
THE NEXUS BETWEEN HUMAN CAPITAL AND INCOME INEQUALITY: THE NIGERIAN EXPERIENCE

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Abstract

The study examines the relationship between human capital and income inequality in Nigeria from 1981 to 2019. The study made use of secondary data and the autoregressive distributed lag (ARDL) bounds test estimation technique to analyze the data. The variables used in the analysis include income inequality, tertiary education enrolment, secondary school enrolment, government health expenditure, inflation rate, employment rate and gdp per capita. The results of the findings showed that one-year lagged income inequality and secondary school enrolment are both significant at the 5% level. In the long run, tertiary education enrolment, secondary school enrolment, government expenditure on health and employment rate are all statistically significant at the 1% level. Thus, in the long run, all the indicators of human capital are significant drivers of income inequality in Nigeria. Notwithstanding, of all the indicators, only tertiary school enrolment is negatively related to income inequality, as expected. The implication is that, in Nigeria, it is tertiary school enrolment that significantly lowers income inequality. Sequel to the finding in respect of the importance of tertiary school enrolment, it is recommended that policy makers continually support enrolment to tertiary schools in order to continuously witness significant declines in income inequality in Nigeria.

Key Word: Human Capital, Income Inequality, School Enrolment, Government Expenditure.

Introduction

There have been various studies on the importance and the relationship between human capital and income inequality. It is widely agreed that human capital accumulation by individuals or nations can positively and significantly affect the income level. Acquiring sufficient education at skilled level will affect the prospects to earn sufficient income.

Development and labour economists are presently concerned on the rising income inequality both in developed and developing countries (Murphy and Topel 2014). Income inequality gap is wider in developing countries than the developed nations. The developed economies have laid much emphasis on education and production of high skilled professional while the developing economies are relying on the foreign skills to harness their natural resources for economic development (Viame and Zileha, 2003). The presence of income inequality affects the way in which an economy works and this affects the realization of some development goals. The negative consequences of income inequality include poverty, under-nutrition, inferiority complex, lack of self-esteem, idleness and low productivity. It also constrains the poor to increase their knowledge through education and training, this will subsequently result to poor human capital development and income distribution, poverty and vicious cycle. (Ray, 1998). People who are less educated or uneducated have fewer prospects to earn sufficient income. Also, unequal distribution of income may result in educational inequality or vice-versa. The importance of education which is the prime factor in human capital influences one's earnings especially in developing economy where the estimates of rate of return are relatively low. Much emphasis is placed on educational certificates in recruitment and remuneration of staff. The higher one's level of education the higher the starting point of wages and the subsequent promotion and the elevation to higher post, not minding the rate of productivity returns.

Long (2010) and Moock (2003) examined the extent to which a rate of return to labour was directly related to the human capital. The studies found that education attainment and college quality raised earnings. Education increases skills and productivity. In a competitive labour market, earned wages, equal workers' productivity, higher productivity leads to higher wages. In a more educated society, higher wages are paid which result to good standard of living. Furthermore, a higher paid family would be able to send their children to better schools for better education in the higher rated professions, such as in engineering, medicine and management courses. Low income and poor family may have negative effect on education investment. This in aggregate would affect human capital development thereby enhancing income inequality. The choice of profession also contributes to the high level of income inequality, such professional skilled labour whose demand is greater than supply command high wages, such courses whose supply is greater than demand reflect more on poor salary negotiation. In this type, underemployment with low or poor wages occur without regarding the level of professionalism or educational attainments, hence, these widen the level of income inequality.

Field (1980), Park (1996), Chakraborty & Das (2005) and Ram (1990) examined the relationship between human capital inequality and income inequality, they all agreed that they are positively related, high level of human capital inequality will bring high level of income inequality. Jordan (2017), Anette & Daltistar (2014), and Suraye & Zaleha (2014), studied the role and effects of human capital on income inequality, their results showed that human capital has positive and high significant effects on income inequalities. However, Ram (1984) and Digdowiseiso (2009) came out in their studies that higher human capital

inequality has no significant effect on income inequality, their results were influenced by their method of computation which was a standard deviation for human capital inequality.

