Labour Market Participation And Rural Household Welfare In Nigeria

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Abstract
This study sought to show the empirical link between labour market participation and household welfare among rural households in Nigeria. A reverse of the conventional fuzzy sets poverty measurement was adapted to generate household welfare indices while the ordered probit method was used to analyze the effect of labour market participation on household welfare. Welfare was generated as three ordered categories ranging from low to moderate to high welfare. Research results were based on the General Household Survey data consisting of 5,000 households, out of which only 1,319 were considered suitable for the study. Welfare was found to be low among rural households with a mean welfare index of 0.12 and participation in the rural labour market reduced the probability of Nigerian households being well-off by almost 17%. The study concluded that regulation of wages of informal sector workers is crucial in Nigeria in order to offer protection from income uncertainty.

Introduction

Developing economies are often characterized by economic structures that are too weak to absorb most of their potential workforce (Campbell, 2013). Scarcity of capital to put labour to productive use is often the bane of such economies. With such a situation of high population growth rate and slow economic growth, labour supply pressures and huge underemployment are often experienced (Buchenrieder *et al.,* 2007). For instance, Africa and the Middle East commanded the smallest share of around 5% of world output between 2000 and 2009 while both regions had the highest population growth rates of almost 2.5% per annum within the same period (ILO, 2011). This creates a situation of excess labour seeking employment, rather than the growth induced labour demand experienced in the developed and emerging economies of the world.

Therefore, incomes are often small and household welfare compromised in such developing economies (Campbell, 2013).

In the largely agrarian societies of Africa, Asia and the Middle East, the rural areas, which hold large amounts of agricultural land, have more of the labour force than the slowly emerging urban industrial areas (Campbell, 2013). In Africa as a whole, rural employment makes up around 64% of total employment; in sub-Saharan Africa, it is slightly higher at 69%; while in Asia it is 60% (ILO Statistics, 2011). These stand in contrast to the global situation in which the rural labour force is smaller (44%) than the urban (56%). Similarly, rural labour employment in America (30%) and Oceania (36%) are smaller than the urban respectively (ILO Statistics, 2011).

Closely related to Africa's situation is

Nigeria's rural sector, which holds over 65% of the country's labour force (NBS, 2005). Its rural economy is hinged on agriculture and the bulk of its production is undertaken by farming households producing mostly at the small scale and/or subsistence level. It is therefore unsurprising that the majority of the rural (largely agricultural) workforce belong to the low-income strata (Ogunwale, 2005). The rural sector is often faced with income uncertainty as its economy often cannot sufficiently support livelihoods, and especially so for those living from subsistence farming (including suppliers of labour) as they are prone to low productivity, low incomes and vulnerable livelihoods (Buchenrieder *et al.,* 2007). Furthermore, the informal sector workers exhibit a constant marginal productivity of labour and so earn just a share of a somewhat constant income pool for their activities which implies that their incomes are often very low, leading to widespread poverty in the sector (Fields, 2004).

The labour market in Nigeria consists of several sources of income, including direct remuneration in the form of cash income, and non-cash income (Ogwumike, 2006). However, direct remuneration from the labour market remains the most important contributor to income security (Liebbrandt *et al.,* 2001). In this regard, rural labour suppliers in Nigeria are usually exposed to income insecurity due to the seasonal nature of agricultural labour demand and the fact that employers of agricultural labour are often unwilling to offer long term contracts, preferring to defer their demand to peak production periods (Leavy and White, 2003). Hence, many farm labourers continue to work on plots even when the value of their marginal product is clearly lower than the ruling wage rate, exposing them to poverty and income insecurity. This, in turn, has led to the high level of income inequality experienced by the rural sector in Nigeria (Oyekale *et al.*, 2006).

A major function of a labour market is to allocate income. Thus, the functioning of the labour market is a determinant of the welfare of the major actors in an economy (Mankiw, 2012). The foregoing, coupled with the fact that majority of the poor live in the rural areas, means that the functioning of rural/informal labour market is critical to the success of any efforts towards pro-poor growth as the rural poor often have their labour endowment as their main assets which they can exchange for income only through the labour markets (Leavy and White, 2003). Since productivity of labour can be seriously hampered by socioeconomic factors beyond the control of the household, a ***laissez-faire*** approach to income allocation (i.e. income determination and allocation by pure market forces) without due intercession through well-tailored policy is a major cause of income inequality (Mankiw, 2012) which greatly affects the rural areas in Nigeria. This study, therefore, seeks to reveal the welfare situation of rural households in Nigeria using a multidimensional approach as well as how their participation, or otherwise, in the labour market affects their welfare.

Materials and Methods
The Neoclassical Theory of Distribution
According to the neoclassical theory of distribution first propounded by John Bates Clark in 1889, the amount paid to each factor of production depends on the supply

and demand for that factor. The demand, in turn, depends on that particular factor's marginal productivity. Given a competitive (both in the factor and output markets), profit maximizing firm, labour wage as well output prices are imposed by the forces of demand and supply. At equilibrium labour earns the value of its marginal contribution to the production of goods and services (Mankiw, 2012).Thus, such a farm hires labour up to the point where the value of its marginal product equals the ruling wage rate (i.e. the point of profit maximization). Therefore, in the short-run, the demand curve for labour is also the farm's value of marginal product (VMP) curve, which is downward sloping due to diminishing marginal product of labour. In competitive markets, a firm faces a perfectly elastic supply of labour (S_L) which corresponds to the wage rate (W) and the marginal factor cost (MFC) of labour (W = S_L = MFC_L). Since optimal resource allocation requires that marginal factor cost of labour (MFC_L) equals the value of marginal product (VMP), this firm would demand L units of labour as shown in Figure 1.

