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Analysis of Agricultural Wages, Trade Income and Income Inequality in Rural Nigeria

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Abstract

Apart from determining the sources of income inequality, this study analyzes the extent agricultural wages and trade income contributes to income inequality in rural Nigeria. Findings show high income inequality with a Gini coefficient of 0.51. Also the sources of income inequality were mostly trade and agricultural incomes, with a share of income of 42.7% and 30.9% respectively in total inequality. The share of income from wages and salaries in total income was found to be 26.4%. Trade income was found to be inequality-dampening, while agriculture income is inequality-enhancing, suggesting that trade income and agricultural wages are major contributors of income inequality in rural Nigeria.

Keywords: Agricultural wages; trade income; income inequality; Gini coefficient; rural Nigeria

Introduction

Previous studies in Nigeria have decomposed inequality and poverty and examined the relationship that exists between them. They failed to provide empirical evidence of the sources of income inequality, especially in rural areas. In recent times, there is growing concern over what happens when the gap between the rich and the poor in terms of income grows too wide. High inequality slows economic growth and reduces social mobility, threatens the stability of the society and could hold back the development of consensus on meeting common challenges and a right step in reducing the gap between rich and poor in terms of income (Charles-Coll, 2011; Dabla-Norris, Kochhar, Suphaphiphat, Ricka and Tsounta, 2015; Keeley, 2015). Income distribution is becoming more dispersed than ever before, which serves as a wedge between the poor and the rich, funneling income largely to those at the top of the scale and thus making it difficult for the low-income group to go out of poverty. Recent line of argument is that persistently high levels of inequality are eroding opportunity and mobility for those whose living standards and economic well-being are negatively affected by the changes in inequality gap. Among the economic challenges facing rural Nigeria is the increasing income inequality.

There are several reasons for the existence of income inequality among individuals with some actually related and other responding to the same underlying economic forces. Charles-Coll (2011) categorized the reasons for the existence of income inequality into endogenous and exogenous reasons. With respect to the exogenously determined factors, land distribution as a source of income inequality is naturally related with the rural context of societies, where production and the generation of wealth were highly associated with agricultural activities. Also, education is one of the most important determinants of the future income level of any individual. A society with a poor access to education may find itself in a situation in which the few who could obtain education and acquire skills will allocate in working positions that offer high salaries. If the supply of skilled workers is scarce not to meet the current demand, wages will rise even further. The reverse will be the case with the unskilled individuals who could not have access to education, the excess supply will drive wages to even lower levels, thus widening the gap between the income of educated and non-educated individuals.

In rural Nigeria, the distributions of income, wages and wealth are more dispersed than ever. Though, measurement issues abound, it is assumed that income inequality is at historically high levels. Income inequality has risen considerably over the past several decades. Income inequality among others is of concern because there are negative outcomes such as sub-optimal use of human resources, cause investment-reducing political and economic instability, and has raised crisis risk. However, it is not just widening inequality that matters. Choi (2011) shows that as income inequality rises the wealthy and poor increasingly sort into different neighborhoods, concentrating in communities that differ considerably from one another. Taking into consideration endogenous individual factors, one could mention the variety of preferences among individuals which can potentiate or undermine any physical or intellectual attribute. Preferences are influenced by social and cultural values. Constructed as a result of collective inertia, costumes, traditions, history and geography can determine the individuals' attitude towards certain preferences or choices such as work, education, risk aversion, or even decisions over leisure and income preferences. In other words, each individual, regardless of its innate abilities, can make different decisions and follow different paths which in turn can affect their income level and differentiate one from the others. Gender and race are among the most frequent causes for inequality within societies. Mitrakos (2014) posits that regarding the structure of inequality, contrary to what is often claimed during public debates, economic inequalities are much more (almost by 75%) attributable to differences within the various socioeconomic population groups (broken down based on demographic, geographical, occupational, educational and other criteria) than to differences between these groups. The extent of inequality, its drivers and what to do about it have become concern to policymakers and researchers. One factor that seems to be of major relevance and of more concern is the sources of inequality in rural community which is not yet clear. It is worrisome because persistently unbalanced income equality will result in pervasive inequities in access to education, health care, finance, and social resentment among other necessary sustainable growth variables.

