Economic Horizons, May - August 2023, Volume 25, Number 2, 93 - 104
UDC: 33 ISSN: 1450-863 X

Original scientific paper
UDC: 330.34:330.564(6)
doi:10.5937/ekonhor2302103O

THE EFFECT OF ECONOMIC GROWTH ON INCOME INEQUALITY IN SUB-SAHARAN AFRICA

Ibrahim Abidemi Odusanya*

Olabisi Onabanjo University, Department of Economics, Ago-Iwoye, Nigeria

In this paper, the way in which economic growth influences income distribution is examined with a focus on Sub-Saharan Africa (SSA). Despite considerable growth in a number of the SSA countries, the region has been slow in reversing the rising trend of income inequality. A large proportion of countries in the region globally rank among economies with extreme income inequality. The study covers a period from 1995 to 2015, due to the limited data on the measure of income inequality, the Gini index, for the largest number of the countries of the region. The Generalized Method of Moments (GMM) system was employed in examining this paradox. The findings of this research study do not only suggest the presence of an inverted-U relationship between economic growth and income inequality, but the supposition of the S-shaped curve hypothesis in the interplay of growth and inequality was also tested and confirmed. It can be concluded that in no way do spurts in economic growth bring about diminution in income disproportion in Sub-Saharan Africa.

Keywords: economic growth, generalized method of moments, income distribution, Kuznets hypothesis, Sub-Saharan Africa

JEL Classification: C23, D33, F43, N47

INTRODUCTION

The discourse on income inequality and its defining implications has remained topical (Wong & Ribeiro, 2017), drawing the attention of economists and policymakers across regions throughout the world. Studies on the income inequality - growth nexus are mainly classified into two categories: the studies on how economic growth influences income inequality, on the one hand, and the studies assessing how income disparities exert an influence on growth, on the other. The first category of studies generally focus on the conventional tradeoff between expanding growth and plummeting inequality in line with the seminal work done by S. Kuznets in 1955, whereas the other strand relies on the framework of N. Kaldor's examination of the reverse effect of income inequality on growth. Subsequently, a bigger chunk of the extant empirical literature on the growth - inequality nexus rather focuses on the effect of income disparities

* *Correspondence to*: I. A. Odusanya, Olabisi Onabanjo University, Department of Economics, P.M.B 2002, Ago-Iwoye, Nigeria; e-mail: ibrahim.odusanya@oouagoiwoye.edu.ng

on growth. Notable studies on the effect of growth on income distribution are not consensual in their findings. Some studies find economic growth to exert a positive influence on income inequality, whereas other studies report the presence of the negative effect of economic growth. There are but few studies that report the U-shaped relationship between growth and inequality in contrast to the general Kuznets inverted U-shaped curve. There is also the emerging evidence of the S-shaped relationship, whereas few other studies deduce that the effect could be mixed. It is also contended that the Kuznets hypothesis is more often disproved than confirmed (Lyubimov, 2017). This controversy in findings provides an impetus for the current empirical investigation. Perceptibly, the effect of economic growth on income inequality in SSA remains dimly discerned.

The interest in Sub-Saharan Africa demonstrated in this paper is pertinent indeed. The region shows to be characterized by a consistent and intriguing feature of rising income inequality amidst spurts in economic growth. The regional growth rate in SSA fluctuated between 3.37 percent in 1995 and 2.82 percent in 2015. In 2002, it reached a record rate of 6.34 percent and slumped to 3.04 percent in 2009. It rose to 5.58 percent in 2010, whereas in 2014, it stood at 4.66 percent (World Bank, 2018). Despite the robust and rapid economic growth achieved by many countries in Sub-Saharan Africa, income distribution has remained largely inequitable. In the last two decades, many Sub-Saharan African countries, including Rwanda, Nigeria, and Ethiopia, have witnessed unprecedented growth in their economies, achieving an impressive annual growth rate well above the global average (Fuje & Yao, 2022). Even with this remarkable expansion in economic activities, a very large proportion of people are still living in abject poverty, with a very negligible proportion of the population gaining riches, underscoring the magnitude of disproportionateness in income distribution in the region. The level of variations in income distribution is not only extremely high but continues to grow. The facts pertaining to the depth of income inequality in the region revealed that the incomes of the bottom 50% were roughly 30 times lower than those of the top 10%, simultaneously depicting the highest gap between these income groups globally (Chancel, Cogneau, Gethin & Myczkowski, 2019). The countries hit the worst include Nigeria, Ethiopia, Botswana, Zambia, even South Africa, the only G-20 member country in the region (Ighobor, 2018). The significant diminution recorded in regional income inequality prior to 2010 is fast being eroded, casting doubt on the gains of recent spurts in growth.