Amparo and Raphael (2014) came out in their studies that there is low correlation between changes in income and education inequality. Lin (2007) affirmed in their results revealed lower education can bring a lower income inequality. Heckman & Yi (2012) and Murphy & Topel (2014) studied the relationship among human capital, inequality and economic growth. Their studies revealed a positive relationship between human capital and economic growth, negative relation between income inequality and economic growth while Suraya and Zaleha (2015) affirmed in their study that human capital has positive and significant effect on income inequality in developing and developed countries. According to their studies, income inequality helps the entrepreneur to produce more with less cost of production, which results to more profits and more investment. Also, income inequality helps the affected low wage earners to go for more training and educational pursuit to acquire more skills.

Empirical Review

Many researchers have written on the relationship between human capital development and economic growth, gender inequality and income inequality. Some of the results of their findings are as follows:

Anette (2014) examined the effect and the relationship between income inequality and human capital for fifty years in one hundred and twenty three countries. A two-least square estimation was adopted for the analysis of the secondary data collected. The results of the findings showed a positive and significant relationship between income inequality and educational attainment, this showed that an improved educational attainment is capable of reducing inequality. In their contribution to literature on human capital and income inequality, Chani & Pervaiz (2014) investigated the relationship between the two variables in Pakistan. An annual time series data for 37 years was collected while Johanson Co-integration and OLS Statistical method were used to ascertain the long-run relationship between human capital inequality and income inequality, according to the results, human inequality causes income inequality. The study advised government to put in place policies to reduce income inequality in order not to discourage people from putting in their labour as well as not to discourage educational attainment which may eventually affect human capital negatively.

Suraya and Mahmood (2015) examined the effect of human capital on income inequality in 92 countries for forty years (1970-2010) using panel data and employed two-step System Generalised Method of Moment. The result of the findings showed that human capital inequality has a positive and significance effect on income inequality. The study advised governments to give adequate equal opportunities to reduce income inequality as well as formulating policies to reduce human inequality. Amparo and Rafael (2014) also examined some facts on human capital and income inequality using panel data of 146 countries for sixty years (1950-2010). The results of the finding revealed that tertiary education should be encouraged than the secondary and primary schools, educational system with significant skills accumulation should be encouraged. Also, the level of illiteracy should be reduced for more access to higher levels of education with more skill-biased technological progress.

Furthermore, Heckman & Yi (2012) examined the role of human capital inequality and economic growth in China. The study made use of descriptive analysis to evaluate inequality in education and the role of China in financing public schools. According to the study, the country was facing serious challenges in reducing high inequality in education and the quality of the country's labour force. The result of the findings revealed that human capital

development has a strong positive significant effect on capital markets. The study therefore encouraged government to increase her expenditure on education in order to encourage and enhancing the quality and quantitative education.

Murphy & Topel (2014) focused their attention on the relationship among human capital investment, inequality and growth in the United States. The study examined the rising wages inequality for men and women which relates to skill prices. Also, included in the study is the demand and supply of labour. Time series data were used to analyse the economic growth model, elasticity with various variables of human capital, inequality and economic growth. The result showed the trends of measurement and intensity of applications of the supply of human capital and equilibrium inequality, income inequality and growth. The result also showed how the human capital choices of individuals and families affect the type of skills and labour force. Jorge (2013) contributed to the general debate on the relationship between economic growth and income inequality. A descriptive analysis was employed to review the three main position of analysis- positive, negative and linear relationship. The result of the debate recognised in general agreement of the relationship but no general agreement on how the distribution of income result in lower or higher GDP growth after a period of time.

