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DIRECT VERSUS INDIRECT TAXATION AND INCOME INEQUALITY

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ABSTRACT: In this paper, we employed multivariate econometric analysis approach to study the relationship between taxation and income inequality in Nigeria. The study was a country-specific approach using tax and macroeconomic data from 1980 to 2011. We collected data from the Central Bank of Nigeria Publications, Federal Inland Revenue Service, World Bank and Index Mundi. We estimated the data using a combination of co-integration and error correction model. Preliminary diagnostic analysis using Ramsey RESET test, Breuch-Pagan-Godfrey, Granger causality test and Breuch-Godfrey test of serial correlation were affected to check the accuracy of our model. The preliminary analysis where favourable with no cases of serial correlation, non-normality, bi-directional causality and model misspecification. We found a negative and robust relationship between total tax revenue, total tax revenue to GDP ratio and income inequality in Nigeria with t-values of (-2.748706) and (-2.287270) and negative coefficients of (-0.007869) and (-0.512235) respectively. We found a negative but insignificant relationship between GDPPC, PCREDIT/GDP, TDT/TIT*TTR while LFP and TDT/TIT had positive but insignificant relationship with income inequality with coefficients of (0.421) and (1.243794) and t-values of (1.732565) and (1.717362) respectively.

KEYWORDS: Direct taxation, indirect taxation, Income inequality, Total tax revenue, Error correction model, Granger causality.

1.0 INTRODUCTION

Income inequality can be addressed through a variety of public policies such as: social expenditure (public spending on education, health and housing), policies of more inclusive growth pattern, good governance (transparency and accountability) and taxation. But the extent to which the latter (taxation) satisfies the function of income redistribution has been a subject of protracted debate in the developed economies of the world. Different tax components have different effect on macroeconomic activities. Indirect taxes are seen to be regressive since every person (whether rich or poor) pay the same rate on their consumption expenditure. But since the poor pay a higher proportion of their income as tax, indirect tax tends to increase the disparity in societal wellbeing (Barnard, 2010 & Cornia, Gomez-Sabaino & Martorano, 2011). Direct taxes tends to be more equitable. This is because taxes on income rises as income increases and as such, direct taxes are said to be progressive even though some sub-components of direct taxes have been considered the most distortive form of taxation with adverse effect on entrepreneurial activities (Djankov, Ganser, Meliesh, Romalho & Shleifer, 2006), labour supply (Hausman, 1985 & Killingsworth, 1983) and investment and productivity (Mendoza, Milesi-Ferretti & Asea, 1996; Vartia, 2008; & Shwellnus, 2008). Direct taxes enhances the redistribution function of taxation as they help to reduce income inequality (Saez, 2004; Barnard, 2010; and Martinez-Vazquez, Vulovic, & Moreno-Dodson, 2012).

This study was motivated by two congenial developments: The extant theoretical and empirical literature on taxation and income inequality in the developed economies are endowed with diverse theoretic and mixed results and the paucity of empirical researches in the emerging economies of Sub-Saharan Africa with Nigeria as a reference point.

Our study made several contributions to knowledge. Primarily, there are sparse country-specific studies which focused on developing economies. Most existing studies in developed countries adopted the usual cross-country approach to link taxation and income inequality (Giovanni, 2010; Martinez-Vazquez, Vulovic & Liu, 2010; Duncan & Sabririanova, 2008; Weller, 2007 and Chu, Davoodi & Gupta, 2000). Cross-country approach only presents pooled estimates but fails to disentangle the result for each specific unit of study. In addition, we adopted the multivariate econometric analysis to address the impact of direct versus indirect taxes on income inequality proxied by Gini coefficient, instead of the usual micro-simulation and general equilibrium models. This is considered a laudable contribution to the literature on taxation– inequality dynamics in the developing economy. To the best of our knowledge, this appears to be the first attempt to use multivariate econometric analysis to address country-specific issue of taxation and inequality.

Statement of Research Problem

According to Wright (2000:145) *"large inequalities of wealth and income are likely to undermine democracy (equality of political power and influence) by giving some people much greater resources to influence the political process than others…to the extent money can be translated into political power through various mechanisms, political equality is weakened by economic inequality. Thus, even if one does not feel that economic equality per se is likely to violate principles of social justice, one might still oppose high levels of inequality on the grounds that it weakens democracy".*

The above insertion is a complete description of the state of the Nigerian nation where money politics, bribery and corruption are rooted in all facets of our national lives. In an attempt to address these myriad of problems, taxation has become extremely handy in the developed nations. The fundamental question therefore was: what is the effect of direct versus indirect taxation on income inequality in Nigeria?