Owing to the foregoing views, this paper offers an empirical insight into the implications of growth in the economy for income inequality in the SSA region. The examination of the effect of economic growth on income inequality is also expedient in the quest of Sub-Saharan African countries in achieving the goal 10 of plummeting inequality within and among the nations under the Sustainable Development Goals (SDGs) by the year 2030. The achievement of this target seems to be unrealistic if the trend of income inequality in the region persists. Thus, the main research hypothesis in this study is as follows:

H1: Economic growth does not have a significant effect on income inequality in Sub-Saharan Africa.

Theoretically, the study mainly relies on the Kuznets inverted-U hypothesis and the conjecture of the S-curve relationship between growth and inequality. The Blundell-Bond System Generalized Method of Moments (GMM) was applied to the data on income inequality (the Gini index) for 31 SSA economies in the period from 1995 to 2015. The evidence was found that economic growth was the key factor determining gaps in income distribution in the SSA region. Apart from the introductory section, this paper also has five other sections. In the second section, a review of the relevant studies is presented. Section Three focuses on the methodology and data. In Section Four, the results and discussion are presented. The fifth section contains the conclusions of the paper.

REVIEW OF RELEVANT STUDIES

S. Kuznets (1955) analyzed a nonlinear quadratic relationship between growth and income inequality

using data on England, US, and Germany, only to find the presence of an inverted-U relationship between economic growth and income inequality. Since the seminal work done by S. Kuznets (1955) on the effect of economic development on income inequality, a number of authors have empirically investigated the link for different economies, the outcomes they have come to being of a conflicting nature. There are strands of the literature contending that the Kuznets hypothesis may not be sufficient in explaining variations in income inequality over time or across countries (Barro, 2000). This is amidst the views that economic growth tends not to have any distributional effects at all (Charles-Coll, 2010), while income inequality seems to depend more on the type of growth and institutions, not merely on the stage of the growth of the economy. The findings of these studies showed that the impact of economic growth on income inequality tended to be positive, negative, nonlinear, or mixed. R. Pagano (2004) examines the relationship between inequality and growth using data on 40 countries (both rich and poor). Economic growth exerts a positive effect on income inequality for a sample of the OECD nations (otherwise rich countries), while its effects on growth are negative for poor countries. These effects are not statistically significant. These inferences were drawn for estimation from fixed effects and the GMM models. R. Pagano (2004) also finds economic growth to Granger-cause income inequality, with a positive sign for the period from 1958 to 1998. Relying on the estimation of the panel data drawn from 125 countries with the help of the pooled OLS and the three-stage least square, M. Lundberg and L. Squire (2003) establish the fact that economic growth has a significant positive effect on income inequality. Economic growth has a statistically significant adverse effect on income inequality, which indicates that the growth of the economy exacerbates inequality. However, in spite of the statistical significance of this effect, it is considered to be quite small given its magnitude. A percentage-point rise in the growth of the economy corresponds to a higher percentage point in the Gini index. One other study that suggests a noxious effect of economic growth on income inequality is the study carried out by A. R. Cheema and M. H. Sial (2012), who find growth to have a positive and statistically significant association with income inequality in Pakistan. A percentage rise in average expenditure (a proxy used for growth) culminated into a 0.18 percent rise in income inequality. However, this effect is less pronounced in rural areas compared to urban areas. A. O. Binatli (2012) investigates the relationship between growth and income inequality for some selected countries for the periods from 1960 to 1985 and from 1985 to 1999. Volatility in economic growth initially increases income inequality, with the size of the effect dwindling later. For the period from 1960 to 1985, a one percent increase in growth volatility brings about a 1.3-percentage-point rise in the Gini coefficient. For the period from 1985 to 1999, a 0.3-percentage-point rise in the Gini coefficient is traceable to a one percent increase in growth volatility. F. Niyimbanira (2017) examines how growth affects income inequality in the South African Province of Mpumalanga. The findings suggest that growth in the economy does not reduce inequality in income distribution. Using the panel fixed effects model, S. S. Akadiri and A. C. Akadiri (2018) report a positive long-term relationship between economic growth and income inequality for 20 African countries. The estimates of the causality test are supportive of the hypothesis of neutrality between growth and inequality.

In contrast, W. A. Risso, L. F. Punzo and E. J. Senchez-Carrera (2013) find a consistent negative relationship between the GDP *per capita* and the Gini index for Mexico over the period from 1968 to 2010, based upon the estimates of the fully modified OLS (FMLOS) and dynamic OLS (DOLS). The estimates of canonical cointegration regression (CCR) indicate a negative relationship, with a one percent rise in the GDP *per capita* culminating to 0.13 reduction in income inequality. Likewise, N. F. Wahiba and M. Weriemmi (2014) explore the effect of economic growth on inequality in income in Tunisia and deduce a positive impact for the periods from 1984 to 1995, from 1996 to 2011, and from 1984 to 2011. While the impact was insignificant for the period from 1984 to 1995, it was statistically significant for the periods from 1996 to 2011 and from 1984 to 2011. Thus, the rising growth of the Tunisian economy had contributed to an increase in inequality in income distribution. For a sample

