.

Novelty/Originality – The originality of this research lies on the government inability to generate enough tax revenue and non-tax revenue to meet expenditure without collecting debt. This is because collection of debt always leads to frequent increase in debt burden in Nigeria. Fewer or no one has carried out a careful analysis of the relationship between tax and non-tax revenue against total debt in Nigeria.

Keywords: Exchange Rate, Interest Rate, Population Rate, Public Debt, Tax Revenue

1. Introduction

Lack of adequate generation of tax revenue and non-tax revenue to finance government expenditure, lead to continuous increase in budget deficit in Nigeria and other nation of the world (Bamidele & Joseph, 2013), thus, for the government to breach the gap between revenue and expenditure, government has to resort to borrowing to finance the deficit. That is the reason some developing and developed nations government keep accumulating public debt to finance budget deficit. Over the years, the government of Nigeria has obtained different kinds of loan locally and internationally from both national and international financial institutions, foreign governments to finance developmental projects in the government efforts to breach the gaps of deficit in its budget (Rahmon, 2018). In 2011, internal and external public debt figures at the national and sub national levels stood at the manageable threshold of N11,205 trillion in 2016, N34,319 trillion in 2018 (Central Bank of Nigeria, 2018).

Unfortunately, the accumulation of debts for a long time always leads to persistent budget deficit. Financing the interest, public debt and the increasing demand to provide infrastructures, social services and other expenditures without generating enough revenue, can subsequently, leads to more public debt accumulation, which the economy cannot be able to sustain. This issue may further aggravate and increase the problem in the economy, especially in terms of rising interest rate, high associate poverty level, high exchange rate, inflation, economic depression and fiscal crisis (Kiminyei, 2018). Thus, investment in the critical sectors of the economy needs huge finance. Countries that relied on non-tax revenue, receiving few investments through international and domestic trades without giving much attention to tax revenue may have to resort to borrowing to support their economic development, especially if non-tax revenue is not forthcoming. Thus, countries like Nigeria and other countries that depend on non-tax revenue from oil for their developmental activities faced a lot of trouble. Most especially, during the period of decline in prices of oil in the international markets, due to covid-19 or reduction in demand due change from using oil to other sources of energy and the constant increase in the rate of population. This has contributed greatly to the drastic fall in total revenue. Hence, borrowing become eminent to meet government expenditures or to harness taxation as alternative sources of raising the needed revenue to meet the increasing needs of development activities in the economy (Ono & Uchida, 2018).

Previous studies on public debt revealed either negative or positive impact on the economic growth and development of a nation. The impact usually depends on the amount and purposes for the collection of debt. Consumer Financial Protection Bureau (CFPB) (2019) stated that borrowers with high public debt burden to revenue ratio are more likely to be in trouble when settling the debt. Furthermore, 43 percent of the ratio of debt to revenue is the maximum amount of ratio borrowers are expected to maintain to give room for the borrower to collect or add more loans. Although, there are some exceptions, where some lenders give loan even when debt to revenue ratio is more than 43 percent. Even though, for them to do that, they will have to make a reasonable good faith effort to determine your ability to pay the loan and interest. Normally, the amount of debt expected of a country to borrow is measured using debt –to-GDP (Rehman et al., 2019). Reinhart et al., (2015) considered 90 percent to be the threshold for debt-to-GDP ratio. And concluded that any nation economy with less than 90 percent debt-to-GDP ratio stand to chance to grow. But immediately after that point, increase in public debt will leads to negative effect on a nation economy. Furthermore, it shall affect tax revenue, and non-tax revenue generation. This is because the large part of the amount of tax and non-tax revenue realized by the government will be used to finance debt and interest with little or none left to fund developmental and administrative activities. Thus, government most explore its other revenue sources or increases tax rates to meet up with its increasing expenditure demand. This will also be a burden on the citizens. But when debt in a nation is low, the economy grows positively.