The aforementioned scenario can be used to explain the Nigeria situation. For example, given the peculiar nature of agriculture in Nigeria, during off-season periods, the marginal productivity of labour is significantly lowered, therefore, the VMP curve shifts to the left (VMP_1 – see fig. 1). Also, the lowered marginal productivity of labour during these periods is reflected in reduced wages earned by labour. Thus a new equilibrium is established at (VMP_1, W_1) characterized by lower labour demand (L_1) and lower wages (W_1).
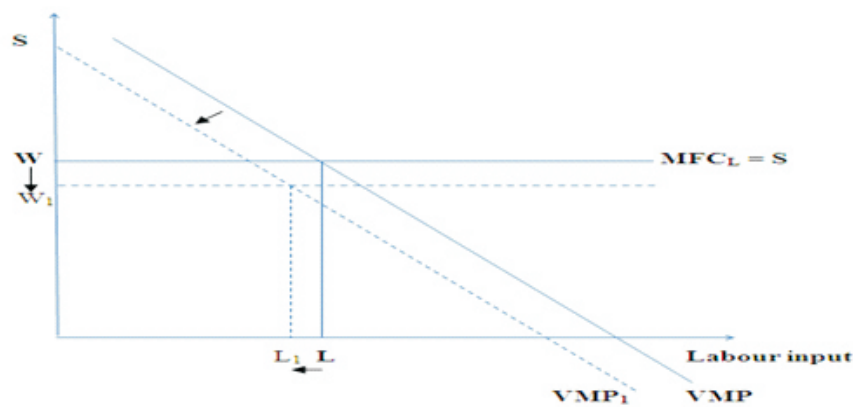

Figure 1: **The Short-Run Labour Demand Curve**

Labour supply, on the other hand, is determined by the work–leisure trade-off. A plot of the supply of labour against wage rates gives an upward sloping labour supply curve at higher wage rates which is due to the relative sizes of the substitution and income effects of the wage rate changes (Rutherford, 2002). The wage increase can be decomposed into two separate effects: the pure income effect as well as a substitution effect. The income effect is shown as the movement from point A to point C in Figure 2.
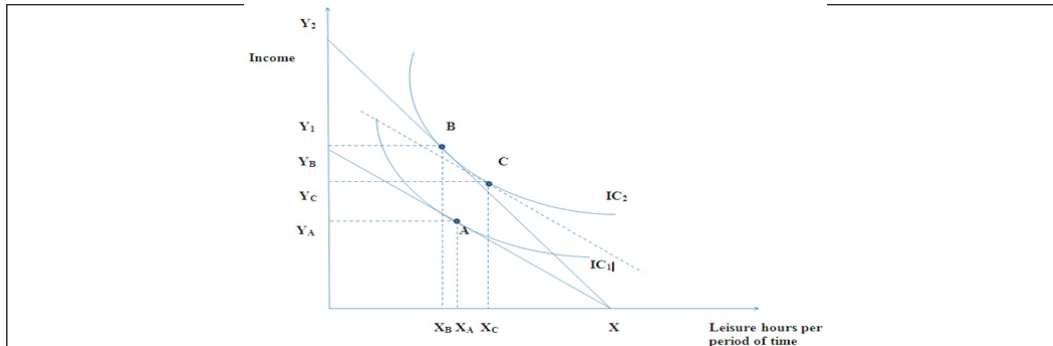
Figure 2: **The Income and Substitution Effects on Labour Supply**

In some cases, the substitution effect is greater than the income effect (in which case more time will be allocated to working), but in other cases the income effect will be greater than the substitution effect (in which case less time is allocated to working).

Drawing on the foregoing, it would be expected that, in the informal sector in Nigeria, the substitution effect of labour supply would outweigh its income effect as incomes are generally low due to factors such as lack of labour specialization as well as seasonality of production. This would be especially significant in the agricultural labour market during the "off-season" where labour demand is at its lowest in the sector and labourers would be eager to substitute more work time for leisure with any marginal increase in their incomes.

Conceptual Framework
In Fields' (2004) opinion, the informal sector is often conceived as a free entry sector of last resort where wages are significantly lower than those in the formal sector and which holds majority of the "working poor" in developing economies. Marginal productivity here is very low or negligible and falls below the bargaining wage or income share accruing to workers; therefore, wages are not determined by the marginal productivity of labour but by a share of income accruing to each worker. This suggests that the determination of income can be approached in two ways including the following:

One is to assume that there is a fixed amount of income to be earned in the informal sector regardless of the number of people working in that sector - that is, the marginal product of labour is literally zero. Full income-sharing among the informally employed is assumed, so that each earns the average product which varies inversely with the number of people in the informal sector. A second approach is to regard a part of the informal sector as experiencing *constant* marginal product. For example, it is assumed that working in agriculture earned such a worker the marginal product from his or her efforts, not an average product. Thus, assuming that the marginal worker and the marginal land are as productive as preceding ones, the *marginal* product of labour in agriculture is constant.

