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Income Disparity and Kuznets Hypothesis: The Case of Nigeria

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Abstract

Mixed results have been produced from empirical studies on income disparity and expansion of the economic. Using current data, this work examines the existence of a Kuznets sort trade-off linking economic growth and income disparity in Nigeria for the period1980-2018 by employing Fully Modified Ordinary Least Square (FMOLS) procedure. The time series characteristics evaluation indicated that the variables are integrated of order one, I(1) and cointegrated which justifies deployment of the FMOLS. The summary of the FMOLS outcome is that Kuznets genre trade-off connecting economic expansion and income disparity in Nigeria does not exist in the long run. The paper further analyzed a variety of socioeconomic variables on Nigeria's Gini coefficient and the results of the FMOLS multivariate regression indicates that income variation is propelled by inherent reasons like age, tax policy trade gross national expenditure and trade openness. However, public policy should be put in place that could possibly bring to bear a categorical impact on minimizing income disparity via economic measures that encourage broad pension coverage, appropriate tax policy, trade openness, and gross national expenditure.

Keywords: Nigeria, Kuznets curve, Income inequality, GDP per capita, FMOLS method, Economic expansion, Cointegration model, Augmented Dickey Fuller (ADF) test.

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Contents

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Contribution of this paper to the literature

This study contributes to existing literature by examining the existence of a Kuznets sort trade-off linking economic growth and income disparity in Nigeria for the period1980-2018 by employing Fully Modified Ordinary Least Square (FMOLS) procedure.

1. Introduction

Economic inequality refers to the uneven apportionment of a country's economic resources (Aliogo, 2018). It is also termed as income inequality. The topic of income inequality has drawn the interest of many economists long before it was brought to the attention of the general public following the 2008 Great Recession (Pini, 2016). Regardless of the extensive analysis, however, what lies at the base of this issue remains a highly controversial discussion.

Some scholars have emphasized that the growth of the economy is detrimental to curtailment in income imbalance, though contrarily, other people stressed that economic growth gives rise to further income disparities owing to the asymmetrical allocation of the benefits from economic growth amongst members of the community whereupon a couple of persons obtain enormous portion of economic expansion at the cost of the greater percentage of the community (Nwosa, 2019). Mixed results have equally been produced from empirical studies on disparity of income and economic expansion (Deininger & Squire, 1998; Forbes, 2000; Grundler & Scheuermeyer, 2015; Li & Zou, 1998; Partridge, 1997; Persson & Tabellini, 1994). In addition, Delbianco, Dabús, and Caraballo (2014) stated that the link joining disparity of income and economic expansion revolves around the revenue size of the nation. On the strength of that, this present paper examines Nigeria's case where economic imbalance has attained utmost intensity, notwithstanding being Africa's biggest economy. The nation possesses an enlarging economy with ample human capital as well as economic prospect to elevate millions of people from poverty (Ugbede, 2017).

Available works concerning Nigeria have greatly concentrated on the connection between poverty and economic expansion (Obi, 2007; Ogwumike, 2001; Oyeranti & Ishola, 2012) and they applied diverse set of data, regression models and evaluation procedures. Regardless of these works, there is still insufficiency in terms of literature that quantitatively evaluates the immensity of the present momentum of growth-inequality link in the case of Nigeria. Based on contemporary data, this work investigates the presence of a Kuznets pattern concession between economic growth and inequality in Nigeria. Kuznets (1955) in his proposition described the association between income disparity and economic expansion as reversed U form. The Kuznet hypothesis recorded that at the initial phases of economic expansion, disparity in income enlarges, as the economy sprouts additionally; disparity attains its pinnacle and then subsequently dwindles owing to incessant economic expansion. Consequently, the hypothesis of Kuznet stated that during the short run period there is the presence of an indisputable link between income disparity and economic expansion while in the long run the association between income disparity and economic prosperity is negative. Quantitative studies regarding the plausibility of Kuznets theory have been conducted by numerous academics but achieved outcomes are contentious and not definitive (Ahluwalia, 1976; Anand & Kanbur, 1993; Bulíř, 2001; Jha, 1996; Lin & Weng, 2006; Tam, 2008).