of 26 Chinese provinces, K. S. Chan, X. Zhou and Z. Pan (2014) find insignificant reduction in income inequality, even with a faster growth in its provincial economies. The results of the VAR estimation reveal that lagged growth has insignificant negative impact on income inequality. The Arellano-Bond differenced GMM estimates also indicate that lagged growth continues to have an insignificant negative effect on income inequality, i.e. as contemporaneous income inequality slightly declines due to the initially prevailing growth level. H. C. R. Huang, W. Fang, S. M. Miller and C. C. Yeh (2015) investigate how growth volatility influences income inequality in the long run in the US, spanning from 1945 to 2004. The results of the pooled mean group (PMG) estimators indicate that greater growth volatility has a significant positive association with higher income inequality. However, the effect of growth volatility is positive but insignificant for negative economic growth. E. Berisha and J. Meszaros (2016) report a positive association between economic expansion and income inequality, hinged on a negative relationship between a debt and income inequality, which is quite probable given the fact that negative growth in income inequality emanates from rising household debts, since the debt is likely to slow down growth, thereby diminishing returns to top income earners. S. Chang, R. Gupta, S. M. Miller and M. E. Wohar (2019) also confirm the fact that negative volatility in economic growth has a greater effect on income inequality than positive volatility does for the US economy between 1917 and 2015.

Contrary to the findings of the aforementioned studies, there are authors who have confirmed the Kuznets inverted-U hypothesis. R. J. Barro (2000) finds the evidence for the Kuznets inverted-U-shaped relationship for a panel of 84 countries. The real GDP *per capita* coefficient was consistently positive, while simultaneously that of the squared GDP *per capita* was negative, and they were both statistically significant and quite stable. This implies that income inequality increases initially, only to later decrease, during the periods of economic development. M. Lundberg and L. Squire (2003) also report a Kuznets-type relationship for eight countries, no relationship for 30 countries in terms of the growth - inequality nexus, and a U-shaped relationship (i.e. inverse Kuznets curves) for the 11 countries included in the sample. R. J. Barro (2008) also confirms the applicability and relevance of the Kuznets hypothesis. The results of the seemingly unrelated regression (SUR) estimations show that the GDP *per capita* exerts a positive and significant influence on the Gini coefficient, whereas the squared GDP *per capita* has a significant negative effect on income inequality.

Other notable studies beside R. J. Barro (2000) and R. J. Barro (2008) have also tested and validated the Kuznets hypothesis. They include J. A. Charles-Coll (2010), J. A. Charles-Coll (2014), and D. Hartmann, M. R. Guevara, C. Jara-Figueroa, M. Aristaran, and C. A. Hidalgo (2017). D. Hartmann *et al* (2017) confirm the validity of the Kuznets hypothesis for 150 countries using the pooled OLS and the fixed effects methods of estimation. D. Hartmann *et al* (2017) find that the GDP has a positive coefficient, whereas the squared GDP has a negative coefficient. J. A. Charles-Coll (2010) submits that the Kuznets hypothesis is an empirical regularity, as the results of all his specifications show a positive and statistically significant sign for the GDP *per capita*, and a statistically significant negative sign for its squared coefficient, which on its part clearly indicates that inequality in income distribution will grow at the initial levels of development, only to reduce at later stages. These findings were corroborated by J. A. Charles-Coll (2014), who used a comprehensive data set on 138 countries for the period from 1955 to 2005. Y. Yang and T. M. Greaney (2017) use the Error Correction Model to estimate short- and long-term relationships for South Korea, the United States, Japan and China. The results of the estimation suggest the presence of an S-shaped curve relationship between growth and income inequality for the four economies. The coefficients of the GDP *per capita* and the cubic GDP *per capita* are negative and significant, whereas the squared GDP *per capita* is positive and significant for China and the US, thereby tracing out an S-shaped curve. For Japan and Korea, the coefficients of the GDP *per capita* and the cubic GDP *per capita* are positive and statistically significant, whereas the squared GDP *per capita* coefficient is negative and statistically

significant. All the coefficients are significant at one percent in the long run, except for Korea. The results support both the Kuznets curve hypothesis and the S-curve hypothesis. G. Blanco and R. Ram (2019) revisit the growth - income inequality nexus and confirm a significant regular U-pattern relationship using the data on the US states for the period from 2006 to 2016. This relationship, however, becomes insignificant when the estimation is adjusted for cross-state spillovers. In contrast to the hypothesized Kuznets bell-shaped relationship between growth and inequality, S. Mhaka and A. Sahdev (2023) report a U-shaped relationship between economic growth and income inequality for the Middle and South African countries. The coefficients of the *per capita* GDP and the squared *per capita* GDP were negative and positive, respectively. In studying 52 African countries, M. E. Batuo, G. Kararach and I. Malki (2022) applied the concept of club convergence, involving a possible divergence of *per capita* and a possible convergence of economies into four steady states. They report that the Kuznets inverted-U relationship becomes unstable after controlling for the multiple steady states (Table 1).

