Determinants of Income Diversification among Arable Crop Farmers in Osun State, Nigeria

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Abstract

The study examined determinants of income diversification among arable crop farmers in Osun state, Nigeria. A total of 120 arable crop farmers were proportionately selected from the three agricultural zones in the State that was used for the study. Structured interview schedule was used to elicit relevant information from respondents. Frequencies, percentages, mean and standard deviation, diversity index and Tobit regression model were employed in data analysis. The majority of the farmers had access to farm credit and mean diversity index was 0.46. Factors influencing income diversification among respondents were age (t=-2.68, p≤0.01), credit (t=2.29, p0.05), household size (t=8.24, p≤0.01) and frequency of extension visits (t=2.24, p≤0.05). Only 6.67% of the farmers had income diversity index of 0 meaning that most of the respondents adopted multiple income generating-activities while crop farming remained their dominant income source. In the face of climate change and its attendant risks including total crop failure, farmers should be exposed to other viable farm and off-farm income generating activities, while they are provided with credit facilities to harness such opportunities.

Keywords: Income diversification, Arable crop farmers, Income generating activities

Introduction

Despite the fact that agriculture remains the main source of income for the majority of rural population in developing countries, a large proportion of rural household diversify their economic activities in a variety of ways under different conditions

(FAO, 2018). Firstly, farmers may diversify their agricultural production. Secondly, they may diversify their portfolio of economic activities outside agriculture either on or outside the farm, while some members may migrate to other areas temporarily or permanently in search of better opportunities (FAO, 2014). Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Indeed livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Livelihood diversification among rural households and the factors driving such diversification have indeed, engaged the attention of development researchers for a long time (Senadza, 2014).

Indeed, livelihood diversification among rural households and the factors driving such diversification have engaged the attention of development researchers for a long time Income diversification refers to the allocation of productive resources among different income generating activities, both on farm and off-farm (Benjamin and Richard, 2019). Rural households adjust their activities either to exploit new opportunities created by market liberations or to cope with livelihood risks. An important area for policy purpose is whether household income diversification is a matter of choice or necessity. Household income diversification should be a matter of necessity in the rural economy. On the other hand, if it is a matter of choice, mostly undertaken by richer households having the necessary levels of income and assets to needed transit into non-farm activities requiring high entry cost, it may be necessary for an important policy to be put in place, while removing the impediments to engagement in high value agricultural activities such as cash crop production for export markets (Kamwi *et al.*, 2018)

Rural households in many different contexts have been found to diversify their income sources allowing them to spread risk and ease consumption. Income diversification is often necessary in agriculture based economies because of risk such as variability in soil quality, crop and household diseases, price shock, unpredictable rainfall and weather related event which leads to low productivity, low output and invariably low income which continually trap farmers in viscous cycle of poverty. Consequently, non-farm activities have become an important component of livelihood strategies among rural households. Employment in non-farm activities is essential for the diversification of the sources of farm household's livelihood. Income

diversification helps the household to adopt improved agricultural production technologies which ensure food security for the household.

The contribution of non-farm income sources to rural economy in last two decades is substantial, especially in developing economies. Evidences in literature suggest that a key motivation leading to off-farm labour supply among farm households in both the developed and the developing country has been the desire to have diversified sources of income and manage risk (Shittu, 2014). Biswarup and Ram (2014) also asserted that policy makers have chosen to focus their activities on agriculture and have ignored the contribution made by income diversification to rural livelihoods. Diversification has been analyzed as a rational response by households to lack of opportunities for specialization within existing portfolios (Sisay, 2013).

Income diversification has been found to be a potent tool for poverty reduction more importantly in the face of production uncertainties usually occasioned by the influence of climate change. The tendency for rural households to engage in multiple occupations is often noticeable, but few attempts have been made to link this behavior in a systematic way to rural poverty reduction and food security policies. Also less emphasis has been given to household level choices and especially to the explanation of differences of strategies among households in terms of income-source diversification. Based on the foregoing, this study examined the determinants of income diversification among arable crop farmers in Osun State, Nigeria. The specific objectives of this study were to examine the pattern of income diversification among the farmers and determine the factors related to income diversification

