
**DYNAMICS OF INCOME INEQUALITY AND ITS IMPACT
ON ECONOMIC DEVELOPMENT IN NIGERIA**

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Abstract

This study examined the effect of income inequality on economic development. Despite the importance of income inequality in analyzing welfare issue in a country, there is limited understanding of income inequality in Nigeria. This study filled this gap by employing Annual data covering 1970-2023. The study deployed the Autoregressive Distributed Lag (ARDL) and the Toda and Yamamoto non-Granger causality test techniques to analyse the data. It also investigated the causal relationship between income inequality and economic progress with a view to empirically determining the dynamics of income inequality and its impacts. The results of the relationship between income inequality and economic development in Nigeria found that income inequality had both negative and positive influences at lag one and two, with a negative and statistically insignificant relationship at lag one. Mostly, the short-run findings were negative. Lag one finding was negative and statistically significant ($t = -3.8475$, $p < 0.05$). However, the long run results, established a positive and statistically insignificant relationship ($t = 1.2586$, $p > 0.05$), indicating wide income disparity leading to underdevelopment. The findings of the causal relationship between income

inequality and economic development showed that there was no causal relationship from LOGGDP to LOGGINI. The study concluded that there was no causal relationship from LOGGDPPC to LOGGINI while the second model confirmed the existence of unilateral causation from LOGGINI to LOGGDPPC. The study concludes that if the economy is going to be developed, a significant reduction in income inequality should be achieved in Nigeria.

Keywords: Autoregressive distributed lag, Economic development, Economic growth, Financial development, Income inequality.

Introduction

The foundation of sustainable economic development is the idea of inequity. The disparity in living standards among a population is known as inequality (Gallo, 2002). According to Clark (2015), almost 70% of people in developing countries live in highly unequal societies. Income, wealth, gender, and health are just a few of the various ways inequality manifests itself. Income inequality is the disparity in wealth between the rich and the poor in a society. Although the problem of wealth inequality is growing globally, it is especially apparent in developing countries such as Nigeria.

Nigeria's inequality issue peaked between 1985 and 2004, as evidenced by the country's Gini coefficient, which increased from 0.43 to 0.49 and 0.35 in 2022 and indeed one of the countries in the world with the highest level of income inequality with a Gini index hovering around 0.49 in the last five years (Abu, 2024). Two of the main causes of inequality in the country were the growing levels of corruption and the unequal distribution of financial and human resources (Dali, 2015).

Okafor (2016) asserts that economic development is expected to increase a country's per capita income. It also aims to improve the welfare and standard of living of its citizens. However, there is a difference between economic development and growth in Nigeria because the two are not necessarily the same. One of the main reasons for this is the disparity in wealth between the rich and the

poor. With a poverty level of 1.90 USD per day, an estimated 88.4 million Nigerians were living in extreme poverty as of 2022 compared to the previous year, when about 86.7 million individuals were living in poverty, thus representing an increase. Sasu, (2023) further state that in 2025, more than 93.7 million Nigerians live on a daily income of no more than \$1.90 USD as the headcount was predicted to continue its upward trajectory.

Forbes (2000) suggests that in the short and medium term, an increase in a country's level of income inequality has a significant positive relationship with subsequent economic growth. This relationship is highly robust across samples, variable definitions, and model specifications. This study broad objective is to examine empirically the dynamic impact of income inequality on economic development in Nigeria from 1970 to 2023. In specific terms, the study seeks to:

- i. determine the effect of income inequality on economic development in Nigeria; and
- ii. investigate the causal relationship between income inequality and economic development in Nigeria.

Research Questions

In order to direct this study, the following research questions were raised:

- i. Can income inequality exhibit positive or negative influences economic development in Nigeria? and
- ii. Is there any causal relationship between income inequality and economic development in Nigeria.

Methods

A well-known and significant paradigm for elucidating the connection between economic growth and income disparity is Kuznets' (1955) which states that inequality rises as per capita income rises at low levels and then falls as per capita income declines as growth is occurring.