The contribution of tax revenue in Nigeria has accounted for a small portion of total revenue until recently when non-tax revenue wasn't forthcoming due to the fall in oil price and the impact of covid-19. This has contributed to the more debt accumulation in the bit to fund budget deficit since government did not prioritized taxation as a source of revenue. Even though, of recent, tax revenue is being accorded some priority and it has begin to contribute meaningful to the total revenue in Nigeria (Olushlola & Oliver, 2020). The study discovered that the relationship between tax revenue and non-tax revenue has not been considered in relation to public debt to know as to whether the amount government is generating as revenue is adequate to settle loans and interest, and provide infrastructure and social services that will improve Nigerian economic growth and development. Moreover, there has been inconsistency in the literature on the study of debt and expenditure, and tax revenue and economic growth. This study is carried out to provide answers to the following questions; what is the re-

relationship between tax revenue and public debt? Does non-tax revenue significantly correlate with public debt in Nigeria?

In this paper, the study focuses on how changes in tax revenue and non-tax revenue can affect public debt. The paper emphasized on two types of revenue changes such as tax revenue and non-tax revenue. The research defined tax revenue and non-tax revenue as changes that can broaden the total revenue or decrease public revenue. While, public debt can be referred to as the accumulation of internal and external debts. The major aim of the paper is to empirically examine whether there exists mutual consensus on the effect of tax revenue and non-tax revenue on Nigerian public debt. The coverage of the paper is restricted to tax revenue, non-tax revenue and Nigerian public debt from 2010 to 2019. However, after the discussion on the scope and issues of the paper in the introduction on section one, the discussion on the literature review was captured in section two, while the research methodology was mentioned in section three, and the discussion on the results and discoveries was explicitly explain in section four. Finally, the concluding section deals with the conclusion of the paper.

2. Literature Review, Theoretical Framework and Hypotheses Development

Literature Review

Public debt is the sum or total national debt a government of a nation owed inside and outside the country (Kaka & Ado, 2020). In other words, public debt can be referred to as national debt, which is the total figure of financial obligations owed by the government from its citizens, foreign governments, or international financial institutions like International Monetary Funds, African Development Bank and International Bank for Reconstruction and Development. Thus, public debt can be classified into two; external debt is borrowing from abroad and internal debt is borrowing within the country. Public debt is obtained to be invested on infrastructures, electricity and finance expenditures of government (Kaka, 2020). Bamidele & Joseph (2013) defined debt as the resources or capital assets utilized in running the affairs of an organization, devoid of owners contribution and does not belong to the organization. Senibi, Oduntan, Uzoma, Senibi, & Oluwaseun (2016) opined that nations who do not have enough capital has no alternative than to go for foreign loan in order to meet their domestic savings, balance of payment deficits, and shortfall in revenue with its attendant consequences of continuous increase in loan stock at an alarming rate.

Senibi et al., (2016) assessed the relationship and trend between Nigerian national debt and foreign reserves from 1981 to 2013, using the Johansen cointegration and FMOLS technique. Secondary data were collected and used for the analysis. The paper discovered public debt to have a positive and significant relationship with foreign reserves in the long run. Signifying that the public debt crisis can be related to endogenous and exogenous factors like the economic policies, high dependence on oil, and swindling foreign exchange receipt, the nature of the economy. And suggest that the federal government should use superior technique in negotiating debt and fixed interest payment varying amortization schemes and look for multiyear rescheduling instead of yearly basis. Contrarily, Kaka & Ado (2020) discovered an insignificant and positive effect of national debt on Nigerian foreign reserves.

Ko (2019) examines the long-run and short-run impact of an increase in budget deficits and increase in income tax rates on the economy. Kaleckian model of growth and distribution that sets a budget deficit ratio as an indicator of fiscal policy was used. The discoveries in the long-run shows the impact of expanded budget deficits on economic growth rate to be ambiguous, because higher debt burden has a negative effect on the rate of capacity utilization as well as the economic growth, despite the increase in demand caused by government borrowing. High deficit budget ratio raises the growth ratio on the condition that some specific situation is made. Rauf (2018) examine the effect of corporate characteristics on companies debt. The results found

that Total assets, Return on Assets are significant but negatively relate to companies leverage. Similarly, Liyambo & Kaulihowa (2020) examine the connection government revenue, expenditure and national be-tween government expenditure, government revenue and national debt in Namibia. Data were obtained for the period of 1980 to 2018. Hence, the paper found out that there is a close relationship between increase in debt and public expenditure of government. However, evidence also shows that the tax-spend hypothesis is okay for Namibian government. Thus, government expenditure should be review from time to time by the policy-makers to bring it to optimal levels with the government revenue in order to prevent the widening of public debt.