Research Objectives

The fundamental objective of this study was to examine the relationship between direct versus indirect taxation and income inequality in Nigeria.

The specific objectives of the study were to:

1. examine the relationship between total tax revenue and income inequality in Nigeria;
2. investigate the relationship between private credit to GDP and income inequality in Nigeria;
3. determine the relationship between tax burden (tax ratio to GDP) and income inequality in Nigeria;
4. ascertain the relationship between labour force participation and income inequality in Nigeria;
5. investigate the relationship between interaction variable between tax ratio and total tax revenue and income inequality in Nigeria; and
6. determine the relationship between GDPPC and income inequality in Nigeria.

The rest of this paper was divided into 4 sections. Following the introduction was Section 2, which focused on the trends of direct versus indirect taxes and Gini coefficient in Nigeria, as well as empirical evidence on taxation – inequality dynamics. Section 3 explored the methodology of the study with emphasis on data source, modeling and estimation technique. The results of the estimation and discussion of findings were presented in Section 4, while Section 5 addressed the summary of findings, conclusion and recommendations.

2.0 LITERATURE REVIEW

The most important single measure of income inequality is the Gini coefficient which according to Slack and Rodrigue (2009) is estimated as:

$$G = I - \sum_{i=o}^{z} \left(\sigma Y_{z-1} + \sigma Y_z\right)\left(\sigma X_{z-1} + \sigma X_z\right)$$

(i)Where:

σY = Cumulative distribution of the income variable for i=0,…,z with Y_0=0 and Y=1.

σX = Cumulative distribution of the population variable for i=0,…,z with X_0=0 and X1=1.

Gini Coefficient measures the difference between the actual and equal distribution of income among the populace. The Gini coefficient index is bound between 0 to 1 where 0 represent perfectly equal distribution of income and 1 represents perfectly unequal distribution of income. Higher values of Gini coefficient represent different levels of inequality.

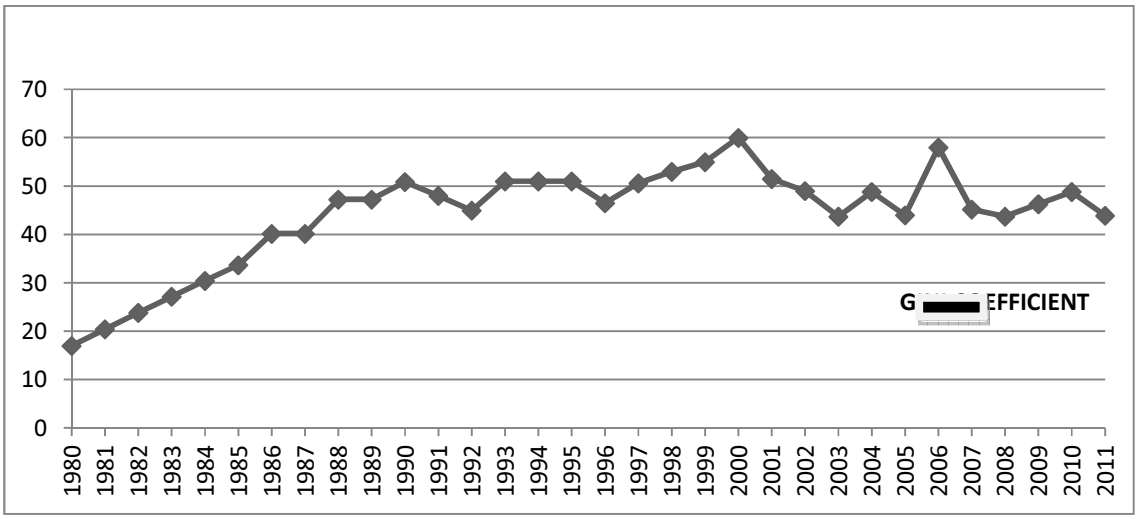

Figure 1: Trend of Gini Coefficient in Nigeria

In Nigeria, there have been consistent rising cases of income inequality even though from 2001, it witnessed a gradual decline. Gini coefficient was estimated to be about (0.17) in 1980 and it rose to (0.51) in 1990 and it peaked at (0.60) in the year 2000. There has been a gradual decline of inequality as a result of the different measures put in place by successive governments to enhance societal wellbeing. In the year 2005, the Gini coefficient reduced to (0.44) and by the end of 2011 it stood at (0.439). See figure 1.