The second approach better mirrors the Nigerian agricultural/informal labour

market. Marginal output of labour tends to remain constant and subject to land availability as well as exogenous factors such as weather. This second approach is, therefore, the basis for understanding labour income determination in this paper.

Data Source

The data used for this study were obtained from the World Bank sponsored General Household Survey (GHS) panel data (Wave II, 2012/2013). The data consist of data collected for both the post-planting and post-harvest periods for household, community and agricultural information. The post-planting agricultural data were used in this study as this would best reflect the peculiarities of labour supply and demand being investigated in this study. Information used for analysis was extracted from the responses of household heads in the GHS sample who were suppliers of labour. The indices used to generate the fuzzy-sets-based measure of household welfare are shown in Appendix 2 of this report.

Empirical Procedure

The method of fuzzy sets used for multidimensional poverty measurement was adapted to generate household welfare indices while the ordered probit regression method was used to analyze the effect of labour market participation on household welfare. Participation in the agricultural labour market (or otherwise) by household heads was determined as follows: respondents who had worked on a farm or enterprise owned or rented by a household member or non-member were deemed to have participated in the labour market while those who had not engaged in any of the foregoing were considered not to have participated in the labour market.

Fuzzy Sets Measure of Welfare

The multidimensional approach to poverty measurement applied in a number of studies (Oyekale and Okunmadewa, 2008; Yusuf and Oni, 2008; Alkire and Foster, 2007) was used to obtain a proxy for household welfare using the method of fuzzy sets. To obtain the welfare measure, households set was defined as $A = \{a_1, ..., a_i, ..., a_n\}$ while an m-dimension vector of socio-economic attributes to study the level of welfare in A was defined as $X = \{X_1, ..., X_j, ..., X_m\}$. The socio-economic attributes used to generate welfare indices for the households included ownership of household assets (such as furniture, generators, vehicles, land, farm machines among others), educational status of household head as well as household-reported cases (or otherwise) of food consumption insufficiency. Given that B is a fuzzy sub-set of households in A, where a_iB stands for the degree of welfare in at least one attribute, the degree of membership of the i-th household ($i = 1,...,n$), with respect to the j-th attribute ($j = 1,...,m$), to the fuzzy sub-set B was defined as: $X_{ij}: = {}_B[x_j (a_i)]$, $0 < X_{ij} < 1$. **In particular,** $X_{ij} = 1$, **if the i-th household** possess**es the j-th attribute while** $X_{ij} = 0$, if the i-th household **does not** possesses the j-th attribute. This reverse procedure to the conventional multidimensional poverty measurement was done in order to measure welfare of households rather than their poverty statuses. This methodology is justified on the basis of the fuzzy approach to poverty measurement based on the weighted indices of poverty. Therefore an inverse weighted score will generate welfare indices for each household rather than poverty indices. This

is similar to the weighted method Cowell and Jenkins (2000) used to measure household welfare.

The degree of membership of the i-th household to the Fuzzy sub-set was defined

$$\mu_\beta(a_i) = \sum_{j=1}^{m} x_{ij}w_j / \sum_{j=1}^{m} w_j \qquad (1)$$

where w_j is the weight attached to the j-th attribute. The intensity of household

$$w_j = \log\left[\sum_{i=1}^{n} g(a_i) / \sum_{i=1}^{n} x_{ij}g(a_i)\right] \geq 0 \qquad (2)$$

where $\sum_{i=1}^{n} g(a_i)$ represents the size of the sample of households taken from the population. Based on the foregoing, households' welfare would range from 0 (worst case scenario) to 1 (best case scenario) depending on how deprived they are in the household welfare attributes considered.

The Ordered Probit Model
Due to the possibility of selection bias between welfare and labour market participation of households, the Heckman model was applied to the data. However, the

as a weighted average of Xij. Household welfare indicators used in the study took the form of simple 'yes/no' dichotomies, in which case X_{ij} is either 0 or 1. The welfare ratio of a household,

welfare with respect to X_j is measured by the weight w_j, expressed as:

inverse mills ratio was not significant, indicating the absence of selection bias between both variables (Appendix 3). Therefore, the ordered probit model was used to analyze the effect of labour market participation on rural household welfare. The dependent variable (Y) was generated as 3 ordered categories of household welfare ranging from low to moderate to high welfare. Following Wooldridge (2002), given that Y is an ordered response taking values of 0, 1 or 2 for household welfare, the ordered probit model for Y conditional on explanatory variables

$$Y = \mathbf{X}\beta + e \qquad e/\mathbf{X} \sim Normal(0,1) \qquad (3)$$

Let $\alpha_1 < \alpha_2 < ... < \alpha_j$ be unknown cut-off points or threshold parameters. Y can, therefore, be defined as follows:

$Y = 0,$ if   (4)

$Y = 1,$ if   (5)

     .
     .

