Taxes and Income Inequality in Nigeria: Cointegration and Error Correction Mechanisms Evidence from 1980 – 2018

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Abstract: This study investigated the effects of taxes on income inequality in Nigeria for the period 1980 to 2018. The data for this research was obtained from the Central Bank of Nigeria, Federal Inland Revenue Service and National Bureau of Statistics. The data obtained were analysed using econometric methods such as augmented dickey fuller, cointegration and error correction mechanisms. The results revealed a significant negative relationship exists between personal income tax, company income tax and inequality; a negative but statistically insignificant relationship exist between value added tax and income inequality; a positive but statistically insignificant relationship exist between value added tax, government spending on education, government spending on health and income inequality. Hence the study concludes that taxes play a major role in income redistribution in Nigeria. The paper recommends amongst others that government should ensure compliance to tax payments because taxes provide a powerful policy tool effectively used for curing economic and social ills and should not to be set too high, as this would discourage investments and savings.

Keywords: Taxes; Income Inequality; Gini Coefficient; Error Correction Model; Nigeria

JEL Classification: H25

Introduction

There has been increasing debate in the study of income inequality over recent years in developed and developing economies. Piketty (2014) and Chen, Lee & Tsai (2019) reported that the rising income inequality globally is one of the most significant challenges facing nations in the 21st century and interest in this topic has increased significantly since the 2008–2009 Global Recession. Atkinson & Piketty (2010) and Cano (2017) stated that the long-run history of income and wealth inequality in most developed countries has primarily examined the role of income taxes in reducing inequality. Awe & Rufus (2012), Ogbeide & Agu (2015) also noted that inequitable distribution of income and its impact on poverty and human development is one of the most debated topics in economic issues in sub-Saharan Africa, especially in Nigeria. Bird & Zolt (2013) maintain that the role of taxes and its effectiveness to influence income inequality in developing economies is one of the most discussed issues in economics and public finance. Piketty (2014), Atkinson (2015) & Martorano (2016) were of the view that taxes is back at the centre of the policy and research agenda of several nations. This is because while both developed and developing economies strategically reduced tax rates, income

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inequality has increased during the last decades, generating global outrage. Some prominent economists have advocated that taxes are a more powerful solution to promote a more equal income distribution among nations (Piketty, 2014; Atkinson, 2015).

Tax is a compulsory contribution made by the citizens of any given country to the state or even an alien, subject to the jurisdiction of the government, for reasons of residence or property and this contribution is for the provision of social amenities for the well-being of that given society (Appah & Zibaghafa 2018; Appah, 2019). Anyaduba & Otubugbu (2019) state that the major objective of taxes in any given society is to ensure that government uses the revenue derived for the facilitation of economic growth, economic stabilization, income redistribution, promoting fairness and equity, fiscal responsibility and accountability, as well as for the provision of national goods and services. Similarly, Maina (2017) noted that the major objective of taxes is to raise sufficient revenue to finance government expenditure that seeks to maximize social welfare that determines its redistribution ability.

Inequality is a circumstance where people have different levels of income. Oboh & Eromonsele (2018) noted that income inequality is basically concerned with the relative position of diverse individuals within the income distribution. Okatch, Siddique & Rammohan, (2013) similarly stated that it is a summary statistic of the difference of income among individuals. Also Oboh & Eromonsele (2018) noted that it is a way of comparing the gap in individuals incomes in a given society or country. The nexus between taxes and income inequality in countries has been studied for a long time. Hanni, Martner-Fanta & Podesta (2015) are of the view that the vast majority of studies concluded that taxes have a modest effect on income distribution. According to Goñi, Lopez & Serven (2011), this is because of the neutrality of the taxes on the poor performance in collecting revenue. However, only few researches have tried to examine whether and how the recent tax changes have contributed to the recent decline of inequality in countries. Tsounta & Osueke (2014) revealed that higher tax revenue is related with more equality. Cornia, Gomez-Sabaini & Martorano (2011) provided that the greater reliance on taxes has significantly contributed to the reduction of inequality on average by 0.4–0.8 points.

The increasing gap of income inequality in Nigeria has brought on a debate based on the level to which taxes are to be used as a means of controlling income inequality. Martinez-Vaquez, Volovi & Liu, (2011); Bird & Zolt, (2014) stated that taxes in developing countries have been observed to be inefficient in solving the redistribution of income. However, as a result Nigeria's dependence on crude oil and gas, Martin and Crookes (2013) noted that there are clear indications of income inequality rising further as a result of higher levels of oil and gas production. Rosen and Gayer (2014) stated that taxes can be used to redistribute income, however the extent to which is debatable. Hence, taxes can directly influence the income distribution depending on the impact of tax, or indirectly depending on how tax revenue is spent. Governments in every country need to strike a balance between efficiency and income redistribution when designing a tax system (IMF 2014). Kumakura & Kojima (2018) stated that inequality can be examined from multiple perspectives such as variations in income and property ownership, full-time and non-full-time employment, or inter-generational and intra-generational income gap. They further noted that to address these issues at the policy level, taxes can be used to address the problem of inequality in developed and developing nations.

