Effects of Farm and Non-Farm Income on Income-Inequality among Rural Households in Osun –State, Nigeria

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Abstract

Rural households in sub-Sahara African drive their income from a variety of sources with farm and non-farm activities accounting for a substantial share of total income. Despite the importance of non-farm activities for rural farm households, little is still known about the impact of such activities on the distribution of income and poverty in Nigeria. This study access the effect of farm and non-farm income on Income- inequality among rural household. The study was carried out in osun state, Nigeria. The study was based on primary data obtained through the use of three hundred and fifty-four structure questionnaire using a multi-stage (three stage) sampling procedure. Both descriptive statistics, gini inequality decomposition by type of income and tobit model analysis were used to analyzed the data obtain.The result obtained from the study shows that majority (64.12%) of all households' derived income from farming which also accounted for 62.6% of the total income. The remaining 37.4% of total Income are derived from different sources from non-farm income. These are non-farm wage and self-employment, each respectively constituting 18.5% and 18.9%.Result of determinants of household income revealed that the major determinants of self-employment income were the age of the household head, their sex, years of farming experience and their household size. For non-farm wage employment income, their major determinant were the sex of the household need, household educational level, farming experience, access to credit and land ownership. For determinants of farm income, only farming experience and land ownership were the significant determinants of the income.Result of gini decomposition by type of income method reveal that farm income as a whole account for 85.31% while non-farm account for only 14.6% of total inequality. The relative concentration coefficient of 1.51 also confirm that farm income is inequality increasing where as non-farm income with value of 0.42 in inequality decreasing in the study area.Conclusively, non-farm income will help in absolving farm income stock and improve income distribution among household in rural areas.

Keywords: effect, farm income, non-farm income, income inequality, rural household.

Introduction

A number of studies have shown that rural households in sub- Saharan Africa derive their income from a variety of sources, with non-farm activities accounting for a substantial share of total income. Despite the importance of non-farm activities for rural farm households, little is still known about the impact of such activities on the distribution of income and poverty in Nigeria.

Previous studies from other parts of the world such as Mexico (Araujo 2003), China (Alain *et al.,* 2005) have revealed that non-farm income have a significant impact on poverty. Studies by Lanjouw, (2001) in Ecuador, Adams (1995) in Pakistan and Chinn, (1979) in Taiwan indicate that non-farm income reduces poverty and rural income inequality. On the other hand, studies in Africa have produced very different results. For instance Reardon *et al.*(1992) in Burkina Faso, Collier and Radwan (2001) in Tanzania found that non-farm income has a negative impact on rural income distribution.

Apart from this, alleviating poverty has been receiving increasing attention in the developing countries including Nigeria, hence, any activity that will directly or indirectly affect income inequality and poverty level of the rural household may be manipulated and used as a poverty alleviation strategy. The fact that, most of the poor are located in rural areas implies that this strategy will be felt by majority and this will enhance its effectiveness in reducing poverty. The recent decline in the $1-a-day poverty rate in developing countries from 28 per cent in 1993 to 22 percent in 2002 has been mainly the result of falling rural poverty (from 37 per cent to 29 per cent) while the urban poverty rate remained nearly constant (at 13 percent). More than 80 percent of the decline in rural poverty is attributed to better conditions in rural areas rather than to out-migration of the poor. So, contrary to common perceptions, migration to cities has not been the main instrument for rural (and world) poverty reduction (World Development Report, 2008).