$Y = j,$ if   (6)

Based on the assumption of normality of the error term (e), the conditional distribution of Y given **X** can be simply derived from each of the response probabilities (in equations 4 – 6) as follows:

$$P(Y = 0|\mathbf{X}) = P(Y \leq \alpha_1|\mathbf{X}) = P(\mathbf{X}\beta + e \leq \alpha_1|\mathbf{X}) = \Psi(\alpha_1 - \mathbf{X}\beta)$$

(7)

$$P(Y = 1|\mathbf{X}) = P(\alpha_1 < Y \leq \alpha_2|\mathbf{X}) = \Psi(\alpha_2 - \mathbf{X}\beta) - \Psi(\alpha_1 - \mathbf{X}\beta)$$

(8)

.
.
.

$$P(Y = j-1|\mathbf{X}) = P(\alpha_{j-1} < Y \leq \alpha_j|\mathbf{X}) = \Psi(\alpha_j - \mathbf{X}\beta) - \Psi(\alpha_{j-1} - \mathbf{X}\beta)$$

(9)

Similarly,

$$P(Y = j|\mathbf{X}) = P(Y > \alpha_j|\mathbf{X}) = 1 - \Psi(\alpha_j - \mathbf{X}\beta)$$

(10)

The parameters α and β can be estimated by maximum likelihood and the model can be simply stated as follows for i households:

$$Y_i = \mathbf{X_i}\beta + \varepsilon_i$$

(11)

Y_i is the household welfare status. Households were classified as having low, medium or high welfare relative to the overall Mean Welfare Index (MWI) generated from the fuzzy analysis. Households with MWI greater than or equal to one-third of the overall MWI but less than two-third were regarded as having low welfare ($Y = 0$), those with MWI greater than or equal to two-thirds of the overall MWI but less than the overall MWI were categorized as having medium welfare ($Y = 1$) while those with MWI greater than or equal to the overall MWI were considered to be high welfare households ($Y = 2$). X_i represents a vector of explanatory variables (Appendix 1) regressed on the endogenous variable including the following:

X_1 = Labour market participation (LMP) decision of household head (Participates = 1, 0 if otherwise)

X_2 = Age of household head (Years)
X_3 = Square of age of household head (Years)
X_4 = Sex of the household head (Dummy; Male = 1, 0 if otherwise)
X_5 = Marital status of household head (Dummy; Married = 1, 0 if otherwise)
X_6 = Household size (Number)
X_7 = Monthly man-hours worked (Hours)
X_8 = Farm size (Hectares)
X_9 = Total income of household head (Naira)
X_{10} = Social capital (Dummy; Belongs to a socioeconomic group = 1, 0 if otherwise)
X_{11} = Credit access of household head (Dummy; has access = 1, 0 if otherwise)

Results

Analysis of Socioeconomic Characteristics of Rural Households in Nigeria

A summary of the socioeconomic characteristics of the sample of household heads is presented in Table 1. The mean age of household heads was 49.96 years. Household heads aged 30 years and below were in the minority (10.8%) in the sample. Also, 81% of the household heads are male while 84% have at least primary education. Over 67% of the male household heads have at least primary education while just over 16% of the female counterparts have attained a similar level of education. Average household size is six persons with more than half of the households (55.1%) having between 6 and 15 members. Only 20.8% of the household heads belong to at least one social group – with informal savings groups (79.6%) being the preferred association for those who participate in social groups. However, more male household heads (17.4%) belong to social groups than female household heads (3.5%) in rural Nigeria

Table 1. Distribution of household heads by socioeconomic characteristics

Characteristic	Male Headed Households (n=1,069) %	Female Headed Households (n=250) %	Pooled (n=1,319) %	Difference Test (P-values)
All	81.1	18.9	100	
Age				
= 30	9.8	1.0	10.8	
31 – 50	40.0	5.2	45.2	
>50	31.3	12.7	44.0	
Mean	48.32 (±15.11)	56.99 (±15.35)	49.96 (±15.53)	0.000***
Education				
No formal	2.0	0.4	2.4	
Vocational/technical	0.7	0.3	1.0	
Quranic	3.0	0.9	3.9	
Primary	38.3	7.8	46.1	
Secondary	29.6	8.5	38.1	
Tertiary	7.4	1.1	8.5	
Marital Status				
Married	73.5	1.4	75.0	
Single	7.5	17.5	25.0	
Household Size				
1 – 5	35.1	8.7	43.8	
6 – 15	45.2	9.9	55.1	
□ 15	0.8	0.3	1.0	
Mean	6.34 (±3.34)	5.84 (±3.25)	6.25 (±3.33)	0.014*

Social Group Membership			
Not involved in social groups	63.7	15.5	79.2
Involved in social groups	17.4	3.5	20.8
Cooperatives	16.4	4.0	20.4
Informal savings groups	12.4	67.3	79.6
Household Monthly Income (?)			
= 10, 000	50.0	10.8	60.8
10, 001 – 30, 000	20.3	5.0	25.3
30, 001 – 50, 000	5.2	1.2	5.8
< 50, 000	5.6	1.9	7.5
Mean	16,451.89 (±28,430.82)	19,661.10 (±30,998.37)	17,060.16 (±28,950.10)	0.068*

Credit Access			
No	62.2	15.1	77.3
Yes	18.9	3.9	22.7
Formal institutions	8.0	3.3	11.3
Informal groups	42.0	8.3	50.3
Friends and relatives	59.0	10.0	69.0
Land Ownership			
No	60.3	13.5	73.8
Yes	20.7	5.5	26.2

Figures in bracket are standard deviations. Difference of means test was based on the Student's t-test. *** coeff. significant at 1%; ** coeff. significant at 5%; * coeff. significant at 10%

Labour Market Decision among Rural Households

Among the household heads, Table 2 indicates that approximately 34% participated in the labour market while 66% did not. The gender distribution of participants and non-participants reveals that 28.7% of those who participated in the rural labour market were male household heads while 5.5% were female.