In addition, Mohammed and Popoola (2016) examined the determinants of human capital to the economic growth for 14 years in developing countries. Time series data was employed while OLS Statistical method and Powel Co-integration test were applied to show the long-run equilibrium relationship. The results of the findings showed that human capital development and its determinants have a stable long-run relationship. The study advised the government to maintain the human capital development level through education and health expenditure policies.

Omankhaden, Joshua, Obarisiagbon and Okorie (2014) examined the role and efficiency of government on human capital development in Nigeria. Secondary data was collected while Ordinary Least Square method was adopted for the data processing. Particular emphasis was placed on education component of human capital. The result of the findings showed a significant reduction in the efficiency of government expenditure on education between the period of 1990 and 2013. The study therefore advised government for more commitments and encouragements on more financial aid to education for more quality of education and professional outputs of human capital and capacity building.

Long (2010) examined the extent to which the rate return to labour was directly related to human capital in United States for 35 years. It focused on the effect of education attainment and college quality on three groups of students between 1970 and 1990s. The results of the study showed that educational attainment and college quality raise earnings. It also revealed that the increasing effects of education attainment has positive and significant effect on voters registration, while the effects of college quality has effect on, late marriage, child bearing particular for males and finally a positive effect of additional year of studies on earning.

Theoretical Framework

The classical economists have interest in income inequality because income equality discourages savings. According to them, inequality in income encourages and provides incentive for economic growth. In their own submission and belief, Keynesian economists advocated for income inequality to sustain economic growth. The Marxian followers supported Keynesian economists, they opposed income inequality because it works against the capitalism. Income inequality would lead the poor masses to less demand and consumption, less production, and thus really work against the capitalists.

The classical school on the other hand favoured income inequality because it encourages savings. Other economists that support income inequalities include Lewis and Kuznet (1955). Kuznet (1955), introduced U-shaped curve, he postulated his experience with the developed countries where there is tendency for income inequalities to increase initially and tends to reduce as the countries continue to develop. The high income inequality according to him, had a favourable effect on economic growth in the early stage because of enough savings and profits for further investment and larger capital formation. Lewis advocated income inequality for under-developed nations, his assertion may not work well for developing economics as it worked well in developed economics, and income inequalities is no condition for rapid economic growth because the policy of raising profits and increasing savings for capital formation may lead to social unrest. High level of income inequality where majority are affected would affect the demand and consumption of goods and services, reducing level of productivity, low savings and investment respectively.

This work rely on the principle of Keynes and his followers that income inequality brings stagnation in the economics; where high percentage of labour are affected by high income inequality, this results to poor demand and consumption and by multiplier effects, it leads to low production and poor investment. The objectives of this study are to investigate the long-run relationship between educational attainment and income inequality as well as to examine the causal relationship between employment rate and income inequality in Nigeria.

Methodology

In order to achieve the above objectives, the study followed the works of Gregorio and Lee (2002) as adopted by Ahmed and Imam (2013). The variables used in the work are the ones that are directly linked to human capital development and income inequality. The variables used are; income inequality (proxied by Gini Index), tertiary education enrolment, secondary school enrolment, health expenditure, inflation rate, employment rate and GDP per capital. Data for the variables were for 38 years (1981-2018) and were sourced from the Nigerian Bureau of statistics and WDI respectively.

The implicit form of the equation:

$$\text{GINI} = f(\text{TEE}, \text{SSE}, \text{GHE}, \text{INFL}, \text{EMPL}, \text{GDPC})$$

Expressed in a linear and log linear form

$$\text{GINI} = \beta_0 + \beta_1 \text{TEE} + \beta_2 \text{SSE} + \beta_3 \ln \text{GHE} + \beta_4 \text{INFL} + \beta_5 \text{EMPL} + \beta_6 \ln \text{GDPC} + \text{Et}$$

β_3 and β_6 are in value while others: β_1 , β_2 , β_4 and β_5 are in rates

GINI: Gini index; Tee: Tertiary Education Enrolment, SSE: Secondary School Enrolment, GHE: Government, Expenditure on Health, INFL: Inflation Rate, EMPL: Employment Rate, LNGDPC: Log GDP Per Capita.

