

Taxation and Economic Growth: Evidence from Nonlinear Model in Nigeria

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Abstract:

Driven by the possibility of heterogeneous behavior among entrepreneurs and other economic agents, this study examined the link between taxation and economic growth for Nigeria. Our results show that the relationship between the two constructs are nonlinear and changes in the RGDP is very sensitive to changes in taxation such that any increase in tax may lead to the exit of low-ability entrepreneurs, thereby creating platform for possibility of marginal decline in growth. Our study offers some policy implications.

Keywords: Taxation, nonlinearity, economic growth, Nigeria.

JEL Classification: G10; H20; H22

I. INTRODUCTION

Over the years, various governments both in developed and emerging economies have put in place concerted efforts to enhance economic growth via different approaches. The endogenous growth model for instance, explains that the factors that drive growth in an economy are inherent in such economy. It stresses that growth is gradual and endogenously determined. Some of these factors that drive growth endogenously are –taxation, industrialization, agriculture, trade and commerce (Roy Bahl, 2018); (Babajide, A. A., Lawal, A. I., and Somoye, 2015); (Lawal, A. I., Asaleye, A.J, IseOlorunkanmi, J., Popoola, 2018); (Lawal, Nwanji, Asaleye, & Ahmed, 2016). Other scholars have stressed the impact of external factors in promoting economic growth. They identify the roles of foreign direct investment (FDI), external debt among others as key in aiding economic growth (Fashina, Asaleye, Ogunjobi, & Lawal, 2018); (Kottardy, Giakoulas & Man (2019). A common ground among these divergent scholars is the impact of tax on economic growth.

The ability of tax to drive economic growth has been a subject of inconclusive debate in literature. While some authors stress the positive role of tax in generating Internally Generated Revenue (IGR) required to promote economic growth (Baugh, Ben-David and Park, 2018);(Epstein & Gang, 2018), others have focused on the dangers of tax crowding out investment. The question is does tax contributes positively to growth? In other words, what is the nature of the relationship between taxation and economic growth? The current study attempts to answer this question, using evidences from the Nigerian economy. Existing studies that examined the impact of tax on economic growth mainly focused on the developed economies. (see for instance (Ji, 2016); (Filipovi, 2015); (Wang, Liu, Niu, Liu, & Yao, 2018); (Saez & Stantcheva, 2018); (Alexeev & Chernyavskiy, 2015); (Cetin, 2017); (Huizinga, Voget, & Wagner, 2018); (Prichard, Salardi, & Segal, 2018); (Moortgat, Annaert, & Deloof, 2017); (Munro & Munro, 2014); (Long & Pelloni, 2017); (Bishnu, Ghate, & Gopalakrishnan, 2016); (Pierpoint, 2017); (Stiglitz,

2018); (Kottaridi, Giakoulas, & Manolopoulos, 2019) except for some few like Edaine, Okoi (2014), Worlu&Nkoro (2012), Adegbei & Falule (2014) among others. Another challenge with the existing literature from Nigeria is that they assumed that, the relationship between the two construct are linear. (Lai & Liao, 2012); (Huber, Shubik, & Sunder, 2018); (Tsuchiya, 2016); (Pierpoint, 2017); (Abrahamson, 2016); (Bosi & Pham, 2016); (Gross, 2014), have shown that the relationship between economic growth and taxation has not always been linear. The authors stressed that estimating the relationship within the concepts of linearity may lead to misleading results.

Recent evidence have shown the rising tax profile of Nigeria, this poses a quest to knowing whether or not this growing rate have impact on economic growth.

Our results have some policies implications as it sharpens policy makers' insight to knowing how best to manipulate tax instrument to aid economic growth. The remainder of the study is as structured as follows: Section two presents the literature review; section three presents the data and methodology; section four presents the results while section five concludes the study.

II. LITERATURE REVIEW

The current study is governed by two streams of theories. The first set comprises of theories that examines the connectivity between tax and economic growth such as cost of service theory that stresses that people should be taxed for enjoying public facilities, Laffer curve hypothesis that discusses tax revenue within the context of earnings such that individual can afford to pay tax to the point of his income. This hypothesis is keenly related to the ability to pay framework of Adam Smith (Stiglitz, 2018); (Wahab, 2011); (Philippon, T. and Ariell, 2012) (Midrigan, V. and Daniel, 2014); (RM Bird, 2018b); (Piketty, T., Saez, E. and Stefanie, 2014).

