POVERTY REDUCTION AND ITS DYNAMIC INTERACTION WITH ECONOMIC GROWTH AND INCOME INEQUALITY: EVIDENCE FROM NIGERIA (1986 – 2019)

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Abstract

This study examines the dynamic interaction between economic growth and inequality in the analysis of the behavior of poverty in Nigeria. This is with the view to end poverty in all its form everywhere and reduce inequality in Nigeria, this study aligns with 2030 Sustainable Development Goals 1 and 10. Secondary data from 1986 – 2019 was used which were extracted from the World Development Indicator (WDI) published by the World Bank and Central Bank of Nigeria Statistical Bulletin. Vector autoregressive (VAR) model was used to obtain the dynamic effect that existed among poverty level, economic growth and inequality. The result showed that poverty level is affected contemporaneously by the shocks from it past value but diminishes over time. The impulse response of economic growth and inequality to a one standard deviation shock to poverty level has a noticeable increasing positive effect in the short run but showed an oscillatory movement around negative values in the long run.

INTRODUCTION

Poverty is now a universal plaque, national governments and their development partners are all working to end poverty in all its forms everywhere and reduce inequality within and among countries. Poverty reduction and inequality have captured the interest of United Nations, researchers and policymakers both developed and developing countries of the globe. Poverty is often thought of as a lack of material resources, however, poverty is correlated closely with all aspects of individual's life. However, Taiwo & Agwu (2016) defines poverty as a condition where a person is not able to provide food, clothing and shelter; unable to meet economic and social obligations, lacks gainful employment and skills, limited access to human capital development and economic infrastructure such as education, health, potable water and sanitation. This consequently limits the chances of advancing one's welfare. In Africa, poverty remains a major developmental issue particularly when it concerns economic growth and inequality. Economic growth is a signal of a good economic performance and a social wellbeing of any nation. Deterioration in the growth rate of any economy or nation is seen as areduction in the citizen's living standard (ljaiya's&Bello 2017). The concept of inequality means unfairness which usually manifest in terms of inequitable distribution of

income, it implies that there are some groups of people, which are referred to as capitalist, getting a bigger share of the total income while the other groups of people also referred to as workers, and are getting lesser share (Saifullahi, 2014). The state of poverty and inequality in developing counties is alarming particularly Nigeria, as a result the United Nations Sustainable Development Goals (SDGs) and World Bank Group twin goals 1 and 10 for 2030 is reducing poverty and inequality. Prior to SDGs, in 2000 there was the Millennium Development Goal (MDG) which ultimate goal and target was eradication of hunger and reduction in the poverty level.

Understanding the relationship between poverty reduction, economic growth and income inequality is of particular importance for developing countries. The link between poverty reduction, economic growth (GDP) and income inequality is influenced by the growth theories. In the endogenous, exogenous and Schumpeterian growth theories, economic growth is achieved through capital accumulation. Growth realized from capital accumulation results in improved living standards that lead to poverty reduction (Magombevi& Odhiambo, 2017). In order to analyse these interactions, this study uses the Bourguignon model (Poverty-Growth-Inequality - PGI) and the Growth Incidence Curve (Bourguignon, 2004). Bourguignon model states that reduction of poverty depends on the combination of policies based on the relation between growth and inequalities. According to Bourguignon, poverty reduction strategy requires the combination of nationwide policies aimed at growth and inequality decrease. However, inequality affects growth both directly, through the amount and concentration of the savings of the non-poor, and indirectly, through its effect on the extent of poverty for given average income. Thus, the study on the economic growth becomes an important variable of study along with income inequality is key to poverty reduction.

