Determinants of non-farm income diversification among rural households in Nigeria

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Abstract: Integrated rural development approach to poverty reduction has been reported to have limited success in Nigeria. This is because farming is considered as main source of income for rural households, despite their involvement in other non-farm income generating activities. Focusing on income derivable from farming alone may be partially responsible for the ineffective poverty reduction strategies in Nigeria. In this paper, we investigate the composition and determinants of non-farm income of rural households in Nigeria. The 2004 National Living Standard Survey (NLSS) data collected by the Nigeria's National Bureau of Statistics was used for the analysis. The results from the study show that the share of farm, non-farm wage- and self-employment incomes in total household incomes were 24.3%, 43.0% and 23.7% respectively. Econometric analysis show that, households whose heads are male and had formal education, increased the likelihood of households' participation in non-farm wage-employment activities, while access to credit and having larger farm size decreased it. Access to credit; community participation; larger family size and possession of capital assets increased the likelihood of participation in non-farm self-employment activities, while having larger farm size, being a non-indigene decreased it.
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1.Introduction

In Nigeria approximately 54.4 percent of the population are poor, about two-thirds of them living in rural areas (NBS, 2004). Important determinants of living conditions of households and their members are the economic activities in which they are engaged and the returns they are able to earn from those activities. For many households in Nigeria, especially in the rural areas, agriculture is the main activity, (NBS 2004). Previous analysis of poverty has shown that poverty is disproportionately concentrated among households whose primary livelihood lie in agricultural activities. Therefore poverty reduction has been on the agenda of international development agencies as well as governmental and non-governmental organizations. Several potential exit paths out of rural poverty have been suggested in the literature (De Janvry et al., 2002). A common approach was through integrated rural development that focused mainly on increased productivity in agriculture. Agriculture has therefore been focused as the central element of poverty reduction strategy and attempt to increase the productivity of agriculture and alleviate rural poverty in most developed countries has dealt with the structural sectoral problems. These problems have related to land tenure, lack of inputs, inadequate and fragmented farm size, and pricing and marketing (Schwarze, 2004 and Pham, 2006). The integrated rural development approach had only limited success and often turned out not to be sustainable (De Janvry et al., 2002), and after many decades of focusing on agriculture as the core of rural development policies, it is now clear that agriculture alone is not enough for sustainable increases in income (World Bank 1997, Scwarze 2004) . The development of agriculture according to Lanjouw (1998) has to be seen not only as sectoral problems but also as inter-sectoral problems. The reason is that raising the productivity of agriculture alone, though necessary, is not a sufficient condition for rural poverty reduction (Anderson and Leiserson 1980). A new approach to rural development that takes a comprehensive view of the multiplicity of income sources that rural household will rely upon has to be developed. An important aspect of this new approach is the promotion of rural non-farm activities and enhancing access of the rural households to these sources of income (De Janvry et al, 2005).

In Nigeria, agriculture alone has been seen as the main basis for income and livelihood of the rural population. Even the rural people claim that their major income generating activity is farming and so they regard other income generating activities as residual, Illiya (1999). This however implies that the non-farm sources of income might have been underestimated. In their study, NISER (2004) examined the structure of income among rural

households in Nigeria; they found that non-farm income, as proportion of total income of the rural majority was about 34.16 percent, implying that non-farm income sources cannot be regarded as "residual". Anderson and Leiserson (1980) indicated that, based on minimal estimates, the percentage of rural labour force engaged in non-farm work in most of the developing countries falls between 20-30 percent. Reardon et al. (2001) also note that about 40 percent of rural household incomes are from non-farm sources, which is important to keep in mind in the analysis of rural livelihood strategies and in the design of rural development strategies.

The above evidences implies that the existence of both indigenous as well as modern non-farm activities in rural Nigeria is indicative of the fact that other means of rural sources of livelihood besides farming exist and despite the importance of these activities, very little is known about them and on the role they play in income generating strategies of rural households in the study area. This study is stimulated by this preliminary insight that rural households do not depend on farming as the only source of income, but on a variety of non-farm income sources. The nature of these incomes and the factors influencing rural households' diversification need to be better understood for priority setting. Since the goal of any poverty reduction strategy is to increase income and other welfare indicators of rural households (Gordon and Craig, 2004), any policy which aim is to increase income should first understand the composition of these income sources, so that target interventions can be applied appropriately.

Here, we analyse the various activities rural households engage to generate income, the share of income from each activity and their determinants . The results of the findings would help in drawing policy conclusions with respect to rural poverty reduction and rural development. The rest of the article proceeds as follows: section 2 describes the data used and methodolgy implemented, section 3 presents the main results on income generating activities and the estimates of the determinants of income diversification, section 4 draws out the main conclusions.