Apart from determining the sources of income inequality, this paper contributes to existing literature by examining the extent agriculture and trade income contributes to income inequality in rural Nigeria.

Methodology and Purpose of the Study

This study analyzes the extent agricultural wages and trade income contributes to income inequality in rural Nigeria. 240 households were selected from Isuaniocha community in Akwa North Local Government Area, Anambra State, Nigeria. The sample size was determined first by randomly selecting 600 households from the population, and then, the Sloven's formula was used to arrive at the sample size of 240.

A standard set of measurement of inequality is built on the Lorenz curve which measures the proportion of total income, x , received by the p^{th} fraction of the population, arranged in ascending order of income. The Gini coefficient is commonly used as a measure of income inequality. It satisfies the four main principles (the transfer principle, also known as the Pigou-Dalton principle, the scale independence, the anonymity principle and the population independence) that any inequality metric should meet in order to be considered a reliable measure. The Gini coefficient can be defined as one less two times the area under the Lorenz curve given as:

$$G = 1 - 2 \int_0^1 L(R) dR \quad . \quad . \quad . \quad (1)$$

The Gini index can also be expressed in the covariance format following the work of Ichoku, *et al.* (2011) as:

$$G = \frac{2cov(x, R)}{\bar{x}} \quad . \quad . \quad . \quad (2)$$

where:

x is income and R is the cumulative distribution of income ranked in ascending order

\bar{x} is the mean income and COV is covariance. Clearly, the Gini index is twice the normalized income and rank. It also implies that there is symmetry between income and rank distribution. The Gini coefficient of the i th source of income, $I_G(Y_k)$ is represented as:

$$I_G(Y_k) = \frac{Cov(Y_k, i)}{n\mu_k} \quad (3)$$

The fact that total income is the sum of source incomes, the covariance between total income and its rank can be written as the sum of covariance between each source income and the rank of total income. The income Gini is then written as a function of the source Gini as presented below:

$$I_G(Y) = \sum_k \frac{\mu_k}{\mu} R_k I_G(Y_k) \tag{4}$$

R_k is the correlation ratio presented as:

$$R_k = \frac{Cov(Y,i)}{Cov(Y_k,i)} \tag{5}$$

Similarly, $\sum_k W_K g_K = 1$

$$W_K = \frac{\mu_k}{\mu} \tag{6}$$

$$g_K = R_k \frac{I_G(Y_k)}{I_G(Y)} \tag{7}$$

$W_k g_k$ is the factor income inequality weight of an income source in the aggregate income inequality or the relative contribution of source k , w_k is the source income weight or income share of income source k and g_k is the respective contribution coefficient of the i th such in overall inequality. The source of an income increases the overall income inequality if g_k is higher than 1 and decreases it when it is less than 1. The regression-based decomposition was developed by Morduch and Sicular (2002). Per capita real income and per capita adult equivalent income were the measures of welfare used for decomposing the sources of income inequality.

The decomposition is conducted by specifying an income function, like:

$$Y = aX + e \tag{8}$$

where:

- Y = per capita real income
- X = n x M matrix of independent variables
- a = M-vector of regression coefficients.

Given the conventional decomposition approach:

$$Y_i = \sum_{k=1}^k Y_k \quad (9)$$

The contributions to the Gini income inequality by each of the socio-economic factors (X_i) are decomposed as:

$$k(X^w, Y) = \frac{\sum_{i=1}^n (i - \frac{n+1}{2}) \hat{a}^w X_i^w}{\sum_{i=1}^n (i - \frac{n+1}{2}) Y_i} \quad (10)$$

Equation (10) can be applied in different inequality indices like the Theil-T, and coefficient of variation (CV). But Morduch and Sicular (2002) posit that parameters estimated with different approaches could produce different signs. It was thus pointed that for policy purposes, a choice must be made between different methods.