Tax revenue is a revenue generated by the government using the tax instruments. Tax revenue is collected in form of indirect and direct tax (Kaka, 2020). Thus, Gordon (2010) stated that there is an increase in empirical evidence indicating taxes to encourage the utilization of debt in large firms that are profitable and discourage it in less profitable firms. Almendros & Mira (2016) considered the role of tax in explaining the financial decisions of companies. The study investigates the applicability of the corporate tax shields explanation of capital structure on companies listed on the Spanish stock exchange for the period of 2007 to 2013. Tax is discovered to be positive and statistically significant in the determination of capital structure. Furthermore, the results stated that marginal tax rates influence the debt policies of companies listed on Spanish stock exchange. Moreover, the presence of non-tax shield ds constitutes an option to the utilization of debt as a tax shelter. In line with the theoretical expectations, there is a positive and strong connection between tax and debt in less levered companies. In the same vein, Field et al., (2013) assessed the effect of new thin-capitalization rule initiated by the Spanish government in 2012 on the financing behavior of Spanish companies listed on stock exchange. The paper concluded that capital structure choices are indeed significant and positively relate to tax, of which the relationship is quantitatively valid. Tax rates were also discovered to have a connection with company's capital structure selections, and concluded that the firms value may increase as a result of optimal debt selection. The trade-off theory of capital structure offers a theoretical explanation to the relationship between corporate debt policy and taxes. Fatica et al., (2013) observed that the deduction of tax on interest payments in corporate income tax systems coupled with no such provision for equity financing creates economic distortions and exacerbates leverage. Graham (1996) discovered marginal corporate tax rate to an effect on debt policies of firms in United State.

Alberternst & Sureth, 2015 and Dreßler & Scheuering (2015) examine the effect of introducing restriction to the interest fiscal deductibility in German corporate tax reform of 2008. The results show evidence of the effect of thin-capitalization rule on debt ratio of companies that are affected by the interest barrier which reduce their leverage more than companies that are not affected. Conversely, Salehi & Salami (2020) examine the effect of cost of debt and tax shelters in Iran. The discovery indicates that financial leverage use is not inversely related to companies' tax-aggressive policies. However, there is no inverse relationship between tax shelters and total debt. These discoveries are crucial to Iranian economy.

Sharma (2018) investigate the determinant of corporate structure, using nine firm level explanatory variables (profitability-EBIT margin, return on assets, earnings volatility, non-debt tax shield, tangibility, size, growth, age debt service ratio and tax shield) were selected. The main discovery shows that size, debt service capacity growth, profitability, age, and tax shield variables are significant in determining the level of capital structure and debt. Graham (1996) tests whether the incremental use of debt is positively related to simulated firm-specific marginal tax rates that account for net operating losses, investment tax credits, and the alternative minimum tax. The simulated marginal tax rates exhibit substantial variation due to the dynamics of the tax code, tax regime shifts, business cycle effects, and the progressive nature of the statutory tax schedule. Using annual data from more than 10,000 firms for the years

1980–1992, the study provides evidence of high-tax-rate for firms that issue more debt than their low-tax-rate counterparts.

Theoretical Framework and Hypotheses Development

Studies above deals with the relationship between company's marginal tax rates and debts. This indicated that fewer or no studies carried out that is concern with examining the impact of tax on public debt investigating in a country and so the study states the first hypothesis:

H1: Tax revenue significantly affect public debt in Nigeria.