Table 2. Distribution of labour market participation decision by characteristics of household heads

Characteristics	Participation Decision	
	Yes (n = 452)	No (n = 867)
	%	%
All	**34.2**	**65.8**
Age		
= 30	3.4	7.4
31 – 50	15.9	29.3
□ 50	14.9	29.1

Sex		
Male	28.7	52.4
Female	5.5	13.4
Educational Attainment		
No formal	0.6	1.8
Vocational/technical	0.5	0.5
Quranic	1.4	2.5
Primary	16.5	29.6
Secondary	12.2	25.9
Tertiary	3.1	5.4

Evaluation of Welfare Status of Households

The overall mean welfare index (MWI) of the households obtained from the fuzzy analysis was 0.12 (out of a possible score of 1). A summary of the household welfare indices is shown in Figure 3 of which over 80% of households showed MWI of 0.2 or less. The MWI was uniform (0.12) among almost all categories of rural households. However, households whose head participated in the labour market showed a better MWI than those whose heads had not participated. The decomposition statistics of these by the various characteristics of the households are shown in Table 3.
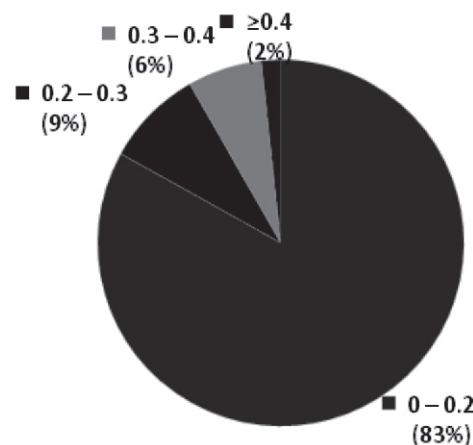
Figure 3. Summary of welfare status among households

Table 3. Welfare distribution by selected household characteristics

Socioeconomic Characteristics	MWI
Age	
= 30	0.12
31 – 50	0.12
> 50	0.12
Gender	
Male	0.12
Female	0.12
Marital Status	
Married	0.12
Single	0.12
Credit Access	
Does not have access	0.12
Has access to credit	0.12
Household Size	
1 – 5	0.12
6 – 15	0.12
☐ 15	0.13
Land Owners hip	
Owns Land	0.12
Does not Own Land	0.12
Social Group Membership	
Belongs	0.12
Does not Belong	0.12
Labour Market Participation Decision	
Participates	0.13
Does not participate	0.12

Effect of Labour Market Participation on Rural Household Welfare

Haven fitted a Heckman model on the data and obtaining a statistically insignificant Inverse Mills ratio (Appendix 2) indicating the absence of any bias, the ordered probit model was then used to carry out an assessment of the effect of labour market participation decision of household heads on the welfare. Table 5 presents the results of the ordered probit analysis. The chi-square value of 24.8 was statistically significant at 5% level, indicating that the data set fitted the model. The probabilities of the ordered dependent variable Y taking values of 0, 1 or 2 lay between probabilities of -0.111 and 1.061 of the standardized normal variable z. These probabilities represent the cut-off points or threshold parameters of the model. Five of the exogenous variables were seen to be statistically significant at different levels ranging from 5% to 10%. The coefficient of LMP (Labour Market Participation), though significant at 5%, has a negative sign. Farm size was negatively related to household welfare with a slope of 0.020 (at 5% significance). Also, being a female household head was positively related to the dependent variable (slope 0.054; significant at 10%), while being single was negatively related to welfare (slope 0.047; significant at 5%)

Table 5. Parameter estimates of the determinants of rural household welfare in Nigeria

Variables	Coefficient	Standard Error	t-Ratio	Slope		
				High Welfare	Moderate Welfare	Low Welfare
Labour market participation	-0.434**	0.191	-2.27	0.164	-0.043	-0.12
Age	0.007	0.011	0.65	-0.003	0.001	0.002
Age^2	-0.000	0.000	-0.52	0.000	-0.000	-0.000
Sex	0.141*	0.082	1.72	-0.054	0.014	0.040
Marital status	-0.122**	0.063	-1.94	0.047	-0.012	-0.034
Household size	0.011	0.009	1.17	-0.004	0.001	0.003
Monthly man-hours worked	0.007	0.005	1.53	-0.003	0.001	0.002
Farm size	-0.051**	0.023	-2.17	0.020	-0.005	-0.014
Total income	-0.000	0.000	-0.57	0.000	-0.000	-0.000
Social capital	-0.181**	0.091	-2.00	0.068	-0.018	-0.051
Credit access	0.086	0.088	0.98	-0.032	0.008	0.024
Log likelihood	-1,378.988					
Prob> chi^2	0.010					
chi^2	24.63*					
Pseudo R^2	0.009					
#α_1	-0.111					
#α_2	1.061					

*** coeff. significant at 1%; ** coeff. significant at 5%; *coeff. significant at 10%*

#Pr (Y = 0) = Pr (z <   -0.111); Pr (Y = 1) = Pr (-0.111 < z < 1.061); Pr (Y = 2) = Pr (z > 1.061)