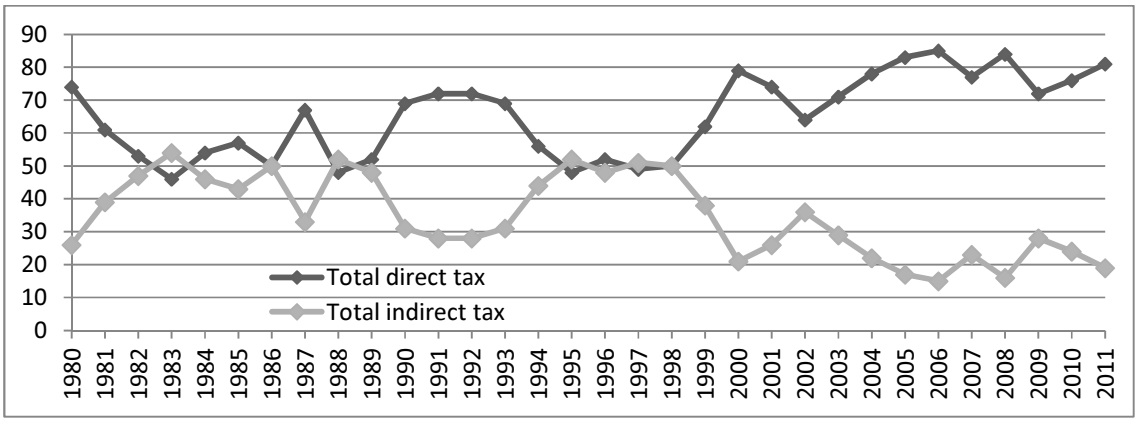

Figure 2: Trend of Direct and Indirect Taxes in Nigeria

The increasing reliance on direct taxation as a tool for government fiscal policy may have accounted for the gradual decline in the inequality gap in Nigeria, even though global emphasis is on indirect tax. Direct taxation accounted for about 74% of the total tax revenue in the year 1980 in Nigeria. It rose to about 79% in 2006. There was a slight decline between 2009 (72%) and 2010 (76%) as a result of the crisis in the Niger-Delta region. By the year 2011, there was a sharp improvement to 81%, due to the presidential amnesty which restored peace in the region. See figure 2.

Ex-tant empirical literature (mostly from the developed nations) has provided inconclusive evidence on the effect of the different tax components on income inequality with majority leaning towards a negative or neutral relationship between direct taxation and income inequality. Chu, Davoodi and Gupta (2000) investigated income distribution and tax and government social spending policies in developing countries between 1980 and 1990. The study reported that unlike industrialised countries, developing countries have not been able to use tax and transfer policies to effectively cut down on the level of income inequality. Specifically, it was discovered that the tax ratio and urbanisation variables were statistically significant and the significance was found to be fairly robust. It was established that a revenue-neutral increase of 40% point (from 80%-120%) in the ratio of direct to indirect tax revenue would reduce the Gini coefficient by (0.75) of a percentage point. And that a one percent point increase in the ratio of direct tax revenue to GDP and an increase at the same rate in indirect tax would raise the Gini coefficient by (0.06) of a percentage point. And that a one percentage point increase in the ratio of direct tax revenue to GDP and an increase at the same rate in indirect tax would raise the Gini coefficient by (0.60) of a percentage point.

Saez (2004) examined the efficacy of direct and indirect tax instruments in the redistribution of income both in the long-run and short-run. They found that indirect taxation is sub-optimal and income redistribution could only be achieved through the instrumentality of direct taxation. They concluded that in the long-run, direct income taxation should be preferred to indirect tax instruments to raise revenue and achieve redistribution of income. In the same vein, Weller (2007) examined the benefits of progressive taxation to economic growth using cross-country data covering a period of 21 years from 1981 to 2002. The study found that progressive income taxation may lead to a higher equitable income distribution, higher revenues, less financial and economic volatility and faster growth. The evidence according to Weller, revealed an association with higher revenues and a more equitable distribution but also with higher deficit with no trace of output volatility and growth.

Duncan and Sabirianova (2008) examined whether income inequality was affected by the structural progressivity of national income tax systems. They used a detailed personal income tax schedules for a large panel of countries. They developed an estimate comprehensive time varying measures of structural progressivity of national income tax systems over 1981 to 2005. The study found that while progressivity reduced observed disparity in reported gross and net income, it had a statistically significant smaller effect on the correct inequality estimated by consumer based measures of Gini coefficient. They discovered that under some certain conditions, tax productivity may improve actual income inequality mostly in countries with weak law and order and large informal non taxable sector.