Following Oyekale, Adeoti and Oyekale (2006), the CV approach is decomposed as:

$$k_{cv}(X^w, Y) = k_{VAR}(X^w, Y) = \left[\frac{\sum_i (Y_i - \mu) \hat{a}^w X_i^w}{\sum_i (Y_i - \mu) Y_i} \right] = \left[\frac{[Cov(\hat{a}^w X^w, Y)]}{Var(Y)} \right] \quad (11)$$

Akin-Olagunju and Omonona (2014) provide the general formula for calculating the Gini coefficient for a distribution of income among n individuals as thus:

$$G = \frac{1}{2n^2 \mu} \sum_i \sum_j |Y_i - Y_j| \quad (12)$$

where:

G = Gini coefficient

Y = income (expenditure) of the whole population

Y_i and Y_j = the income of individuals i and j , n = number of individuals.

Following Lerman and Yitzhaki(1985), the Gini coefficient for total income can be represented as:

$$G = \sum_{k=1}^K S_k G_k R_k \quad . . . \quad (13)$$

Equation (13) indicates that the effect of income source k on overall income inequality can be decomposed into three components. These are the share of income component k in total income, S_k ; the inequality within the sample of income from source k , G_k ; and the correlation between source k income and total income, R_k . This measure of income inequality is in conformity with the Pigou-Dalton transfer principle, income scale independence, population independence, anonymity or symmetry and, it is additively decomposable. It also indicates that the influence of any income component upon total income inequality depends on: (i) how important the income source is with respect to total income; (ii) how equally or unequally distributed the income source is; and (iii) how the income source and the distribution of total income are correlated. This allows for the estimation of the effect that change in income from a source will have on total income inequality by:

$$\frac{S_k G_k R_k}{G} - S_k$$

When $S_k > \frac{S_k G_k R_k}{G}$, then the effect of a change in income from k will be negative and therefore inequality-dampening. Conversely, if $S_k < \frac{S_k G_k R_k}{G}$, the effect of a change in the source income will be positive and inequality-enhancing. If $S_k = \frac{S_k G_k R_k}{G}$, then income source is inequality invariant. The instrument used by this study is a close ended questionnaire. This instrument is appropriate because it is extremely flexible and employed to generate information from a large or small number of people.

Theoretical and Empirical Literature

Different theoretical frameworks point to different factors explaining the reason why inequality can affect economic growth (Ehrhart, 2009). There seems to be a wide consensus on the ideas that inequality can hinder economic growth and that country specificities matter in order to understand through which channels inequality slows down the pace of economic growth.

As posited by Bernstein (2013), inequality significantly influence level of human development, cost and access to financial capital and the depth of investment in public goods, which are relevant

to the economic growth process. For instance, higher inequality could lead to worse educational opportunities for children in many households compared to an economy where growth is more equitably distributed. In this theory, higher income inequality leads to higher educational inequality, where low-income children end up in lower-quality schools, benefit less relative to higher-income children from parental investments in child-enhancement goods such as art lessons or vacations to interesting places, and have less access to higher education. The relatively low human capital of the future workers then leads them to become less-effective inputs into the production of economic output, which slows the rate of growth. The demand-side theory points out that inequality is likely to negatively affect growth through the differences in the marginal propensity to consume across the income scale; because of the assumed diminishing marginal utility of money high-income people have the income they need to handily afford the things they need, such as housing, and want, such as jewelry and vacations (Bernstein, 2013).

The seminal contribution addressing explicitly the issue of economic inequality was developed by Kuznets (1955). The underlying premise is that the benefits of productivity growth would flow more broadly as society advances. Based on empirical evidence, Kuznets posits that inequality tends to rise in the early stages of economic development, as a consequence of industrialization, and then it declines in later stages, as capitalism matures. In this sense, income inequality presents the classical Inverted-U shaped trend in time. Put differently, Simon Kuznets pointed out that as emerging economies grew, inequality grew as well, as the few with high-asset endowments land owners, for instance-profit from their ownership of productive resources. Then as industrialization evolves, a much larger portion of the population has the chance to participate in higher value-added work, which reduces inequality. The result is an inverted U-shaped curve with inequality on the y-axis and per-capita income on the x-axis. As income grows, its distribution initially becomes more unequal, but as the benefits of productivity become more widely shared, inequality diminishes (Bernstein, 2013).