Note: Pr = Probability

Discussion

Majority of the household heads were within their economically active years. However, a considerable proportion (44%) was also above 50 years. This lends support to the belief that the economically active, younger persons consistently migrate to the urban centers in search of work, leading to a gradually aging rural population in Nigeria (Abbass, 2009; Fields, 2004; Harris and Todaro, 1970). Most household in rural Nigeria are male-headed. Further, educational attainment of the household heads is quite high but it is significantly higher among male household heads than their female counterparts. Household sizes are large with an average of 6 members. Social group membership and credit access was very low among the household heads. Also, credit was more accessible to male household heads compared to female household heads. These facts have a bearing on the productivity of the household heads as their low credit access could have been worsened by their inability to form or join social groups which are generally seen as a means of accessing credit by members. Similar results were obtained in Kwara State by Yusuf (2008).

The consequent lack of credit would be a hindrance to their economic activities.

The bulk of rural labour market participants came from those within their economically active years. Household heads 50 years of age or under made up 56.4% of the participants (i.e. 19.4% of the total sample household heads). Furthermore, among the non-participants, the greatest proportion came from household heads above 50 years of age (making up 29% of the total number of household heads). The foregoing conforms to the understanding that with advancing age, people tend to become less productive and, consequently, less willing to supply their labour to the market (**Anyaegbunam** *et al.***, 2010; Ajibefun and Aderinola, 2004)**. Also, more male household heads participated in the rural labour market than the females which is expected considering the fact that most rural economic activities (especially agriculture) are labour intensive and consequently male dominated. Furthermore, the overwhelming majority of the participating household heads had either primary or secondary education as their highest educational attainment. This situation is understandable given that fact that the agricultural sector is the main employer of labour in rural Nigeria. Todaro (1969) and Fields (2004) explained that given the unspecialized nature of labour requirement (and employment) in the sector, it is expected that the bulk of its work force will have low human capital endowment.

A low welfare scenario exists in rural Nigeria brought about by low asset ownership (as shown in Appendix 4. In addition, the MWI also reveals the depth of deprivation being experienced by households; the low figure shows that rural households in Nigeria are largely deprived in terms of household and productive assets. Although the R^2 value was of the ordered probit model estimated low, going by Frost (2014), the low R^2 value was not sufficient to query the goodness of fit of the model as such low values can be expected in social science research since human behaviour is often largely unpredictable. Furthermore, R^2 is not a test statistic and there seems to be no clear intuitive justification for its use as such (Cameron, 1993). From the model, labour market participation was seen to be

negatively associated with the probability of rural households attaining high welfare in Nigeria. This shows a similar outcome of labour market participation to what Sitienei *et al*. (2013) found in Malawi. Labour market participation by a household head reduces the households' probability for improved (high) welfare by 0.164. Similarly, the probability that a household would have moderate welfare is reduced by 0.043 if the household head participates in the labour market. Therefore, the low and unregulated incomes earned by rural sector workers were seen to be negatively affecting their household welfare. Being a female headed household, increased the probability that household welfare would be high. This can be traced to the significant role of mothers in ensuring the adequate nutrition and general wellbeing of their households as opined by Black *et al*. (2013). On the other hand, households whose heads were married were shown to have a lower probability of belonging to the high welfare category.

It was also found that a unit increase in the size of the farmland held by the household would result in a decrease in the probability that a household would belong to the high welfare category, likely an indication of the greatly reduced productivity that results from neglectFlier of farms by owners in preference for supply of labour to other farms and activities (Sitienei *et al*.,2013). Thus, the poor wages received, coupled with the loss of potential income from neglected farms leaves rural household heads in a poverty trap. This situation is worsened by the possibility that they could be paying some form of rent on their land holdings as majority do not own the lands they use for production.

Conclusion and Recommendations
Rural household welfare is generally poor in Nigeria and participation in the labour market tends to exacerbate the problem as incomes are generally low and unregulated. Moreover, agriculture which is supposed to be the main driver of the rural economy has been unable to adequately fulfill this role due to huge productivity losses on the farm. Consequently, households having access to agricultural land (either by ownership or rent) does little to improve the situation. Generally, there is the problem of seasonality in demand for labour which greatly can greatly diminish the earning potential of the rural labour supplier.

It is therefore recommended that some form of regulation in wages of informal/ agricultural sector workers be implemented (especially during the off-season) in order to offer income protection from the combined negative effects of oversupply of informal labour and seasonality in labour demand. Unskilled rural labour suppliers should be helped to form organized groups wherein their wages are determined and regulated as done by their urban counterparts. Such decisions can then be enforced by the relevant governmental agencies such as the ministry of labour and productivity and the ministry of agriculture. Further, the agricultural economy can be strengthened through price and income support, youth empowerment schemes/ programmes, among others, which can help in expanding employment opportunities in the economy. This also will ensure higher incomes for the rural households and a route out of poverty. The study revealed that the larger the farm size held by a household, the worse its welfare was. Properly targeted schemes that can improve their productivity such as input subsidy schemes, innovation

dissemination and training may, therefore, go a long way to improve household welfare.