Meanwhile, there are several studies, which focused on taxes and income inequality. Most existing studies are from developed countries (example, Aasness, Benedictow, & Hussien, 2002; Atkinson and Leigh 2010; Sameti & Rafie, 2010; Iris, Martinez-Vazquez, & Vulovic, 2012). In Nigeria some studies

conducted include (example, Awe & Rufus, 2012; Bakare, 2012; Ilaboya & Ohonba, 2013; Ogbeide & Agu, 2015; Obaretin, Akhor & Oseghale, 2017; Oboh & Eromonsele, 2018; Anyaduba & Otubugbu; 2019). It remains unclear why empirical studies in developing country like Nigeria often yield conflicting results. These conflicting results show that the effect of taxes on income inequality is not concluded. The inconclusive results have made the issue of taxes and income inequality open to further empirical studies. Also, none of these studies in Nigeria used health expenditure and education expenditure as variables in their respective study. The gap in terms of the location, period covered and methodology is also a contributory factor to the differences in the outcomes of the effect of taxes on income inequality. Following the aforementioned gap created by the prior studies in terms of findings and conclusion reached by various studies, this study will aim at filling the gap by introducing health and education variables and analysis on taxes on income inequality structure in Nigeria. To achieve the objective of this paper, the following research questions were answered in the study:

1. What is the effect of personal income tax on gini coefficient in Nigeria?
2. To what extent does company income tax affect gini coefficient in Nigeria?
3. What is the effect of petroleum profit tax on gini coefficient in Nigeria?
4. To what extent does customs and excise duties affect gini coefficient in Nigeria?
5. What is the effect of value added tax on gini coefficient in Nigeria?

The following hypotheses were tested:

Ho_1: Personal income tax does not have a positive and significant effect on gini coefficient for the period 1980 to 2018 in Nigeria.

Ho_2: Company income tax does not have a positive and significant effect on gini coefficient for the period 1980 to 2018 in Nigeria.

Ho_3: Petroleum profit tax does not have a positive and significant effect on gini coefficient for the period 1980 to 2018 in Nigeria.

Ho_4: Custom and excise duties do not have a positive and significant effect on gini coefficient for the period 1980 to 2018 in Nigeria.

Ho_5: Value added tax does not have a positive and significant effect on gini coefficient for the period 1980 to 2018 in Nigeria.

In order to achieve the objective of this paper, the paper is divided into five sections. The remaining sections are as follows: section two presents the review of related literature, section three describes the methodology, section four of the study explains the results and discussion of findings and section five presents the conclusion and recommendations.

Literature Review

Conceptual Framework

Concept of Taxes and Tax System: Tax is a compulsory contribution made by the citizens of any given country to the state or even an alien, subject to the jurisdiction of the government, for reasons of residence or property and this contribution is for the provision of social amenities for the well-being of that given society (Appah & Zibaghafa 2018; Appah, 2019). Similarly, Bhartia (2017) noted that a tax

is a compulsory levy that is payable by an individual, partnership and corporations to the government without any corresponding entitlement to receive a definite and *direct quid pro quo* from the government. Onwuchekwa & Aruwa (2014) also noted that tax is a compulsory payment made by all concerned economic units to the government of a given tax jurisdiction from which social services are provided, without necessarily providing an explanation on how the funds generated was spent or equating services with the money collected. Nzotta (2007) stated that there are four basic issues that must be understood for taxes to play its objectives in any economy. First, a tax is a compulsory levy made by the citizens to the government and this levy is for general common use. Secondly, a tax ensures a general obligation on the tax payer. Thirdly, there is a presumption that the contribution made by the tax payer to the government may not be equivalent to the benefits received. Finally, a tax is not imposed on a citizen by the government because it has rendered specific services to him or his family (Appah & Zibaghafa 2018; Appah, 2019. Taxes can be divided into direct and indirect. There are different categories of direct taxes. These include the personal income tax, petroleum profit tax, companies' income tax, educational tax. The different major categories of indirect taxation in Nigeria include, Value Added Tax and Custom and Excise Duty (Umoru & Anyiwe, 2013; Manukaji, 2018).

Maina (2017) noted that a tax system is the legal structure that governs the implementation of the various types of taxes. Hence, the major objective of a tax system of any given government is to generate sufficient revenue to provide social goods and services to members of that society. Nasira, Haruna and Abdullahi (2016) maintained that an efficient and effective tax system is capable of providing the basic social services in the country. Taxes are used to achieve equity in income and wealth distribution and maintain equilibrium and economic growth in any given society. The National Tax Policy of Nigeria (2012) reported that the major objectives of the Nigerian Tax System are to promote fiscal accountability, growth and development, provide stable resources for the government in order to provide public goods and services, tackle income inequality, provide stabilized economy, promote equity and justice, and to address market imperfections. The Nigerian system of taxation is a means to address unequal distribution of income by charging the rich more and directing public expenditure to benefit poor (Anyaduba & Otulugbu, 2019). Martinez-Vazquez, Vulovic and Liu (2011) stated that the effects of taxes on inequality depends on the size of the system of taxation; since countries with a smaller tax system has a positive effect on inequality while nations with larger size of the system of taxation have a negative effect on income inequality. Maina (2017) stated that taxes can directly affect income distribution in terms of the impact of tax or how tax revenue is spent.