Non-tax revenue is a revenue generated by the government from other activities different from taxes. One of the most difficult task for the government is to augment its resources from both tax and non-tax revenue to fund unexpected expenditure which are outside the budget. Therefore, Mohanty & Petra (2016) investigated the impact of per capita non-tax revenue per capital expenditure in economic service sector in case of 15 NSC sub-national governments of India for the period 2010 to 2015. The findings disclose that per capita non-tax revenue has positive influence on per capita revenue expenditure of governments. However, the estimated coefficient is inelastic which implies the collection efficiency of revenue sector needs to be further upgraded. As regards to policy implication, government should raise the non-tax revenue through the marginal pricing provision of goods to increase users' coverage. Alternatively, Gordon (2010) observed that there is an increasing research evidence which revealed that taxes encourages the use of debt in big companies that are profitable and discourage it in companies that are less profitable. Similarly, there is growing debate, though, on the source of any non-tax revenue costs from debt finance offsetting the tax advantages of debt. Thus, research evidence support "lemons" model in which lack of information about the viability of borrowing firms inhibits use of debt, and then explores how tax policy should be designed in response. Some of the research found in the literature on non-tax revenue in public finance include: Mawia & Nzomoi (2013) and Mohanty (2014) who also disclosed that non tax revenue has accounted for the little and declining part of the total revenue which led to the increase in public debt in India. Based on the abovementioned discussion the study state the second hypothesis:

H2: Non-tax revenue significantly affects public debt in Nigeria.

Exchange rate is the value of a nation currency over other nations currency. Therefore, some recent studies gave emphasis on the relationship between exchange rates and other causal factors. The studies used different empirical strategies and set of data in carrying out their research. This is because the exchange rate is one of the macroeconomic variables that is of importance in the underdeveloped and developing nation of the world. As it affects imports, inflation, export, debt services and repayments and economic activity as a whole. For quiet sometime now exchange rate Exchange rate is thought to have significant impact on foreign debt services and debt repayment. Thus, with continuous raise in public expenditures, and low capital formation in majority of the developing countries, many governments have resorted into borrowing internally or/and externally (abroad). However, majority of the borrowings come with interest attached, and hence, the debt and the interest may have to be serviced. Servicing and repayment of external debt may involve demand for foreign currency which tends to affect the exchange rate of the country (Saheed et al., 2015). Hence, Saheed et al., (2015) investigating the effect of external debt on exchange rate in Nigeria. Using the Ordinary Least Square, and the findings shows that debt service payment, eternal debt are positive and statistically significant in explaining exchange rate fluctuation in Nigeria within the period of observation. Similarly, Ijeoma (2013) used of linear regression model to investigate the effect of exchange rate on external debt in Nigeria. The results reveals that there is a positive and statistically significant

relation between exchange rate and external debt, and that exchange rate fluctuations affects external debt service payment, external debt and the nation's economic growth. Similarly, Bunescu (2014) examine the relationship that exist between external debt component on medium and long term of the evolution of RON/EUR exchange rate. And discovered exchange rate to have a positive and insignificant effect on debt. This show that there is inconsistency in the results and hence, third hypothesis is stated as follow:

H3: Exchange rate significantly affects public debt in Nigeria.

Population is the total number of people or items in a given country at a particular period. Hence, Afflatet (2018) observed that majority of the industrialized nations are facing a long term challenges of population ageing. It has been forecasted and predicted that countries with high rate of ageing population have the tendency of having a sharp increase in public debt. Thus, there are studies on how population ageing affect public debt until now. The investigation on this matter is crucial as the increase in the ageing population might force the government to spend more on age-friendly infrastructures Goedl & Zwick (2018) pensions (Alonso-Garcia & Rosado-Cebrian, 2019), medicines and so on. Thus, there is a tendency for the government to borrow more funds from the external market due to the rise in Government spending. Thus, Rahman, Ismail, & Ridzuan (2021) states that an increase in the number of ageing population is the recent demographic challenge that is forcing the government to go for more external loans in other to meet internal demand of 36 upper-middle-income economies from 2000 to 2017 due to the increase in the ageing population. The research showed that increase in the level of public debt could be as a result of increase in the ageing population most especially if age 65 and above was used as a bench mark for ageing population. Nonetheless, the findings changed when the bench mark was change old age dependency ration. It demonstrated that the increase in external debt take place as a result of increase in ageing population age 65 and above due the fact that government must have to allocate more money to meet healthcare, age-friendly infrastructure, social security and pensions needs. Therefore, the reliance of old age people on government reduces to the bear rest minimum due to their saving. Hence, there is an insignificant relationship between old age dependency ration and external debt level.

