PARTICIPATION AND WAGE OF RURAL FEMALE HEADED HOUSEHOLDS IN NIGERIA NON-FARM EMPLOYMENT

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Abstract

Considering the growing importance of rural development diversifying income through the non-farm activities in complementing proceeds of agricultural development, the study determines the rural female headed farm households' participation and wage in non-farm activities. Data were analyzed using descriptive statistics, Herfindal index, Probit, Tobit and Heckman two-step regressions. Average rural female headed farm household consist of seven members with income diversification level of 2.8. Education, dependency ratio and distance to the urban centres determined the household participation in non-farm activities while wages receive in non-farm employment were determined by hour of labour supplied, distance to the urban centres, and education.

Keywords: Wage equation, Inverse Mill ratio, Heckman estimates, Reservation wage, Kuhn-Tucker conditions

Introduction

Evidence from literature revealed that there has been an increasing recognition recently that the rural economy is not confined to the agricultural sector, but embraces the broad spectrum of needs of all rural people including social service provision, economic activities, infrastructure and natural resources (Csaki and Lerman, 2000; Davis and Bezemer, 2004) and the economic diversity in the countryside has the potential to foster local economic growth and alleviate the rural-urban income gap and rural poverty (Davis and Bezemer,

2004). Literature further revealed that involvement of rural farm households in non-farm activities exhibits higher potentials of reducing rural unemployment rate as well as increasing household income (Nicodemo, 2007; De Janvry *et al.*, 2005). Thus, many research work recommended that the non-farm employment should be developed more particularly among farm households in order to increase share in agricultural household income (Lanjouw and Murgai, 2009; Davis *et al.*, 2009, Idowu *et al.*, 2011). In fact, Ranjan (2006) pointed out that the desirability of developing the non-farm sector should involve encouraging the participation of women by empowering them.

Nicodemo (2007) was of the opinion that both employment and participation are influenced by supply and demand factors. Employment may be low because many women do not want to enter the labour market, or participation may be low because too few jobs are being offered to attract women into the labour market. In the first case, low participation rates are explained by women's preferences and in the second by employers' preferences and discouragement on the part of the women. It is very difficult to disentangle these two effects, and it is made more difficult by the effect of wages on the participation and the employment rates (Nicodemo, 2007).

Estevez and Hethey (2010) reported that three issues matter in thinking about women's economic position viz labour market attachment; the degree of gender earnings gap; and hours of paid work, while Seebens (2009) found that women's contributions to household income through non-farm activities are limited and smaller as compared to those of men, due to the possible reasons of active involvement in household chores, as well as the number of dependants that limit women's time which can be spent on non-farm activities. Coppard (2001) reported that Mitra (1993) assesses the role of women in the non-agricultural sector and found that the number and proportion of women was much lower than men in both the non-agricultural and rural non-farm sectors. Srivastava *et al*. (1995) examined the status of participation of female workers in rural non-farm employment and found that in terms of total employment, work participation of rural females was higher than that of urban females while over twenty per cent of female workers worked in the rural non-farm sector.

Considering the growing importance of the non-farm activities among the rural female folks in developing countries, this study aims at analyzing the determinants of female headed farm households' participation in non-farm activities in rural southwest Nigeria and the factors contributing to different wages received from the various non-farm activities.

Theoretical Framework

A neoclassical household model based on utility maximization is used (Huffman 1991; Weersink, 1992; Brick, 2005). Following and adopting from Brick (2005) extraction from different empirical studies conducted between 1971 and 2004; in the agricultural household model, female headed farm households are assumed to maximize utility subject to constraints on time, income and farm production. Utility, U, is assumed to be derived from purchased goods (Y_h) and the home-time of the farmer (T_h), and is affected by human capital (H_h) and other household and area characteristics (Z_h), which are assumed to be exogenous to current consumption decisions:

$$U = U(Y_h, T_h, H_h, Z_h) \tag{1}$$

The utility function is assumed to be quasi-concave, continuous and non-decreasing in consumption goods and leisure. The level of utility attainable by the farm household is subject to the constraints imposed by: time, budget, farm production and human capital. The farm household has a fixed amount of time (T), which can be allocated to home time (T_h), farm work (T_f) and/or non-farm work[1] (T_{nf}).

$$T = T_h + T_f + T_{nf} \tag{2}$$

The consumption of market goods at the price P_h is limited by the amount of available income earned from farm profits, non-farm wages and other exogenous household income (V). Farm profit is equal to the price of farm output (P_f), multiplied by output (Y_f), less the variable cost (RX). Where R is the input price vector and X is the quantity of inputs used. Non-farm income is the product of the hours worked non-farm (T_{nf}) and the wage rate (W_{nf})

$$P_h Y_h T_h = P_f Y_f - RX + W_{nf} T_{nf} + V \tag{3}$$

The farm production technology available to farm household to produce farm output:

$$Y_f = f(T_f, X; Z_f, H_f) \tag{4}$$

where Y_f is the farm output, f(.) is the concave production function, Z_f is the exogenous farm specific characteristics; and H_f is the vector of human capital stock variables influencing the productivity of the farm.