A-priori Expectation

$$\Delta \text{GINI}, \Delta \text{GINI} \text{ and } \text{GINI} < 0$$

$$\Delta \text{TEE} \quad \Delta \text{SSE} \quad \Delta \text{LNGHE}$$

While

$$\Delta \text{GINI}, \Delta \text{GINI} \text{ AND } \Delta \text{GINI} > 0$$

$$\Delta \text{INFL} \quad \Delta \text{EMPL} \quad \Delta \text{LNGDPC}$$

ARDL model Specification

The ARDL model is specified as:

$$\begin{aligned} \Delta \text{GINI}_t = & \beta_0 + \beta_1 \text{GINI}_{t-1} + \beta_2 \text{TEE}_{t-1} + \beta_3 \text{SSE}_{t-1} + \beta_4 \text{In GHE}_{t-1} + \beta_5 \text{INFL}_{t-1} \\ & + \beta_6 \text{EMPL}_{t-1} + \beta_7 \text{In GDPC}_{t-1} + \sum_{i=1}^p \phi_1 \text{GINI}_{t-1} + \sum_{i=1}^q \phi_2 \Delta \text{TEE}_{t-1} \\ & + \sum_{i=1}^q \phi_3 \Delta \text{SSE}_{t-1} + \sum_{i=1}^q \phi_4 \Delta \text{In GHE}_{t-1} + \sum_{i=1}^q \phi_5 \Delta \text{INFL}_{t-1} \\ & + \sum_{i=1}^q \phi_6 \Delta \text{EMPL}_{t-1} + \sum_{i=1}^q \phi_7 \Delta \text{In GDPC}_{t-1} + e_t \end{aligned}$$

The error correction Model is specified as;

$$\begin{aligned} \Delta \text{GINI}_t = & \beta_0 + \sum_{i=1}^p \gamma_1 \text{GINI}_{t-1} + \sum_{i=1}^q \gamma_2 \Delta \text{TEE}_{t-1} + \sum_{i=1}^q \gamma_3 \Delta \text{SSE}_{t-1} + \sum_{i=1}^q \gamma_4 \Delta \text{In GHE}_{t-1} \\ & + \sum_{i=1}^q \gamma_5 \Delta \text{INFL}_{t-1} + \sum_{i=1}^q \gamma_6 \Delta \text{EMPL}_{t-1} + \sum_{i=1}^q \gamma_7 \Delta \text{In GDPC}_{t-1} + \gamma_7 \text{ECT}_{t-1} \\ & + e_t \end{aligned}$$

Where:

β_0 = Constant or Intercepts term.

ϕ_i = Short run multipliers/short run dynamics

γ_0 = long- run multipliers

Δ = the first difference or change operator

t-1 = Time element and lags

Explanation of Variables

- Income Inequality: Proxied by Gini Index. This is used for effective measure of inequality.
- Tertiary and Secondary Enrolment: This used as proxy for education and are used to measure human capital development.
- Government Expenditure on Health: This is Government total expenditure on health care delivery and is used as a component of human capital development.

- d. Employment Rate: This shows the employment to population ratio of the country. This involved the working population age.
- e. GDP per Capita: This shows the average income distribution in the country. This will show the gap in the level of income inequality.

Discussion of result

Unit root test

In this study, the unit root test is conducted using the Augmented Dickey-Fuller (ADF) test. Table 1 presents the ADF test result tested under the null hypothesis of a unit root amongst the series against the alternative hypothesis of no unit root in the series. From table 1, a clear mixture of both [I (0)] and [I (1)] series is reported. TEE and INFL are stationary at level [I (0)] while GINI, SSE, GHE, EMPL and GDPC are not stationary at level but become stationary after the first difference. As the series is integrated at both [I(0)] and [I(1)], the ARDL bound test estimation can therefore be conducted in a convenient manner.