Nonetheless, Pan & Wang (2012) revealed an increase in the ratio of public debt to GDP ratio is cause by old age dependency ratio in European areas. Kamiguchi & Tamai (2019) that both tax rates and the public debt to GDP ratio positively depend on longevity. Moreover, it gives explanation for the increase in public debt to GDP ratio under population ageing in nations like Germany, United Kingdom and Japan. Similarly, Pegkas (2018) examine the connection between other factors and economic growth in Greece, where imbalances persist several years after the financial crisis. The finding showed a negative long-run connection of government debt and population growth.

Empirically, most of the papers have been focusing on how ageing population as a demographic variable affects the external debt as shown in Alonso-Garcia & Rosado-Cebrian, (2019); Kamiguchi & Tamai, (2019); Mensah et al., (2017); Rahman et al., (2021). In addition, Rahman et al. (2021) stated that to achieve higher income, substantial amounts of capital are needed to boost the economy, especially during the global transformation into the fourth industrial revolution. Hence, the need for external debt is highly relevant to these countries as opposed to domestic debt. High domestic debts tend to crowd-out private investments (Neck et al., 2012), thus slowing down the economic growth of the country. Since Nigeria aim to become high-income economies, the economic slowdown is not an option. Thus, external debt is necessary as an engine of growth for Nigeria. Moreover, little research has been done until now on whether and how population affects public debt in a nation. Based on the above findings, the study state the fourth hypothesis:

H4: population significantly affect public debt in Nigeria.

Interest rate is the benefit gotten for giving out loans for a particular period. It is also considered as a measure of the unwillingness of those who possess money to part with their liquid control over it. Interest rate is the price paid for the right to borrow and use loanable funds (Ezeabasili & Mojekwu, 2011). While interest rate risk management is mostly studied within banking industry, non-financial firms also view interest rate exposures and hedging of them to be of utmost importance (Bodnar & Hopwood, 2010). Délèze & Korkeamäki (2018) In comparison to bank financing, public debt market may allow firms to match maturity and risk structures between their assets and liabilities. The paper test whether new issuers on the European corporate bond markets experience a change in their interest rate sensitivity upon their bond issuance. The result shows that stock returns of a firm is important and significantly less sensitive to interest rate fluctuations most especially when it enters the publicly traded bond market. The discovery is in support of the argument that firms usually issue new debt to manage their interest rate.

However, Ezeabasili & Mojekwu (2011) examine the impact of fiscal deficits on nominal interest rate in Nigeria. The study used Cointegration techniques and structural analysis. The finding shows evidence of fiscal deficit variable to be statistically significant and positive. As such, it is an indication that the elasticity of deficit 0.114 in respect to income, which shows that huge deficit causes interest rate to raise. Moreover, the relationship between money supply and interest rate in Nigeria is inversely related, but the relationship is between inflation and interest rate is positive and significant. It is suggested that bond financing should be taken as an alternative to the usage of monetary financing. Thus, Turner & Spinelli (2012) looks at the differential between interest rate used to service public debt and how it affects the growth of the economy is it relates to the assessment of fiscal sustainability among the OECD economies. It shows that the differential was normally very low in almost all the period in the last decade when it is compared with the 1980s and the early 1990s. Even though, the low differential is also partly explained by factors which can be corrected and change in the future, including very low policy rates, the “global savings glut” and the effect which the European Monetary Union had in reducing long-term interest differentials before the crisis period. The differential is also likely to rise in the future because the number of countries which have debt-to-GDP ratios above a threshold at which there appears to be an effect on sovereign risk premia has risen sharply. Moreover, debt is projected to increasingly rise above this threshold in most of these countries.