METHODOLOGY AND DATA

In this paper, income inequality is expressed as a function of economic growth in the following research study baseline equation:

$$INEQ_{i,t} = a_0 + \alpha INEQ_{i,t-1} + \psi \ln y_{i.t} + Z_{i,t}\theta + \mu_i + \varepsilon_{i,t} \quad (1)$$

where *INEQ* represents income inequality, *y* is the GDP *per capita*, *Z* stands for the vector of the other variables that drive income inequality in an economy. These variables are inflation and trade openness. To test the Kuznets hypothesis, the y^2 is the squared GDP *per capita* incorporated in (1).

$$INEQ_{i,t} = a_0 + \alpha INEQ_{i,t-1} + \psi \ln y_{i.t} + \varphi \ln y_{i.t}^2 + Z_{i,t}\theta + \mu_i + \varepsilon_{i,t} \quad (2)$$

The coefficient of the GDP *per capita*, ψ, and the coefficient of the squared GDP *per capita*, φ, are theoretically anticipated to either be negative or positive. When ψ is positive and φ is negative, the hypothesized inverted-U shape based on the Kuznets analysis is valid. However, when ψ is negative (i.e. < 0) and φ is positive (i.e. > 0), then there is no such U-shaped relationship.

$$INEQ_{i,t} = a_0 + \alpha INEQ_{i,t-1} + \psi \ln y_{i.t} + \varphi \ln y_{i.t}^2 + \pi \ln y_{i.t}^3 + Z_{i,t}\theta + \mu_i + \varepsilon_{i,t} \quad (3)$$

The inclusion of the cubic GDP *per capita*, y^3, in (3) is to test for the conjecture of an S-shaped relationship in the causal effect of economic growth on income inequality, in line with Yang and Greaney (2017). When ψ (the GDP *per capita* coefficient) is positive, while the squared GDP *per capita* coefficient φ and the cubic GDP *per capita* coefficient π are negative and positive, respectively, then the relationship assumes the S-shape.

For the estimation of the model, the GMM system by R. Blundell and S. Bond (1998) is employed in order to handle the inherent problem of reverse causality in the economic growth - inequality relationship. It also allows the use of both the first differenced equation and the equations at level. Owing to these conditions, the system GMM is preferable, as it makes possible the use of more instruments than the difference GMM. In line with D. Roodman (2009), a collapsed matrix (relying on the *collapse* command in Stata) was made use of in this paper. The two-step system GMM was used because of its better precision and higher consistency over the one-step system GMM (Roodman, 2009). The Hansen test (Hansen, 1982) was used to check the over-proliferation of instruments, which was crucial to ensure that the instruments were not greater than the endogenous variables.

The data on income inequality (the Gini before tax) were retrieved from the Standardized World Income Inequality Database (SWIID). The data on the GDP *per capita*, the inflation rate, and trade openness were taken from the World Development Indicators (WDI) of the World Bank (World Bank, 2018). The data on

Table 1 The synthesis of the reviewed studies on the effect of economic growth on income inequality

S/N	Authors/Year	Sample/Data Structure	Method of analysis	Core findings
1	Kuznets (1955)	England, US and Germany	Descriptive	The inverted-U curve
2	Barro (2000)	84 countries (1965-1995)	3SLS; seemingly unrelated regression	An inverted-U curve; the Kuznets hypothesis is validated
3	Lundberg & Squire (2003)	38 countries	Pooled OLS, 3SLS	Negative
4	Pagano (2004)	40 countries (1958-1998)	Fixed effects; GMM: Granger causality	Growth Granger-causes inequality with a positive sign
5	Barro (2008)	(1960-2000) cross-section	3 SLS; seemingly unrelated regression	An inverted-U curve; the Kuznets hypothesis is validated
6	Charles-Coll (2010)	108 countries (1960-2000)	System GMM; 3SLS and seemingly unrelated regression	The inverted-U curve; the validity of the Kuznets hypothesis is confirmed
7	Cheema & Sial (2012)	Pakistan (1992-2008)	Pooled OLS, Fixed/ random effects	Positive
8	Binatli (2012)	42 countries (1960-1999)	OLS regression	Positive
9	Risso *et al* (2013)	Mexico (1968-2010)	Fully modified OLS; dynamic OLS; canonical cointegration regression	A consistent negative relationship between growth and income inequality; unidirectional causality runs from the GDP *per capita* to the Gini Index
10	Chan *et al* (2014)	China Provinces	VAR; System GMM	Growth does not reduce inequality
11	Charles-Coll (2014)	Mexican states; 138 countries (1955-2005);	SUR and 3SLS	An inverted-U curve; the Kuznets hypothesis is validated
12	Wahiba & Weriemmi (2014)	Tunisia (1984-2011)	OLS	Positive
13	Huang *et al* (2015)	48 US states (1945-2004)	Pooled Mean Group	A U-shaped relationship between growth and inequality
14	Berisha & Meszaros (2016)	Panel of US states from 2003-2012	OLS	Growth acts positively on income inequality
15	Niyimbanira (2017)	18 local municipalities in the South African Province of Mpumalanga	Pooled OLS, Fixed effects	Growth of the economy does not reduce income inequality
16	Hartmann *et al* (2017)	150 countries (1963-2008)	OLS; Fixed effects	An inverted-U relationship between growth and inequality
17	Yang & Greaney (2017)	China, Japan, South Korea & US	Engle-Granger two-step ECM	The signs of the coefficients of the GDP, squared and cubic GDP are negative, positive, and negative, respectively, for the US and China, but the same are positive, negative, and positive, respectively, for Japan and South Korea, i.e. the S-shape curve hypothesis holds for the relationship between growth and income inequality for the countries. The slopes differ at the starting portion of the curve across these economies.
18	Akadiri and Akadiri (2018)	20 African countries	Panel fixed effects (PFE) models	A positive long-term relationship between economic growth and income inequality