Eradicating extreme poverty and hunger is regarded as the most important goal of human development. The fight against poverty is at the top of the world's economic agenda, as noted by the Millennium Development Goals (MDG). According to World Development Report (2008), of the developing world's 5.5 billion people, 3 billion live in rural areas, nearly half of humanity. Of these rural inhabitants an estimated 2.5 billion are in households involved in agriculture, and 1.5 billion are smallholders' households. Poverty in Nigeria, as in other developing countries across the globe, is largely a rural phenomenon (NBS, 2005). This is because rural poverty accounts for nearly 75 percent of overall poverty in most countries (Ravallion, 1994; UNDP, 1999; World Bank,

2001) .Fields, (1998) also assert that poverty in most developing countries is linked to agriculture, most of the poor live in rural areas, and they depend on agriculture for their income, directly in case of farmers and agricultural workers or indirectly in case of self-employed workers engaged in trade, services, agro-processing and other non-farm activities that cater largely for rural demand. Hence, for poverty reduction to be successful, policies backing it must focus on the rural areas. It has been alleged that the single most important factor accounting for rural poverty is low productivity resulting from soil fertility depletion, heavy reliance on basic indigenous technology including the use of unimproved and low-yielding planting material, limited practice of crop protection and high post-harvest losses arising from inadequate storage and processing capacity (UMOFPED, 1997; UMOFPED, 1998).

The concern about the distribution of income is no longer a new one. Aboyade (1983) attributed the persistence of this issue to the failure of income to trickle down as envisaged by the neoclassical economist, in which very little attention was paid to distribution issues. World Bank (1996) revealed that the extent of inequality in the distribution of income is very important in reducing poverty and as a consequence, improve welfare. Hemmer (1994) also revealed that the extent and depth of material poverty are also determined, to a considerable degree, by interpersonal income distribution as the more unequal this income distribution is, the greater is the probability of material absolute poverty. It can therefore be concluded that a good understanding of income source that are inequality-increasing or decreasing is important for making a deliberate policy to encourage those source of income that are inequality decreasing and policies to de-emphasize those income sources that are inequality-increasing sources of income are made and implemented.

Non-farm activities also play a principal role directly, by contribution considerably to rural household's income, and indirectly, by influencing agricultural activities with potential implication for sustainability. Pressure on natural resource may be reduced when households have alternative sources of income. Furthermore, investment in the resource base, such as the use of fertilizer, might be facilitated by cash income from non-farm activities. In contrast to this, Hammer (1994) reasoned that the larger the non-farm component of the operators income, the less time the operator could spend managing the farm, eroding farm level efficiency.

The concern of this study is justified in the sense that it will contribute to the growing literature on the links between non-farm income, poverty and inequality among rural households and this will serve as a base line for further research.

The objective of the study is to analyze the effects of farm and non-farm income on income inequality among rural households in Osun -State.

(i)   Examine the patterns of farm and non-farm incomes among rural households.

(ii)   Analyze the contribution of different source of income (farm and non-farm) to total income inequality;

(iii)   Examine the determinants of farm and non-farm income among rural households;

Theoretical Concept of Households Income and Income Inequality

A variety of definitions of Household income have been advanced in the literature. Many of these spring from the Haigsimon-Hicks (HSH) concept of income as the maximum amount that can be consumed in a given period while keeping real wealth unchanged (Schwarze, 2004). Income represents the capability of the Household in obtaining the goods and services that is requires. It is also important to distinguish between personal income and disposable income. Personal income is the income received by persons from participation in production, from government and business transfer payments, and from government interest. Personal income includes income received by non-profit institution serving Households, by private trust funds (Schwarze, 2004). Income from production is generated both by the labour of individual and by the capital that they own. Private income not earned in production, such as from capital gains or the sale of assets, is excluded. Personal income is calculated as the sum of income and salary disbursement, employer contributions from employee pension and insurance funds, proprietors income, property income (personal interest, dividend and rental income), and transfer payments to individuals, less personal contributions to social insurance.

Disposable personal income is personal income less tax payments while personal income does not include capital gains realized through the sale of assets, personal income taxes do include the taxes paid for these capital gains.

Schwarze (2004) also defined income as the output of activities and it measures both cash and in kind contributions.

DeJanvry *et al.* (2005) referred to household income from various sources including monetary income or income in kind. In this study income from both farm and non-farm activities will be identified and used for analysis.

Farm and Non- Farm Income/Activities

Literature on diversification patterns and livelihood strategies include many different implicit definitions of terms such as non-farm and off-farm. The farm/non-farm distinction revolves around sectoral classifications derived from standard national accounting practices while the on-farm/off –farm distinction reflects the spatial distribution of activities with ''off-farm" income generated away from one's own land (Barrett and Reardon, 2002).