Thus, some other studies reviewed that the analysis and knowledge on poverty and economic growth have changed dramatically over time, the role of economic growth in poverty reduction in the last decade is not the same in this 21st century. According to Feireira (2010) and Fosu (2017), it is obviously not possible to examine growth separately from poverty reduction and inequality. According to Marinko& Romina (2016), billions of people still live in poverty it becomes clear that the "trickle-down" theory must be supplemented by policies of inclusion that lessen sharp disparities in incomes and assets, enhance human capital accumulation and employment opportunities, and help in providing safety nets for the more vulnerable elements of a society. Therefore, it is not only economic growth and inequality that affect poverty, other macroeconomics variables are inclusive. However, empirical studies postulation relating to poverty, inequality and growth nexus in both developed and developing countries in the works of Tanimu & Saifullahi. (2014), Dollar, Kleineberg, & Kraay, (2016). Brueckner& Lederman, (2018), Berg, Ostry, Tsangarides, &Yakhshilikov (2018) and Dabla-Norris, Kochhar, Suphaphiphat, Ricka, &Tsounta, (2015), emerging consensus view is that the long-run effect of inequality on growth is significantly negative, and only when looking at short periods of time the relationship may turn positive. Also, shows that a change in income distribution in favour of decreasing inequality leads to a greater poverty reduction for a given growth.

Over the years Nigeria has experienced encouraging economic growth, considering Central Bank of Nigeria/CBN, (2020) report, the Real GDP increased from 5,484 billion naira in 1985 to 6,130 billion naira in 1990 and dropped to 5,422 billion naira 1995. In 2005 Real GDP increased to 7,330 billion naira and by 2015 real GDP increased to 8.162 billion naira and increased to 9.564 billion naira in 2020. Nigerian economy has been progressive over time in terms of real GDP except for 1985 and 1995. However, the country has recorded a lower ability to reduce the level of poverty. Poverty incidence in Nigeria from 27.2 per cent in 1980 to 42.7 per cent in 1992 and in 2010 poverty level moved from 69 per cent to 72 per cent in 2019 (Central Bank of Nigeria, 2020). These facts show that poverty remains a major issue in Nigeria. Nigeria has failed to achieve its target of United Nations poverty reduction level to 7.55% and eradication of hunger by 2015, as set by the Millennium Development Goals (MDGs) in 2000. In 2007, Nigeria government proposed a Seven-Point Agenda of development. The main objectives and principles of the seven point agenda include: improving the general well-being of Nigerians and making the country become one of the biggest economies in the world by the year 2020 (Vision 20:2020). Considering the level of poverty, income inequality and hunger in Nigeria, it is obvious that the objectives failed. It is necessary that a concerted effort to eliminate poverty in Nigeria is urgently needed, since the various poverty alleviation strategies undertaken by the government and policies makers to reduce the level of poverty has failed. Moreover, Nigeria economy has been growing over time given the upward trend of GDP as noted above. In spite of this upward trend, the country has been facing a lot of economic crisis such as, income inequality, increase in the poverty level, unemployment, poor investment among others has constituted a menace to the overall performance of her economy and the standard of living of the citizen (Agbasi, Edoko&Ezeanolue, 2018). It is therefore important to note that the strategy/approach to poverty reduction is key and also, the variables used in measuring poverty level is important and the methodology employed influences the decisions and conclusions of the researchers.

Thus, studies like (Magombeyi& Odhiambo, 2017), have found unidirectional causality between the two variables using Ordinary Least Square (OLS) regression equations and income as a measure of poverty level and Nelson, Ekokeme, Okoyan, &Dumani, (2018)found a bidirectional causal relationship among economic growth and poverty, The paper used bound testing approach to co integration and Granger causality test to determine the relationship between poverty, inequality and economic growth in Nigeria. Other studies have found no causal relationship between among the variables (Anigbogu, Edoko, and Okoli, 2016), using income as a measure of poverty. Considering the multidimensional variables used to measures poverty and the variation

in the results of the above studies, it is therefore, necessary to further empirical findings on poverty reduction and it's dynamic interaction with economic growth and income inequality in Nigeria from 1986 - 2019 using real consumption expenditure as proxy for poverty level. Most of the studies utilized econometric tools that were inadequate in accounting for complex relationship among the macroeconomic variables. This study employed the Vector Auto regression modeling that aimed at examining impulse responses and variance decompositions to determine how poverty level is been affected by economic growth and inequality in Nigeria. Understanding the exact nature of the dynamic relationships is important for policy formulation. Therefore, the objective of this study is to examine the impulse responses of poverty reduction on economic growth and inequality in Nigeria and to re-examine the causal relationship between economic growth and poverty reduction in Nigeria.