Oliver (2019) gave emphasis on low interest rate and cost of government debt. While, the study developed four major arguments. The first argument shows the current United State situation, where safe interest rate is expected to be lower than the economic growth rate for a longer period, which is of the historical norm than the exception. But if the future is like the past, it is an indication that the debt shall be rollover, and hence, the issuance of debt without a later rise in taxes, may well be feasible. But in this situation, public debt may have no fiscal cost. The Second argument stated that, in the absence of fiscal costs, public debt will reduce capital accumulation, and consequently, have welfare costs. This is an indication that the welfare costs may be assumed to be smaller, and the safe rate is to be the risk-adjusted rate of return to capital. If it is lower than the growth rate, it is an indication of low risk-adjusted rate of return to capital. The average risky rate however also performs a great role. This shows how both the average risky rate and the average safe rate determine welfare outcomes. Thirdly, it considered the evidence on the average risky rate, i.e., the average marginal product of capital. While the measured rate of earnings has been and is still quite high, while, the discovery from asset markets recommends that the marginal product of capital may be lower, with the difference reflecting either mismeasurement

of capital or rents. In this issue of debt: the marginal cost of debt will be lower as the welfare cost of debt becomes low. The Fourth argument considered so many arguments against high public debt, and in particular the existence of multiple equilibria where investors believe debt to be risky and, by requiring a risk premium, increase the fiscal burden and make debt effectively riskier. This is a very relevant argument, but it does not have straightforward implications for the appropriate level of debt. Even though the purpose is not to be on the side of increase for public debt, at this recent political environment. It is to have a richer discussion of the costs of debt and of fiscal policy than it is the case presently. Based on the abovementioned discussion the study state the fifth hypothesis:

H5: interest rate significantly affects public debt in Nigeria.

3. Research Method

The paper utilized the document and quantitative research method. The data for this study was assembly from the debt management office, Central Bank of Nigeria statistical bulletin, and the Federal Inland Revenue Service websites. The medium used in gathering the data was secondary source of data collection. This method was chosen because the researcher cannot change or influence the data due to the fact that it has been documented already. The paper coverage is restricted to the study of tax revenue and non-tax revenue and public debt from 2010 to 2019. The data was analyzed using Ordinary Least Regression (OLS) regression model. The study used similar method of data collection and analysis with Etale & Bariweni (2019); Olushola & Oliver (2020). Regression analysis can be referred to as the relationship that exist between two or more variables (independent and dependent variables). The relationship between the independent and dependent variables can be expressed mathematically, as follows:

$$Y = a + b_1x + b_2x + b_3x + b_4x + b_5x + \dots + b_nx + e_i$$

Where; Y is the dependent variable, which is Public Debt, which in this study, x is the independent variable, which are non-tax revenue, tax revenue, interest rate, exchange rate, and population, a= Constant, e_i = Error term, $b_i \dots b_n$ = is the slope of the regression.

Model Specification

The model used in analyzing the data for the purpose of investigating and establishing the relationships among the variables for the purpose of this research was adopted from previous study. The propose model used for the study was non-tax revenue, tax revenue, interest rate, exchange rate and population in relation to public debt. Therefore, the research model was stated as it is below:

$$YPD = a + b_{tr} + b_{ntr} + b_{ir} + b_{er} + b_{pp} + e_{it}$$

Where;

YPD = Public Debt
btr = Tax Revenue
bntr = Non-Tax Revenue
ir = Interest Rate
ber = Exchange Rate
bpp = Population

Variables	Description/measurement
Public Debt (PD)	It is a nation total figure of debt both internal and external each year.
Tax Revenue (TR)	Is the total amount generated from all taxes
Non-Tax Revenue (NTR)	This is the total revenue generated from other sources apart from tax
Interest Rate (IR)	Is the nation average yearly nominal interest rate.
Exchange Rate (ER)	This is the yearly average exchange rate of a country
Population (PP)	This is the estimated year total population of a country.

Table 1.
Dependent and independent variable description and measurement in the study

4. Results and Discussions

The researchers carried out a descriptive and a multi regression to investigate the effect of tax revenue, non-tax revenue, interest rate, exchange rate and population as independent variables on public debt as dependent variable. Meanwhile, multi regression through the use of OLS was utilized in computing the measurements in this research. The result of the descriptive analysis is as shown below:

Variables	TR	NTR	ER	I R	POP	PD
Mean	6.355	6.5717	1.0315	6.9819	2.2518	16.7111
Maximum	0.9349	0.1401	0.1329	0.0708	0.0344	0.6157
Minimum	6.8379	6.7887	1.1461	7.0897	2.301	17.5841
Std. deviation	3.8279	6.3078	0.7781	6.8791	2.2	15.4875
Observations	10	10	10	10	10	10

Table 2.
Descriptive statistics

Multicollinearity Test

Table 2 below displays the outcome of the Variance Inflation Factor (VIF of the multicollinearity investigation with a tolerance figure for tax revenue, non-tax revenue, interest rate, exchange rate and population as independent variables to be less than 1 and less than 10. This shows that the independent variables are found to be within the acceptable range as stated by (Hair, et al., 2010). This shows that there is presence of multicollinearity in the paper.