The other stream of theories centres on the methodological issues relating to the data generating process of tax. This set of theories opined that the non-linear component of tax should be accounted for in the data generating process. These theories stressed that failure to accommodate the non-linearity component of tax in the examination of the linkages between economic growth and tax will lead to spurious result(Jaimovich, N., Rebelo, 2017); (Fochmann, Kiesewetter, & Sadrieh, 2012); (Sachs, D., Tsyvinski, A., Werquin, 2016); (Fochmann et al., 2012).

Most studies on the Nigerian economy that discussed tax, did not account for its non-linear component in their analysis. The current study also attempted to fill in the gap. A brief review of existing literature on the links between economic growth and tax are presented in the succeeding paragraphs.

(RM Bird, 2018a) examined the impact of the 2010 tax reform on the Canadian economy with a focus on the impact of executive compensation on tax burden as it relates to growth. The study constructed a novel data set based on a difference-in-difference strategy, and observed that option compensation fell substantially at affected firms just after the reform without any significant evidence that the declining option-based structured mitigates by increases in other form of compensation. The study further noted that though the tax reform impact growth positively, its structural component transfer its burden significantly to the top executives.

(Bergstresser & Pontiff, 2013) constructed the after tax returns of the key economic ascents from 1926 to 2009, so as to know how each of these agents would have generated on a set of benchmark portfolio. The study noted that tax burdens reduce the return premium to both individual and corporate investors as well as market capitalization potential accrued to the state. It also exacerbates the equity premium puzzle.

(Veronesi, 2016) examined the links between taxation and economic growth through the eye of heterogeneity, risk aversion, incomplete financial markets and redistributive tax system. The study argued that the behaviour of entrepreneurs at equilibrium is a function of their skill and ability to understand the tax regime, stressing that entrepreneurs are more skilled and less risk-averse under heavy tax regime. This implies that tax impacts positivity on production, thus impact growth, though negative linkages exist between tax and equity risk premium. The study further noted that when tax rate is reduced, initially, both income inequality and stock prices rises up till a point where both will begin to fall along with the tax rate.

(Tsuchiya, 2016) examined the linkages between the dual by calibrating population growth and government budget into the model that examines the relationship between taxation and economic growth. The study observed that tax cut impact upward shift on the growth of the studied economies by improving the government budget situation.

(Fochmann et al., 2012) employed a laboratory

experiment model to examine the impact of limited loss deduction in income taxation on investors' choices by comparing investments in the no tax baseline to a tax control setting characterized by taxed investments income. The study observed that investors' possesses a positive mind set towards a tax cut, thus, tax cut stimulates investment which in turn induces growth.

(Prichard et al., 2018) examined the impact of tax on growth through the eye of political resources curse focusing on taxation, non-tax revenue and democracy. The study observed that the relationship between taxation and economic growth is a long term phenomenon rather than short term. In other word, the authors concluded that taxation have significant long run impact on economic growth. This preposition is in line with (Gross, 2014) findings that government assumes it is optimal to implement the efficient capital allocation in the long run where a rise in capital taxes to attracts capital from abroad to homeland economy.

(Stiglitz, 2018) noted that there is a presumption that Pareto-efficient taxation centers on a positive tax on capital. The study stresses the need to account for the impact of tax and expenditure policies on market distribution of income, so as to mitigate the burden of tax. The author noted that optimal capital tax is positive in as much as the social welfare function is significantly equalitarian with a high productivity of educational expenditures.

(Hayo & Uhl, 2015) examined the impact of tax on labour supply in Germany based on specially designed representative survey of the German population. The study observed that taxation affect production via the self-employed window and that low interest rates alter the motivation for expanding labour supply (see also (Fernández, González, & Rodríguez, 2018).

(Wang et al., 2018) employed both the computable general equilibrium model and the Social Accounting Matrix (SAM) to examine the impact of energy taxation on the economy, environment and public health for Tianjin District of China. The study observed that energy taxes have huge potential to improve the GDP, though it has some adverse impact on energy sector as it increases energy cost. The study further noted that energy tax has helped in reducing air pollutants concentration and improved air environment quality.