Personal Income Tax: This is a tax that is imposed on different sources of income such as labour, interest, dividends and rent of individuals. Manukaji (2018) stated that personal income tax is charged on the income of an individual. Similarly Ogbonna & Appah (2016) noted that the chargeable income of an individual is the aggregate amount from employment, investment, profit from trade, profession or vocation etc) after deducting all non-taxable incomes and relief granted. Anyanwu (1993) stated that personal income tax is a tax on an individual's income which he earned during a given period of time, usually a year. He further noted that this type of tax varies with the size and sources of the taxpayer's income and various other features stated by the relevant law.

Company Income Tax: This is a type of tax that is imposed on companies' profit. According to Chigbu & Njoku (2015), company income tax was introduced in Nigeria in 1961. Ogbonna & Appah (2016) stated that companies' income tax is a form of tax that is imposed on the profit of companies accruing in, derived from, brought into or received in Nigeria in respect of any trade or business, rent, premium, dividends, interest, loyalties and any other source of annual profit excluding profit from

companies engaged in petroleum operations (Manukaji, 2018; Abomaye-Nimenibo, Eyo, & Friday, 2018). This Tax is payable for each year of assessment of the profits of any company at a rate of 30%.

Value Added Tax: This is a form of indirect tax that is applied at each stage of production to the value added. Akhor & Ekundayo (2016) stated that value added tax is a consumption tax levied at each stage of the consumption chain and borne by the final consumer of the product or service. Abomaye-Nimenibo, Eyo & Friday (2018) suggest that value added tax is collected by the seller when taxable items are sold. The seller then nets off the VAT and submits it to FIRS through a designated bank. However, Manukaji, (2018) noted that value added tax is an estimated market value added to a product or service at each stage of its manufacture or distribution and the additions are ultimately added to and services bear the tax burden or the incidence because they cannot recover the tax paid on consumption of goods and services. It was introduced by The Federal Government of Nigeria in January, 1993 and requires a taxable person to register with the Federal Inland Revenue Service to charge and collect VAT at a flat rate of 7.5%. Okatch, Siddique and Rammohan (2013) investigated the determinants of income inequality in Botswana. Their results showed that VAT contributes significantly to income inequality. Fu (2016) investigated indirect tax increments on income gap between urban and rural areas in China using the analysis of Thayer Index from 1994 to 2013. Specifically, the study result shows that value added tax had a negative effect on income gap. He further stated that indirect tax, especially VAT is reducing income distribution as a whole.

Petroleum Profit Tax: This is a type of tax that was introduced in 1957 by the colonial government but became effective and operational in 1958 when the Nigerian government commenced the export of crude oil to the international community. Manukaji (2018); Ogbonna & Appah (2016); Chigbu & Njoku (2015); Ehigiamusoe (2014) noted that petroleum profit tax is a type of tax imposed on companies in Nigeria that are engaged in extraction and transportation of petroleum products. It is particularly related to rents, royalties, margins and profit-sharing elements associated with oil mining, prospecting and exploration leases. This type of tax is imposed to provide revenue for the government, also to serves as an instrument through which the government regulate the number of participants in the petroleum industry and gain control over public assets (Abdul-Rahamoh, Taiwo & Adejare, 2013). It is an instrument for wealth re-distribution between the wealthy and industrialized economics represented by the multinational organizations, who own the technology, expertise and capital needed to develop the industry and the poor and emerging economies from where the petroleum resources are extracted (Ehigiamusoe, 2014; Jubrin, Blessing & Ifurueze 2012). Chigbu & Njoku (2015) noted that this tax is applicable to upstream operations in the oil sector and the most important tax in Nigeria in terms of its share of 95% of government revenue and 70% of total foreign exchange earnings. The problem of this type tax is the fluctuations in the international market.

Custom and Excise Duties: This is one of the oldest forms of modern taxation in Nigeria having been introduced in 1860 as import duties (Ehigiamusoe, 2014. It is tax imposed imports either as a percentage of the value of the imports or as a fixed amount contingent on quality. Imports duties are the country's highest yielding indirect tax and are administered by the Nigerian Custom Service. Custom duties are commodity taxes of imports and exports while excise duties are commodity taxes levied on goods manufactured within the country (Manukaji, 2018; Abomaye-Nimenibo, Eyo, & Friday, 2018).