19	Chang *et al* (2019)	The US economy from 1917 to 2015 and from 1962 to 2014	Wavelength analysis	Negative volatility in economic growth exerts a bigger influence on income inequality than positive volatility does
20	Blanco & Ram (2019)	The panel of the US states from 2006 to 2016	OLS and fixed effects models	A significant regular U-pattern relationship between economic growth and income inequality
21	Batuo *et al* (2022)	52 African countries	The club convergence concept (the divergence of *per capita* and the convergence of economies into four steady states)	The Kuznets inverted-U relationship becomes unstable after controlling for the multiple steady states
22	Mhaka & Sahdev (2023)	Middle and South African countries (2000-2019)	Fixed effects panel regression model	A U-shaped relationship between economic growth and income inequality

Source: Author

the variables pertain to the period from 1995 to 2015. This is mainly due to the availability of the data on the Gini index for the SSA countries. This is the major limitation to extending the study beyond the year 2015. The data on the other income inequality measures are not readily available for the SSA countries.

The thirty-one (31) countries studied in the paper include Senegal, Cape Verde, Sierra Leone, Ghana, Mauritania, Guinea Bissau, Mali, Central Africa Republic, Niger, South Africa, Cote d'Ivoire, Swaziland, Guinea, Nigeria and Burkina Faso, Ethiopia, Mauritius, Botswana, Seychelles, Angola, Uganda, Namibia, Cameroon, Kenya, Malawi, Lesotho, Burundi, Tanzania, Madagascar, Rwanda, and Zambia. The twelve (12) of the countries are from West Africa, five (5) are from South Africa, three (3) are from Central Africa, and eleven (11) are from East Africa. The selection of the countries was based upon the available data on income inequality.

EMPIRICAL RESULTS AND DISCUSSION

Table 2 reveals that a highly significant positive relationship subsists between economic growth (measured by the gross domestic product *per capita*) and the Gini index, which suggests that the growth of the economy is synonymous with higher disparities in income distribution.

Table 2 The correlation matrix

	Gross Domestic Product	Gini Index	Open-ness	Inflation
Gross Domestic Product	1.000			
Gini Index	0.205 (0.000)	1.000		
Openness	-0.258 (0.000)	-0.114 (0.004)	1.000	
Inflation	-0.020 (0.614)	0.017 (0.666)	-0.022 (0.574)	1.000

Note: The values in parenthesis represent p-values.

Source: Author

It also indicates that more benefits of growth spurts tend to accrue disproportionately to the rich. Table 2 also shows that inflation has a negative relationship with economic growth, while it has a positive insignificant relationship with income inequality. This simply connotes that inflation seems to be growth stifling, while it tends to broaden the inequality gap. Trade openness seems to be unfavorable for economic expansion and equitable income distribution in the region.

The result in Column 1 of Table 3 indicates that the lagged Gini index is positive and statistically significant at a one percent significance level, that is to say inequality in income dispersal in the preceding

years exerted an influence on the contemporaneous level of income inequality. The GDP *per capita* coefficient is positive and statistically significant at a five percent significance level, with a 0.18 percent increase in the Gini index traceable to the one percent increase in the GDP *per capita*. The inflation rate is negative and statistically significant at a 10 percent significance level. This implies that inflationary pressure does not really exacerbate inequality in income, which, however, is contrary to the expectation since inflation is anticipated to increase income inequality. In testing the rationality of the Kuznets hypothesis, the inclusion of the squared GDP *per capita* in the inequality model becomes necessary.