Specification of Models

Model I: Effect of income inequality on economic development in Nigeria

This study employs the growth model's Gini coefficient to measure how economic development affects income inequality. To avoid specification bias, a few more important factors need to be controlled for the growth model. These consist of labour, inflation, physical capital, and human capital.

$$GDPPC_t = L_t K_t GINI_t INFL_t TR_t EDU_t \tag{3.1}$$

Log-linear specification is also used for empirical purposes since it produces useful results and facilitates the interpretation of estimated parameters. The functional form of growth model is assembled as follows:

$$\begin{aligned} \ln GDPC_t + \gamma_0 + \gamma_1 \ln L_t + \gamma_2 \ln K_t + \gamma_3 \ln GINI_t + \gamma_4 \ln INFL_t + \gamma_5 \\ \ln TR_t + \gamma_6 \ln EDU_t + \mu_t \end{aligned} \tag{3.2}$$

Where, $\ln GDPC_t$ is the natural log of real GDP per capita, $\ln GINI_t$ is the natural log of Gini coefficient, $\ln L_t$ is the natural log of labour, $\ln K_t$ is the natural log of capital, $\ln INFL_t$ is the inflation rate, and $\ln TR_t$ is the natural log of trade openness as percentage of GDP, $\ln EDU_t$ is the natural log of education, and μ_t is the error term which is normally distributed with zero mean and constant variance.

Using the autoregressive distributed lag model created by Pesaran *et al* (2001), which is shown in equation 3.3 below, the researcher showed a long-term relationship between income disparity and development in Nigeria:

$$\begin{aligned} \Delta LGDPPC_t = \alpha_0 + \sum_{i=1}^p \beta_{1i} \Delta LGDPPC_{t-i} + \sum_{i=0}^{q_1} \beta_{2i} \Delta L_{t-i} + \sum_{i=0}^{q_2} \beta_{3i} \Delta K_{t-i} + \sum_{i=0}^{q_3} \beta_{4i} \Delta LGINI_{t-i} \\ + \gamma_2 \Delta L_{t-1} + \gamma_3 \Delta K_{t-1} + \gamma_4 \Delta LGINI_{t-1} + \gamma_5 \Delta \ln INFL_{t-1} + \gamma_6 \Delta \ln TR_{t-1} \\ + \sum_{i=0} \beta_{5i} \Delta \ln INFL_{t-i} + \sum_{i=0} \beta_{6i} \Delta \ln TR_{t-i} + \sum_{i=0} \beta_{7i} \Delta LEDU_{t-i} + \gamma_1 \Delta LGDPPC_{t-1} \\ + \gamma_7 \Delta LEDU_{t-1} + \mu_t \\ + \gamma_2 L_{t-1} + \gamma_3 K_{t-1} + \gamma_4 LGINI_{t-1} + \gamma_5 \ln INFL_{t-1} + \gamma_6 \ln TR_{t-1} \\ + \gamma_7 LEDU_{t-1} + \mu_t \end{aligned} \tag{3.3}$$

Δ is the difference operator. The summation β_1 to β_7 , represented the short run dynamics of the model, the coefficients γ_1 to γ_7 indicate the long run relationship, and μ is the serially uncorrelated disturbance term with zero mean and constant variance. Following confirmation of co-integration between the variables, the following long run model for GINI was estimated:

$$\begin{aligned} LGDPPC_t &= \alpha + \gamma_1 LGDPPC_{t-1} + \gamma_2 LL_{t-1} + \gamma_3 LK_{t-1} + \gamma_4 \\ & LGINI_{t-1} + \gamma_5 INFL_{t-1} + \gamma_6 LTR_{t-1} + \gamma_7 LEDU_{t-1} + \mu_t \\ & LGINI_{t-1} + \gamma_5 INFL_{t-1} + \gamma_6 LTR_{t-1} + \gamma_7 LEDU_{t-1} + \mu_t \end{aligned} \quad 3.4$$