2. Growth and Inequality in Nigeria: Overview

Nigerian economy can be described as middle-income, mixed as well as a growing market. Some of its rapidly burgeoning industries include manufacturing, financial, service, communications, technology and entertainment. In reference to nominal GDP, it is the 27th- biggest economy based on world ranking, the 22nd- greatest in respect of purchasing power parity. In Africa, the country's economy is considered to be the biggest; its re-emergent manufacturing industry turned out in 2013 to be the biggest on the continent and it produces a sizeable percentage of goods and services for the West African subcontinent (KPMG, 2015).

Notwithstanding being placed among the greatest economies in Africa, Nigeria nevertheless ranks amongst the poverty-stricken countries in the globe. This is basically in view of the fact that the much-acclaimed economic prosperity of recent years has not created adequate employment neither has it resolved the increasing divide between the wealthy and the poverty-stricken. More worrisome is the fact that for a second consecutive year, the country has maintained the 157th position out of 157 nations, as reported in the newest "Commitment to Reducing Inequality (CRI)" index, a worldwide classification of governments in accordance with the effort they are making to address the divergence between the wealthy and the poverty-stricken (Thisdaylive, 2018).

The 2018 report disclosed at the yearly International Monetary Fund and World Bank (IMF/WB) meeting in Bali, Indonesia, showed that one in 10 children in Nigeria does not attain their fifth birthday, and more than 10 million children do not attend school. The bulk of them are girls (approximately 60%). The CRI of OXFAM, a worldwide civil society group that advocates in opposition to inequity and its partners also showed that in the previous year Nigeria had seen an escalation in the amount of labour rights infringements while social expenditure had inerted (Thisdaylive, 2018).

3. Methodology

3.1. Model Specification

Following the procedure of Ahluwalia (1976) and performing a linear regression of GINI index on the logarithm of Gross Domestic Product per capita (GDP) and GDP per capita square, income disparity and economic expansion link is presumed in this fashion:

$$GINI_t = \beta_0 + \beta_1 \log(GDP_t) + \beta_2 \log(GDP_t)^2 + \varepsilon_t \qquad (1)$$

Where ε= Error term; $\beta 0$ = Intercept of the relationship; andβ_1 –β_2= Unknown coefficients of the variables. Positive coefficient β_1 and negative β_2 derived from regression are considered as underpinning for the

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convincingness of Kuznets proposition. The pinnacle of the reversed U- curvature described by Equation 1 transpires at GDP per capita:

$$GDP_{tp} = 10^{\frac{\beta_1}{2\beta_2}} \quad (2)$$

Which in accordance with the Kuznets supposition depicts the 'tipping point', i.e. the stage of development from which disparity ought to diminish with further economical progress. The highest valuation of GINI coefficient envisaged by the Kuznets U- curvature is:

$$GINI = -\frac{\beta^2_1}{4\beta_2} + \beta_0 \quad (3)$$

3.2. Data and Technique of Analysis

The variables employed are per capita GDP and GINI coefficient and the data span the period 1980 to 2018. The rationale behind selecting these periods is because of data accessibility. The data for variables were sourced from World Bank Group, Index Mundi data portal and relevant literatures.

Augmented Dickey Fuller (ADF) was employed to inspect the integration sequence of the variables, which is foremost to scrutinize while evaluating cointegration models. In the attestation of the presence of a long run equilibrium link between the model variables, the Johansen co-integration procedure was employed. Thereafter, the method of Fully Modified Ordinary Least Squares Method (FMOLS) was employed to examine the long-run interconnections of interest. The FMOLS procedure generates dependable estimations for little sample magnitude and yields a check for ruggedness of the outcomes. The FMOLS procedure was initially instituted and advanced by Phillips and Hansen (1990) for evaluating a single co-integrating association that has a mixture of I(1).The FMOLS procedure has an edge above Engle-Granger (EG) processes (one of numerous contemporary econometric procedures initiated to scrutinize the presence of a long-run connection among variables) in initiating suitable amendment to conquer the inference complication in EG procedure and hence, the t-test for long-run estimates are credible (Amarawickrama & Hunt, 2007). The Fully Modified Ordinary Least Squares (FMOLS) procedure employs "Kernal estimators of the Nuisance parameters that affect the asymptotic distribution of the OLS (Ordinary Least Squares) estimator. In order to achieve asymptotic efficiency, this technique modifies least squares to account for serial correlation effects and test for the endogeneity in the regressors that result from the existence of co-integrating relationships"(Kalim & Shahbaz, 2008).

3.3. Unit Root Test Result

Table -1. Augmented Dickey Fuller (ADF) test outcome.