[1] The term non-farm work refers to all activities outside the farm activities (i.e crops and livestock production, aquaculture, agro-processing and natural resources collection) and agricultural wage employment. It does not matter where the activity takes place, at what scale, or with what technology.

Human capital variables will also influence the non-farm earning potential of the member (s) of the farm household along with other market conditions Z_{nf}, which implies that the wage rate should be expressed as:

$$W_{nf} = W_{nf}\left(H_{nf}, Z_{nf}\right) \tag{5}$$

Substituting equations 2, 3, 4 and 5 into equation 1 results in the equation (6), which is maximized through the choice of variable inputs X, and allocation of labour by the household to farm (T_f) and non-farm (T_{nf}) activities.

$$L = U\left(T_h, Y_h, ; H_h, Z_h\right) + \lambda\left[P_f\, f\left(T_f, X; Z_f, H_f\right) - RX + W_{nf} T_{nf} + V - P_h Y_h\right] + \gamma\left(T - T_f - T_{nf} - T_h\right) \text{ - (6)}$$

The Kuhn-Tucker conditions for a maximum are:

$$\frac{\partial L}{\partial X} = \lambda\left[P_f\, f_x - R\right] = 0 \tag{7}$$

$$\frac{\partial L}{\partial T_f} = \lambda P_f\, f_{Tf} - \gamma = 0 \tag{8}$$

$$\frac{\partial L}{\partial T_{nf}} = \lambda W_{nf} - \gamma \le 0, T_{nf} \ge 0, T_{nf}\left(\lambda W_{nf} - \lambda\right) = 0 \tag{9}$$

$$\frac{\partial L}{\partial T_h} = U_{T_h} - \gamma = 0 \tag{10}$$

$$\frac{\partial L}{\partial Y_h} = U_{Y_h} - \lambda P_h = 0 \tag{11}$$

$$\frac{\partial L}{\partial \lambda} = P_f\, f\left(T_f, X; Z_f, H_f\right) - RX + W_{nf} T_{nf} + V - P_h Y_h = 0 \tag{12}$$

$$\frac{\partial L}{\partial \gamma} = T - T_f - T_{nf} + T_h = 0 \tag{13}$$

where λ and γ are Lagrange multipliers for marginal utility of income and human time and U_j and f_j are partial derivatives of the functions U and *f*.

The household will allocate hours to farm work up to the point that the marginal rate of substitution between home time and consumption (γ/λ) is equal to the marginal value of farm labour. Using equation (9), non-farm work will be zero ($T_{nf} = 0$) if the marginal return to non-farm labour or wage rate is less than the marginal rate of substitution between home-time

and consumption goods (W_{nf} (H_{nf}, Z_{nf}) < γ/λ). Assuming an interior solution (T_{nf} > 0), the non-farm wage will equal the marginal value of farm labour (reservation wage[2]):

$$\gamma / \lambda = W_{nf}\left(H_{nf}, Z_{nf}\right) \tag{14}$$

The decision to work non-farm can be summarized through the following participation rule:

$$D = \begin{cases} 1 if W_{nf}\left(H_{nf}, Z_{nf}\right) > \gamma / \lambda \mid_{T_{nf}=0} \\ 0 if W_{nf}\left(H_{nf}, Z_{nf}\right) \leq \gamma / \lambda \mid_{T_{nf}=0} \end{cases} \tag{15}$$

Equation (15) states that the household will work non-farm (D = 1) if the wage rate is greater than the marginal value of farm labour (reservation wage), assuming no non-farm work and evaluated at the point of optimal allocation of time between farm work and leisure. The binary decision rule is thus a function of all the exogenous variables in the model since the optimal non-farm work hours T^*_{nf} is jointly determined with farm labour allocation T^*_f.