(Alexeev & Chernyavskiy, 2015) examined the impact of tax on economic from the view point of natural resources tax for Russia by employing Benchmark

regression model. The study observed that taxation has both positive and negative effect on growth. The study stressed that Russian Central Government more often taxed away the benefits of oil revenue from the oil producing regions, making these regions less beneficiary of the nation's growth dividends whereas, tax accruing from the oil sector has contributed significantly to non-oil regions' growth and development.

(Romer, C. D. and Romer, 2010); (Romer, C. D. and Romer, 2014) employed the narrative record of the changes in the influence of tax policy after the war periods so as to know the differences that are not endogenous. They stressed that the changes are irresponsive to the growth potential of the economy. They examined short run effect of taxes on output and noted that in the post war period, at one percent (1%) increase in tax proportion to GDP will induce a three per cent (3%) fall in output. The author concluded by saying, a permanent change in taxes will only have a temporary impact on output in the short run without any significant impact on the long run on the economy.

Studies on the linkages between tax and economic growth in Nigeria shows that tax have the potentials of simulating growth. For instance, (Alao, 2015); (Edame & Okoi, 2014); (Egbunike, Emudainohwo, & Gunardi, 2018); (D, Adeline, Ph, & Ph, 2014); (Okwori & Sule, 2016); (Lawal, A. I., Oye, O. O., Toro J. & Fashina, 2018) all shows that tax simulates growth. However, none of the existing studies on the Nigerian economy factored in the nonlinear component of tax in the debate on the link between economic growth and taxation. This is one of the gaps that the current study wants to fill.

III. METHODOLOGY

Data for this study were sourced between year 2000 and 2017 from the publications of CBN statistical Bulletin (various sources), the Natural Bureau of Statistics Report (NBS) (various sources) and the Nigeria Contact Database of Companies and Businesses (NGContacts). The variables used are real gross domestic products (RGDP), interest rates, Personal Income Tax, entrepreneurial ability, Labour share in production of final goods, capital income tax.

Our study followed (Jaimovich, N., Rebelo, 2017) to employ a nonlinear estimation technique to examine the relationship between the two constructs. First, we specifies the distribution of entrepreneurial ability $\cap(a)$ stressing that entrepreneurs' income is proportional to

ability as explained by Pareto distribution. The growth rate of the economy is expressed as follows;

$$g = \delta H \frac{k}{k-1} \alpha^k (a^*)^{1-k} \quad (1)$$

Where k represents the shape parameter, α implies the lower bound of the Pareto distribution; a^* is the effect of a tax change (proxy by changes in personal income tax and capital gain tax) on the growth rate in an economy, is as stated below

$$(1-\alpha)a^* \left[1 - \left(\frac{a}{a^*}\right)^k \right] (1-\tau) = \sigma \left[\frac{k}{k-1} a^k (a^*)^{1-k} \right] + \frac{\rho}{\delta H} \quad (2)$$

Here, θ is

$$\theta = 1 + \frac{1}{k} \left[\left(\frac{a^*}{a}\right)^k - 1 \right], \text{ such that}$$

$$\frac{dg}{d\tau} = \frac{-(\rho+\sigma g)}{1-\tau} \left[\frac{1}{\sigma+(1-\tau)(1-\alpha)\theta} \right] \quad (3)$$

Factoring the heterogeneity in the economy, we have

$$\frac{\delta n_t \pi}{r} = w_t \quad (4)$$

Where δ, n_t represents the labour share of final goods and entrepreneurial ability respectively.

The growth rate of the economy is thus expressed

$$g = \frac{\delta H(1-\alpha)(1-\tau)-\rho}{(1-\alpha)(1-\tau)+\sigma} \quad (5)$$

The impact of the changes in taxation on economic growth is

$$\frac{dg}{d\tau} = \frac{-(\rho+\sigma g)}{1-\tau} \left[\frac{1}{\sigma+(1-\tau)(1-\alpha)} \right] \quad (6)$$

IV. RESULTS AND DISCUSSION

Table 1 presents the results of the descriptive distribution of variables used in the model. From the table, the variables are,

Table1: DESCRIPTIVE STATISTICS AND TEST FOR VARIABLES NORMALITY:

	RGDP	PIT	CGT	SLF	EA
MEAN	193.8787	1.238583	10.95455	11.88182	3.323117
MEDIAN	139.6508	6.671433	12.000000	11.700	3.580605
MAXIMUM	188.2074	21.76893	16.500000	28.802	37.66733
MINIMUM	178.7256	-96.39948	6.000000	4.105	-99.89880
STD.DEV	13.5407	20.62040	3.173873	4.564793	17.93176
SKEWNESS	0.007096	-2.597353	-0.084587	0.846133	-4.258121
KURTOSIS	1.480203	12.48918	1.904266	3.649962	26.52031
JARQUE-BERA	4.16999	214.5540	2.253628	6.024590	1147.147
PROBABILITY	0.00078	0.000000	0.00064	0.00017	0.0050
OBSERVATIONS	412	412	412	412	7485

Source: Authors' Computation (2018) Using E-Views 7

Statistical characteristics of all variables are shown in Table 1. We employed the Jarque-Bera (JB) test statistic to determine whether or not each of economic growth proxied by RGDP, Personal Income Tax (PIT), Capital Gain Tax (CGT), Labour Share of Finance Goods (SLF) and Entrepreneurial Ability (EA) follow the normal probability distribution. The JB test is an asymptotic or sizeable sample test that estimates the skewness and kurtosis measures by employing the following test statistics:

$$JB = N \left(\frac{S^2}{6} + \frac{(K-3)^2}{24} \right)$$

Where N= sample size, S=skewness coefficient, and K= Kurtosis coefficient. For a distributed variable with

normality, S=0 and K=3. Hence, the JB test of normality is a test used for the joint hypothesis that S and K are 0 and 3 respectively.

From the results, it can be deduced that all the variables are not normally distributed apart from trade openness whose skewness coefficient is close to zero (0.846133) and kurtosis coefficient is 3.649962.

Table 2, presents the results of regression model. From the table, it can be seen that when the change in the growth rate of real per capita GDP is the dependent variable, significant relationship exist between the dependent variable and each of the independent variable. This suggests that changes in each of these variables

(increase in personal income tax; increase in capital income tax, decrease in personal income tax, decrease in capital income tax, entrepreneur's ability, labour share in final goods) all contributes to growth.

TABLE 2: RESULTS OF THE REGRESSION MODEL

Variables	Regression	
	(1)	(2)
Increase in Labour Income Tax	0.14 (0.26)	0.38 (0.29)
Increase in Capital income	-0.07 (0.07)	-0.34 (0.08)
Decrease in Labour income tax	0.09 (0.027)	0.20 (0.27)
Decrease in Capital income tax	-0.24 (0.21)	-0.18 (0.26)
Entrepreneurial Ability	0.12 (0.24)	0.23 (0.22)
Labour Share in final goods	0.08 (0.26)	0.18 (0.27)
Controls	No	Yes
R^2	0.79	0.89
Fixed effects	Yes	Yes
Time effects	Yes	Yes

Note- RGDP is the dependent variable Source: Authors' Computation 2018

From the table, it can also be deduced that the degree of responsiveness of RGDP to changes in each labour and income taxes is very high such that 1% change in each of these variables will lead to 38% and 34% respectively. This suggests that changes in RGDP are very sensitive to changes in taxation. Our findings supports (Jaimovich, N., Rebelo, 2017) assertion that the marginal effect of tax on growth is sensitive and nonlinear such that a rise in tax may lead to a significant fall in continuous engagement of less-able businessmen, which will in turn induce marginal drop in the gross domestic product.

This result has some policy implications, for instance fiscal authority should be sensitive in the use of tax instruments in sourcing fund up to the point of optimal when tax and other disincentive to investment are low or at best moderate.

V. CONCLUSIONS

This study attempted to examine the relationship between economic growth and taxation within the concept of nonlinearity using data sourced from the Nigeria economy. Our study was motivated by the possibility of heterogeneous behaviour among entrepreneurs and other economic agents within the economy. The results

obtained shows that the relationship between tax and economic growth in Nigeria is nonlinear and that change in the RGDP is very sensitive to changes in taxation such that any increase in tax may lead to the exit of low-ability entrepreneurs, suggesting marginal decline in economic growth. We recommend that fiscal authorities should be careful in the use of tax as a revenue generating instrument only to the point that it is self-moderate.

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