Variables	Collinearity Statistics	
	Tolerance	VIF
Tax Revenue	0.287	3.49
Non-Tax Revenue	0.320	3.12
Exchange Rate	0.644	1.55
Interest Rate	0.202	4.95
Population	0.198	5.04
<i>Mean VIF</i>		3.63

Table 3.
Collinearity Diagnostics

Regression Analysis

The multiple regression analysis carried out for this model involving public debt is displayed in the table below:

Model	R-Square	Adj. R-Square	F-Statistics
1	0.98	0.96	0.01

Table 4.
Model Summary

The measurement of determination disclosed the magnitude to which transformation in the dependent variable (Public debt) can be explicated by the transformation in the independent variable (tax revenue, non-tax revenue, interest rate, exchange rate and population). The explanatory variables (tax revenue, non-tax revenue, interest rate, exchange rate and population) explains 98 percent of their links with the predictor variable (public debt) in Nigeria as indicated in the table above. The relationship of the independent variables and the dependent variable is positive and significant at 1 percent from the result of the F-Statistics. This shows that 98 percent of the transformation in public debt is disclosed by the changes that took place in tax revenue, non-tax revenue, interest rate, exchange rate and population in Nigeria. Thus, figures in the adjusted R-Square measurement of determination shows a value of 0.96. this is an indication that the model of the research was excellent in forecasting the predictor variable.

As the multiple regression analysis established, if all factors are taken into consideration (tax revenue, non-tax revenue, exchange rate, interest rate and population), to be constant at zero, public debt will decrease by -43.70 units in Nigeria. The data analysis also shows that, if all other independent variables are taken at zero, a unit in-

crease in tax revenue will lead to -0.04 units decrease in public debt in Nigeria. Furthermore, a unit increase in non-tax revenue will lead to -0.47 units decrease in public debt in Nigeria. Whereas, a unit increase in exchange rate will leads to 20.70 units increase in public debt. Moreover, a unit increase in interest rate will lead to -0.53 decrease in public debt in Nigeria. From the above analysis of the betas, it can be inferred that population contributed more in the increase in public debt, followed by exchange rate. While, non-tax revenue contributed more in decreasing public debt, followed by interest rate and tax revenue.

Exchange Rate,
Interest Rate,
Population
Rate, Public
Debt, Tax
Revenue

PD	Coefficient	Std. error	t-value	p-value
TR	-0.04	0.05	-0.8	0.47
NTR	-0.47	0.5	-0.92	0.41
ER	2.54	1.07	2.38	0.01
INT.R	-0.53	0.68	-0.78	0.48
POP	20.7	2.64	7.84	0.05
Constant	-43.71	9.32	-4.69	0.01
Breusch-Pagan Prob > Chi2	0.521			
Ovtest Prob > F	0.399			

Table 5.
OLS Estimate of Tax
Revenue, Non-Tax
Revenue and Public
Debt

At 10 percent p-value only population and exchange rate are at 5 percent and 10 percent p-value. While, tax revenue, non-tax revenue and interest rate are not significant. Thus, only population and exchange rate can significantly explain public debt. Tax revenue, non-tax revenue and interest rate are not significant in explaining public debt.

From the result of the analysis, it was discovered that there is a negative relationship between tax revenue and non-tax revenue and public debt. This shows that any increase in tax revenue and non-tax revenue will definitely reduce or decrease public debt. Although, the findings were not statistically significant, meaning that the relationship between tax revenue and non-tax revenue and public t are very weak. Etale & Bariwen (2019) discovered a positive relationship between tax revenue (VAT) and education development, the result wasn't statistically significant. Similarly, (Kiminyei, 2018; Ko, 2019; KPMG, 2011) discovered tax revenue and non-tax revenue to be positive and statistically significant in relation with economic growth. It is naturally for a country that has an increase in revenue to either pay back some part thereby reducing the debt of pay all the debt where possible. Alternatively, where the revenue generated is enough to meet it expenditure, the country debt will remain stationary at a point. Therefore, government of Nigeria should find a way of tapping its natural resources and other unexplored taxes to increase revenue generation.