	Variable	ADF test		
		Level	**k**	**First difference**
Intercept	GIN	-2.223442	3	-2.227336
	GDP	-0.797485	3	-5.276152***
	GDP²	-0.796487	3	-5.281223***
Intercept and trend	GIN	-1.709117	3	-2.416890
	GDP	-0.981313	3	-5.316348***
	GDP²	-0.981642	3	-5.321122***
None	GIN	-0.369255	3	-2.352215***
	GDP	5.079942	3	-1.987687**
	GDP²	5.078441	3	-1.982184**

Notes: ADF indicates the Augmented Dickey-Fuller. Maximum lag order (k) is set to 3 and it is hinged on Schwarz benchmark in the ADF test. Furthermore, ***, ** and * signify dismissal of the null hypotheses at the 1 %, 5 % and 10 % significance levels respectively. The critical values are derived from MacKinnon (1996) one-sided p-values.

ADF unit root test was deployed to scrutinize the order of integration of the variables of interest. This test was conducted with intercept, intercept and trend, as well as with none. Each and every outcome is compiled in Table 1. The result depicts that when the trend is not incorporate, at the level of the variables, ADF sample statistics are below the critical values in absolute terms, implying the null hypotheses (H_0: ... has unit root) are not refused. Nevertheless, the null hypotheses of the unit root are denied for the first difference of the variables as the ADF sample statistics are enormous than the critical values of the variables with the exception of GIN variable. That is, among the variables, only the null hypothesis of stationarity is denied for GIN variable at the first difference. This means that all other variables are integrated order one, I(1).With the intercept and trend, ADF test outcome provides the same conclusion.

With none of intercept or intercept and trend, ADF test finds all the variables to be I(1) process. The test sample statistics for GIN variable is larger than the critical values at 1 % significance level. To this end, all series (variables) utilized in this empirical analysis are all integrated of order I(1).

3.4. Co-Integration Results

Inasmuch as the incorporated variables are I(1), then the next action is the confirmation of the presence of a long run equilibrium connection between the model variables using Johansen co-integration procedure, i.e., there exist no less than one linear composite of the variables that is I(0).To ascertain the lag length to be applied in the test, the VAR assessment was deployed and the outcome disclosed in Table 2 indicates that the most appropriate lag length, on the basis of the LR, FPE, AIC, SC and HQ is 1 lag. In the same vein, the lag exclusion test in Table 3 attests that the ideal lag length to be utilized in the co-integration test is either one or two.

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Table-2.VAR Lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	103.0889	NA	7.72e-07	-5.560497	-5.428537	-5.514439
1	218.0505	204.3761*	2.15e-09*	-11.44725*	-10.91941*	-11.26302*
2	226.9978	14.41511	2.18e-09	-11.44432	-10.52060	-11.12192
3	228.7763	2.568934	3.36e-09	-11.04313	-9.723528	-10.58255

Table-3. VAR Lag exclusion wald tests.

Lag length	LOGGIN	LOGGDP	LOGGDP2	Joint
Lag 1	51.30290	39.98472	39.93012	93.89859
	[4.22e-11]	[1.07e-08]	[1.10e-08]	[2.22e-16]
Lag 2	10.36055	3.014422	2.996762	15.95882
	[0.015737]	[0.389407]	[0.392125]	[0.067747]
df	3	3	3	9

Table 4 displays the outcome of Johansen co-integration analysis executed for the long-run association amongst series by utilizing one lag interval. Trace analysis exhibits one cointegrating equation at the 0.05 level while the Max-Eigen statistics displays also one co-integrating equation at a 5% significance level.

Table-4. Johansen co-integration analysis outcome.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.479385	31.28518	29.79707	0.0335
At most 1	0.141054	7.133648	15.49471	0.5622
At most 2	0.039933	1.507830	3.841466	0.2195
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level * represents rejection of the hypothesis at the 0.05 level **MacKinnon, Haug, and Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.479385	24.15153	21.13162	0.0182
At most 1	0.141054	5.625818	14.26460	0.6616
At most 2	0.039933	1.507830	3.841466	0.2195
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon et al. (1999) p-values				

3.5. FM-OLS Results

The results of ADF and Co-integration tests supported the existence of long-run equilibrium relationships among the model's variables. Hence, the next step is to estimate the long run elasticities using FMOLS method. Table 5 reports the estimated results from FMOLS analysis. The FMOLS results reveal a negative effect of GDP per capita variable on LOGGIN while the coefficient of GDP^2 per capita shows a positively relationship with Gini coefficient (LOGGIN). This means that the Gini coefficient worsens as GDP increases indicating a U shaped relationship among the variables. However, this relationship seems to be statistically insignificant at any of the conventional level of 1%, 5% or 10%. In sum, a Kuznets type trade-off between economic growth and inequality in Nigeria does not exist in the long run.