Barrett *et al*., (2001), explained the sectorial classification further that "farm" activities are associated with those primary sector production processes that produce raw agrifood products from natural resource like land, rivers/lake/ocean, and air. They pointed out that the process could involve growing e.g. cropping, aquaculture, livestock husbandry or gathering e.g. hunting, fishing, and forestry. On the other hand, "non-farm" activities are associated with those secondary and tertiary sector production processes that use raw physical intermediate inputs such as maize, milk and wood and process them into manufactured goods such as maize flour, cheese and furniture or use financial or manufactured capital and labour to produce services e.g. transport, commerce. They also pointed out the sect oral assignments depend only on the nature of the product and types of factors used in the production process and neither location (i.e. at or away from home nor employer (self-employed or hired for a salary or wage) matter. Barrett et al (2001) explained the spatial classification of "on-farm"/"off-farm" and pointed out that on-farm includes all activities on one own property, regardless of sectoral or functional classification and it is almost always self-employment and "of-farm" includes all activities all away from one's own property, regardless of sectoral or functional classification and it can be wage or self-employment.

Most African smallholders derive some income from activities outside primary agriculture i.e. "non-farm" activities away from their own farms i.e. "off-farm" activities, or both, (Reardon, 1997). (Ellis, 2000), thus implies that "non-farm" activities can be carried out away-from one's own property, farm or home, and they are sometimes used interchangeably (Woldenhanna, and Oskam, 2001, Reardon 1997), and they routinely appear in seemingly synonymous ways.

The classification proposed by Barrett *et al*, (2001) according to sector (agriculture and non-agriculture) and functions (wage and self-employment) will be followed in this analysis.

Classification of non-farm activities

The literature makes a useful distinction between low-return non-farm work of last resort and high-return non-farm activities (Ellis, 1998).Different researchers have followed different approaches in dealing with the categorization of non-farm activities. Lanjouw (2001) made a distinction between low-and high-productivity non-farm wage employment, based on whether earnings fall below or exceed the average from agricultural activities. Ferreira and Lanjouw (2001) defined high-return non-farm activities as those with monthly returns above the poverty line.

Schwarze (2004) categorized non-farm activities into self-employment and wage-employment. Scwarze (2004) further reclassified wage-employment into easy-entry-low-return wage employment and difficult-entry, high-return wage employment. According to them, low-return activities include unskilled wage employment while high-returns activities include semi-skilled and high-skilled employment.

In this analysis, an attempt will be made to classify the non-farm activities to self-employment income and wage income. As argued by Scwarze (2004). it is important to distinguish between these two distinct types of economic activity, since self-employment income includes return to entrepreneurship, risk taking, and capital whereas wage income does not.

Income inequality indices and its Measurement

There are various ways to measure inequality. Income inequality refers to disparities in the distribution of economic assets and income. The term typically refers to inequality among individuals and groups within a society, but can also refer to inequality among nation, income inequality generally refers, to equality of outcome, and it is related to the idea of equality of opportunity (Cowell, 1999).

Inequality is often studied as part of broader analysis covering poverty and welfare, although these three concepts are distinct. Inequality is a broader concept than poverty in that it is defined over the distribution, not only the part of the distribution of individuals or household income.

Several different measures of inequality have been proposed in the literature. The questions had always been which one of these measures should be chosen for decomposition? According to Foster (1985), the chosen measure should have five basic properties.

- ❖ The pigou- Dalton Transfer principles:- An income transfer from a poorer to a richer person should register as a rise in inequality, or at least not a fall.
- ❖ Income scale independence: - Inequality measures should be unaffected if there is a uniform proportional change in households' sub-groups.