Solving the Kuhn-Tucker conditions in terms of the exogenous factors leads to the empirical specification for the participation decision as a probability model. The binary decision to participate is generally modelled using one of the probability models (probit or logit). Given the decision to participate, the market wage rate will be observed. Market wages are usually missing for non-participants. To correct for the censored nature of the sample, wage equations are generally specified and estimated by the procedure outlined in Heckman (1976). The resulting model is then used to predict wages for those who do not participate in the non-farm labour market and the Tobit procedure is applied to the entire sample of data for the time spent working non-farm.

In order to correct for the sample bias problem for households who did not participate in certain non-farm work, Heckman's two-step estimation (Heckit) procedure was followed (Heckman, 1976 and1979), used by Chern *et al*. (2003), Olorunfemi and Olowofeso (2007), and Nicodemo (2007). In the first stage, a probit regression will have to be estimated in order to estimate the probability that a given households actually work. This regression will be used to estimate the inverse Mills ratio (λ) for each household, which is used as an instrument in the second regression. Adopting from Olorunfemi and Olowofeso (2007), the first and second regression equations needed were given below as equations 16 and 17:

$$L_i = \prec \varpi i + \psi i \tag{16}$$

[2] According to Brick (2005), reservation wage is defined as that wage below which an individual is unwilling to accept a particular job offer, preferring instead to opt for non-participation.

Where i = index for each survey household; L = Boolean variable indicating membership into a plan; $\prec$ = Vector of variable coefficients to be estimated; ϖ = Vector of independent variables; ψ = Error term ~ N (0,1)

$$k_i = \Re t_i + \xi_i \tag{17}$$

Where k = satisfaction levels as measured by survey questions; $\Re$ = Vector of variable coefficients to be estimated; t = Vector of independent variables used in the probit model i.e. equation 16 plus the Inverse Mills Ratio; ξ = error term ~ N (0, σ^2). The sample rule is that k_i is observed only when L_i is greater than zero.

$$E[k_i \mid k_i isobserved] = E[k_i \mid L_i^* > 0] = E[k_i \mid \psi_i > -\varpi \prec_i] = t_i\Re + E[\xi_i \mid \psi_i > -\varpi \prec_i]$$
$$= t_i\Re + \Im\sigma_\xi \lambda_i(\lambda_\psi) = t_i\Re_i + \Re_\lambda \lambda_i(\lambda_\psi) \tag{18}$$

Where $\lambda_\psi = {}^{-\varpi_i}\!/_{\sigma_\psi}$ $\lambda(\lambda_\psi) = \phi(\varpi_i / \sigma_\psi) / \Phi\left({}^{\varpi_i}\!/_{\sigma_\psi}\right)$ (19)

Equation 19 is the Inverse Mills Ratio for every household. For notational convenience this is put as

$$\frac{\phi(\prec_0^{\wedge} + \prec_1 \hat{\varpi}_i)}{\Phi(\prec_0^{\wedge} + \prec_1 \hat{\varpi}_i)} \tag{20}$$

Where φ, is the density probability function; and Φ is the cumulative probability function. $\Re$ and $\Re_\lambda$ can be estimated by the following equation:

$$k_i \mid L_i^* > 0 = E[k_i \mid L_i^* > 0] + \mu_i = t_i\Re + \Re_\lambda \lambda_i(\lambda_\psi) + \mu_i \tag{21}$$

Where μ_i is heteroscedastic var

$$[\mu_i \mid L_i = 1, t_i, \varpi_i] = \sigma_\xi^2(1 - \Im^2\delta_i) \tag{22}$$

Least squares regression using incidentally truncated data produces inconsistent estimates of $\Re$. However, the least squares regression of k on t and λ produce consistent estimators. Omitting λ would produce the specification error of an omitted variable (Olorunfemi and Olowofeso, 2007).

Unless $\Re\lambda = p\sigma_\xi = 0$. The hypothesis therefore is to test H_0: $P = 0$ using t statistic on λ_i.

For maximum likelihood, recall from equation 16 and 17 that, for the sample selection model, there are two types of observation: Those where k_i is observed and that $L_i > 0$. For these observations, the likelihood function is the probability of the joint event k_i and $L_i > 0$. The probability for the ith observation can be written as the follow (using Bayes Rule):

$$\Pr(k_i, L_i > 0 \mid t, \varpi) = f(k_i)\Pr(L_i > 0 \mid k_i, t, \varpi) =$$

$$f(\xi_i)\Pr(\psi_i > -\varpi_i \prec \mid \xi_i, t, \varpi)\frac{1}{\sigma_i}\phi\left(\frac{k_i - t_i\Re}{\sigma}\right).\int_{-\varpi\prec}^{\infty} f(\psi_i \mid \xi_i)d\psi_i$$