Table 1. Augmented Dickey-Fuller (ADF) Unit Root Test

Variable	Level		1 st Diff.		Prob.	Result	Remark
	T-Stat.	5% C.V.	T-Stat.	5% C.V.			
GINI	-2.5904	-3.5366	-3.6731	-3.5403	0.0337	I (1)	Stationary
TEE	-4.0615	-3.5806	-	-	0.0180	I (0)	Stationary
SSE	-0.7308	-3.5331	-5.4436	-3.5366	0.0004	I (1)	Stationary
GHE	-2.3416	-3.5530	-3.3480	-3.5684	0.0779	I (1)	Stationary
INFL	-6.6095	-3.5331	-	-	0.0000	I (0)	Stationary
EMPL	-1.7115	-3.5578	-4.4160	-3.5578	0.0071	I (1)	Stationary
GDPC	-1.9807	-3.5403	-4.0739	-3.5366	0.0146	I (1)	Stationary

Source: Authors compilation from E-views 10

ARDL Bound Test for Cointegration

Following Adama et al., (2022) and Popoola et al. (2018), the autoregressive distributed lag (ARDL) bound test approach for co-integration by Pesaran et al. (2001) is employed in this study and the result is presented in table 2. This method has several advantages over other co-integration tests, such as the Engel-Granger and Johannsen co-integration method, in particular the fact that it can be used to confirm the co-integrating relationship between variables regardless of the order of integration, as long as they are below order two [I(2)]. Another important benefit is its potential to be used even in small sample sizes studies, unlike other co-integration tests.

When using GINI as the dependent variable under the null hypothesis of no co-integration against its alternative hypothesis of a co-integrating relationship, the f-statistics from the ARDL bound test is 4.80843. Since the f-statistic value of 4.80843 is greater than the upper bound value at 1%, 5% and 10% level of significant therefore indicating that a long-run relationship exists among the variable in the study. We can therefore reject the null hypothesis of no co-integration.

Table 2. ARDL bound test

	Value	K
F-statistic	4.80843	6
Significance	<i>I(0)</i>	<i>I(1)</i>
10%	2.12	3.23
5%	2.45	3.61
1%	2.75	4.43

Source: Authors compilation from E-views 1

ARDL and Error Correction Model Result

Since co-integration has been established in the model, the next step is to estimate the long run and short-run relationship, which result is shown in table 3 and table 4, respectively. In the long run, TEE, INFL and LNGDPC are negative predictors of GINI. TEE is significant at 1%, but INFL and LNGDPC are not stationary. Other variables such as SSE, GEH and EMPL have a positive relation with GINI and are all statistically significant at the 1%, 5% and 1% level respectively. In the short run estimate on table 4, the error correction term is -0.629862 meaning the speed of adjustment back to equilibrium is approximately 63%. The result from table 4 reveals the error correction term (ECT) to be high, statistically significant and negative as expected. The negative and significant result indicated a reversal to equilibrium, while a high value of ECT indicates a faster speed of adjustment. We also found that R^2 to be 82 %; this implies that all variation in the model can be explained. The Durbin-Watson (D-W) test for autocorrelation shows D-W to be 2.198609. We can, therefore conclude that there is no autocorrelation in the model.

Table 3. Long-run estimates ARDL

TEE	SSE	LNGHE	INFL	EMPL	LNGDPC
-8.45E-06	2.81E-06	2.02354	-0.00736	0.96148	-4.07856
2.67E-06	7.33E-07	0.688170	0.038097	0.313629	10.09908
[-3.1690]	[3.8282]	[2.9405]	[-0.1933]	[3.0657]	[-0.4039]
(0.0064)	(0.0016)	(0.0101)	(0.8493)	(0.0078)	(0.6920)

The t-statistic and probability value are represented by parenthesis [] and (), respectively. Source: Authors compilation from E-views 10