The following error correction model was created to predict the short run dynamics after the variables' lag orders were chosen using the relevant Information Criterion to determine the optimal ARDL specification structure:

$$\begin{aligned} \Delta LGDPPC_t &= \alpha_0 + \sum_{i=1}^p \beta_{1i} \Delta LGDPPC_{t-i} + \sum_{i=0}^{q_1} \beta_{2i} \Delta L_{t-i} + \sum_{i=0}^{q_2} \beta_{3i} \Delta K_{t-i} + \sum_{i=0}^{q_3} \beta_{4i} \Delta LGINI_{t-i} \\ & + \sum_{i=0}^{q_4} \beta_{5i} \Delta INFL_{t-i} + \sum_{i=0}^{q_5} \beta_{6i} \Delta LTR_{t-i} + \sum_{i=0}^{q_6} \beta_{7i} \Delta LEDU_{t-i} + \theta ECM_{t-1} \end{aligned} \quad 3.5$$

When the short run parameters fall between β_1 and β_7 , and the adjustment value is presumed to be smaller than zero. The equation's calculated co-integration model yields the delayed error correction term, or ECM. To confirm the validity and dependability of the estimated results, a number of diagnostic tests were also carried out.

Model II: Causal relationship between income inequality and economic development in Nigeria

The Toda and Yamamoto (TY) method is an alternate approach (Toda and Yamamoto, 1995). Causality test by Toda and Yamamoto (1995), require estimating the following VAR. Real GDPPC, Eq. (3.6):

$$\begin{aligned} \text{LnGDPPC}_t &= \alpha + \sum_{i=1}^k \gamma_1 \text{LnGDPPC}_{t-i} + \sum_{j=k+1}^{d \max} \gamma_2 \text{LnGDPPC}_{t-j} + \sum_{i=1}^k \phi_1 \text{LnL}_{t-i} + \sum_{j=k+1}^{d \max} \phi_2 \text{LnL}_{t-j} + \sum_{i=1}^k \delta_1 \text{LnK}_{t-i} \\ & + \sum_{j=k+1}^{d \max} \delta_2 \text{LnK}_{t-j} + \sum_{i=1}^k \beta_1 \text{LnGINI}_{t-i} + \sum_{j=k+1}^{d \max} \beta_2 \text{LnGINI}_{t-j} + \sum_{i=1}^k \sigma_1 \text{INFL}_{t-i} + \sum_{j=k+1}^{d \max} \sigma_2 \text{INFL}_{t-j} \\ & + \sum_{i=1}^k \lambda_1 \text{LnTR}_{t-i} + \sum_{j=k+1}^{d \max} \lambda_2 \text{LnTR}_{t-j} + \sum_{i=1}^k \rho_1 \text{LnEDU}_{t-i} + \sum_{j=k+1}^{d \max} \rho_2 \text{LnEDU}_{t-j} + u_t \end{aligned} \quad 3.6$$

Gini co-efficient, Eq. (3.7)

$$\begin{aligned} \text{LnGIN}_t = & \alpha_0 + \sum_{i=1}^k \gamma_i \text{LnGIN}_{t-1} + \sum_{j=2}^{j_{\max}} \gamma_j \text{LnGIN}_{t-1} + \sum_{i=1}^k \phi_i \text{LnL}_{t-1} + \sum_{j=2}^{j_{\max}} \phi_j \text{LnL}_{t-1} + \sum_{i=1}^k \delta_i \text{LnK}_{t-1} + \sum_{j=2}^{j_{\max}} \delta_j \text{LnK}_{t-1} \\ & + \sum_{i=1}^k \beta_i \text{LnGDPPC}_{t-1} + \sum_{j=2}^{j_{\max}} \beta_j \text{LnGDPPC}_{t-1} + \sum_{i=1}^k \sigma_i \text{INFL}_{t-1} + \sum_{j=2}^{j_{\max}} \sigma_j \text{INFL}_{t-1} + \sum_{i=1}^k \lambda_i \text{LnTR}_{t-1} + \sum_{j=2}^{j_{\max}} \lambda_j \text{LnTR}_{t-1} + \\ & \sum_{i=1}^k \rho_i \text{LnEDU}_{t-1} + \sum_{j=2}^{j_{\max}} \rho_j \text{LnEDU}_{t-1} + u_t \end{aligned} \quad 3.7$$

Where $\ln GDPPC$ is natural logarithm of real GDP Per Capita; $\ln GINI$ represents natural logarithm of the GINI; $\ln L$ is natural logarithm of Labour, $\ln K$ is log of capital, $\log Infl$ is the inflation rate, $\ln TR$ is log of Trade Openness and $\ln EDUC$ is secondary school education enrolment.