❖ Decomposability: This requires that overall inequality should be related consistently to constituent parts of the population such as population sub-groups.
❖ Principle of population: Inequality measures should be invariant to replications of the population. For example, merging two identical data sets should not alter the distribution.
❖ Anonymity or symmetry: The inequality measures should be independent of any characteristics of individuals (or households) other than their income (or the welfare indicator whose distribution is being measured). Cowell (1999) cited in Litchfield, 1999) shows that any measure of inequality that satisfies these axioms is a member of the generalized entropy (GE) class of inequality measure.

Some basic inequality measures include the range, the relative mean deviation, the variance, and coefficient of variation, the standard deviation of logarithms, the Gini coefficient, Theil entropy and Atkinson's inequality measures. One of the measures of inequality which meets the five preceding properties is the Gini coefficient.

Gini coefficient of inequality:- This is the most commonly used measure of inequality. The coefficient varies between O, which reflect complete equality, and 1, which indicate complete inequality (one person has all the income or consumption, all other have none). Graphically, the Gini coefficient can be easily represented by the area between the Lorenz curve and the line of equality distribution.

Inequality can be decomposed by sub group, income, sources, causal factors and other unit characteristics. The focus of this study will be on decomposition of inequality by sources. An inequality measure can be regarded as source decomposable if total inequality can be broken down into a weighted sum of inequality by various income sources, for example, non-farm and farm income. Gini coefficient is the most commonly used indicator of inequality. Gini coefficient will therefore be used to test whether non-farm sources of income increase or decrease income inequality.

Gini coefficient can be defined as

$$Gini = \frac{\sum_{i-i}^{n}\sum_{J=1}^{n}(yi - yj)}{2n^2 \bar{y}} \quad \text{-------------------------------- (1)}$$

Where n is the population, y is the average income of the total population, yi and yj are income of individual i and j

An alternative definition for the Gini coefficient follows (McDonald et al., 1999)

$$\text{Is} \quad G = \frac{2\sum_{k=1}^{k} Cov(y_k, F(y))}{\mu} \quad \text{-- -- -- -- -- -- -- -- -- -- -- --(2)}$$

The equation above can now be rearranged to give the following

$$G = \sum_{k=1}^{k}\left\{\left\{\frac{Cov(y_k F(y))}{Cov(y_k,(y))}\right\}\left\{\frac{2Cov(y_k F(y_k))}{\eta_k}\right\}\left[\frac{\eta_k}{\eta}\right]\right\} = \sum_{k=1}^{k} R_k G_k S_k \quad \text{-- -- -- -- -- -- --(3)}$$

Here S_k is the share of source k of income in total income, G_k in the Gini coefficient measuring the inequality in the distribution of income component k within the group and R_k is the Gini correlation of income from source k with total income. (Leibbrandt et al., 2001). The larger the product of these three components, the greater the contribution of income source k to total inequality as measured by G, S_k and G_k are always positive and less than one while R_k can fall anywhere in the range [- 1, 1] since it shows how income from source k is correlated with total income.

RESEARCH METHODOLOGY
Description of Study Area
The study was carried out in Osun State, Nigeria. Osun was carved out from the old Oyo state in 1991. It is situated in Southwestern part of the country. The state is bordered in the west by Oyo state, in the east by Ondo and Ekiti State, in the north by Kwara state and south by Ogun State. It has a land area of 8,882.55square-kilometres and a population of 3,423,535 (2006 population census). The study area falls on Latitude $8^0 10'$ to the north and Latitude $6^0 5'$ to the south. It is also marked by Longitude 4^0 to the west and Longitude $5^0 4'$ to the east. The mean annual temperature is between 21.1^0C to 31.1^0C. Rainfall varies from 1100 millimeters per annum in the southern part to 800 millimeters per annum in the northern part. While the raining season starts in the late March and ends in October, the dry season stretches from November to early March. Soil types range from Itagunmodi series (fiable red clay), Araromi series to sedentary, sandy and loamy soils.

The above ecological features provide opportunities for various crops and cropping patterns in the state. In the forest region with a much higher rainfall and relative humidity, tree crops such as cocoa, kola, citrus and oil palm are grown. Equally grown are arable crops such as maize, yam, rice, cassava, tomato and pepper. On the other hand, the derived savannah region has mainly arable crops with tree crops grown in patches. The traditional language is Yoruba and the capital of the state is Osogbo.