After the FMOLS trivariate regression analysis was performed among LOGGIN, LOGGDP and LOGGDP^2 variables of interest, other control variables were introduced in the model in a bid to elucidate which forces or conditions in the economy influence income disparity. In other words, the paper further examined how a diverse range of socioeconomic variables influence the country's Gini coefficient and the outcomes of the FMOLS multivariate regression are depicted in Table 6.

Table-5.FMOLS regression outcomes.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDP)	-10.99405	16.70786	-0.658016	0.5148
LOG(GDP^2)	5.506396	8.352284	0.659268	0.5140
C	3.583980	0.139135	25.75910	0.0000
R-squared	0.172846	Mean dependent var		3.783653
Adjusted R-squared	0.125581	S.D. dependent var		0.114843
S.E. of regression	0.107390	Sum squared resid		0.403644
Long-run variance	0.033525			

Table 6 presents the outcomes of the FMOLS multivariate regression analyses. Model I contains demographic control variables that are found to be significantly related to inequality (Gini coefficient). It revealed that income disparity is determined by natural causes such as age. Both LOGYONG (Population ages 15-64 (% of total)) and LOGOLD (Population ages 65 and above (% of total)) show positive significant effects on inequality. Both coefficients are significant at the 1% level but the immensity of the coefficient of LOGOLD is higher than the coefficient of LOGYONG.

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Table-6.FMOLS multivariate regression analyses.

Variables	Model 1	Model 2	Model 3
Intercept	-66.55960*** (-3.830266)	-67.22867*** (-2.950320)	-66.86183*** (-2.992618)
Demographic variables			
LOGYONG	9.608340*** (4.495132)	9.643446*** (3.744974)	9.660119*** (4.164879)
LOGOLD	15.37832*** (3.988223)	15.55283*** (3.133124)	15.46315 (3.129567) ***
LOGPOG	0.575679 (0.591425)	0.579694 (0.557125)	
Economic variables			
LOGGDP	-0.259074 (-0.040909)	-0.070319 (-0.011024)	-0.039729 (-0.006232)
$LOGGDP^2$	0.159901 (0.050497)	0.066131 (0.020741)	0.051140 (0.016048)
LOGGEXP	-0.305544** (-2.354139)	-0.308938** (-2.346276)	-0.309571** (-2.353766)
LOGAVT	-0.044520** (-2.384192)	-0.045481** (-2.389593)	-0.045598** (-2.396728)
LOGUEMP	-0.010298 (-0.443983)	-0.010511 (-0.440490)	-0.010337 (-0.431692)
LOGTOP	-0.111811** (0.0323)	-0.116134** (-2.215310)	-0.116799** (-2.232688)
LOGSSE		-0.013124 (-0.080554)	
LOGYONG*LOGSSE			-0.018060 (-0.114645)

Note: *Significant at 10%; **significant at 5%; ***significant at 1%. All variables are integrated of order I(1). T-statistics in bracket.

However, the result should be taken with caution because rather, older populations are less unequal (have a lower Gini) than younger ones, probably because as individuals age there is little variation in their incomes. Retirement from prolific ventures is a clear leveler of income variations. Additionally, the impetus to chase ever-higher incomes dwindles as workers draw near retirement, bringing-forth the age earnings curve (Jackson, 2016). However, one of the demographic control variables did not show statistical significance, i.e., LOGPOG (population growth rate).

Besides LOGGDP and $LOGGDP^2$ variables which earlier had no measurable influence on income inequality, surprisingly, LOGUEMP (unemployment) was also found to have no significant influence on income inequality. Intuitive, unemployment is expected to leads to more income equality. The other included economic control variables in Table 6 are all statistically significant and of the expected signs. The analysis shows that increasing gross national expenditure (LOGGEXP) especially on productive assets reduces income inequality. Gross national expenditure (% of GDP) in Nigeria was 99.86 as of 2015 (Indexmundi, 2019a). Its highest value over the period 1981-2015 (34 years) was 106.79 in 1998, while its lowest value was 67.92 in 2000 (Indexmundi, 2019a).