Literature Review

The studies on the relationship between poverty, inequality and economic growth have always been an important one in the developing countries like Nigeria and it generates lots of debates on whether the relationship is positive or negative. Some scholars have argued that unequal distribution of income stimulates economic growth while others hold a view that income inequality affects growth and contributes to rise in poverty level.

Bashir, Olufunsho&Jameelah (2015) and Ajike, Oladeji, Bank-Ola (2021) argued that for poverty reduction to be effective, it is necessary that government authorities reinforce their efforts to distribute the income within an egalitarian manner. According to Rajan (2010) the growing income inequality was a key factor leading to the financial crises and the perennial economic downturn. Bruckner and Lederman (2018) examined poverty, inequality and growth nexus, they postulated that the long run effect of inequality on growth is significantly negative, and that only in the short run the relationship is positive. Evelyn & David (2015) examined the existence of a causal relationship between poverty and inequality in Nigeria. Adopting Granger causality techniques, this study finds out that there is a direct line of causality between poverty and inequality as well as indirect channels through unemployment and low life expectancy on inequality which exacerbate poverty in Nigeria. Joseph (2018) and (Sunday & Amago, 2011) attempted to empirically assess the relationship between poverty, income distribution and the growth of the Nigerian economy. To do this, a co-integration technique was employed to test for the unit root and the error correction mechanism (ECM). The Real Gross Domestic product was regressed on Private Consumption Expenditure, Per Capita Income, Registered Unemployment, and Government Expenditure on Health and Education.

Lin (2003) reported China's experience during the period of 1985-2001. It was reported that economic growth effectively reduced poverty. However, at the same time, the

increasing income inequality that was created by the economic growth decreased the effectiveness of the effort to reduce poverty. Ravallion (2006) studied the effects of income inequality on poverty in India and China in 1980-2000. He found that, similar to Lines findings, economic growth reduced poverty in the two countries, and income inequality reduced the effectiveness of poverty reduction. Furthermore, he also reported that poverty reduction needed a combination of economic growth, a sort of "pro-poor" pattern of economic growth, and income inequality reduction. Le (2008) examined the relationship between poverty and growth on the one hand and initial inequality on growth on the other hand in the provincial level of Vietnam. Poverty was negatively related to growth while there was no relationship between initial inequality and later growth. Also, Ncube, Anyanwu & Hausken (2013) found that income inequality levels indeed significantly reduced economic growth as greater inequality was associated with lower economic growth in the MENA region.

As regard the relationship between income inequality and economic growth, results of empirical studies have produced different views. In the first view, the belief shows that inequality is not a final outcome of growth but plays a central role in determining the rate and pattern of growth (see Bourguignon, 2004 and Bashir, Olufunsho&Jameelah 2015).

In summary, based on the conflicting results obtained from the literatures reviewed on poverty reduction, economic growth and inequality nexus in Nigeria. This study deserves further empirical investigation, because most of the studies reviewed fail to examine the dynamic interactions among economic growth and inequality in the analysis of the behavior of poverty over time in Nigeria and thereby filling the gaps in the existing in literature.

Methodology

Theoretical framework

The theoretical framework of analysis adopted in this study is the endogenous economic growth theory as explained bythe Bourguignon model (Poverty-Growth-Inequality – PGI) and the Growth Incidence Curve (Bourguignon, 2004). Bourguignon model states that reduction of poverty depends on the combination of policies based on the relation between growth and inequalities. According to Bourguignon, poverty reduction strategy requires the combination of nationwide policies aimed at growth and inequality decrease. Also, McKinnon (1973) and Shaw (1973) on the theoretical linkage among finance, growth and poverty. They explained the channel through which economic growth transcend (trickle down effect) into poverty reduction. McKinnon Condit effect describes the mechanism through which poor people benefit directly from formal financial intermediation by widening access to financial services providing employment opportunities, equal distribution of income and credits available to the poor

for investment, which will result to an increase in output from where poverty could be reduced.