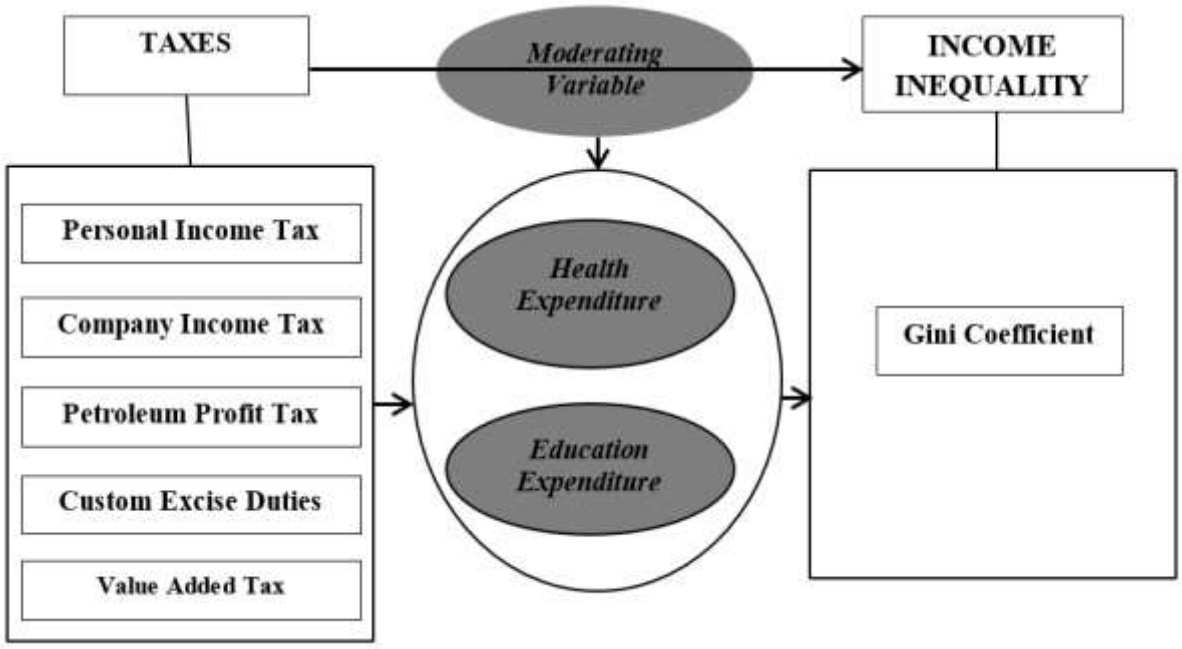

Figura 1. Conceptual Framework on Taxes and Income Inequality

Source: Anyaduba & Otubugbu (2019); Oboh & Eromonsele (2018); Ilaboya and Ohonba (2013); Manukaji (2018); Ogbonna & Appah (2016); Maina (2017); Chigbu & Njoku (2015); Ehigiamusoe (2014)

Concept of Income Inequality: Inequality is the differences in the share of something between or among two or more individuals where the share of one or some is more than that of the others. Inequality can be in income, consumption, wealth, gender, employment, health variables and many more (Ogbeide & Agu, 2015). Income inequality is defined as the inequitable distribution of income among the members of a particular society. Maina (2017) stated that inequality can be reflected in terms of access to basic services, opportunities, income among others. Income is generated from the factors of production: labour, capital, land and entrepreneurship.

Krugman (2014) stated that unequal compensation and high incomes has led to accumulation of wealth on a few rich people, rather than high capital to income as provided by Piketty (2014). A wages income at the top is rising at a high rate (Krugman, 2014). The wages of the top executives is increasing at a much higher rate than that of the other workers, which provides huge disparities between the two classes; this has contributed to the accumulation of capital on a few hands (Krugman, 2014). The high wages of the political elites and top executives is driven mainly by technology. Social and political forces also provided to the high wage difference (Piketty, 2014). Globalization, technological change, falling tax rates for the rich, changes in demography and disparities in distribution of wages and salaries are seen as the major cause of inequality (OECD 2012; Maina, 2017). Globalization also contributes to income distribution through international trade and foreign direct investment (FDI). Kayizzi-Mugerwa (2001) made some additional factors such as social and economic problems lead to high income inequality in Sub-Sahara Africa such as conflicts and weak institutions. He also observed the existence of high rural urban gap in African countries and attributes this to colonization. Igbuzor (2017) stated that the drivers of inequality in Nigeria include retrogressive taxation, inadequate budgeting system and allocation, insufficient resource management and policy implementation, elite capture, cronyism and favouritism, and prohibitive cost of governance. While Ilaboya and Ohonba (2013) noted that inequality of income can be reduced through of public policies such as good governance represented by transparency and accountability, public

expenditure on health, housing and education, policies of more comprehensive growth pattern, and taxation.