The results further discovered that interest, has a negative relationship with public debt in Nigeria. However, just like it is in the case of tax revenue, non-tax revenue, the relationship is weak and also not statistically significant. This indicate that increase interest rate will also decrease public debt collection and burden. This is because if the interest rate on loan is high, normally borrowers will be skeptical to borrow and if they must have to borrow, they will not borrow much looking at the heavy burden of interest payment. This will make government to also consider other option that are cheaper like tax revenue and exploring our God giving natural resource, as it is currently happening in Nigeria.

Contrary to the above results, exchange rate and population rate in the study results was discovered to have positive relationship with public debt in Nigeria. In the case of exchange rate and population rate, the relationship was statistically significant and the relationship was strong. This signifies that increase in exchange rate and population rate will definitely lead to increase in public debt. This is because, as countries population grows, without a corresponding increase in revenue or rather when revenue is declining, more expenditure may be required to expand the existing infrastructures and provide new ones to meet up with the growth in population rate. Moreover, social services provision and security will have to be expanded as well, this will put

pressure on the government to borrow to meet up with the new challenge of increase in expenditure due to increase in population. This is one of the greatest challenge of governance in Nigeria. Similarly, increase in exchange rate will increase public debt burden most especially foreign loans which are expected to be paid in the currency the loans was collected. In the face of current depreciation of Nigerian currency, the burden of interest and public debt repayment will definitely increase, as the tax and non-tax revenue will not be enough to pay interest and debt due to currency depreciation as against other currencies.

5. Conclusion, Implication and Limitation

The main objective of the study is to empirically examine whether there exists a mutual consensus on the effect of tax revenue and non-tax revenue on Nigerian public debt. The coverage of the paper is restricted to 2010 to 2019. However, the paper started with introduction, the discussion on the literature review, followed by the research methodology, the discussion on the results and findings, and end with the conclusion of the study. The result of the study discovered an insignificant negative relationship between tax revenue, non-tax revenue and interest rate in their relationship to Nigerian public debt. In the same vein, exchange rate and population rate were discovered to have positive and statistically significant relationship with public debt in Nigeria. The study concluded that, the contribution of tax revenue to the reduction of public debt is minimal as could be shown from the results. While, non-tax revenue is contributing more than tax revenue in public debt reduction in Nigeria because the non-tax revenue is more than the tax revenue generation. Even though, presently, there is a drastic declined in revenue generation from crude oil due fall in oil price in the international market, and the reduction in the output per barrel extracted due to the activities of vandals and the covid-19. In addition, increase in exchange rate and population rate is contributing more to increase in public debt. Thus, increase in exchange rate will also increase public debt burden most especially on foreign loans which are expected to be paid in the currency the loans was collected. In the face of current depreciation of Nigerian currency, the burden of interest and public debt repayment will definitely increase, as the tax and non-tax revenue will not be enough to pay back the interest and debt due to currency depreciation as against other currencies. Similarly, as countries population grows, without a corresponding increase in revenues, more expenditure may be required to expand the existing infrastructures and provide new ones to meet up with the growth in population rate. While, an increase in interest rate does not increase public debt but rather it discourages the government from collecting more debt and push the government to look for alternative source of revenue.

The study recommended that; government should harness more other untapped taxes to increase tax revenue generation to pay loans interest and principal. Since, revenue from oil is reducing due to fall in prices in the international market, government should look at the possibility of extracting mineral deposits like gold, uranium to expand the revenue base, and this will in turn boast foreign exchange earnings and the country currency value will also appreciate against other currencies. Lastly, there should be a mechanism to put in place by the government to check population growth by setting the number of children an individual should be allowed to have and other better option is possible in Nigeria to reduce the pressure of increase expanding expenditure and subsequently, reduce borrowing.

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