Martinez-Vazquez, Vulovic and Liu (2010) investigated the impact of direct versus indirect taxes on income inequality for 116 developed, developing and transitional countries from 1972 to 2005. The two stage least square procedure was employed in the data estimation to control for potential reverse causality of some of the variables. The results suggested that the effect of tax ratio to income inequality is a function of the size of the taxation system. In countries with small tax system, there was positive effect on income inequality. But the effect was negative in countries with larger size taxation system. For the full sample studied, the tax mix had negative effect on the Gini coefficient thereby reducing income inequality in countries with share of total tax to GDP larger than (0.29). For the sub-sample of developing countries, there was no statistically significant effect of tax mix on income inequality. The result according to them conformed with existing evidence of low impact of tax systems on distribution of income for developing countries.

Krever and Zhang (2011) did a country-specific study using China and examined progressive income taxation and urban individual income inequality. They found that China had not been able to use income tax (personal income tax to effectively redistribute income). They concluded that it would be likely that significant reform of the personal income tax law and administration would be required for income tax to be meaningful on income redistribution in China.

The inability of the tax system to effectively redistribute income also came to the fore in the study of Bargain, Dolls, Immervol, Neuman, Peichl, Pestel and Seiglock (2011) who examined the effect of United States tax reform on income inequality by employing a decomposition approach which differentiated the mechanical effects and changes due to policy reforms. They discovered that reforms during the democrats administration had an equalising effect at the lower half of the distribution. While Republican era reforms had a disequalising effect which was attributable to tax cuts for high income households. They discovered that overall policy effect of the period covered was marginal.

In a more recent study, Giovanni (2012) examined inequality trends and their determinants using data from Latin America from 1990 to 2010. The least square dummy variable estimator was employed in the study. It was observed in the model that changes in the explanatory variables accounted for 64% variation in the inequality over 2002 to 2009 while in the GMM, it reduced to 35%. In the LSDV model, it was observed that GDP per capital had a negative but non significant effect on inequality. The ratio of direct to indirect tax revenue was found to be strongly significant and negatively related to income inequality in all the models considered.

Iris, Martinez-Vazquez and Vulovic (2012) using data from 1970 to 2009 for Asian countries, examined government fiscal policies and redistribution of income. The study employed panel estimation and discovered that tax systems tends to be progressive but government expenditure seems to be a more effective tool for income redistribution. Personal income tax was found to have a negative impact on income inequality in Asian countries. It was revealed that one percentage point increase in personal income tax in Asia reduced income inequality by (0.573) compared to (0.041) percentage point in the rest of the world. Corporate income tax was found to reduce inequality in the rest of the world but regressive in Asia. One percentage point increase in CIT was found to increase income inequality by about (0.598) percentage point in Asia.

Martinez-Vazquez, Vulovic and Moreno-Dodson (2012) investigated the impact of tax and expenditure policy on income distribution using tax and macroeconomic variables from 1970 to 2009. The study discovered that faster growing countries in terms of population growth seems to experience larger income inequality. On the effect of globalisation on inequality, it was revealed that globalisation increases income inequality. They established that progressive income taxes (personal and corporate) reduced inequality. General consumption taxes, excise taxes and custom duties had negative impacts on income distribution.

3.0 METHODOLOGY

Data and Data Source

Annual time series data were sourced from Central Bank of Nigeria Statistical Bulletin, Federal Inland Revenue Service, Index Mundi, Federal Office of Statistics and World Bank. The study spanned a period of 32 years from 1980 to 2011.

Model Specification

Our model was a modification of the models of Chu *et al* (2000) and Martinez-Vazquez *et al* (2010). Chu *et al* (2000) studied income distribution, tax and government social spending policies in developing countries using the model:

$$g_{it} = C_0 + C_1 r_{it} + C_2 d_{it} + C_3 S_{it} + C_4 U_{it} + C_5 K_{it} + C_6 X_{it} \quad \text{(i)}$$

Where:

g = Gini coefficient

r = ratio of direct to indirect taxes

s = secondary school enrolment

u = urbanisation

k = transition country dummy

x = inflation dummy

it = country and time subscript for three decades (1970s to 1990s).