Gini Coefficient: This is a measure of inequality in income distribution. It is based on the Lorenz curve. Lorenz curve shows the income and wealth distribution in a graphical form. It was developed by Lorenz (1905) to analyze wealth inequalities of a society in different periods. It shows the percentage of income and wealth held by a certain proportion of the population. The curve reveals the deviation from the line of perfect equality. This coefficient measures income inequality based on the Lorenz curve and has values between 0 and 1 (0 and 1 inclusive) where figures closer to 0 signifies more equality in the distribution, values closer to 1 shows higher inequitable distribution of income while 0 signifies absolute equality in the distribution (Lee, Kim & Cin, 2013; Ogbeide & Agu, 2015; Maina, 2017). Income inequality can be within the country or between two or more countries. Ortiz and Cummins (2011) found the Gini for Sub-Saharan Africa to average to 0.442 in 2008. This can be compared to 0.483 for Latin America, 0.354 for Eastern Europe and Central Asia, and 0.309 for High-income countries for the same period. Ratios such as decile ratio or quintile ratio are also measures of income distribution. The Gini Coefficient has been the most popular tool for measuring income inequality in literature. Several scholars such as (Awe & Rufus, 2012; Bakare, 2012; Ilaboya & Ohonba, 2013; Mallaye, Yogo, & Timba, 2015; Maina, 2017; Anyaduba & Otulugbu, 2019; etc.) have applied Gini coefficient as a measure for inequality in their various researches.

Theoretical Framework

There are several theoretical analyses that explain the nexus between taxes and income inequality in any given society. According to Ihenyen & Mieseigha (2014), a theory of taxation is based on the activities between tax liability and the state, the primary purpose of taxation is to raise revenue for the government to provide social goods and welfare for the people. Ogbonna and Appah (2012) further noted that this reasoning justifies the imposition of taxes for state activities and the apportionment of the tax burden between members of a given tax jurisdiction. This study is anchored on the optimum income tax theory, ability to pay theory and expediency theory of taxation.

The Theory of Optimum Tax: The optimal tax theory was propounded by Atkinson and Stiglitz (1976) in their seminar paper. The theory of optimal tax examines the tax design that seeks to maximize social welfare of people. The design of the tax system determines its redistribution ability (Maina, 2017). According to the Atkinson and Stiglitz (1976), the optimum tax theory examines the scenario where persons may vary simply in their income levels, and then government can charge taxes on income but where the utility function varies between all commodities and labour, the appropriate tax design needed not to utilize indirect taxation. Anyaduba & Otubugbu (2019) stated that the optimum tax theory views the design and implementation of a tax that reduces inefficiency and distortion in the market under given economic constraints through pareto optimality.

Ability to Pay Theory: This theory was propounded by Arthur Cecil Pigou (1877-1959). According to Jhingan (2014), the ability to pay theory of taxation is just, equitable and the most accepted theory of taxation. Bhartia (2009) stated that this theory was supported by the classical thinkers due to its conformity with the ideas and concepts of justice and equity. The ability to pay theory states that those who possess income should contribute to support government activities on the basis of their relative ability. Anyaduba & Otubugbu (2019) noted that this theory provides the argument that taxes paid by a citizen, and his comparative share in the total tax burden are determined in accordance to his or her

capacity to pay. They further suggest that high-income earners should pay more than low-income earners. However, Jhingan (2014) criticized the ability to pay theory on the basis that there is no meaning in taking consumption expenditure as an index of ability to pay and ignoring saving and investment expenditure. This theory is justified in this study because ability to pay provides the objective of maximum welfare of society.

Empirical Review

There are several prior empirical studies conducted on the relationship between taxes and income inequality in different societies. Some of these previous empirical works are reviewed below with a view to observing the trend of the findings on the subject matter.

Martinez-Vazquez, Moreno-Dodson, and Volovic (2012) studied the impact of tax and expenditure policies on income distribution from large panel of countries. They found in a closed economy one percentage point increase in ratio of company income tax to GDP decreases income inequality by 0.7 percent point. Thus, this negative effect on income inequality will be lesser the more opened an economy is. 10 point rise in the globalization index, decreases negative effect of company income tax on income inequality by 0.1 percentage point. In general, their study showed the likely role that taxes and public expenditure policies play in affecting income distribution, that progressive personal income taxes and corporate income taxes reduce income inequality. The impact of corporate income taxes tends to be wiped away in opened or globalised economies. While they also argued that indirect taxes such as general consumption taxes, excise taxes and customs duties have a negative impact on income redistribution. Their study concluded that there is significant effect of both taxes and public spending on income distribution when they are considered jointly.

Ramot and Ichihashi (2012) examined the effects of tax structure on economic growth and income inequality. The study employed secondary sources of data obtained from the World Tax Database (WTD) provided by Office for Tax Policy Research (OTPR), KPMG and Pricewaterhouse Coopers (PwC) while data for Gini's index as a measurement of income inequality was collected from the World Income Inequality Database (WIID) provided by the United Nations organization with a panel data set of cross national data of 65 countries for the period 1970-2006. The data obtained from the secondary sources were tested using ordinary least square random effect and fixed effects estimations. The study found that statutory corporate income tax rate has a significant negative relationship with economic growth and income redistribution by controlling for various other variables of growth and income inequality. They however, stated that personal income tax rates have no effect on economic growth and on income inequality. Also in their findings, they classified the countries into tax groups based on their average top statutory corporate income tax rates and found that, high company income tax rates, above 40% corresponded with lower income inequality also on the other hand; lower company income tax rates below 40% are not significant in reducing income inequality.