Model specification

This study uses annual time series data for the period 1986-2019 gathered from several sources namely Central Bank of Nigeria (CBN) published by Statistical Bulletin (2020), and World Development Indicator (2020). In this study, poverty level is measured by per capita household Consumption expenditure (POV) in Nigeria, economic growth is also included in the model, RGDP is used to measure the level of economic growth and finally GINI is used to measure the level of income inequality, the measures of income inequality are mainly the Lorenz curves and the GINI coefficient. The GINI coefficient measures income inequality based on the Lorenz curve and it varies from 0 (perfect equality) to 1 (perfect inequality). A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The GINI index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. The major limitation of these measures of inequality is that both neither indicate the number of people who fall below the poverty line nor the extent of impoverishment (Anyanwu, 1997), and the scarcity of their time-series data for Nigeria. Hence, per capita income is employed as measure of inequality (GINI).

To summaries the dynamic interactions of macroeconomic variables (POV, RGDP, GINI), the Vector Autoregressive (VAR) is used. A VAR is an n-equation, n-variable model in which each variable is, in turn, explained by its own lagged values, plus current and past values of the remaining n-1 variable. It is also the reduced form of a dynamic economic system involving a vector of variable Zt.

 $Az \Box = \beta_1 z \Box_{-1} + \beta_2 z \Box_{-2} + \beta_3 z \Box_{-3} \dots \beta_{PZ} \Box_{-P} + \mu \dots (1)$

 $Z \square$ = (CEx, RGDP, PCI) and $\mu \square = \sum e \square$ ------ (2)

Where

 β_1 , β_2 β_3 are the coefficient of external debt, foreign direct investment and poverty index. Therefore, $Z \Box$ can be expressed as thus:

Therefore, equation 3 to 5 will be estimated in obtaining the dynamic effect that exists among poverty level, economic growth and inequality. Where CEx = poverty level, RGDP = economic growth and PCI = income inequality. We see, therefore, that the impulse response functions are employed to obtain the interactive effect among poverty level, economic growth and inequality, given equations 3 to 5. After obtaining the dynamic effect that existed among the variables, the following bivariate Granger causality models are estimated to detect the direction of the causality bivariate relationship between the poverty level and economic growth, and poverty level and inequality.

 $\Delta LRCEx \Box = \phi + \delta_1 \Delta LRCEx \Box_1 + \dots + \delta \Box \Delta LRECx \Box_1 \Box + \lambda_i \Delta LRGDP \Box_1 + \lambda \Box \Delta LRGDP \Box_1 + e \Box ------(7)$

Estimation technique

In order to obtain objective results in the investigation of the interactive effects among poverty level, economic growth and inequality in Nigeria, impulse responses were used through the application of the VAR model. To meet the second objective, which is to reinvestigate the causal relationship among the macroeconomic variables using per capita consumption expenditure as the measure for poverty level, the Granger Causality Test was employed. The section starts with examining the time series property of the variables that were included in the model in order to avoid the occurrence of spurious regression. Determining the order of integration of the Augmented DickeyFuller (ADF). After ascertaining the order of integration, the Johansen co-integration analysis was carried out in order to test for the existence of a co-integrating vector among the variables.

Empirical results

Time series properties of data

From table 1 below, it was observed that, all the macroeconomics variables (poverty level proxied by real consumption expenditure (RCEx), economic growth measured by real GDP (RGDP) and inequality proxied by per capita income (PCI) all became stationary after first difference since the series were integrated of order one I(1) at 5 per cent level of significance.

Series	Level	First Diff	Remark
LRCEx	-2.190115	-4.695683	l(1)
LRGDP	-2.603039	-3.170494	l(1)
LPCI	-2.530542	-3.216087	l(1)

Table 1: ADF Statistics for Testing Unit Roots in the Variables

Critical value at 5% = -2.95

Sources: computed from study data

Determination of Optimal Lag Length

According to this approach, the lag length of the VAR must first be determined and this should be small enough to allow for estimation and, high enough to ensure that errors are approximately of white noise. As such, using five different information criteria viz: sequential modified LR test Statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ). The result in Table 2 showed that all the five criteria (LR, FPE, AIC, SC, and HQ) indicated an optimal lag order for the VAR upon which the co-integration analysis is based is one (2).