Empirically, Kuznets' hypothesis has been criticized by some scholars who contend that it is not only growth that fuels inequality in the society, but the nature of growth (see for instance, Ota, 2017, ten Barge). They maintained that the effect of growth on inequality depends on the factors which characterize the economic environment such as the

structure of output, the degree of economic dualism, the structure of employment, the distribution of land, the operation of capital markets and the overall level of human capital. In addition to that, more recently, Kuznets' approach has been even more radically questioned reversing the causation relation between growth and inequality, underlying Kuznets' seminal contribution. Basically, the idea is that economic inequality affects the pace and the nature of economic growth and not the reverse as in Kuznets' analysis (Stiglitz, 2012).

This stream of existing studies on inequality provides neither a direct causal link between inequality and rate of growth, nor a unique explanation. The study by Aristizabal et al. (2015) examined the individual-level determinants of wage inequality for Bolivia, Colombia, and Ecuador and found that Colombia exhibit the most unequal distribution of income. The wage regressions also show that wage of a college-educated individual does not differ from the wage of a person with only (some) primary education. It was however concluded that the sources of income inequality can differ substantially across countries. Respective policy prescriptions should differ accordingly. Focusing on the income shares of the poor and the middle class, the study by Dabla-Norris et al. (2015) examined the causes of divergent trends in inequality developments across advanced economies and emerging markets and developing countries. Findings indicates that technological progress and the resulting rise in the skill premium (positives for growth and productivity) and the decline of some labor market institutions are the reasons for inequality in advanced economies, emerging markets and developing countries

Inequality and poverty among households have also been studied by Akin-Olagunju and Omonona (2014) using primary data generated from 120 households. It was reported that agriculture contributes with 41.6% to the overall income inequality; non-farm self-employment (NFSE) contributes with 22.5%, while non-farm wage employment (NFWE) contributes with 36.4%. Agriculture and NFSE enhances inequality. Cingano (2014) examine trends in income inequality and its impact on economic growth in OECD countries. Using harmonized data, finding suggests that income inequality had negative impact on growth. Increased income disparities depress skills development among individuals. Mitrakos (2014) also examined the trends and the characteristics of inequality, poverty and living conditions in Greece, emphasizing the distributional effects of the austerity measures adopted

during current economic crisis. In the decomposition analysis, the structure of inequality and the contribution of various income sources in overall inequality and the main characteristics of the Greek social solidarity system and the poor distributional impact of social benefits were determined. The study revealed that income inequality and relative poverty has increased. Mitrakos and Tsakloglou (2012) analyzed inequality and poverty in Greece for the period 1974-2008 using primary data and conclude that relative poverty initially decreased considerably between 1974 and 1982 and thereafter remained relatively stable with narrow fluctuations throughout from 1982-2008. An examination of poverty adopting the absolute approach rather than the relative one however found that absolute poverty has decreased impressively. In separate studies, Matsaganis and Leventi (2011, 2012) used tax-benefit micro simulation techniques and estimated the impact of the austerity measures and the concomitant decline in economic activity on aggregate inequality and poverty, concluding that the austerity measures undertaken by the Greek government were progressive, but had small redistributive effect in relative terms and very important in the absolute poverty. Araar (2006) used the Shapley value to decompose Gini coefficient and generalized it to other inequality indices in Cameroon. The study found that rural areas contributed less than the urban areas to total inequality, while about two-third of the total inequality was explained by the nonfood in the expenditure components decomposition. The study by Oyekale, Adeoti, and Oyekale (2006) decomposed inequality and poverty and found that in 2004, income inequality was higher in rural areas than urban areas. Beside, employment income increases income inequality while agricultural income reduces income inequality. Interestingly, inequality between states, rural-urban areas and geographical zones accounts for the greater portion of observed inequality.

Results

Firstly, we present the personal characteristics of the respondents. Table no. 1 shows the distribution of the respondents' personal characteristics.