Bastagli, Coady, and Gupta (2012) reviewed how fiscal policy can address income distribution in both developing and developed economies. The study used secondary sources of data obtained from the International Monetary Fund, World Tax Database and Gini index from the World Income Inequality Database while the data obtained was analysed using descriptive statistics They assembled a detailed database on post-tax and transfer income inequality for 128 developing and 22 developed economies. They found that fiscal policy can influence income inequality both indirectly through its impact on the future earning capacities on market income of individual and direct through its impact on current

disposable incomes. They concluded that in developed economies, fiscal policy has played a significant role in redistribution, particularly on the expenditure side, also through income taxation progressivity. However, the developing economies need to improve their distributive influence of fiscal policy by improving their capacity to raise tax revenue and to spend those resources more equitable and efficiently.

Ilaboya and Ohonba (2013) investigated the effects of direct and indirect tax on income inequality in Nigeria for the period 1980-2011. The study employed time series data collected from the Central Bank of Nigeria Statistical Bulletin, Federal Inland Revenue Service, Index Mundi, Federal Office of Statistics and World Bank for a period of 32 years while the data obtained were tested using diagnostic tests, Phillip-Peron test, Autoregressive Distributive Lag (ARDL) approach to error correction mechanism. Their study found a significant negative relationship between total tax revenue to GDP and income inequality in Nigeria, as a result of t-value of (-2.748706) and (-2.287270) and negative coefficients of (-0.007869) and (-0.512235) accordingly. They also found an insignificant negative effect between GDPPC, PCREDIT/GDP, TDT/TIT *TTR. While LFP and TDT/TIT had an insignificant positive impact on income inequality in Nigeria as a result of coefficients (0.421) and (1.243794) and t-value of (1.732565) and (1.717362) accordingly.

Oboh & Eromonsele (2018) examined taxation and income inequality in Nigeria for the period 1980-2014. This study used secondary sources of data obtained from Nigeria journal of economics and statistics, National centre for economic management and Administration, National Bureau of Statistics, economic and social bulletin publication, Central Bank of Nigeria Publications and Federal Inland Revenue Service and expost facto research design was employed while the paper analysed data using Normality; Heteroskedasticity test; Auto/serial correlation; Model misspecification; cointegration and Error Correction Model (ECM). From the regression results, indirect tax was found to be negatively related to income inequality in Nigeria. On the other hand, direct tax was found to have a positive impact on income inequality in Nigeria. Hence, direct tax widens the gap between the rich and the poor in Nigeria. Their study therefore concluded that indirect taxes reduce income inequality more in Nigeria.

Anyaduba & Otubugbu (2019) studied taxation and income inequality in Nigeria. Their study specifically examined value added tax, custom and excise duties, petroleum profit tax and company income tax on GINI in Nigeria for the period 1990 to 2016. The paper employed secondary sources of data from 1990-2016 from the Central Bank of Nigeria (CBN) Statistical Bulletin, Index Mundi, National Bureau of Statistics and Federal Inland Revenue Service of Nigeria and expost facto research design was adopted while the Augumented Dickey Fuller (ADF) unit root test Cointegration and Error Correction Models (ECMs) were used for the analysis of data. The data for the study were sourced from the Central Bank of Nigerian statistical bulletin, Federal Inland Revenue Service and the National Bureau of Statistics. The result showed that VAT, CED and PPT had positive relationship with GINI when measured at 5% critical level, though VAT and CED were not significant. CIT had a negative but significant impact on GINI. Based on the findings, we conclude that only CIT was able to reduce income inequality.

Methodology

Research Design: This study adopts ex-post facto and correlational research designs. The ex-post facto design was adopted because it does not provide the researchers the opportunity to control the variables mainly because they have already occurred and cannot be manipulated while the correlational research design was adopted to explain the relationship between the independent and dependent variables.

Sources of Data: The data used for this study was collected from the Federal Inland Revenue Service (FIRS), Central Bank of Nigeria (CBN), and National Bureau of Statistics (NBS) of various publications ranging from 1980 to 2018. The variables employed in the modelling of the study includes income inequality (dependent variable), personal income tax, company income tax, petroleum profit tax, custom & excise duty, value added tax (independent variable), health expenditure and education expenditure (control variables).

Data Analysis Technique: The secondary data collected were analysed using descriptive statistics, diagnostic tests, stationarity test, error correction mechanism (ECM) and co-integration. The ECM was used so as to induce the flexibility by combining short-run dynamic and long-run equilibrium at the same time while the Augumented Dickey Fuller (ADF) unit root test was used to test for Stationarity of the variables.

Model Specification: The model used in this study is a modification on the model of Martinez-Vazquez, Vulovic & Moreno-Dodson (2012), Ilaboya & Ohonba (2013), Maina (2017), Oboh & Eromonsele (2018) and Anyaduba & Otubugbu (2019). The functional form of the model used in this study is specified as follows:

$$GINI = f(PIT, CIT, PPT, CED, VAT, HEX, EDX) \quad 1$$

Where: GINI (Gini coefficient), PIT (Personal Income Tax), CIT (Company Income Tax), PPT (Petroleum Profit Tax), CED (Custom & Excise Duty), VAT (Value Added Tax), HEX (Health Expenditure) and EDX (Education Expenditure).