Table 4. Short-run estimates

ECM	Δ GINI (-1)	Δ TEE	Δ SSE	Δ EMPL	Δ LNGDPC
-0.629862	0.579008	-2.68E-06	1.01E-06	-0.20862	-5.28914
0.0902	0.11537	1.46E-06	3.90E-07	0.110453	5.39577
[-6.98658]	[5.01886]	[-1.83545]	[2.59903]	[-1.89187]	[-0.98024]
0.0000	(0.0002)	(0.0863)	(0.0201)	(0.0780)	(0.3425)
R-squared	0.821724		Serial Correlation		(0.7467)Reject H_0
D-W stat	2.198609		Normality test		(0.6778)Reject H_0
F-statistic	9.679490		Heteroskedasticity Test		(0.1194)Reject H_0
Prob(F-statistic)	0.000008				

Δ denotes the difference operator. The t-statistic and probability value are represented by parenthesis [] and (), respectively. Source: Authors compilation from E-views 10

After performing the ARDL model test, some diagnostics and stability tests are conducted and reported in table 4 to satisfy the usefulness and reliability of the result. From the results also reported in table 4, there is no evidence of serial correlation or heteroskedasticity problem in the model. The Jarque-Bera Normality test also shows evidence of a normally distributed error.

Figure 1 and Figure 2 represents the plot of the cumulative sum of the residual (CUSUM) and the cumulative sum of the square residual (CUSUM of Square) respective. From the CUSUM and CUSUMSQ plots in figure 1 and 2, they show evidence that the model is stable since the blue line plot lies within the 5% level of significance.

Figure 1. Cumulative Sum of the Residual

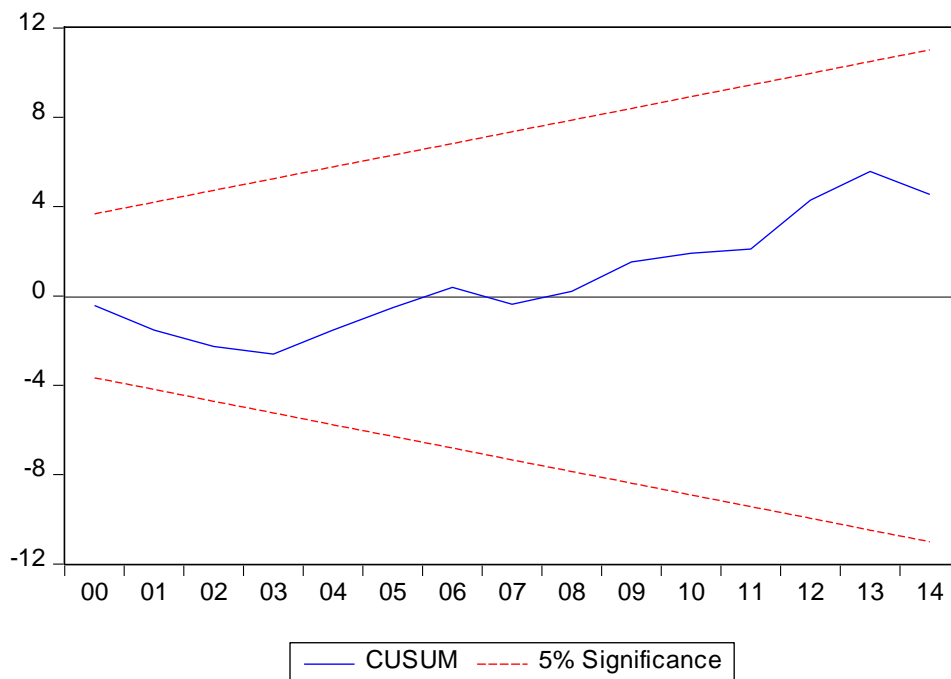
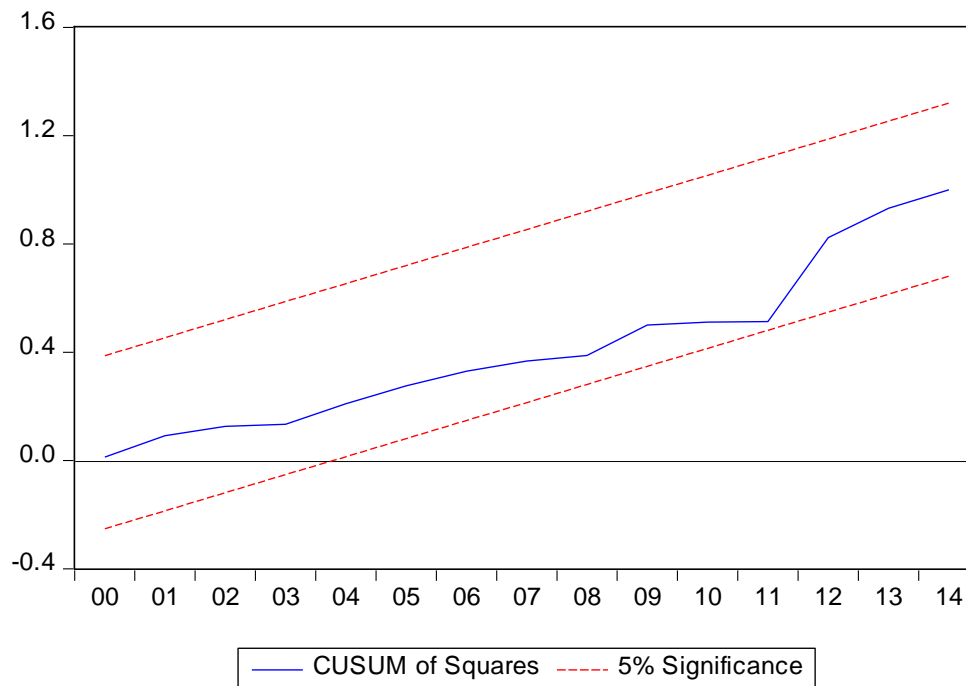