Table no. 1. Personal characteristics of the respondents

Variables	Frequency	%
Age		
Below 30 years	85	35.42
30 - 44 years	95	39.58
45 - 59 years	60	25.00
Total	240	100.00
Mean	32	
Gender		
Male	125	52.08
Female	115	47.92
Total	240	100.00
Marital Status		
Married	170	70.83
Single	42	17.50
Divorce	8	3.33
Widow	20	8.33
Total	240	100.00
Educational Status		
No formal education	8	3.33
Primary	19	7.92
Secondary	94	39.17
Tertiary	119	49.58
Total	240	100.00
Household Size		
1-5	58	24.17
6-10	64	26.67
11-15	33	13.75
16-20	46	19.17
21-Above	39	16.25
Total	240	100.00
Mean	12	
Occupation		
Farmer	87	36.25
Civil Servant	99	41.25
Trading	54	22.50
Total	240	100.00

Source: Authors Computation based on Field Survey, 2018

As depicted in Table no. 1, females are 115 (47.92 percent) of the total respondents while males are 125 (52.08 percent). Also, 85 or 35.42% of the respondents are below 30 years, 95 or 39.58% are between 30-44 years, 60 or 25.00% are between 45-59 years with mean age of 32. Concerning educational qualification, 8 or 3.33 percent of the

respondents has no formal education, 19 or 7.92 percent had primary education, while 94 or 39.17 percent has secondary education as their highest educational level attained. 119 or 49.58 percent of the respondents had tertiary education. Furthermore, 70.83% are married, while 17.50% of the respondents are single, 3.33% are divorced and 8.33% are widows. For the household size 58 (24.17%) has household size of 1-5 persons, 64 (26.67%) has household size of 6-10 persons, while 33 (13.75%) has household size of 11-15 persons. The household of 46 or 19.17% of the respondents were between 16-20 persons and 39 or 16.25% are with household size of 21 and above. Also, 87 or 36.25% are farmers, 99 or 41.25% were civil servants, while 54 or 22.50% are traders.

The result of the quintile distribution of income sources is presented in Table no. 2. As can be observed, the first quintile group represents the 1st 25 percentiles of the population, the second quintile group represents the 50th percentile (median group), while the 3rd quintile group is equivalent to the 75th percentile.

Table no. 2. Distributional summary statistics of quintile distribution of income sources

Quintile group	Quintile	% of median	% quintile group share of income	% cumulative group share	cumulative group share × mean (income)
1	18000	56.917	5.952	5.952	3151.875
2	31500	99.605	11.484	17.436	9232.833
3	60000	189.72	20.147	37.583	19901.08
4			62.417	100.000	52952.01
Minimum income		5500			
Maximum income		600000			
Mean income		52952			

Source: Authors Computation based on Field Survey, 2018

The income for the 1st, 2nd and 3rd quintile groups were 18000.000 or 56.92% median, 31500.000 or 99.605% of median and 60000.000 or 189.72% of median respectively. The percentage income difference between the poorest income group and the middle-income

group was found to be 42.69%, and the percentage income difference between the group immediately after the middle-income group and the middle-income group itself was 90.12%. This means that the income of the poorest percentage of the population was 42.69% below the income of the middle-income group (percentage) of the population whereas, the middle group was 90.12% below the income of the group following the middle-income group of the population. The percentage quintile group share of income for the 1st and 2nd quintile groups were respectively 5.952% and 11.484%. While, it was 20.147% and 62.417% for the 3rd and 4th quintile groups respectively. The difference between the share of income of the 1st and 2nd quintile groups is 5.53%, and the difference between the share of income of the 3rd and 4th quintile groups is 42.27%. The percentage quintile group share of income for 4th quintile group is 56.47 above the 1st quintile income group and 50.93 above the 2nd quintile group.

In line with the purpose of the study, income was decomposed into three income sources using the Gini coefficient and impact of each income source on inequality. The result is reported in Table no. 3.