References

Abbass, I.M. (2009). Trends of rural urban migration in Nigeria. *European Scientific Journal*, 8(3):97-125. ISSN: 1857 – 7881 (Print) e - ISSN 1857-7431

Ajibefun J.A., Aderinola E.A. (2004). Technical Efficiency and Policy Implications in Traditional Agricultural Productions "Paper Presented at Bi-annual Research Workshop of AERC. Nairobi Kenya, 24th – 29th May".

Alkire, S. and Foster, J. (2007). Counting and multidimensional poverty measurement. OPHI working paper series no. 07, pp 1 – 41 OPHI, December, 2007

Anyaegbunam, H. N. Okoye, B. C. Asumugha, G. N. Ogbonna, M. C. Madu, T. U. Nwakor N. and Ejechi M. E. (2010). Labour productivity among small- holder cassava farmers in South East agro ecological zone, Nigeria. African Journal of Agricultural Research Vol. 5(21), pp. 2882-2885, 4 November, 2010

Black E.R., Cesar G.V., Walker, S.P., Zulfi qar, A., Bhutta P.C., Mercedes, de Onis, Ezzati, M., Grantham-McGregor, S., Katz J., Martorell, R., Uauy R., and the Maternal and Child Nutrition Study Group **(2013): Maternal and child under-nutrition and overweight in low-income and middle-income countries. T**he Lancet. Vol. 382, Issue 9890, 3 – 9 August, 2013, pp 427 – 451.

Buchenrieder, G., Möllers, J., Happe, K., Davidova, S., Fredriksson, L., Bailey, A., Gorton, M., Kancs, D., Swinnen, J., Vranken, L., Hubbard, C., Ward, N., Juvančič, L., Milczarek, D. and Mishev, P. (2007). Conceptual framework for analyzing structural change in agriculture and rural livelihoods. Discussion paper Number 113, 2007; Leibniz Institute of Agricultural Development in Central and Eastern Europe. http://hdl.handle.net/10419/28462

Campbell, D. (2013). The labour market in developing countries. In S. Cazes and S. Verick (Eds.), Perspectives on Labour Economics for Development, pp. 7 – 38. Geneva: International Labour Organization.

Cameron, S. (1993). Why is the *R* Squared Adjusted Reported□ *Journal of Quantitative Economics,* 9 (1):183–186.

Cowell F. and Jenkins S. (2000). Estimating welfare indices: household weights and sample design. Distributional Analysis Programme, London School of Economics. Discussion Paper No. DARP 48

Fields, G.S. (2004). *A guide to multisector labour market models*. Retrieved [10/10/2013], from Cornell University, School of Industrial and Labor Relations site: http://digitalcommons.ilr.cornell.edu/workingpapers/86/

Harris, J. and Todaro, M. (1970). Migration, unemployment, and development: a two sector analysis. *American Economic Review*, 40: 126-142.

International Labour Organization (ILO) (2011). Country brief – Nigeria's response to the crisis." 2nd African Decent Work Symposium 2010. October 6-10, Yaounde, Cameroon

Leavy, J. and White, H. (2003): Rural labour markets and poverty in sub-Saharan Africa. Working paper,

Institute of Development Studies, University of Sussex

Liebbrandt, M., Bhorat, H. and Woolard, I. (2001). Household inequality and the labour market in South Africa. ***Contemporary Economic Policy,*** 19 (1) pages f

Mankiw, G.N. (2012). Principles of microeconomics (sixth edition). © 2012, 2009 South-Western, Cengage Learning; Library of Congress Control Number: 2010941870. ISBN 13: 978-0-538-45304-2, ISBN 10: 0-538-45304-4.

National Bureau of Statistics (NBS) (2005). Annual abstract of statistics, NBS, Lagos, Nigeria.

Ogunwale, A.B. (2005). A case study of small scale farmers' participation in Nigeria agricultural development programmes: Oyo and Osun state agricultural development programmes. *Journal of Rural Development.* 28 (1):85 – 96.

Ogwumike, F.O. (2006). Labour force participation, earnings and inequality in Nigeria. *SARPN acknowledges the African Economic Research Consortium (AERC).* 10 – 12 October 2006. Retrieved on January 30, 2011 f r o m http://www.sarpn.org.za/documents/d0 0 0 2 2 7 0 / L a b o u r - force_Nigeria_Oct2006.pdf

Oyekale, A.S., Adeoti, A.I. and Oyekale, T.O. (2006). Measurement and sources of income inequality among rural and urban households in Nigeria. PMMA Working Paper 2006-20, Poverty and Economic Policy Research Network (www.pep-net.org)

Oyekale, A.S. and Okunmadewa, F.Y. (2008). Fuzzy approach to multidimensional poverty analysis in

Abia state, Nigeria. *Research Journal of Applied Sciences* 3(7): page range 490-495, 2008 ISSN: 1815-932X.

Porterfield S. (2001). Economic vulnerability among rural single-mother families. *American Journal of Agricultural Economics,* 83 (5):1302–1311.

Rutherford, D. (2002). Routledge dictionary of economics. Second edition, Taylor and Francis Group, London and New York. ISBN 0-203-00054-4 Master e-book. ©2002 Donald Rutherford.

Sitienei, I., Mishra, A.K., Gillespie, J. and Khanal, A.R. (2013). Participation in informal off-farm labour market and its impact on household income and food security in Malawi. Selected Paper prepared for presentation at the Southern Agricultural Economics Association (SAEA) Annual Meeting, Dallas, Texas; 1-4 February 2014.