The results of the estimation of this model are given in the columns 2 and 3 of Table 3, and they results suggest that the GDP *per capita* is positive and statistically significant at a five percent significance level, with a one percent increase in the GDP *per capita* translating to the initial 0.14 percent increase in income inequality. On the contrary, the squared GDP *per capita* is negative and statistically significant at a 10 percent significance level. These findings suggest that growth in the economy initially promotes income inequality. Further growth in the economy, however, has a reversed or inverse relationship with income inequality, possibly owing to structural changes in the economy. This is in tandem with the postulation of S. Kuznets (1955). By controlling inflation, the coefficients of both the contemporaneous and squared GDP *per capita* maintain their signs. They equally remain statistically significant at a five percent and 10 percent significance levels, respectively. These results still trace out an inverted-U relationship between growth and inequality for the SSA region.

Table 3 The effect of economic growth on income inequality

Dependent Variable	Gini index (Model 1)	Gini index (Model 2)	Gini index (Model 3)
Lagged Gini index	1.0411*** (0.0266)	1.0147*** (0.0162)	1.0821*** (0.0512)
Gross domestic product	0.1793** (0.0747)	0.1419** (0.0534)	3.1047*** (1.1177)
Squared gross domestic product		-0.0028* (0.0017)	-0.4226*** (0.1538)
Cubic gross domestic product			0.0195** (0.0069)
Inflation	-4.60e-07* (2.41e-07)	0.0004** (0.00002)	0.0003 (0.0014)
Openness		0.0002 (0.0008)	
Constant	-0.1789 (0.0983)	-0.2119 (0.0807)	-7.3731 (2.8634)
Instruments	25	30	29
Countries	31	31	31
Hansen Test	0.333	0.428	0.404
AR (1)	0.045	0.039	0.389
AR (2)	0.817	0.727	0.670

Notes:***, **, * denote a 1%, 5% and 10% significance level, respectively. The standard errors are in brackets.

Source: Author

In line with Y. Yang and T. M. Greaney (2017), the hypothesized S-shaped relationship was tested while researching the growth - inequality nexus. To test the likelihood of such a relationship, the cubic GDP *per capita*, i.e. y^3, was included in the income inequality model. The results are accounted for in Column 3 of Table 3. The GDP *per capita* is positive and statistically significant at a one percent significance level, i.e. as the economy grows, income inequality rises initially. On the other hand, the squared GDP *per capita* is negative and statistically significant at a one percent significance level, depicting an inverse relationship between economic growth and income inequality, whereas the cubic GDP *per capita* coefficient is positive and statistically significant at a one percent significance level.

These findings suggest the validity of the S-shape hypothesis as conceptualized by Y. Yang and T. M. Greaney (2017). The statistically insignificant probability values of AR (2) indicate that all the models in this study were specified well and that there are no second order serial correlation issues in them. Likewise, the instruments do not exceed the cross-sections in all the estimated models. The instruments used in this research study are quite consistent based on the probability values of the respective Hansen statistics.

The estimates of our models consistently indicate the presence of a positive effect of the contemporaneous growth of the economy on income inequality in SSA, which surmises that growth spurts do not actually whittle down disparities in income distribution. The finding is congruent with M. Lundberg and L. Squire (2003), R. Pagano (2004), A. O. Binatli (2012), N. F. Wahiba and M. Weriemmi (2014), E. Berisha and J. Meszaros (2016), among others. However, W. A. Risso *et al* (2013) and K. S. Chan *et al* (2014), among others, reported a negative effect of economic growth on income inequality. With the contemporaneous GDP *per capita* being positive in relation to income inequality, it implies that economic growth will originally promote income inequality in the economy, which conforms to Kuznets' postulate that growing income *per capita* will initially lead to a rise in income inequality. By implication, the pattern of the interaction between growth and income inequality unfolds as the structure of the economy changes. The inclusion of the squared GDP *per capita* in the model gave rise to a significant inverted-U relationship between economic growth and inequality, which is as result of the positive coefficient of the contemporaneous GDP *per capita* and the negative squared GDP *per capita*, which confirms the rationality of the Kuznets inverted-U hypothesis for the Sub-Saharan African region. The studies that have confirmed this hypothesis include R. J. Barro (2000), R. J. Barro (2008), J. A. Charles-Coll, (2010), J. A. Charles-Coll (2014) and Hartmann *et al* (2017). Y. Yang and T. M. Greaney (2017) confirmed applicability of the Kuznets inverted-U hypothesis for Japan and South Korea but did not find the evidence for this hypothesis for China and the US. It is quite apt to note that none of the aforementioned studies focused on Sub-Saharan Africa. The consistency of the results obtained in this paper with the Kuznets hypothesis has certain implications. It indicates that sectoral or structural shifts in the economic development process are crucial in explaining variations in income inequality in Sub-Saharan Africa. That is to say income inequality within and between sectors is traceable to the level of the growth and development of the economy, simultaneously showing that the economies of the SSA region are bound to experience both negative and positive causal relationship from economic growth to income inequality in the process of their development. Likewise, growth spurts are likely to be increasing income inequality while the periods of growth trough are likely to be associated with income inequality. It also depicts a trade-off between income equality and growth. Therefore, when higher equality in income distribution is desired, there is likely to be an opportunity cost of lower economic growth. Apparently, when higher growth is desired, there tends to be an inevitable increase in income inequality.