2. Data and methodology

The data used for the study were collected by the National Bureau of Statistics (NBS). They were based on the Nigeria Living Standards Surveys (NLSS) of households that was carried out between September 2003 and August 2004. The questionnaire development was a joint effort of the Nigerian Bureau of Statistics, the World Bank and the National Planning Commission. The survey covered the rural areas of the 36 states of the Federation and the Federal Capital Territory. One hundred and twenty enumeration areas were studied in each of the states while sixty were covered in Abuja. The national sample size for the 12-month survey period was 21,900 housing units. However, some households did not fully complete the questionnaires. Out of 21,900 households that were targeted for the survey, only 19,158 completed the survey. Although there are 19,158 urban and rural households in the full sample, the analysis focused on rural households, which total 14,512. However some households did not report any income and this reduced the sample size to 13033. Variables extracted from the NLSS data include socio-economic characteristics; capital assets; consumption expenditures; incomes from farm, and non-farm activities. Non-farm activities were further categorised into self-employment and wage-employment.

3.2 The Multinomial Logit Model

The multinomial logit model was used to express a household's choice of income activities as a function of some explanatory variables. According to the model, each individual will fall into one of the categories with certain probability. The income activities choices available for the households in the study area can be categorized into three activities these include: (i) income from farm activities, (ii) income from non-farm wage employment activities and, (iii) income from non-farm self- employment activities. Following Kennedy (1988), the multinomial logit is expressed as

$$P_{ij} = \frac{\exp\left(X_i \gamma_j\right)}{\sum_{j=0}^{3} \exp\left(X_i \gamma_j\right)} \quad \text{..... (1)}$$

Setting $\gamma_{ij} = 0$, the model can be rewritten as:

$$P_{ij} = \frac{\exp\left(X'_i \gamma_j\right)}{1 + \sum_{j=1}^{2} \exp\left(X'_i \gamma_j\right)} \quad \text{(j=1,2)..... (2)}$$

and

$$P_{i0} = \frac{1}{1 + \sum_{j=1}^{2} \exp\left(X'_i \gamma_j\right)} \quad \text{..... (3)}$$

Where P_{ij} (j=0, 1, 2) = the probability associated with the income activities choices of a household *i* with j=0 if the household participates only in farm

activities; j=1 if the household participates in non-farm wage employment activities; and, j=2 if the household participates in non-farm self employment activities.

X_i = the explanatory variables, which remains constant across alternatives.

3. Empirical results

3.1 Descriptive Analysis of Income and Activities

Results from table 1 shows that agriculture is the predominant activity among rural dwellers in the study area; about 78 percent of the surveyed households are involved in this activity. The proportion of income generated from this activity by the rural households is small (24.3 percent).

When non-farm activities were categorised into non-farm wage- and self- employment activities, it is shown that 15.2 percent and 19.7 percent of the households are engaged in non-farm wage and self employment activities. The share of income from non-farm wage employment is 43.0 percent, while non-farm self employment income share is 23.7 percent. This result shows that, though the percentage of households who are engaged in non-farm wage employment is lower than other activities in the study area, in terms of returns, it is the most remunerative activity in the study area.

Households belonging to the first and the third terciles (table 2) had slightly higher proportions of non-farm wage employment income (50.0 percent and 49.7 percent), than those in the second tercile. Although the mean income for the poor households is the least, their proportion of income from farm activities is the highest of the three expenditure categories. In terms of participation, participation in agricultural activities is comparatively low for households that are better off (74.3 percent), whereas it is the other way round for non-farm activities. 19.2 percent of the richer households participate in non-farm wage employment while 22.7 percent of the same households participate in non-farm self employment activities. Only 9.6 percent of the poorest households are engaged in non-farm wage employment activities and 17.7 percent participate in non-farm self employment activities.

Male headed households generate 28.1 percent of their income farm activities; 49.7 percent and 27.6 percent from non-farm wage and self employment activities (table 3). While female headed households generate 22.2 percent of their income from farm activities; 44.3 percent and 28.1 percent from non-farm wage- and self- employment activities respectively. Participation in farm and non-farm wage employment activities is slightly higher for male headed households, whereas it is the other way round for non-farm self employment activities. 21.6 percent of the female headed households are engaged in non-farm self employment activities while 19.2 percent of the male headed households are engaged in the same activities.