Todaro, M.P. (1969). A model of labour migration and urban unemployment in less developed countries. *The American Economic Review*: volume 138-148.

Wooldridge, Jeffrey M. (2002). Econometric analysis of cross section and panel data. The MIT Press, Cambridge, Massachusetts, London, England: 504-508

General Household Survey (GHS) Panel (Wave II, 2012/2013), Living Standards Measurement Survey (LSMS-IDA), World Bank 2013

Yusuf, S.A. and Oni, O.A. (2008). Expected poverty profile among rural households in Nigeria. *African Journal of Economic Policy* 15(1):139-163

Appendix1. List of Regression Variables and their *A Priori* Signs

Variables	Description	Units	Expected Signs	Selected Literature
LMP	Nominal	Dummy	-	Sitienei *et al* (2013)
Age	Discreet	Years	-	Sitienei *et al* (2013); Adepoju and Obayelu (2013), Harjes (2007)
Age^2	Discreet	Years	-	Bedemo *et al*., (2013); Heitmueller (2006)
Sex	Nominal	Dummy	+	Tijani *et al*., (2010) ; Black *et al*., (2013)
Marital status	Nominal	Dummy	-	Tijani *et al*., (2010); Heitmueller (2006); Porterfield (2001)
Household size	Discreet	Number	-	Bedemo *et al*., (2013); Heitmueller (2006)
Monthly man-hours	Continuous	Number	-	
Farm size	Continuous	Hectares	+	Agwu *et al* (2012); Tijani *et al*., (2010)
Total income	Continuous	Naira	+	Adepoju and Obayelu (2013)
Social capital	Nominal	Dummy	+	Oluwatayo (2009), Yusuf (2008)
Credit access	Nominal	Dummy	+	Bedemo *et al*., (2013)

Appendix 2. Welfare Attributes used for Fuzzy Sets Analysis (From GHS Wave II Data)

Household assets

Own furniture (3/4 piece sofa set)
Own furniture (chairs)
Own mattress
Own bed
Own mat
Own sewing machine
Own gas cooker
Own stove (electric)
Own stove (gas, table)
Own stove (kerosene)
Own fridge
Own freezer
Own air conditioner
Own washing machine
Own electric clothes dryer
Own bicycle
Own motorbike
Own cars and other vehicles
Own generator
Own fan
Own radio
Own cassette recorder

Own Hi -Fi sound system
Own microwave
Own iron
Own TV set
Own computer
Own DVD player
Own satellite dish
Own musical instrument
Own mobile phone
Own inverter
Own other household assets

Socioeconomic situation
Situation where household did not have enough food

Agricultural assets
Own land
Own farm machine

Education
Household head has formal education

Appendix 3: Heckman model

	Variables	Coefficient	Standard error	t-ratio
	Age	0.002	0.002	0.89
	Age^2	-0.000	0.000	-0.97
	Gender	-0.024	0.211	-0.11
	Marital status	0.010	0.025	0.40
	Household size	-0.000	0.043	-0.01
Heckman stage II	Primary occupation in agric.	0.003	0.045	0.07
Welfare (DV)	Farm size	-0.004	0.020	-0.18
	Total income	-0.000	0.000	-0.02
	Social capital	-0.001	0.015	-0.07
	Credit access	0.009	0.013	0.73
	Monthly man-hours worked	0.000	0.000	0.06
	Constant	0.110	2.373	0.05

	Selection variables	Coefficient	Standard error	t-ratio
	Age	-0.001	0.013	-0.07
	Age^2	0.000	0.000	0.04
	Gender	0.164	0.096	1.71
	Marital status	-0.018	0.073	-0.25
Heckman stage I	Household size	0.034	0.011	3.15
Labour Market Participation (Selection DV)	Primary occupation in agric.	0.035	0.074	0.47
	Farm size	0.016	0.027	0.58
	Total income	0.000	0.000	1.34
	Social capital	0.004	0.104	0.04
	Credit access	-0.001	0.101	-0.01
	Constant	-0.775	0.365	-2.12
	Lambda (IMR)	-0.016	1.775	-0.01
	Rho	-0.161		
	Sigma	0.098		

DV = Dependent variable;
IMR = Inverse Mills Ratio

Appendix 4: Distribution of Assets Ownership among Rural Households in Nigeria

Assets	Percentage of Households Owning Assets (n = 1,319)
Household Assets	-
Furniture	87.8
Mattress	90.9
Bed	83.9
Mat	81.9
Sewing Machine	9.9
Gas Cooker	1.7
Stove	29.6
Fridge	9.0
Freezer	4.3
Air Conditioner	0.8
Washing Machine	0.0
Electric clothes dryer	0.0
Bicycle	27.7
Motorbike	37.7
Cars and other vehicles	4.9
Generator	19.8
Fan	27.1
Radio	60.6
Cassette recorder	11.1
Hi-Fi (Sound System)	2.6
Microwave	1.1
Iron	27.7
TV Set	28.5
Computer	1.8
DVD Player	22.0
Satellite Dish	2.4
Musical Instrument	0.0
Mobile Phone	59.2
Inverter	0.5
Agricultural Assets	
Land	20.9
Farm machine	9.2
Others Assets	11.6