Sources, Types and Method of Data Collection
This study was based on primary and secondary data. The primary data was obtained through the use of a structured questionnaire administered to selected rural household heads in the study area. Primary data collected from each household include the following;

(i)   Socio economic, demographic and community data such as age, gender, household size, level of education, major occupation, production assets, access to pipe borne water, electricity, credit, distance to nearest market and motor able road.

(ii)   Sources, proportion and actual values of income from farming and non-farming activities which each household member engaged in.

The above primary data were complemented with secondary data that were obtained from various publications of the Food and Agriculture Organization (FAO), Central Bank of Nigeria (CBN), National Bureau of Statistics (formerly FOS) research reports and relevant journals.

Sampling Procedure and Sample Size
The population of the study was all rural households in Osun-State. A multi-stage (Three-Stage) sampling procedure was adopted in the study.

The first stage was the purposive selection of ten rural local government areas in the state. The second stage involved random selection of three to four rural communities/ villages with population of less than 20,000 inhabitants from each of the ten selected local government areas. While the third and final stage involved systematic selection of

about ten percent of the households in each of the rural communities / villages. This was achieved using the list of estimated number of households in each villages/ rural communities provided by the State Agricultural Development Project (ADP).

In the end, a total of 400 households were sampled and interviewed in 34 rural communities for the purpose of this study. However, only three hundred and fifty-four (354) copies of questionnaires were used in the analyses because of the inadequate information and inconsistent responses of the 46 others

Methods of Data Analysis
Both descriptive and quantitative methods were used in the analyses of the data generated from the study.

Analytical Model:- Gini Decomposition by type of income
In order to determine the contribution of various sources of income (farm and non-farm) to over all income inequality indices. The study adopted income inequality decomposition by types of income as proposed by Stark *et al* (1986) and used by Adam (2001), following the decomposition technique used by Adams(2001), the source decomposition of Gini coefficient can be developed as.

$$G_o = \sum_{k=1}^{k} R_k G_k S_k$$

-- (4)

Where ;

S_k is the share of source K of income in total group income i.e.

$$S_k = \mu_k / \mu$$

-- (5)

G_k is the Gini Coefficient measuring the inequality in the distribution of income component k within the group and R_k is the Gini correlation of income source k with total income define by

$$R_k = \frac{Cov[Y_k, F(Y)]}{Cov[Y_k, F(Y_k)]}$$

-- (6)

Using this decomposition, it is possible to identify how much of overall income inequality is due to a particular income source. Assuming that additional increments of an income source are distributed in the same manner as the original units, it is possible to use decomposition to inquire whether an income source is inequality increasing or inequality decreasing on the basis of whether or not enlarged share of that income source lead to an increase or decrease in overall income inequality. On the basis of equation above, the relative concentration

coefficient of income source k in overall inequality (g_k) can be defined as

$$g_k = R_k \frac{G_k}{G}$$ --- (7)

where g_k is the relative concentration coefficient of income source k in overall inequality. Income source factor k provide a disequalising effect,

If > 1 and an equalizing effect if $g_k < 1$

In order to study the effects of non-farm income on inequality, we compare the Gini index of total income (which include non-farm income), G_0 with that of farm income only, G_f if the value of G_0 is inferior to that of G_f, non-farm income reduces total income inequality and vice- versa.

In order to analyze the determinants of farm and non-farm income, Tobit regression model was applied,

$$y* = \beta'x + e$$ ---(8)
$$y = y * (\beta'x + e) \, if \, y* > 0$$
$$y = 0 \, if \, y* \leq 0$$

Where Y_1 is the share of farm or non-farm income in total income

X_i - X_n = Explanatory variables or Household observable characteristics. Which includes individual level variables, household level variables and community level variables.

e_i = error term.