An attempt to test the conjecture of the S-shaped curve hypothesis (in terms of the effect of growth on inequality) by Y. Yang and T. M Greaney (2017) proved to be valid for the SSA region. This emanates from the statistical significance of the positive GDP *per capita*, negative squared GDP *per capita* and positive cubic GDP *per capita* coefficients for the sampled period.

This traced out the S-shaped causal link between growth and income inequality i.e. the economy initially experiences the hypothesized Kuznets relationship followed by the U-shaped relationship between growth and inequality. It is, however, apt and vital to note that the S-shaped curve hypothesis is likely to be a long-term phenomenon and the same could be tested better using data covering a very long period at the country level. The study by Y. Yang and T. M. Greaney (2017) employed data on China (for the period from 1964 to 2013), Japan (for the period from 1960 to 2010), South Korea (for the period from1963 to 2013) and the US (for the period from 1960 to 2012) and did not obtain the same results for the four economies. For instance, there are differences in the slope of the S-curve of South Korea and Japan. This shows that structural differences across these economies are likely to be the underlying determinants of this postulated relationship.

CONCLUSION

The extant empirical studies have failed to produce consensual findings on the implications of the growth of the economy on income inequality due to a lack of reliable and adequate data and the use of an inappropriate methodology. Taking cognizance of these issues, the Blundell-Bond GMM was applied to income inequality data on SSA in this paper and economic growth is found to play the crucial role in income distribution. It is specifically inferred that in no way do spurts in economic growth bring about reduction in income gaps, as income accruals or economic gains ostensibly benefit only a few in the region. The evidence of the analysis of the effect of economic growth on income inequality also supports the Kuznets inverted-U hypothesis. It is also very apposite to note that the Government seems to be pursuing growth-promoting policies without prejudice to reducing income inequality or achieving an effective income redistribution, since positive growth is recorded to the detriment of an equitable income distribution. An unabated increase in income inequality could impede economic growth in the long run, especially through unequal access to investment opportunities. This effect is likely to have pronounced implications for the informal sector, a relatively larger employer of labor in the SSA region, through a lack of access to credit or investible funds. Persisting income inequality could also have eventual reversed dampening effect on economic growth via low human capital investment by disproportionately poor households. Given the long-term consequences of the subsisting relationship between growth and inequality in the region, policymakers need to advocate growth-enhancing strategies that will simultaneously stem rising income inequality in SSA. This paper provides an empirical proof of the effect of economic growth on income inequality in Sub-Saharan Africa, substantially contributing to the extant literature at the same time. However, there is the need for country-specific studies in drafting effective policies for reducing the gap between the rich and the poor, given the differences in the growth profiles of the countries. Likewise, the studies of this nature are necessary for the accurate documentation of the evidence of the S-curve supposition at various national levels.

REFERENCES

Akadiri, S. S., & Akadiri, A. C. (2018). Growth and inequality in Africa: Reconsideration. *Academic Journal of Economic Studies*, *4*(3), 76-86.

Barro, R. J. (2000). Inequality and growth in panel of countries. *Journal of Economic Growth*, *5*(1), 5-32. doi:10.1023/A:1009850119329

Barro, R. J. (2008). Inequality and growth revisited. *ADB Working Paper Series on Regional Economic Integration No. 11.* Mandaluyong City, PH: Asian Development Bank.

Batuo, M. E., Kararach, G., & Malki, I. (2022). The dynamics of income inequality in Africa: An empirical investigation on the role of macroeconomic and institutional forces. *World Development*, *157*, 105939. doi:10.1016/j.worlddev.2022.105939

Berisha, E., & Meszaros, J. (2016). Household debt, economic conditions and income inequality: A state level analysis. *The Social Science Journal*, *54*(1), 93-101. doi:10.1016/j.socij.2016.11.002

Binatli, A. O. (2012). Growth and income inequality: A comparative analysis. *Economics Research International*, *2012*, 1-7. doi:10.1155/2012/569890

Blanco, G., & Ram, R. (2019). Level of development and income inequality in the United States: Kuznets hypothesis revisited once again. *Economic Modelling*, *80*, 400-406. doi:10.1016/j.econmod.2018.11.024

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115-143. doi:10.1016/s0304-4076(98)00009-8

Chan, K. S., Zhou, X., & Pan, Z. (2014). The growth and inequality nexus: The case of China. *International Review of Economics & Finance*, *34*, 230-236. doi:10.1016/j.iref.2014.08.004

Chancel, L., Cogneau, D., Gethin, A., & Myczkowski, A. (2019). Income inequality in Africa, 1990-2017. *World Inequality Database World Issue Brief 2019/6*. Paris, FR: World Inequality Lab.