From equation 1, the econometric form is stated thus:

$$LGINI = \beta_0 + \beta_1 LPIT + \beta_2 LCIT + \beta_3 LPPT + \beta_4 LCED + \beta_5 LVAT + \beta_6 LHEX + \beta_7 LEDX + \mu \quad 2$$

Where: β_0 = intercept; β_1 = coefficient of parameter PIT; β_2 = Coefficient of parameter CIT; β_3 = Coefficient of parameter PPT; β_4 = Coefficient of parameter CED; β_5 = Coefficient of parameter VAT; β_6 = Coefficient of parameter HEX; and β_7 = Coefficient of parameter EDX.

Theoretically, it is expected that personal income tax, company income tax, petroleum profit tax, custom & excise duty; value added tax, health expenditure and education expenditure would be expected to have negative relationship with income inequality in Nigeria.

Results and Discussions

Table 1. Descriptive Statistics

	GINI	CIT	PIT	PPT	CED	VAT	EDX	HEX
Mean	44.05744	297323.6	167299.3	855156.2	181814.9	214378.3	106177.4	63291.23
Median	43.00000	46200.00	59416.00	164300.0	87900.00	47100.00	39882.60	15218.08
Maximum	56.00000	1836473.	634857.7	3201000.	817264.0	802965.0	465301.2	296442.8
Minimum	36.20000	403.0000	3.900000	3746.900	1616.000	4100.000	155.8100	41.31000
Std. Dev.	5.302811	456214.4	230267.8	1036659.	216390.3	274203.6	144249.5	89837.61
Skewness	0.608795	1.620364	1.083766	0.880801	1.289587	1.035277	1.224701	1.287664
Kurtosis	2.517312	4.883309	2.373760	2.394594	3.973720	2.512042	2.985487	3.220099
Jarque-Bera	2.787708	22.82991	8.271847	5.638357	12.35044	7.353609	9.749647	10.85623
Probability	0.248117	0.000011	0.015988	0.059655	0.002080	0.025304	0.007636	0.004391
Observations	39	39	39	39	39	39	39	39

Source: Author's computation using e-views

Table 1 presents the descriptive analysis of the time series properties of the variables included in the model. The descriptive statistics was carried out for the variables involved in our model from 1980 to 2018. It shows that the mean value of GINI, PIT, CIT, PPT, CED, EDX and HEX as 44.05744, 297323.6, 167299.3, 855156.2, 181814.9, 214378.3, 106177.4 and 63291.23 respectively. The standard deviation of GINI, PIT, CIT, PPT, CED, EDX and HEX from their respective long-term mean values every year point at 5.302811, 456214.4, 230267.8, 1036659, 216390.3, 274203.6, 144249.5 and 89837.61 respectively. The probability value of Jarque-Bera statistics for all variables shows their distribution level at mean zero and constant variance. It indicated that tax structure variables and economic growth were normally distributed. The variables are positively skewed.

Table 2. Augmented Dickey Fuller Unit Root Test

Variables	Level	1st Difference	Order of Integration
Log(GINI)	-0.369255	-2.352215	I(1)
Log(PIT)	1.031225	-6.219344	I(1)
Log(CIT)	-0.289652	-6.335816	I(1)
Log(PPT)	-0.793137	-6.533519	I(1)
Log(CED)	-0.842407	-6.066187	I(1)
Log(VAT)	-0.947537	-8.430607	I(1)
Log(EDX)	-1.800958	-7.803040	I(1)
Log(HEX)	-1.341944	-10.17095	I(1)

Critical Value @ 5% **-1.950117**

Source: Author's Computation using e-views

The variables in the model were integrated variables; all the variables attained stationarity after first difference. The null hypothesis of non-stationarity of the variables in the model is rejected after differencing at 5 percent level of significance.

Table 3. Johansen Co-Integration Test

Date: 05/11/20 Time: 15:01
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments
Trend assumption: Linear deterministic trend
Series: LOG(GINI) LOG(PIT) LOG(CIT) LOG(PPT) LOG(CED) LOG(VAT) LOG(EDX) LOG(HEX)
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.803178	203.7560	159.5297	0.0000
At most 1 *	0.691603	143.6142	125.6154	0.0025
At most 2 *	0.562423	100.0886	95.75366	0.0243
At most 3	0.498807	69.50800	69.81889	0.0529
At most 4	0.394768	43.94972	47.85613	0.1110
At most 5	0.348465	25.37043	29.79707	0.1486
At most 6	0.207844	9.518737	15.49471	0.3196
At most 7	0.023974	0.897836	3.841466	0.3434

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computation using e-views

Table 3 result reveals three co-integrating equation at 5 percent significance level. This means that, there is the probability of a long run equilibrium relationship among the variables in the model. Thus, the error correction model can be run, to ascertain the long run relationship.