Table 1: Composition of household income by activity

Income activity	Share in total income (%)	No of households participating	% of households
Farm activity	24.3	10212	78.4
Nonfarm wage employment	43.0	1975	15.2
Nonfarm self employment	23.7	2568	19.7
Other			
Remittances	5.9	1451	11.1
Transfers	3.0	3800	29.1

Table 2: Composition of Household Income by Poverty Group

Expenditure Tercile	First	Second	Third
Farm income			
Shares in total income (%)	25.8	24.2	21.7
No of households participating	2970	3754	3838
% of households participating	87.8	83.7	74.3
Nonfarm wage income			
Shares in total income (%)	50.6	47.6	49.7
No of households participating	323	661	991
% of households participating	9.6	14.7	19.2
Nonfarm self employment Income			
Shares in total income (%)	23.6	28.2	28.6
No of households participating	598	798	1172
% of households participating	17.7	17.8	22.7

Table 3: Composition of Household Income by Gender of the Household Head

	Male	Female
Farm income		
Shares in total income (%)	28.1	22.2
No of households participating	8251	2311
% of households participating	81.1	18.9
Nonfarm wage income		
Shares in total income (%)	49.7	44.3
No of households participating	1739	236
% of households participating	17.1	8.3
Nonfarm self employment Income		
Shares in total income (%)	27.6	28.1
No of households participating	1950	618
% of households participating	19.2	21.6

3.2 Determinants of non-farm income diversification

The categorization of households according to their income activities was used as a basis for the specification and estimation of the multinomial logit model for the likelihood of belonging to one of the activity income groups. Non-farm activities were categorized into non-farm wage- and self-employment activities. The interest is finding out how each of the explanatory variables affects the odds of a household engaging in non-farm activities relative to farm activities which is the base case. As explanatory variables, we use household socio-economic and demographic characteristics. The results include the maximum likelihood estimated coefficients, the likelihood ratio test as well as the changes in probability. The estimated results of the multinomial logit model were interpreted using change in probability following Rahji et al. (2008). The coefficients of the probabilities of the non-farm wage-employment activities and non-farm self-employment activities were estimated with respect to farm activities category. A positive significant coefficient on a variable indicates that the variable is associated with a higher probability of being in that activity group (non-farm wage- and self-employment) relative to the reference group (farm activities). Conversely, a negative coefficient indicates that the probability of the respondents choosing to participate in non-farm activities is smaller than the probability of participating in farm activities.

The results of the test of significance of the determinants of non-farm income diversification using the likelihood ratio chi-square statistic in table 4 shows that the variables specified in the model were significant. The likelihood ratio test of -5992.47, chi-squared value of 5400.68 with 40 degree of freedom is significant at 1%, implies a significant relationship between non-farm income diversification and the explanatory variables. In addition to the estimated coefficients, the marginal impacts of changes in the explanatory variables on the probability of participating in farm activities were also presented. The explanations of these marginal impacts depend on the unit of measurement of the explanatory variables. Relative to participating in farm activities, some of the variables included in the model were found to be significant in explaining the probability of households participating in non-farm wage-employment and nonfarm self-employment activities in the study area. Table 4 shows that variables representing household size and access to credit had mixed impact on non-farm wage- and self-employment activities relative to farm activities. For example, a 10% increase in household size leads to a decrease in the probability of participating in non-farm wage-employment activities by 1.1%, but an increase in the probability of participating in non-farm self-employment activities by 2.6%. Similarly, a 10% increase in the number of household heads having access to credit will decrease the probability of participating in non-farm wage-employment activities by 0.8%, but increase the participation in non-farm self-employment activities by 1.4%.

Other key policy variables with significant impact are value of assets, community participation (social capital), dependency ratio, age, educational status and gender of the household head, landsize, livestock units owned, migrant status, and the regional variables. The implications are that a 10% increase in any of these variables would lead to an increase (or a decrease) in the probability of households participation in non-farm wage- and self-employment activities by some percentage points.

Value of assets, Household size, social capital, age of the household head, access to credit, South east, and South west regional variables have significant and positive impact on non-farm self-employment activities but not on wage- employment activities. This shows for instance, that, a 10% increase in the value of assets owned by the households would lead to an increase in the probability of participation in non-farm self-employment activities by 1.8%. Since assets could be a measure of wealth (Scwarze 2004), it implies that richer households are more likely to participate in non-farm self- employment activities than poorer households. Similarly, a 10% increase in the age of the household head would increase the probability of households' participation in non-farm self-employment activities by 0.7%. This implies that older household heads have a higher probability of participating in non-farm self employment activities than younger ones, probably because some non-farm self- employment activities available in the study area require years of training, skills and experience.

Gender, educational status of the household head, dependency ratio, North east and North west regional variables have significant and positive impact on non-farm wage-employment acivities but not on non-farm self-employment activities. For example, a 10% increase in the level of education of the household head leads to an increase in the probability of participating in non-farm wage-employment activities by 0.9%. For a 10% increase number of male headed households, the likelihood of participating in non-farm wage- employment activities would increase by 2.7% and a 10% increase in number of dependents in the households would lead to an increase in the likelihood of participation in non-farm wage-employment activities by 0.7%.