Methodology
This study was conducted in Osun State, Nigeria. Osun State has thirty Local Government Areas (LGAs). It is located in southwestern Nigeria. It lies between Longitude 21.65° and 6.75° East of Greenwich meridian and Latitudes 6°59' and 9° North. It is bounded in the East, West, North and South by Ondo, Oyo, Kwara and Ogun States respectively. It has land mass of 925,100 hectares with estimated population of 2,172,005 people (Federal office of statistics, 2008). Osun state has 30 local government areas divided into 3 agricultural zones; Iwo, Osogbo and Ife-Ijesha with 7, 12 and 11 local government areas, respectively. There are 2,960 registered arable crop farmers in the 3 agricultural zones. Two-stage sampling procedure was used in selecting the study sample. In the first stage, 1 (10%) local government area, with the highest population of registered arable crop farmers was purposively selected from each of the 3 agricultural zones to make a total of 3 local government areas. These are Ede North, Ejigbo, and Ife Central Local Government Areas with 265, 160 and 170 registered arable crop farmers respectively. In the second stage, proportional sampling was employed to select 20% of the registered arable crop farmers from each of the 3 selected local government areas; 53, 32 and 35 registered arable crop farmers from Ede North, Ejigbo, and Ife Central Local Government Areas, respectively to make a total sample size of one hundred and twenty (120) arable crop farmers for the study. Data were collected with the aid of structured interview schedule. The age of the household heads was measured as

number of years in existence, level of education as number of years spent in school, household size as number of people living together and feeding from the same pot, farm size as land area under cultivation in hectares, amount of credit received was estimated by aggregation of amount of credit assessed from formal and inform credit institutions and extension contacts as number of times the farmer is visited by the extension agent in a year. Data were analyzed using percentages, means, Herfindahl-Hirschman diversity index (HHI) and Tobit regression.

Herfindahl-Hirschman diversity index
$$HHI = 1 - \sum_{i=1}^{n} P^2$$
Where p is the proportion of each income source on total household income

Tobit regression
The two-limit tobit model was applied to analyse the determinants of income diversification. Since HHI cannot be below zero or above one, a double censored regression model, in particular a two-limit tobit model was used to analyse the determinants of income diversification.

$$Y^* = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots \beta_6 X_6 + \varepsilon$$

$Y = 0$ if $Y^* \leq 0$
  1 if $Y^* \geq 0$
  Y if $0 < Y < 1$

Here, X_1, X_2,…,X_n denote independent variables that have a bearing on time allocation. Y^* is a latent variable indicating desired Herfindahl index. The relationship between the observed and latent variable is provided above and ε is an error term which is assumed to follow a standard normal distribution. The model is expressed as

$$Y^* = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots \beta_7 X_7 + \varepsilon$$

$Y^* = 0$ if the household does not diversify or the share of income from diversifying to off farm is 5% and/or less than 5% and $Y^* = Y$ for which the income share from off-farm is greater than 5% where Y is the share of income from off-farm activities.

X_1 = Age of household head (years)
X_2 = Education (years of formal schooling)
X_3 = Household size (number of persons in the household)
X_4 = Farm size (hectares)
X_5 = Amount of credit received (Naira)
X_6 = Extension contact (Number of contacts)
β_o = Intercept to be estimated, β_1 -β_7 = Coefficients to be estimated, ε = Error term
All variables were measured and incorporated into the model as explained earlier.

Results and Discussion

Sources of Income and Pattern of income Diversification
Table 1 shows that 61.7% derived income from tree crop farming and 28.3% from livestock production. Over twenty percent (23.3%) obtained income from non-agricultural wage employment, 15.0% from agricultural wage employment, 50.0% from non-farm employment and 53.3% from remittances. Results also showed that

arable crop farming has 31.1% share in the average total income of the sampled farmers, non- agric. wage employment had 22.8% while agric. wage employment had 12.3% share in the total income of farmers. The share of tree cropping in the total income was 8.5% while non-farm employment had 13.0%, livestock sales had 9.1% and remittances had just 3.2% share in the total income. Overall, farmers in the study area derive 51.1% of their income from agricultural sources and 48.9% from non- agricultural sources. This means that majority of the sampled farmers earn their living from agriculture even though they exhibited varying degrees of diversification. That is, agriculture remains the major source of income in the rural areas. This result is in tandem with the existing literature. According to NBS (2012), the poor in Nigeria are reported to be predominantly rural dwellers and households that rely mainly on agricultural means of sustenance.