Martinez-Vazquez *et al* (2010) examined the trend, theory and economic significance of direct versus indirect tax using the model:

$$Gini = \alpha_1 taxratio_{it} + \alpha_2 totaltax_{it} + \alpha_3 taxratio * totaltax + X_{it}\beta + Giniconcept_{it} + \varepsilon_{it}$$

(ii)

Both models above were modified to suit the country-specific nature of our study and our model was specified as:

$$GiniCo = \beta_1 taxratio + \beta_2 TTR + \beta_3 taxratio * TTR + \beta_4 TBUD + \beta_5 GDPPC + \beta_6 \frac{pcredit}{GDP} + \beta_7 LFP + \varepsilon$$

(iii)

Where:

$GiniCo =$ Gini Coefficient from 1980-2011

Tax ratio = $\frac{TotalDirectTax}{TotalIndirectTax}$

TTR = Total tax revenue

Tax ratio*TTR = $\frac{TotalDirectTax}{TotalIndirectTax} * TotalTax\,\mathrm{Re}venue$

TBUD = Tax Burden = $\frac{TotalTax\,\mathrm{Re}venue}{GDP}$

GDPPC = GDP per capital

Pcredit/GDP = Private sector credit to GDP ratio

LFP = Labour force participation

ε = Error term and $\beta_1 to \beta_7 < 0$ unknown coefficients of the variables. The *apriori* expectation was $\beta_1 - \beta_7 < 0$

Data Estimation Technique

Preliminary diagnostic tests were carried out to check the adequacy of our model. The Phillip-Peron test was employed to test the stationarity or otherwise of the time series data. The possibility of a long-run relationship between the dependent and explanatory variables was tested using the Engel-Granger two stage

procedure. Discrepancies between the long-run and short-run impact of the explanatory variables were corrected using the Autoregressive Distributive Lag (ARDL) approach to error correction mechanism.

4. ESTIMATION RESULTS AND DISCUSSION

Descriptive Statistics

Table 1: Results of Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	Jarque-Bera	Probability	Observations
GINICo	44.13	60	16.96	10.42708	7.526446	0.023209	32
TDT/TIT	2.3475	5.66	0.34	1.376998	4.319693	0.115343	32
TTR	931.1172	4757.95	11.4	1356.897	11.56073	0.003088	32
TDT/TIT*TTR	3338.344	21089.39	15.23	6045.87	26.98991	0.000001	32
TTR/GDP	16.59375	38	8	6.85264	11.31838	0.003485	32
GDPPC	384.4409	540.34	296.27	60.81657	4.454597	0.107819	32
PCREDIT/GDP	15.74938	38.59	8.93	7.052836	26.92234	0.000001	32
LFP	50.93438	56.8	39.7	7.278807	5.727185	0.057063	32

Source: Researcher's Computation (2013)

*Note: GiniCo=Gini Coefficient, TDT/TIT=Tax Ratio, TTR=Total Tax Revenue, TDT/TIT*TTR= Interaction variable between tax ratio and total tax revenue, TTR/GDP=Tax Burden, GDPPC = GDP Per Capital, PCREDIT/GDP = Private sector credit to GDP ratio, LFP = Labour force participation.*

From the result above, it was observed that between 1980 and 2011, the Gini coefficient had a maximum value of (60) and a minimum value of (16.96) with an average of (44.13). The average ratio of total direct tax to total indirect tax was (2.35) while the average ratio of the interaction variable between tax ratio and total tax revenue was (3338.34). The ratios of GDP per capital and private sector credit to GDP were (384.4) and (15.75) respectively. As observed from the Jarque-Bera statistics, most of the variables used in the study were normally distributed.

Table 2: Result of the Correlation Test

	GINICo	TDT/TIT	TTR	TDT/TIT*TTR	TTR/GDP	GDPPC	PCREDIT/GDP	LFP
GINICo	1							
TDT/TIT	0.052716	1						
	0.289141	-----						
	0.7745	-----						
TTR	0.22848	0.636693	1					
	1.285439	4.522415	-----					
	0.2085	0.0001	-----					

TDT/TIT*TTR	0.193957	0.798044	0.922841	1				
	1.082913	7.2537	13.12264	-----				
	0.2875	0	0	-----				
TTR/GDP	-0.79096	0.25724	-0.26047	-0.15742	1			
	-7.08039	1.458031	-1.47769	-0.8731	-----			
	0	0.1552	0.1499	0.3895	-----			
GDPPC	0.066533	0.592279	0.893878	0.775494	-0.11624	1		
	0.365226	4.026203	10.92097	6.727692	-0.64101	-----		
	0.7175	0.0004	0	0	0.5264	-----		
PCREDIT/GDP	-0.14273	0.234584	0.669647	0.530221	-0.03492	0.631855	1	
	-0.78987	1.321753	4.938618	3.425265	-0.19138	4.46507	-----	
	0.4358	0.1962	0	0.0018	0.8495	0.0001	-----	
LFP	0.735337	0.230484	0.407644	0.326587	-0.62264	0.444957	-0.00148	1
	5.943037	1.297344	2.445142	1.892565	-4.35818	2.721373	-0.00809	-----
	0	0.2044	0.0206	0.0681	0.0001	0.0107	0.9936	-----