Variables with significant and negative impact include, landsize, livestock units owned, migrant status, distance to work and North west regional variable. Landsize, livesock units owned and migrant status have significant and negative impact on both non-farm wage- and self-employment activities, while distance to work have significant impact only on non-farm wage-employment activities. For instance, a 10% increase in landsize would lead to a decrease in the probability of household's participation in non-farm wage-employment activities by 0.7%, and participation in self-employment activities by 2.5% and for a 10% increase in the livestock units owned by the household, the probability of participation in non-farm wage- and self-employment activities would decrease by 0.5% and 3.6% respectively. This result implies an inverse relationship between household landholdings and non-farm activities in the study area. Similarly, a 10% increase in the number of migrants would lead to a decrease in the participation of non-farm wage-employment activities by 2.1% and non-farm self-employment activities by 0.3%.

Table 4 Parameter estimates of the Multinomial Logit Model

	Non-farm wage- employment		
Variables	Coefficient Estimate	p-value	Marginal effects
Landsize	-0.221	0.000***	-0.250
Livestock	-0.003	0.000***	-0.054
Assets	-0.006	0.829	-0.427
Hhsize	-0.341	0.000***	-0.110
Age	-0.015	0.059	-0.154
Sex	0.647	0.000***	0.267
Educ1	0.522	0.071	0.114
Educ2	0.036	0.085*	0.076
Educ3	0.151	0.059*	0.104
Deptratio	-0.320	0.000***	0.073
Illness	0.193	0.102	0.267
Socialcap	-0.007	0.854	-0.058
Credit	-0.307	0.000***	-0.089
Distance t_wk	0.005	0.367	-0.073
Migrant	0.268	0.087*	-0.215
Southeast	-0.096	0.627	-0.001
Southwest	0.472	0.135	0.007
Northeast	0.391	0.059*	0.083
North central	0.665	0.000***	0.158
Northwest	0.722	0.001**	0.153
Constant	-22.331		

***, ** and * indicates the variables of which the estimated coefficients are statistically significant at level of 0.01; 0.05 and 0.1 respectively

Table 4 (cont'd) .

	Non-farm self-employment		
Variables	Coefficient Estimate	p-value	Marginal effects
Landsize	-0.211	0.000***	-0.068
Livestock	0.200	0.000***	-0.362
Assets	0.069	0.013**	0.189
Hhsize	0.193	0.000***	0.269
Age	-0.019	0.000***	0.073
Sex	0.135	0.139	0.068
Educ1	0.096	0.496*	0.079
Educ2	0.051	0.730	0.133
Educ3	0.377	0.082	0.347
Deptratio	-0.001	0.767	-0.317
Illness	0.052	0.656	0.056
Socialcap	0.103	0.021**	0.174
Credit	0.379	0.000***	0.144
Distance t_wk	0.007	0.847	-0.305
Migrant	-0.702	0.000***	-0.027
Southeast	0.567	0.000***	0.013
Southwest	1.768	0.000***	0.119
Northeast	-0.280	0.124	-0.002
North Central	1.122	0.000***	0.142
Northwest	-0.616	0.001**	-0.075
Constant	-1.264		
Diagnostic tests	Loglikelihood=-5992.47; loglikelihood ratio chi^2 stat. (40) = 5400.68; prob>chi^2 = 0.000***; pseudo R^2 = 0.31;		

***, ** and * indicates the variables of which the estimated coefficients are statistically significant at level of 0.01; 0.05 and 0.1 respectively.

Conclusion

The study investigated non-farm diversification and its determinants among rural households in rural Nigeria. The study found that farming is the predominant occupation among rural households in the study area. The study also found that, although farming is the main occupation for most households, majority of households in the study area have fairly diversified sources of income and farming alone cannot sustain a sufficient livelihood of the rural households. Since income from non-farm sources takes a higher share in household income, non-farm activity can no longer be considered as residual by households in rural Nigeria. While farming remains the dominant income for the poorest, non-farm occupations and especially wage-employment activities are the main sources for the

relatively richer households. Regression models show that education, gender, landsize and household size are key determinants of participation in non-farm wage-employment activities, while value of assets, access to credit, social capital, household size and landsize are the key determinants of non-farm self-employment activities. These factors improve the opportunities to start own business and find employment in the higher- paying non-farm sector. This shows that, resource- poor households in rural areas are faced with considerable barriers to entry into remunerative nonfarm activities. The findings presented here suggest that investment in education, enhancing rural households' access to credit and improving the asset endowments of the poor would be an important policy instrument in the promotion of rural non-farm employment among rural households in Nigeria.

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