***A priori* expectation**

The *a priori* expectation with respect to equations 1 is stated in this subsection. In order to improve economic development, equation 1 predicts that trade openness, capital (measured by gross fixed capital creation), labor supply, and secondary school enrollment will all have positive relationships with GDP per capita. In contrast, it is anticipated that the inflation rate and Gini coefficient will be negative in order to enhance economic development.

Sources of Data, Description and Measurement of Variables

The study uses Gross Domestic Per capita as an endogenous variable for economic development, labour supply, physical capital, inflation rate, trade openness, and secondary school enrollment sourced from World Development Indicator (2024), and Gini index proxy for income inequality sourced from World Income Inequality Database (WIID) (2024).

Results

This section presents the detailed analysis, study’s results interpretation and discussion of findings.

Unit Root Results

Table 4.1. Optimal Augmented Dickey-Fuller unit root test with structural breaks

Variables	Level	First Difference	Break Date	Order of Integration
GDPPC		-5.0225** ^b	2020	I(1)
GINI		-10.6894*** ^b	1980	I(1)
L	-27.0739*** ^b		1979	I(0)
K	-27.0739*** ^b		1979	I(0)
INFL	-6.2404*** ^b		1995	I(0)
TR		-8.9791*** ^b	1981	I(1)
EDUC		-8.6449*** ^b	2013	I(1)

Note: Intercept = a, Intercept and Trend and Intercept=b. ADF stands for Augmented Dickey Fuller unit root tests; 1%, 5%, and 10% levels of significance are represented by ***, **, and *, respectively. Stable at levels and the first difference, respectively, are represented by I(0) and I(1).

Source: Author's Computation.

The Augmented Dickey-Fuller (ADF) is used to establish order of integration in this study. They are mixture of I(1) and I(0). The optimal Augmented Dickey-Fuller unit root test with structural breaks is shown in Table 4.1.

Research Question One: Can income inequality exhibit positive or negative influence on economic development in Nigeria?

The first step is to establish whether or not a long-term relationship exists or not between the variables of interest before moving to main analyses.

ARDL Bounds Test**Table 4.2: Result on Bounds Test**

F-statistic	8.6992
K	6
Upper Bounds	3.62**
Lower Bounds	2.63**

Note: ** represents 5% level of significance.
K is the number of exogenous variables in the models.
Source: Author's computation.

The ARDL Bounds Test confirms a long-term relationship between Nigeria's economic development and income inequality, refuting the null hypothesis of no cointegration at a 5% level of significance.

ARDL short run result on effect of income inequality on economic development in Nigeria**Table 4.3: ARDL Short and Long-run Results****Dependent variable: D(LOGGDPPC)(1,3,2,2,1,3,0)**

Variable	Coeffi-cient	Std. Error	t-Statistic	Prob.
C	-4.3109	0.4725	-9.1241	0.0000
D(LOGGINI)	0.0541	0.1303	0.4149	0.6811
D(LOGGINI(-1))	-0.4638***	0.1205	-3.8475	0.0006
D(LOGGINI(-2))	-0.1039	0.1126	-0.9229	0.3634
D(LOGL)	2.9414***	0.6704	4.3871	0.0001
D(LOGL(-1))	2.0122***	0.3831	5.2526	0.0000
D(LOGK)	-0.0938***	0.0219	-4.2791	0.0002
D(LOGK(-1))	-0.0266**	0.0126	-2.1162	0.0427
DLOG(EDUC)	0.0464	0.0924	0.5020	0.6193
D(LOGINFL)	0.0502***	0.0142	3.5226	0.0014
D(LOGTR)	0.1204***	0.0341	3.5330	0.0014
D(LOGTR(-1))	-0.0565*	0.0319	-1.7712	0.0867
D(LOGTR(-2))	-0.0618**	0.0319	-1.9367	0.0622
ECT(-1)	-0.1272***	0.0137	-9.2646	0.0000
R ²	0.9100			

Note: ***, ** and * represent 1%, 5% and 10% levels of significance, respectively.