Table no. 3. Gini Decomposition by income sources

Income Source	Sk	Gk	Rk	Ti	% Change
Wages and salaries	0.3284	0.5465	0.7449	0.2639	-0.0645
Trade	0.3645	0.6990	0.8480	0.4265	0.0620
Agriculture	0.3071	0.6321	0.8079	0.3096	0.0025

Note: Sk represents share in total income; Gk: Gini source, Rk: Gini coefficient of income source, Ti: share of total income source in total inequality

Source: Authors Computation based on Field Survey, 2018

In table no. 3 it can be seen that income from trade has the highest share in total income, with 36.5% of the total income. Thus, indicating how important the income source is with respect to total income. Income from wages has the second share, accounting 32.8% of total income, while the least share came from agriculture. The level of

inequality contributed by the various income sources including the total income inequality is reported in column 2. The estimated income Gini coefficient of 0.507 portrays a high level of income inequality in the community. The lowest, the income Gini coefficient from wages and salaries is 0.55 or 55 percent, while being the highest, the income Gini coefficient from trade is 0.69 or 69.9%. The Gini coefficient from agricultural income is 0.63.

In column 3, all the income sources are highly correlated with total income which indicates how important the income sources are with respect to total income. Trade income is leading in this regard, with a Gini correlation coefficient of 0.85, while the degree of Gini correlation with total income distribution is 0.81 and 0.75 for income from agricultural sources and income from wages and salaries respectively. The share of the income sources respectively in total inequality presented in column 4 reveals that share of income from trade in total inequality is 42.7%, which is the highest – indicating how unequally distributed is the income source in the community. The second highest is income from agricultural activities. Share of this income source in total inequality is 30.9%. The least income source in total inequality is income from wages, with a share of 26.39%. This is an indication that income is unequally distributed and has contributed to income inequality in the community. The evidence of the effect of change in income on total income inequality presented in column 5 depicts that none of the income sources is purely inequality invariant as no percentage change coefficients of the income sources is totally 0. An increase in income from wages reduces income inequality by 0.06%, while increase in income trade increases income inequality by 0.06%. Conversely, the effect of increase in agricultural income is 0.0025, which is almost inequality invariant.

Discussion

Results from this study have shown that all the income sources are highly correlated with the total income, which indicates how important the income source is. However, trade income is leading in this regard, with a coefficient of 0.8480, while the degree of Gini correlation with total income distribution is 0.8079 and 0.7449 for agriculture and income respectively. The share of the income sources respectively in total inequality presented in column 4 reveals that share of income from trade in total inequality is 42.65%, which is the highest, revealing how

unequally distributed is the income source in rural areas. The second highest is income from agriculture, with a share in total inequality of 30.96%. The least income source in total inequality is income from wages (26.39%). The implication of the findings is that income is unequally distributed and has contributed to income inequality in the community. The evidence of the effect of change in income on total income inequality depicts that none of the income sources is purely inequality invariant as no percentage change in the income sources is equal to 0. Another interesting finding is that an increase in income from wages reduces income inequality by about 0.06%, while increase in income trade increases income inequality by 0.06%. The effect of increase in agricultural income is 0.0025, which is almost inequality invariant.

Conclusion

While this study sought to determine the sources of income inequality in rural Nigeria, the specific objectives was to examine the contributions of agricultural and trade income sources to income inequality. Following Lerman and Yitzhaki (1985), the Gini index approach was adopted to decompose the income inequality and findings indicate that while income is not evenly distributed, income from trade has the largest share of total income followed by income from wages and then agriculture, with a share of 0.37, 0.33 and 0.31 respectively. Also, income Gini coefficient is 0.51 or 50.7% and being the highest, the income Gini coefficient from trade is 0.699 or 69.9% and the income Gini coefficient from wages and salaries is 0.55 or 55%. All the income sources are highly correlated with total income, Moreover, share of income from trade in total inequality is 42.65%, while the shares of income in total inequality are 30.96 and 26.39% respectively for agriculture and wages. From the findings, we can infer that trade wages are inequality-dampening, while agricultural wage is inequality-enhancing with coefficient, suggesting that income inequality in rural areas is majorly contributed by trade and agriculture.

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