Among the variables that also influenced inequality the most in Table 6 is tax policy (LOGAVT, i.e. average tax rate). In particular, it shows that the greater the general tax rates in connection with revenues as a share of GDP, the lesser the Gini. This as stated by Jackson (2016) may assist in elucidating why countries like Switzerland and France, which have huge tax rates on the affluent, experience low income disparity than the U.S., which has relatively low ones. As stated by Jackson (2016) taxation can be a two-edged sword, as taxes may serve as a disincentive to fruitful (income and job creation) attitude. Thankfully, it is feasible to design tax policy that stimulates economic expansion in the short term while lifting government revenue in the long term. The Nigerian taxation system having gone through list of reforms and adjustment in recent times all in the attempt to promote greater tax compliance and advance Nigeria's business climate still has some contentions issues that require urgent attention (Hart, 2018).

Table 6 also shows that trade openness (LOGTOP) is connected with a decline in income disparity in Nigeria. But in recent times there has been a rise in income inequality despite trade expansion in developing countries (including) as noted by Harrison, McLaren, and McMillan (2011). Trade (% of GDP) in Nigeria was 21.12 as of 2015 (Indexmundi, 2019b). Its highest value over the period 1960-2015 (55 years) was 81.81 in 2001, while its lowest value was 19.62 in 1970 (Indexmundi, 2019b). However, the result in this paper confirms (Wood, 1994) framework and Gourdon (2011) work that trade liberalization reduces income disparity for countries well endowed in primary educated labor. Invariably, countries with at a minimum 20% of primary educated labor will have declining income disparities during their liberalization.

One more specification of the mode used was done to check for the robustness of the result by the inclusion of LOGSSE (School enrollment, secondary (% gross)) control. The results are also presented in Table 6 in Model II. In the Model II, LOGSSE was included as part of the control variables. The estimated LOGYONG, LOGOLD, LOGGEXP, LOGAVT, and LOGTOP coefficients increased in the magnitude when compared to Model I, while remaining statistically significant. LOGSSE turned out to be statistically insignificant.

Model II from Table 6 was then elaborated and tested with interaction terms. Interaction terms for the young population LOGYONG (Population ages 15-64 (% of total)) was added to examine whether its influence is conditional on secondary school enrollment. The result is not robust to the inclusion of LOGYONG. That is, interacting LOGYONG with openness yields insignificant results.

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4. Conclusion

Economic prosperity is anticipated to trigger economic development and rise in the well-being of the people. This is expected to lessen the existing degree of income disparity. Mixed results have been produced from empirical studies on income disparity and economic expansion. Using current data, this work examines the existence of a Kuznets type trade-off between economic expansion and income disparity in Nigeria for the period1980-2018 by employing Fully Modified Ordinary Least Square (FMOLS) procedure. The analysis of time series characteristics revealed that the variables are integrated of order one, I(1) and cointegrated which permits the application of FMOLS. The FMOLS outcome revealed a negative effect of GDP per capita variable on LOGGIN while the coefficient of GDP^2 per capita shows a positively relationship with Gini coefficient (LOGGIN). This means that the Gini coefficient worsens as GDP increases indicating a U shaped interconnection among the variables. However, this relationship seems to be statistically insignificant at any of the conventional level of 1%, 5% or 10%. The outcomes of the FMOLS multivariate regression analyses revealed that income disparity is impelled by natural causes such as age. Both LOGYONG (Population ages 15-64 (% of total)) and LOGOLD (Population ages 65 and above (% of total)) show positive significant effects on inequality.

Besides LOGGDP and $LOGGDP^2$ variables which earlier had no quantifiable impact on income disparity, surprisingly, LOGUEMP (unemployment) and LOGPOG (population growth rate) were also found to have no significant influence on income disparity. Among the variables that also influenced inequality the most is tax policy. In addition, trade openness (LOGTOP) is identified with a decline in income disparity in Nigeria. The analysis shows that increasing gross national expenditure (LOGGEXP) especially on productive assets reduces income inequality also. In sum, inequality is a socioeconomic challenge. However, public policy should be put in place to exert a positive effect on lessening income disparity via economic policy that encourages broad pension coverage, appropriate tax policy, trade openness, and gross national expenditure.

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