Lag	LogL	LR	FPE	AIC	SC	HQ
0	15.69423	NA	9.08e- 05	0793389	-0.655976	-0.747841
1	134.8929	208.5976	9.30e- 08	-7.680805	-7.131154*	-7.498611
2	145.1998	16.10451*	8.72e- 08*	-7.762486*	-6.800596*	-7.443647*

Table 2: VAR Lag Order Selection Criteria

*indicates lag order selected by the criterion at 5 per cent level of significance

Co-integration analysis

The co-integration test was carried out using Johansen co-integration test with Lag 2.Table 3 depicts the results of the trace and maximal Eigen value of the unrestricted co-integration rank test indicate no co-integrating equations at the 5 per cent level of significance.

Table 3: Trace and Maximal Eigenvalue of the Unrestricted Co-integration Rank Test

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical value	Prob.**
None	0.423163	29.69768	29.79707	0.0513
At most 1	0.306851	12.09142	15.49471	0.1526
At most 2	0.011283	0.363108	3.841466	0.5468

Trace and Max-Eigenvalue test indicates no co-integration at the 0.05 level

The result in Table 3 showed that the models are co-integrated, implying no long-term relationship between poverty level, economic growth and inequality in Nigeria. Therefore, the study proceeded in obtaining interactive effect among poverty level, economic growth and inequality using the impulse response approach and forecast error decomposition by estimating the VAR models stated in equations 3-5. After obtaining the interactive effect among variables, the study proceeded to meet the second objective of estimating the bivariate Granger causality in equations 6 and 7.

Impulse Response Analysis

From Figure 1, one standard deviation was calculated in percentage form for each of the variables. The horizontal axis of the impulse response function (IRF) showed the number of periods that had passed after the impulse was given, while the vertical axis measured the responses of the variables.

The graphs showed the impulse response function of consumption expenditure per capital poverty level illustrating the dynamic response of poverty level to a one period standard deviation shocks to the innovations of the system and also indicates the directions and persistence of the response to each of the shocks over ten years. The results showed that the response of poverty to a one standard deviation innovation in its past values was significantly positive in the short run and medium term before an oscillatory movement around negative values in the long run. This result implies that poverty is affected contemporaneously by the shocks from its past value but diminishes over time. Similarly, the impulse response function showed that a shock to economic growth was naturally significantly positive in the short run but was gradually declines in a positive values in the medium and long run. However, poverty level responded initially

negatively and contemporaneously to one standard deviation innovation in the inequality. The response of economic growth to shock of other variables, the response of economic growth to a one standard deviation shock to poverty has a noticeable increasing positive impact in the short run and medium term before an oscillatory movement around negative values in the long run. Furthermore, the impulse response function showed how economic growth affect itself. The result showed a significantly positive effect in both short run and long run. However, economic growth responded an initially negatively value and contemporaneously to on standard deviation innovation in the inequality in both short run and long run periods. A shock to poverty produces a significantly positive values in the short run but a movement along negative value in the long run.



Figure1:Impulse

Response Function

Variance Decomposition

Variance decomposition of poverty level, it is illustrated that economic growth and inequality did not explain variation in poverty reduction in the short run which is the first period. However, economic growth variable and inequality variable explained about 19.86% and 0.42% variation in second period respectively and increased to 46.46% and 3.58% in the medium run but economic growth later decreased to 36.63% while inequality level increased progressively to 23.21% in the long run period. The table further shows the variance decomposition of economic growth. In the first period, nothing is explained by inequality while poverty level explained 32.23% of the variation in economic growth. In the first period the variation explain by poverty level increased 33.06% while that of inequality is 4.06% in the medium run. The response of inequality is explained by poverty up to 35.62% while economic growth is 59.43% in the first period. Looking at the first period, the explained variations increased to 35.75% medium run attributes to poverty while that of economic is 61.80%. This show the level of dynamic interactions between economic and inequality on poverty level in Nigeria. In the long run attributes to period 10, the variance explain by poverty level decreased to 27.29% while economic growth decreased to 55.21%.