Table 1: Sources and volume of income

Sources of income		Percentage
Arable crops production		100.0
Other farm income		
Tree cropping		61.7
Livestock sales		28.3
Non-farm income		
Non-Agric. wage employment		23.3
Agric. wage employment		15.0
Non-farm employment		50.0
Income from remittances		53.3
Sources of income	**Average Income (₦)**	**% of Total Ave. Income**
Arable crops production	650,888.9	31.1
Tree crops	177,567.6	8.5
Livestock sales	191,052.6	9.1
Non-agric wage employment	476,785.7	22.8
Agric wage employment	257,500	12.3
Non-farm employment	272,866.7	13.0
Income from remittances	66,093.8	3.2
Total	**2,092,754.4**	**100.00**

Source: Field survey; 2017 ***Multiple Response Table**

Farmers' Degree of Income Diversification
The result in Table 2 shows the degree of income diversification among the farmers in the area. Using the Herfihndahl Hirschman diversification index, respondents with the most diversified income sources had the highest index and those with the least sources had the smallest. Just a few (6.7%) had a diversity index of 0 meaning that they concentrated on arable crop farming without engaging themselves in other income generating activities. This implies that these farmers did not diversify their

income sources at all. About 33.3% had diversity index of 0.2 - 0.39, 33.3% had diversity index between 0.6 and 0.79 while only 26.7% had 0.4-0.59 index. The mean income diversification index is 0.46. This implies that an average respondent in the study area was involved in one or more types of income–generating activities available within the study area in addition to farming. These activities were distributed between the farm and non-farm sectors identified in the area. On the average, a respondent was involved in at least one farm activity and one non-farm activity. Zero index implies full concentration on farming while 1 implies perfect diversification**.** The closer the index to zero, the lower the diversification and the closer the index to 1, the more diversified are the income sources**.** That is, diversification index depicts the level at which farmers' income is diversified**.** Tithy *et al.* (2016) found a very low rate of income diversification among rural households in Bangladesh with an average SID (Simpson Index of Diversity) of 0.25.

Table 2: Farmers' degree of income diversification

Diversity index	Percentage
0	6. 7
0.2-0.39	33. 3
0.4-0.59	26. 7
0.6-0.79	33. 3
Total	**100.0**

Source: Field survey; 2017

Determinants of Income Diversification
Factors determining income diversification are presented in Table 3. The coefficient obtained for age was negative and significant at 1%. This implies that increase in age would decrease income diversification. Amount of credit received was positive and significant at 5% meaning that the amount of credit received influence income diversification. Unavailability of credit constrains rural households' ability to borrow when faced with a large transitory fall in their incomes; leaving these households unable to cope with income variability thereby reducing income diversification. The coefficient obtained for extension contact was positive and significant at 5%. The implication of this is that extension contact influence income diversification. Contact with extension can provide information to the respondents on viable income diversification options. The coefficient obtained for household size was positive and significant at 1%. This implies that increase in household size would increase income diversification. This result is in tandem with the findings of Sallawu, *et al.* (2016). Increase in household size may increase labour availability which will make it easier for the household to engage some members in off-farm and other income generating activities.

Table 3: Socio-economic determinants of income diversification

Variables	Coefficient	Std. error	t
Age	-0.1946*	0.0727	-2.68*
Years of formal education	0.0828	0.0998	0.83
Household size	0.8691*	0.1054	8.24*
Farm size	0.0471	0.0826	0.57
Extension visits	0.1588 **	0.0641	2.48*
Farm Credit	0.1480**	0.0647	2.29*
Constant	0.1291	0.3952	0.33
Sigma	0.5170	0.0643	0.33

*P ≤0.05   Obs. = 120   LR Chi^2 (7) = 112.30
Prob. > Chi^2 =   0.0000   Log likelihood = -37.948134   Pseudo R^2 = 0.59.
Source: Field survey; 2017

Conclusion and Recommendations
 There is high level of income diversification among arable crop farmers in the study area, crop farming is still the major income generating activity. Amount of credit received, extension contacts and household size positively influenced income diversification, age of the household head negatively influenced income diversification. Based on the findings of this study, it is recommended that farmers should form themselves into co-operative groups and pull their resources together in order to increase their capital base and garner better strength to negotiate for credit facilities. Also, farmers should approach credit houses collectively as cooperatives to secure loans while improvement in financial services is also imperative to empower farmers to adopt income diversification strategies more readily. Farmers through cooperative arrangements should also endeavor to source for agricultural information including credit sourcing, collectively on their own.

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