Chang, S., Gupta, R., Miller, S. M., & Wohar, M. E. (2019). Growth volatility and inequality in the U.S: A Wavelet Analysis. *Physica A: Statistical Mechanics and its Applications*, *521*, 48-73. doi:10.1016/j.physa.2019.01.024

Charles-Coll, J. A. (2010). The optimal rate of inequality: A framework for the relationship between income inequality and economic growth. *Munich Personal RePEc Archive Paper No. 28921*.

Charles-Coll, J. A. (2014). Inequality and growth in the context of the Mexican economy: Does inequality matter for growth? *ECINEQ Working Paper No. 2014-331*. Palma de Mallorca, ES: The Society for the Study of Economic Inequality.

Cheema, A. R., & Sial, M. H. (2012). Poverty, income inequality and growth in Pakistan: A pooled regression analysis. *The Lahore Journal of Economics*, *17*(2), 137-157. doi:10.35536/lje.2012.v17.i2.a6

Fuje, H., & Yao, J. (2022, September 21). Africa's rapid economic growth hasn't fully closed income gaps. IMF BLOG. https://www.imf.org/en/Blogs/Articles/2022/09/20/africas-rapid-economic-growth-hasnt-fully-closed-income-gaps

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators, *Econometrica*, *50*(4), 1029-1054. doi:10.2307/1912775

Hartmann, D., Guevara, M. R., Jara-Figueroa, C., Aristaran, M., & Hidalgo, C. A. (2017). Linking economic complexity, institutions and income inequality. *World Development*, *93*, 75-93. doi:10.1016/j.worlddev.2016.12.020

Huang, H. C. R., Fang, W., Miller, S. M., & Yeh, C. C. (2015). The effect of growth volatility in income inequality. *Economic Modeling*, *45*, 212-222. doi:10.1016/j.econmod.2014.11.020

Ighobor, K. (2018). Closing Africa's wealth gap. *Africa Renewal*. Retrieved January 15, 2023, from https://www.un.org/africarenewal/magazine/december-2017-march-2018/closing-africa%E2%80%99s-wealth-gap

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, *45*(1), 1-28.

Lundberg, M., & Squire, L. (2003). The simultaneous evolution of growth and inequality. *The Economic Journal*, *113*(487), 326-344. doi:10.1111/1468-0297.00127

Lyubimov, I. (2017). Income inequality revisited 60 years later: Picketty vs Kuznets. *Russian Journal of Economics*, *3*(1), 42-53. doi:10.1016/j.ruje.2017.02.003

Mhaka, S., & Sahdev, A. (2023, February 6). *Economic growth and Inequality: The Kuznets Hypothesis in high inequality African regions*. Research Square. https://www.researchsquare.com/article/rs-2530615/v1

Niyimbanira, F. (2017). Analysis of the impact of economic growth on income inequality and poverty in South Africa: The case of Mpumalanga Province. *International Journal of Economics and Financial Issues*, *7*(4), 254-261.

Pagano, R. (2004). An empirical investigation of the relationship between inequality and growth. *Banca d'Italia Temi di discussione No. 536*. Rome, IT: Bank of Italy.

Risso, W. A., Punzo, L. F., & Sanchez-Carrera, E. J. (2013). Economic growth and income distribution in Mexico: A cointegration exercise. *Economic Modelling*, *35*, 708-714. doi:10.1016/j.econmod.2013.08.036

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal: Promoting communications on statistics and Stata*, *9*(1), 86-136. doi:10.1177/1536867x0900900106

Wahiba, N. F., & El-Weriemmi, M. (2014). The relationship between economic growth and income inequality. *International Journal of Economics and Financial Issues*, *4*(1), 135-143

Wong, A., & Ribeiro, C. (2017). Income inequality: Does it matter? *Economic Horizons, 19*(2), 141-155. doi:10.5937/ekonhor1702141W

World Bank. (2018). *World Development Indicators*. Washington, DC: The World Bank.

Yang, Y., & Greaney, T. M. (2017). Economic growth and income inequality in the Asia-Pacific region: A comparative study of China, Japan, South Korea and the United States. *Journal of Asian Economics*, *48*, 6-22. doi:10.1016/j.asieco.2016.10.008

Received on 25th February 2023,
after two revisions,
accepted for publication on 13th July 2023.
Published online on 23th August 2023.

Ibrahim Odusanya is a lecturer at the Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Nigeria. He holds an MSc and a PhD in economics from the University of Ibadan and Obafemi Awolowo University, respectively. His research interests are related to health and development economics.