Source: Author's computation

ARDL Long-run result on effect of income inequality on economic development in Nigeria
Dependent Variable: D(LOGGDPPC)(1,3,2,2,1,3,0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGINI	1.6224	1.2586	1.2890	0.2072
LOGL	23.3870**	11.3902	2.0533	0.0489
LOGK	-0.7393**	0.3778	-1.9567	0.0597
LOGINFL	0.7466	0.4190	1.7818	0.0849
LOGTR	0.5389	0.4286	1.2574	0.2183
LOGEDUC	0.3646	0.7359	0.4955	0.6238

Note: ***, ** and * represent 1%, 5% and 10% levels of significance, respectively.

Source: Author's computation.

The ARDL results in Table 4.3 showed a negative and statistically significant error correction term coefficient, indicating co-integration and stable long-term connection. A 12.72 percent change in the long-run equilibrium rate caused the aftershock, demonstrating the effectiveness of the ECT.

The study results in Table 4.3 revealed a negative correlation between income inequality and Nigeria's economic development, with both positive and negative effects observed at lags one and two. The theoretical hypothesis suggests a negative correlation between income inequality and economic development. At the 1% level of significance, a 1% change in income disparity at lag one resulted in a 46.38% decline in economic progress for the time in question. It suggests that economic progress increases in tandem with a decrease in income disparity. However, over time, there was a positive and statistically insignificant link between economic development and income disparity. This means that between 1970 and 2023, Nigeria had underdevelopment due to a significant income distribution gap. The amount was significant because, over the time under study, a 1% change in the unequal distribution of income resulted in a 162% decline in Nigeria's economic development. The study found a negative relationship between income inequality and economic development, with most short-term impacts being negative, contradicting the theoretical hypothesis that

income inequality and economic growth would be negatively correlated.

Residual diagnostic test results

Breusch-Godfrey Serial Correlation LM Test:	0.0806 (0.9228)
Heteroskedasticity Test (BPG):	0.8179 (0.6760)
Normality Test:	0.4638 (0.9684)
Ramsey Reset Test:	2.9647 (0.7930)

Note: p-values are in the parentheses.
Source: Author’s computation.

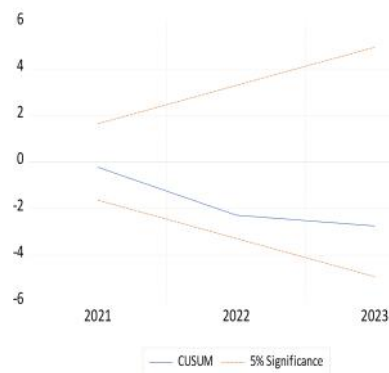


Figure 4.1: Cumulative Sum Test

Source: Author’s computation

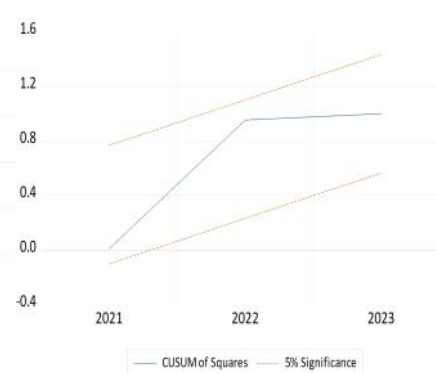


Figure 4. 1.2: Cumulative Sum Squares Test

Source: Author’s computation.

The study assessed the accuracy and robustness of the ARDL model’s estimations using residual diagnostic tests, confirming its validity and parameter stability, indicating its reliability in short-run dynamics. Results showed normal distribution of errors, no serial correlation, and no significant heteroscedasticity test. The Ramsey Reset Test also confirmed the model’s validity. The cumulative sum

and cumulative sum squares tests confirmed parameter stability.

Research Question Two: Is there any causal relationship between income inequality and economic development in Nigeria. Finding the optimal lag length is the first step, as shown below:

Determining Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC
0	176.5818	NA	2.67e-12	-6.783271	-6.515587
1	501.4294	545.7440	4.40e-17	-17.81718	-15.67571*
2	573.6000	101.0388	1.95e-17	-18.74400	-14.72875
3	634.2634	67.94303*	1.68e-17	-19.21054	-13.32151
4	701.7171	56.66112	1.62e-17*	-19.94869*	-12.18587

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author's computation.