$\beta_I = \beta_n$ = The parameter coefficients

Household's observable characteristics are;

Individual level variables

Age of household head (in year)

Gender (male = 1, female = 0)

Marital status (Married = 1, Not married = 0)

Years of formal Education

Experience in Primary Occupation

Household level variables

Household size (actual number)

Access to credit (Yes = 1, No = 0)

Landowner (Yes = 1, No = 0)

Access to extension service

Membership of Community association (Yes = 1, No = 0)

Value of other assets owned by household (naira)

Community level variables

Distance to the nearest market (km)

Access to electricity (Yes =1, No = 0)

Result and Discussion

Structure of Rural household income

Table 1 and Figure 1 presents the structure of rural household income in the study area. It shows how different income sources contribute to overall household incomes. The analysis provides background information on the amount and sources of income earned by average household, which would later form the basis of the income inequality analysis. Majority (64.12%) of all households derived income from farming, which accounted for 62.6% of the total income. The remaining 37.4% of total income are derived from different sources of non farm income. These are non-farm wage and self-employment, each respectively constituting 18.5% and 18.9%.

Almost one-third of the sample households derived their incomes from livestock enterprises, but income from this source constitute only 2% of the total income. This suggest that the type of livestock activities are on small-scale level-mostly extensive free range backyard system. Crop farming, which is mainly subsistence in nature, is the most important single source of income for the rural households accounting for about 60.3% of total income.

Majority (78.53%) of the households in the area received income from non-farm sources, and non-farm self-employment income is the most important, accounting for about 19% of total income and 50.4% of non-farm income. Non-farm self-employment is mainly derived from handicrafts, food processing shop-keeping and other local services, as well as trade in agricultural and non-agricultural goods. The non-farm wage employment includes formal and informal jobs in construction, manufacturing, education, health, commerce, administration and other services also contributed about 18.5% total income or 49.5% of non-farm income.

Table 1: Average composition of Household incomes.

Income source	Proportion of households receiving income from the source	Mean income (Naira)	Share in total income (%)
Total farm income	64.12	150,000.20	62.6
crop income	39.27	144,424.30	60.3
Livestock income	29.37	5,575.90	2.3
Total non-farm-income	78.53	89.538.14	37.4
Non-farm self-employment	39.98	45,141.26	18.9
Non-farm wage employment	38.83	44,395.88	18.5
Total household income	_	239,538.34	100

Source:- field survey 2010.

Determinants of Household Income
In order to analyze determinants of household income share by source, share of household income by sources was estimated as endogenous variables for all income equations.. Some household have zero income shares from some components due to non-participating in that sources of income, hence these endogenous variables have some censored data. Accordingly, the estimated method was censored Tobit regression. All the income share equations were statistically significant at 1% level (see Table 2)

Determinants of Non-Farm Self Employment Income Share
The result of the analysis of determinants of income share from non-farm self -employment shows that the model is significant at 1 percent ($P<0.01$) as the sigma was 249.4.36 with a t – value of 15 .103. as seen in Table 9, four independent variables were significant in determining the share of total per capita income of household coming from non-farm self-employment. The age of the household was significant and negative at 5 percent meaning that income from non-farm self-employment reduces as the age of household heads increases and this is reasonable since older farmers tend to be conservative and earn most of their income from farming but less from non-farm. The sex coefficient was also negative and significant at 1 percent meaning that non-farm self-employment income is associated more with female headed households than male headed households. The coefficient of farming experience was negative and statistically significant at 1 percent. The negative sign on the coefficient shows that income from self- employment reduces as the farming experience of the household head increases and this further confirm our finding on age coefficient above. Household size was also positively associated with non-farm self-employment income at 1 percent. This implies that as the household size increases the tendency to earn more income from self-employment also increases and this is in agreement with "Push factor concept" were-by households were pushed to diversify into non-farm self-employment in order to survive from poverty possibly due to large family size.