Figure 2. Cumulative Sum of Square Residual



Conclusion and policy recommendations

This article has conducted an empirical investigation into the nexus between human capital and income inequality in Nigeria. As indicators of human capital, secondary school enrolment, tertiary education enrolment, and government expenditure on health were used. One of the findings shows that both in the short- and long-run, gross domestic product per capita isn't a significant determinant of income inequality. In the case of secondary school enrolment, it positively and significantly impacts income inequality in the short and long run, hence, at the level of enrolment into secondary school, income inequality prevails. It is a different ball game when it comes to tertiary school enrolment as it negatively and significantly impacts income inequality in the short-and long-run, though weakly so in the short run as it is only significant at the 10% level. The take-home lesson from this is that with higher enrolments into tertiary schools come the bridging of the income gap in Nigeria. Stated differently, higher levels of tertiary school enrolments reduce income inequality significantly. Considering the employment rate, the sign of its coefficient is negative, and this variable is weakly significant in the short run; but this reverses in the long run as it becomes positively and highly significant. Hence, increases in employment rate only reduce income inequality in the short –run but not necessarily in the long run. The inability of employment rate to significantly drive down income inequality in the long run may be a pointer to varying remunerations that go with different skills and employments/jobs.

Stemming from the revelation that secondary school enrolment and government expenditure on health as indicators of human capital, in the long run, are still consistent with increasing income inequality unlike the case with tertiary education enrolment, it seems plausible that the populace be motivated via different means to proceed to the tertiary school level in order to sufficiently drive down income inequality.

Limitation of study and area of future research

Not distinguishing between employment rates by job type seems to hide the possible heterogeneous nature of employments and their attendant remunerations; this is noted to be a limitation of this study and an area of future research. Data on aggregate employment in Nigeria by job-type isn't easy to come by anyway.

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