Table 4. Parsimonious Error Correction Model

Dependent Variable: LOG(GINI)
Method: Least Squares
Sample (adjusted): 1983 2018
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.393119	0.989719	2.417979	0.0298
LOG(PIT)	-0.018850	0.008131	-2.320129	0.0035
LOG(CIT)	-0.175768	0.068563	-2.563585	0.0225
LOG(PPT)	0.044113	0.022848	1.930691	0.0740
LOG(VAT)	-0.014304	0.031192	-0.458589	0.6536
LOG(EDX)	0.008077	0.044390	0.181944	0.8582
LOG(HEX)	0.007622	0.038271	0.199154	0.8450
ECM(-1)	-0.150210	0.082010	-1.875175	0.2312

R-squared	0.733296	Mean dependent var	3.793326
Adjusted R-squared	0.733241	S.D. dependent var	0.110052

S.E. of regression	0.044941	Akaike info criterion	-3.089167
Sum squared resid	0.028276	Schwarz criterion	-2.121461
Log likelihood	77.60501	Hannan-Quinn criter.	-2.751412
F-statistic	9.327801	Durbin-Watson stat	2.216152
Prob(F-statistic)	0.000050		

Source: Author's computation using e-views

Table 4 shows the error correction results between Gini (proxy for inequality) and tax proxies, with the control variables government expenditure on education and health. The result revealed that a negative relationship exists between Personal Income Tax (PIT), Company Income Tax (CIT), Value Added Tax (VAT) and GINI, a unit increase in the variables will lead to a fall in the level of inequality in Nigeria by -0.018850, -0.175768 and -0.014304 respectively. This indicates that PIT, CIT and VAT have helped to reinforce the objective of income redistribution in Nigeria for the period under review. Petroleum Profit Tax (PPT) has a positive relationship with GINI, this interpret that increase in PPT will lead to an increase in the level of inequality in Nigeria.

The CIT result conforms with the findings of Anyaduba & Otulugbu (2019), Piketty and Qain (2009), Martinez-Vazquez *et al.* (2012), Ramot and Ichihashi (2012), Ilaboya and Ohonba (2013) and it negates the finding of Iris, *et al.* (2012). The findings of VAT is in line with the findings of Cicowiez *et al.* (2009), Erero (2015) and Fu (2016), who found that VAT had a negative effect on income Gap, thereby reducing income inequality. The result of PIT is in consonance with the result of Anyaduba & Otulugbu (2019). PPT has a positive relationship with income inequality index, this is in tandem with the findings of Martin and Crookes (2013) and that of Moradi (2009) and John Obiora Anyaduba1 & Praise Oghenefejiro Otulugbu (2019).

Government spending on education and health have positive relationship with inequality, it connotes that increase in government spending will lead to an increase in the level of inequality in Nigeria, this points to the fact that a large part of government spending on these sectors have been misappropriated and it has been inadequate and channel to the wrong quarters. Government spending on education is a part of government effort towards human capital development, the share of spending dedicated to promote educational activities and develop of human in the country has been relatively low and a far cry from the UNESCO minimum requirement. Spending on Health another part of the human capital development, though positive have been statistically insignificant both in the short and long run; government had only paid lip service to the development of human capital in Nigeria and the situation still gets worsened by the day. Education and Health are vital components of human capital, a healthy workforce means a healthy economy, an insignificant amount is spent in the sector. Human capital development is the livewire of any economy and for any economy to achieve high level of equality it must shift its attention on investing in things (Physical capital) and invest in Human development.

Assessing other vital elements in the ECM model, we saw that the R^2 revealed a good fit, 73 percent of the variation in the dependent variable is explained by the independent variables and the remaining 27 percent are being captured by the stochastic term. The F-statistic value of (9.327801) with probability value of (0.0050) indicates that the entire model is statistically significant. The Durbin Watson statistic of 2.21 rules out the presence of autocorrelation, this means that the model can be relied upon for policy decision making.

Conclusion and Recommendations

This study examined the effect of taxes on income inequality in Nigeria. The study adopted econometric models for the analysis of data. The results revealed significant negative relationship exists between personal income tax, company income tax and inequality; a negative but statistically insignificant relationship exist between value added tax and income inequality; a positive but statistically insignificant relationship exist between value added tax, government spending on education, government spending on health and income inequality. The study therefore recommended that government should ensure compliance to tax payments because taxes provide a powerful policy tool effectively used for curing economic and social ills; tax rates should not to be too high, as this would discourage investment and entrepreneurial activity. Hence revenue derived from taxes should be sufficient to provide basic public goods and services, and progressive enough to redistribute income among members of the society with minimal distortions in the economy. Therefore, government should be strategic to achieve this balance. Also the government of Nigeria should focus more on Value Added Tax (VAT). This is because VAT on goods and services consumed more by low income groups should be totally exempted, while VAT should be imposed on goods and services heavily consumed by high-income groups in the country.

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