Source: Researcher's Computation (2013)

The correlation coefficient revealed the existence of a linear relationship between the regressand and the regressors. From the result, the coefficient of correlation of the variable with respect to itself was (1.00) which revealed perfect correlation. There was a positive correlation between Gini coefficient and TTR, TDT/TIT*TTR, GDPPC and LFP with coefficients of (0.22), (0.193), (0.06) and (0.74). While TTR/GDP, TDT/TIT and PCREDIT/GDP all had negative correlation with Gini coefficient. The values revealed a fairly weak relationship and indicates the absence of multicollinearity in the model.

Econometric Analysis

We tested for serial correlation and the result revealed F-statistic and obs* R-square values of 1.25 (0.30) and 3.27 (0.19) (probability values in parenthesis) at the 5% significance level. It revealed absence of serial correlation (see appendix 1). The Breuch-Pagan-Godfrey test of heteroskedasticity indicated the presence of homoskedasticity with F-statistic and obs* R-square values of 0.98 (0.46) and 7.14 (0.41) respectively (see appendix 2). Ramsey RESET test for model specification revealed that the model was not mispecified. The F-statistic value was (2.75 with p-value of (0.14) (see appendix 3). Granger causality test reported cases of uni-directional relationship (see appendix 4).

To determine the time series properties of the variables in the model, each was subjected to unit root test using the Phillip-Peron approach. The result revealed that with the exception of TDT/TIT and

TDT/TIT*TTR, which were stationary, all other variables had unit root. The first difference of the Gini coefficient, TTR, TTR/GDP, GDPPC, PCREDIT/GDP and LFP gained stationarity.

Table 3: Results of the Phillip-Peron Test at Levels and First Difference.

VARIABLES	**LEVELS**		**FIRST DIFFERENCE**		**ORDER OF INTEGRATION**	
	PP Stat.	Critical Value at 5% level	PP Stat.	Critical Value at 5% level		**REMARK**
GINICo	-1.89	-3.56	-38.77	-3.57	I(1)	Stationary
TDT/TIT	-5.44	-3.56	-32.04	-3.57	I(1)	Stationary
TTR	0.43	-3.56	-15.85	-3.57	I(1)	Stationary
TDT/TIT*TTR	-4.93	-3.56	-24.71	-3.57	I(1)	Stationary
TTR/GDP	-3.43	-3.56	-25.96	-3.57	I(1)	Stationary
GDPPC	-1.85	-3.56	-15.84	-3.57	I(1)	Stationary
PCREDIT/GDP	-1.78	-3.56	-12.01	-3.57	I(1)	Stationary
LFP	-1.67	-3.56	-27.76	-3.57	I(1)	Stationary

Source: Researcher's Computation (2013)

The result in Table 3 shows that at first difference, the PP statistics of all the variables with constant and trend exceeded the absolute critical PP value of (-3.57) at 5% level of significance. Thus, all the variables were of order one 1(1).

Table 4: Results of the Unit Root Test for Residual Using Phillip-Peron

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.883722	0.0251
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Source: Authors Computation 2013

With evidence of unit root established, we tested for the existence of a long-run relationship between GiniCo and the regressors. The Engle and Granger two-stage test was used to carry out the co-integration test. The result of the unit root test on the OLS residual was reported in Table 4 above. We observed that the residual was stationary since the absolute PP test statistic of (-3.88) exceeded the absolute critical PP

value of (-3.56) at 5% level of significance. With this result, we concluded that GiniCo and the explanatory variables were cointegrated.