In conclusion, the result from variance decomposition confirmed that economic growth does not reduce the level of poverty in Nigeria. The results also, indicated a strong relationship between economic growth and inequality to poverty level.

Variance Decomposition of LRCEX: Period S.E. LRCEX LRGDP LPC						
1	0.145673	100.0000	0.000000	0.000000		
2	0.201902	79.71871	19.86312	0.418172		
3	0.240170	62.94734	36.61264	0.440028		
4	0.263492	54.69055	43.74924	1.560217		
5	0.278077	49.95948	46.45593	3.584590		
6	0.289114	46.44097	46.79967	6.759358		
7	0.298624	43.54904	45.89296	10.55800		
8	0.307830	40.99037	44.23700	14.77263		
9	0.317024	38.70215	42.24838	19.04947		
10	0.326328	36.63510	40.15388	23.21102		
Variance D	ecomposition o	f LRGDP:				
Period	S.E.	LRCEX	LRGDP	LPCI		
1	0.088563	32.22858	67.77142	0.000000		
2	0.142754	44.12461	55.73280	0.142585		
3	0.180589	40.57953	58.64862	0.771843		
4	0.204809	35.64044	62.67926	1.680297		
5	0.220595	32.05569	63.87979	4.064520		
6	0.231718	29.40657	63.17734	7.416088		
7	0.241163	27.19602	61.06782	11.73617		
8	0.249988	25.31197	58.24689	16.44114		
9	0.258785	23.66929	55.07725	21.25346		
10	0.267609	22.24587	51.87756	25.87657		
Variance D	ecomposition o	f L PCI:				
Period S.E. LRCEX LRGDP LPCI						
1	0.092850	35.61800	59.42619	4.955811		
2	0.149976	47.39044	49.76890	2.840662		
3	0.188507	43.65886	54.54303	1.798117		
4	0.212630	38.93364	59.44772	1.618637		
5	0.227161	35.75652	61.80186	2.441615		
6	0.236548	33.50588	62.26538	4.228740		
7	0.243767	31.66844	61.41491	6.916652		
8	0.250208	30.06358	59.74611	10.19030		
9	0.256527	28.61423	57.58962	13.79614		
10	0.262910	27.29929	55.21576	17.48495		

Cholesky Ordering: LRCEX LRGDP LPCI

Bivariate Granger causality

After obtaining the dynamic interactions, the following bivariate Granger causality models are estimated to detect the direction of the causality bivariate relationship between the poverty level and economic growth, and poverty level and inequality in Nigeria.

Direction of causality	F – Statistics	P. value	Conclusion
LRGDP → LRCEX	7.89107	0.0020	Causality
LRCEX → LRGDP	2.03295	0.1505	No Causality
LPCI → LRCEX	3.60956	0.0408	Causality
LRCEX → LPCI	2.17317	0.1333	No Causality
LPCI → LRGDP	2.18484	0.1320	No Causality
LRGDP → LPCI	1.36423	0.2726	No Causality

Table	4:	Causality	Bivariate	Relationship	between	the	poverty	level	and
economic growth, and poverty level and inequality									

Table 4 shows that causation only existed between poverty level and Economic growth, and poverty level and inequality at a 5% level of significance. Economic growth running from poverty level to economic. This implies that an increase in economic growth could cause poverty level. Also, inequality running poverty to inequality, which implies that an increase in inequality could cause poverty level according to the Granger Causality Test.

Conclusion/Recommendation

The implications from the above results is that a positive change in income distribution leads to a greater reduction in poverty for a given economic growth in Nigeria. The result from variance decomposition confirmed that the economic growth alone does not reduce the level of poverty in Nigeria. The results also, indicated a strong relationship between economic growth and inequality to poverty level. The consequence of this is that economic growth policies alone without regarding income inequality will not fulfill poverty reduction goals in Nigeria.

Therefore, it is recommended to Nigerian government and policies makers on "end poverty in all its form everywhere" and "reduce inequality within and among countries" goals, thata serious strategy for poverty reduction should include both policies for increasing growth and measures for effecting more equitable income distribution. Doing these could bring about poverty reduction in the country, however, development strategies that put their attention only on one of these phenomena are not able to reduce poverty.

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