Determinants of Non-Farm Wage-Employment Income
The table also shows those significant factors influencing the proportion of the household per capita income earned from non-farm wage employment. The result of the analysis shows that the model is significant at 1percent ($P<0.01$) as the sigma value was 32227.28 with t – value of18.77.
        The coefficient of sex of the household heads was positive and significant at 1 percent indicating that belonging to a male headed household is positively associated with deriving income from non-farm wage employment, coefficient of household education level also reveals that as the years of formal education of the household head increases the share of income coming from non-farm wage employment will likely increase. This is normal as the more educated the head of a household, the more likely the household will generate income from non-farm wage employment like government and private salary employment.
        Farming experience was also negative and significant at 10 percent meaning that income from non-farm wage employment tends to reduce with increase is farming experience.
        The coefficient of access to credit and land ownership were significant at 1 percent but positive and negative respectively, this imply that household head with access to credit will earn more income from non-farm wage employment than those without access to credit, while those households without land will likely earn more income from wage employment than those who own land.

Determinants of Farm Income
The result of the analysis of determinants of income share from farm income was significant at 1 percent alpha level. The sigma value of 101620.66 with a t-value of 20.16 shows the goodness of fit of the model, out of all the regressors only two have significant coefficients. Coefficients of farming experience was positive and significant

at 5 percent level meaning that as the years of farming experience increases, household head tend to earn more income from farming activities and this is normal since farmers learn more from previous experiences which tend to improve their productivity and income. Coefficients of land ownership was also significant and positive at 10 percent, this imply that household head who own land are likely to earn more income from farming activities, this is also normal since land is a major factor of production is Agriculture.

Table 2: Determinants of Household Income

VARIABLES	NONE FARM SELF INCOME COEFF.	NON FARM WAGE INCOME COEFFICIENTS	FARM INCOME OEFFICIENTS
Age of HIH head	-3492.60** (1.99)	3199.07 (1.53)	5353.88 (1.052)
Sex of HH head	-40.14*** (10.59)	80189.35*** (7.55)	14076.89(0.933)
Marital status	6.57 (0.24)	-4.94 (-0.019)	-15.86 (0.854)
Education level	2.95 (0.145)	144.88*** (2.63)	-54.15 (0.854)
Farming experience	-572.58*** (-2.82)	408.35* (1.72)	44.57**(2.076)
Household size	3683.47***(2.844)	-11639.28***(-5.95)	3108 .08 (-0.759)
Access to credit	1201. 99 (-0331)	16642.71*** (3.94)	5453 .76 (-0.459)
Land ownership	-7889.39 (-1.071)	-24102.81*** (-2.97)	34298.46* (1.763)
Members of cooperative	1089.32 (0.89)	3775.47 (1.55)	1978.50 (-0.382)
Total assets	-6.65 (-0.375)	-5.22 (-0.722)	0.174 (0.995)
Access to extension services	-0.049 (-0.375)	-8.76 (-0.085)	24.09 (1.38)
Access to electricity	198.44 (0.39)	7429.86 (1.22)	-9607.69 (-0.609)
Distance to market	832.03 (1.73)	-176.28 (-0334)	-611.76 (-0.431)
Constant	78288.29** (1.95)	-106981.46** (-1.963)	-145137. 98 (-1.084)
Sigma	-24984.36***(15.10)	32237.28***(15.77)	101620.66***(20.16)
Log likely hood function	-1643.916	-1722.39	- 3025.72

Non-farm income and income inequality.

In order to analyze over-all income inequality among rural households in Osun state and how individual income sources contribute to the observed inequality. for this purpose, Gini decomposition method was adopted for two reasons. First, it is possible to isolate how much of overall income inequality is due to any particular source of income and second, it also state which income source is total income inequality increasing or decreasing.

The result of the Gini coefficient decomposition is presented in Table 2. It can be seen that the Gini coefficient of per-capita rural income for Osun-State is 0.4125 and which is lower than the Gini coefficient of 0.51 for Nigeria as a whole (FAO, 2006) or 0.48 reported by NBS (2006). This may be because rural income inequality is usually lower than urban inequality. The result is also comparable to Gini coefficient of per capita rural income in Egypt of 0.408 by Adams (1999).