Error Correction Model Analysis

Table 5: Results of the Parsimonious Error Correction Model (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.052577	0.892058	1.179942	0.2506
DGDPPC	-0.055403	0.044073	-1.257056	0.2219
DLFP	0.421998	0.243569	1.732562	0.0972
DPCREDIT/GDP	-0.250811	0.170146	-1.474096	0.1546
DTDT/TIT	1.243794	0.724247	1.717362	0.0926
DTDT_TIT/TTR	-0.000240	0.000713	-0.336443	0.7397
DTTR	-0.007869	0.002863	-2.748706	0.0443
DTTR/GDP	-0.512235	0.223950	-2.287270	0.0322
ECM(-1)	-0.704908	0.184903	-3.812324	0.0010

R-squared	0.632015	Mean dependent var	0.869032
Adjusted R-squared	0.498202	S.D. dependent var	5.227775
S.E. of regression	3.703236	Akaike info criterion	5.693992
Sum squared resid	301.7071	Schwarz criterion	6.110310
Log likelihood	-79.25687	Hannan-Quinn criter.	5.829701
F-statistic	4.723124	Durbin-Watson stat	1.928115
Prob(F-statistic)	0.001785		

Source: Authors Computation 2013

We tested the short-run response of Gini coefficient to changes in the explanatory variables. An examination of the result shows that about 63% of the systematic variation in Gini coefficient, a proxy for income inequality was caused by the regressors. While the balance, though unexplained by our model, was captured by the error term. The overall model was found to be statistically significant with a calculated F-value of (4.72) which exceeded the critical F-value at 5% level of significance. This means a joint effect of the explanatory variables on income inequality in Nigeria.

From the result, we observed that in the short-run, DTTR, and DTTR/GDP had statistically significant negative impact on income inequality in Nigeria, having reported robust t-statistics of (-2.748706) and (-2287270) and negative coefficients of (-0.007869) and (-0.512235) respectively at the 5% level. DGDPPC, DPCREDIT/GDP, DTDT/TIT*TTR were also found to have negative impact on income inequality in Nigeria, even though the impacts were statistically insignificant at the 5% level. Their respective t-values were (-1.257056), (-1.474096), (-0.336443) respectively.

The variables of DTDT/TIT, DLFP, exhibited positive but insignificant relationship with income inequality in Nigeria having reported positive coefficients of (1.243794) and (0.421998) respectively. The respective

t-values were (1.732562) and (1.717362). The coefficient of the ECM was found to be correctly signed and significant at 1% level. The coefficient of the ECM with a value of (0.70) means the speed of adjustment was about 70%. The Durbin Watson statistic of (1.92) was substantially close to two and indicated the absence of autocorrelation in the model.

Discussion of Findings

The average tax ratio for Nigeria in the 1990s and there after was between (12-15)%. It went as low as 8% between 1995 to 1998. It was therefore not surprising to find that tax ratio to income inequality was positive though insignificant. The implication of this is that tax ratio increased income inequality minimally having reported an insignificant t-value of (1.717362) and a positive coefficient of (1.24). Relatively, the Nigerian tax system can be said to be small since the share of total tax revenue to GDP is between (12-15)% and way below the benchmark of 29% which Martinez-Vazquez *et al* (2010) considered an enlarged tax system. According to them, the size of the tax system determines the effect of tax ratio on inequality. With small tax system, there was positive relationship between tax ratio (TDT/TIT) and income inequality which was the position of our finding.

Contrary to expectation, total tax revenue was found to reduce income inequality in Nigeria which means the Nigeria tax system is helping to reduce the level of income inequality. This result is at variance with the studies of (Chu *et al*, 2000; Bird & Zoit, 2005; Harberger, 2006) which reported that developing countries have not been able to use tax and transfer policies to effectively reduce the level of income inequality. The total tax variable reported a negative coefficient of (-0.007869) and a statistically significant t-value of (-2.748706). The ratio of total tax revenue to GDP also displayed a negative coefficient and statically significant t-value of (-2.287270) which means it helped to reduce income inequality in the period studied. In addition, the interaction variable between tax ratio and total tax revenue was found to have a negative effect on income inequality even though it was not statistically significant at the 5% level.

The ratio of GDP per capital was found to have a negative and insignificant impact on income inequality. This finding corroborates the results of Duncan and Sabirianova (2005) and Giovanni (2012). Against our expectation, labour force participation was found to have a positive effect on income inequality. The implication is that labour force participation increases income inequality in Nigeria. Finally, private credit as expected, was found to reduce income inequality in Nigeria.

7. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

The following findings were reported:

1. Tax ratio (TDT/TIT) was found to increase inequality in the period study even though the effect was statistically insignificant.
2. Taxation was found to have a negative and statistically significant impact on income inequality in Nigeria having reported a negative coefficient and robust t-value of (-0.007867) and (-2.748706) respectively.
3. Private credit to GDP ratio reduced income disparity in the period under study having reported a negative coefficient of (-0.25081) and insignificant t-value of (-1.474096).
4. Total tax ratio to GDP was also found to reduce income inequality in the period under review.
5. Labour force participation was found to increase income inequality in Nigeria between 1980 and 2011.
6. The interaction variable between tax ratio and total tax revenue was found to reduce inequality in Nigeria as it reported a negative coefficient even though the effect was statistically insignificant.
7. GDP per capital had a negative impact on income inequality even though the impact was non-significant at the 5% level.

Conclusion

The broad objective of this study was to examine the effect of direct versus indirect taxation on income inequality against the backdrop of the huge disparity in societal wellbeing in Nigeria. While it was established that the Nigeria tax system has helped to enhance the redistribution of wealth within the period covered, the ratio of direct to indirect tax was found to increase inequality even though the impact was insignificant at the 5% level. It was also discovered that tax burden helped to reduce the level of inequality since it exhibited a negative impact on income inequality in Nigeria. We are however mindful of the limitations of the multivariate econometric approach to income inequality. The generalisation of the findings is however not affected by these limitations. If properly harnessed, taxation may be Nigeria's next oil. This study put forth the following recommendations.

Recommendations

1. Since we have been able to establish that Nigeria tax system is a viable fiscal tool for government to bridge the gap between the elites and the poor, it is important to strengthen the administrative mechanism of government taxation to reduce the several leakages.
2. Taxation of the Nigerian informal sector is fraught with corruption and inefficiency hence, the tax ratio was found to increase inequality. It is therefore important to effectively harness personal and corporate income taxes in Nigeria. In the case of company income tax, all medium scale businesses should be listed or at least register with CAC so their activities becomes transparent and accountable. This will no doubt increase the tax ratio and improve our initial position of a positive relationship.
3. Bank lending should be increased upon so as to up the level of private credit to GDP. This will no doubt help to create wealth in the organised private sector with the resultant effect of reducing the wealth disparity between the rich and the poor in Nigeria.
4. Revenue loss through the twin problem of tax evasion and avoidance has no doubt reduced total tax to GDP ratio in developing countries (Nigeria inclusive). Hence there is urgent need for effective computarisation of all tax activities in Nigeria, starting with registration of all tax papers with emphasis on the private sector.
5. Effective regulation of the entire tax system is urgently needed. Some tax laws have become very obsolete and require not just a review but constant review. Tax offenders whether individuals or corporate entities should be handled with all seriousness so as to check others.

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APPENDICES

Serial Correlation Test

Appendix 1: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.255842	Prob. F(2,22)	0.3045
Obs*R-squared	3.279003	Prob. Chi-Square(2)	0.1941

Source: Researcher's Computation (2013)

Heteroskedasticity test

Appendix 2: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.984988	Prob. F(7,24)	0.4650
Obs*R-squared	7.141542	Prob. Chi-Square(7)	0.4143
Scaled explained SS	1.995155	Prob. Chi-Square(7)	0.9601

Source: Researcher's Computation (2013)

Ramsey Test

Appendix 3: Ramsey Test

	Value	df	Probability
t-statistic	0.571008	23	0.5735
F-statistic	0.326050	(1, 23)	0.5735
Likelihood ratio	0.450450	1	0.5021

Source: Researcher's Computation (2013)

Granger Causality

Appendix 4: Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
DGINI does not Granger Cause DGDPPC	29	0.6905	0.511
DGDPPC does not Granger Cause DGINI		1.68578	0.2065
DLFP does not Granger Cause DGINI	29	0.81155	0.456
DGINI does not Granger Cause DLFP		0.61355	0.5497
DPCREDIT_GDP does not Granger Cause DGINI	29	0.08578	0.9181
DGINI does not Granger Cause DPCREDIT_GDP		0.2807	0.7577
DTDT_TIT does not Granger Cause DGINI	29	0.90542	0.4177
DGINI does not Granger Cause DTDT_TIT		2.94259	0.072
DTDT_TIT_TTR does not Granger Cause DGINI	29	1.63696	0.2156
DGINI does not Granger Cause DTDT_TIT_TTR		2.39485	0.1126
DTTR does not Granger Cause DGINI	29	0.01571	0.9844
DGINI does not Granger Cause DTTR		1.55739	0.2312
DTTR_GDP does not Granger Cause DGINI	29	1.61265	0.2202
DGINI does not Granger Cause DTTR_GDP		0.25794	0.7748

Source: Researcher's Computation (2013)

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