The study uses the Vector Autoregulation model and Akaike information criterion to examine the causal relationship between income inequality and economic progress in Nigeria from 1970 to 2023 as shown in Table 4.6.

Results of the Causal Relationship Between Income Inequality and Economic Development in Nigeria

The causal relationship between GDPPC and GINI was investigated in the first model (equation 3.6), in which GDPPC served as the dependent variable. H0: "There is no causality between LOGGDPPC and LOGGINI" was accepted based on the WALD test results because the p-value was greater than 0.05. The H1 hypothesis was approved, and it was discovered that there was no causal relationship between LOGGDP and LOGGINI.

The causal relationship between LOGGINI and LOGGDPPC was investigated in the second model (equation 3.7), in which LOGGINI

was the dependent variable. H0: “There is no causality between LOGGINI and LOGGDPPC” was rejected based on the WALD test results since the p-value was less than 0.01. The existence of causation was demonstrated from LOGGINI to LOGGDPPC, and the H1 hypothesis was accepted.

Table 4.7: VAR Granger causality/block exogeneity wald tests

Chi-Square		Probability	
LOGGDPPC ≠ LOGGINI	0.1725	0.6779	Ho Accepted
LOGGINI → LOGGDPPC	3.4168	0.0645	Ho Rejected

Source: Author’s computation.

Discussions

Before beginning the primary analysis, the first step is to determine whether or not there is a long-term link between the variables of interest. Co-integration and a stable, long-term relationship were indicated by the ARDL bounds test findings, which displayed a negative and statistically significant error correction term coefficient.

The study reveals a negative correlation between income inequality and Nigeria’s economic development, with both positive and negative effects at lags one and two. The theoretical hypothesis suggests economic progress increases with decreased income disparity.

The study supports Grundler and Scheuermeyer’s (2015) and Mnif (2015) findings that income inequality negatively impacts economic growth across 154 countries using GMM.

The study investigated the causal relationship between GDPPC and GINI, with the H0 hypothesis accepted and the H1 hypothesis approved. Adinde (2017) challenged the Kuznets curve’s applicability in Nigeria, arguing that GDP granger causes income inequality and advocates for equitable resource distribution. The second model (equation 3.7) investigated the causal relationship between LOGGINI and LOGGDPPC, rejecting the H0 hypothesis and confirming the existence of causation.

Conclusion

This study examined income inequality's impact on Nigeria's economic development from 1970 to 2023. It found that a 1% increase in income inequality led to a 46.38% decrease in economic development. By implication, in the short run, uneven distribution of income was much pronounced in the Nigerian economy. However, in the long run, the relationship was positive, suggesting the need for policies promoting fair income redistribution. Long-term, however, the link was both positive and adversely influencing economic development, suggesting that the income distribution was somewhat but widely impacted. This implied that in order to guarantee a fair income allocation in Nigeria, more policies targeted at achieving this goal must be vigorously pursued.

Second, the study looked into the causal relationship between Nigeria's economic development throughout the study period and income disparity. The study found that there was no causal association from LOGGDP to LOGGINI. The second model verified that there was a causal relationship from LOGGINI and LOGGDPPC. It suggests that more policies aimed at equitable wealth transfer in Nigeria must be vigorously pushed. This result confirms the findings of the first objective of this study.

Finally, the study concludes that equitable income redistribution in Nigeria must be further lowered if the country's economy is to be grown to its full potential. The implication of this paper is twofold: It illustrates the need to pay attention to wealth redistribution that is pro-poor and would not further enrich the already rich in the society. A contribution from this study to the literature is seen in relation to the fact that it has examined the elements which influence inequality and economic development. The central thesis of the paper, namely that if the economy is going to be developed, a significant reduction in income inequality should be achieved in Nigeria is corroborated by evidences herewith presented.

Recommendations

The study underscores the need for long-term evaluation of pro-growth policies' impact on inequality, emphasizing the need for

government tax reforms to ensure fair taxation. The study emphasizes the need for urgent government transfers and policies to address income inequality, emphasizing the need for substantial economic development in Nigeria.

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