Among the disaggregated income sources, crop income is the most correlated with total income with a correlation coefficient of 0.979, It is also the most unequally distributed income source with Gini- coefficient of 0.619, while the livestock income is the most equally distributed (Gini coeficient =0.194) among sources of income.

By decomposing the overall Gini coefficient, it is revealed that farm income as a whole accounts for 85.31%, while non-farm accounts for only 14.6% of total inequality, and this agrees with Adams (1999) and Van den Berg and Kumbi (2006), who reported that farm income contributes more than nonfarm income to inequality in rural Egypt and Ethiopia. The relative concentration coefficient of 1.51 (above 1) further confirms that farm income is inequality-increasing where as non-farm income with value of 0.42 (less than 1) is inequality-decreasing in the study area. High income inequality in farm income is entirely driven by crop income, while low income inequality reported in non-farm income is due to a relatively lower value of Gini coeficient from non-farm wage income. The source elasticity suggest that a 10% increase in farm income would increase the overall Gini coefficient by 2.6% while a 10% increase in non-farm income would reduce over-all Gini coefficient by the same magnitude (2.6%).

Table 3: Non-farm income and income inequality

Source of income	Proportion of household receiving income from source	Share in total income	Gini coefficient for income source	Gini correlation with total income	Pseudo-Gini coefficient	Contribution of income source to overall income inequality	Relative concentration coefficient of income source	Percentage contribution to overall income inequality	Source elasticity of total inequality
(k)	(P_k)	(S_k)	(G_k)	(R_k)	(G_kR_k)	($S_kG_kR_k$)	($g = R_k G_k$)	($S_kG_kR_k/G$)	($S_kG_kR_k/G$)-S_k
Total farm income	0.6412	0.5979	0.6249	0.997	0.6230	0.3521	1.51	85.36	0.2557
Crop income	0.3927	0.5894	0.6099	0.979	0.5971	0.3519	1.45	85.31	0.2637
Livestock income	0.2938	0.0085	0.1937	0.122	0.0234	0.0002	0.06	0.05	-0.0080
Total non-farm income	0.7853	0.4021	0.5410	0.319	0.1726	0.0604	0.42	14.64	-0.2557
Non-farm wage employment income	0.3898	0.1926	0.4782	0.138	0.0660	0.0127	0.16	3.08	-0.1618
Non-farm self employment income	0.3983	0.2095	0.5825	0.391	0.2278	0.0447	0.55	11.56	0-0.0939
Total income		1.000		1.000		0.4125		100	

Conclusions

From the result of this study, the following conclusion can be drawn.

First, non-farm income is an important source of income in rural areas accounting for about 38% of total income and up to 78.5% of households received income from the source.

Secondly, analysis of income inequality effects of non-farm income revealed that non-farm income not only reduces poverty among households but also reduces income inequality and this will make it a suitable instrument in formulating policy of alleviating poverty most especially in rural areas of developing countries like Nigeria.

Conclusively, non-farm income will help in absolving farm-income shock, and improve income distribution among households in rural area.

Recommendations

From the evidence of this study, there is no doubt that participating in non-farm activities by farmers in rural area will have a positive impact on their household welfare in term of redistribution of income. Against this background, the following recommendation are therefore made.

(1). Provision of social amenities like good roads, poltable water, electricity, availability of modern market facility including lock-up shops and modern communication facilities in rural areas by government and private developers will go a long way in promoting non-farm activities in rural areas. Community development association and non-governmental organization (NGOs) can also help on this issue.

(2). Establishing credit institution/Agencies and cooperative societies or strengthening the already available one will also encourage/ promote credit access in rural areas and membership of cooperative societies since this will directly promote farmers diversifying to non- farm sectors.

(3). Extension agents should place more emphasis on the roles of non-farm diversification in mitigating farm risk and providing a more secured alternative income.

(4). Policy makers should take advantage of poverty reduction effects and inequality equalization effects of non-farm income in formulating poverty alleviating programs especially in rural areas of developing countries like Nigeria.

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