and

$$= \frac{1}{\sigma_1}\phi\left(\frac{k_i - t_i\Re}{\sigma}\right).\int_{-\varpi\prec}^{\infty}\phi\left(\frac{\psi - \frac{p}{\sigma_i}(k_i - t_i\Re)}{\sqrt{1-p^2}}\right)d\psi_i = \frac{1}{\sigma_i}\phi\left(\frac{k_i - t_i\Re}{\sigma_i}\right).$$

$$\left[1 - \Phi\left(\frac{-\varpi_i \prec -\frac{p}{\sigma_i}(k_i - t_i\Re)}{\sqrt{1-p^2}}\right)\right] = \frac{1}{\sigma_i}\phi\left(\frac{k_i - t_i\Re}{\sigma_i}\right).\Phi\left(\frac{\varpi_i \prec +\frac{p}{\sigma_i}(k_i - t_i\Re)}{\sqrt{1-p^2}}\right) \quad (23)$$

Thus the probability of an observation for which the data is observed is the density function at the point k_i multiplied by the conditional probability distribution for L_i given the value of k_i. Where k_i is not observed, L_i will be ≤ 0. For these observations, the likelihood function is just the marginal probability that $L_i \leq 0$. Given no independent information on k_i, the probability is written as

$$\Pr(L_i \leq 0) = \Pr(\psi_i \leq -\varpi_i \prec)\Phi(-\varpi_i \prec) = 1 - \Phi(\varpi_i \prec) \quad (24)$$

Therefore the log likelihood for the complete sample of observations is given as follows:

$$\log R(\Re, \prec, P, \sigma, thedata) = \sum_{t=1}^{N_0}\log[1 - \Phi(\varpi_i \prec)] +$$

$$\sum_{t=N_0+1}^{N}\left[-\log\sigma_1 + \log\phi\left(\frac{k_i - t_i\Re}{\sigma_i}\right) + \log\Phi\left(\frac{\varpi_i \prec +\frac{p}{\sigma_i}(k_i - t_i\Re)}{\sqrt{1-p^2}}\right)\right] \quad (25)$$

where there are N_o and N_1 observations, $N = N_0 + N_1$.

The parameter estimates for the sample selection model can be obtained by maximizing this likelihood function with respect to its arguments. These estimates will be consistent and asymptotically efficient, under the assumption of normality and homoskedasticity of the uncensored disturbances (Olorunfemi and Olowofeso, 2007).

Methodology of the Study

The Study Area

The empirical setting for the study consists of farming communities in the southwest geo-political region of Nigeria. Southwest geo-political region is one of the six geo-political regions in Nigeria. The geographical location of southwest Nigeria covers about 114,271km^2 (which is approximately 12 percent of Nigeria's total land mass) with the total human

population of 28.61 million (approximately 20.44 percent of the Nigeria's total human population) (NBS, 2006; UN, 2006).

Yoruba is the main ethnic group in the region, which comprises several dialects. Southwest lies within latitudes $4^{o} - 14^{0}$N and longitudes $3^{0} - 14^{0}$E and exhibits the typical tropical climate of averagely high temperature and high relative humidity. The temperature is relatively high during the dry season with the mean around 30°C and low temperature is experienced during the rainy season, especially between July and August when the temperature could be as low as 24°C. The distribution of rainfall varies from about 1000 mm to about 2000 mm.

The south western part of Nigeria has three main types of vegetation, namely, mangrove forest, tropical rain forest and guinea savannah. The tropical rain forest is found mainly in Ogun, Ondo, Ekiti states and some part of Oyo state while the mangrove forest is found mainly in Lagos state and some part of Ogun and Ondo states. Guinea and derived savannah are found mostly in Osun and some part of Oyo and Ogun states.

Sampling Procedure

The study utilizes primary data generated among rural farm households drawn from Southwest Nigeria. Multi-stage sampling technique was employed in selecting the respondents from the study area. The first stage entails a simple random selection of three states (Ekiti, Ogun and Osun states) from the six states in the southwest Nigeria. Subsequent selections were based on the organisation of farming communities in each of the three states selected into cells, blocks and agricultural zones by the Agricultural Development Programme (ADPs) in Nigeria.

The second stage of the sampling process involved a random selection of five agricultural zones from the three selected states in stage one (proportional to the number of agricultural zones in each of the selected states). This was followed by a simple random selection of four of the blocks in each selected zone, which allowed 20 agricultural blocks to be randomly selected. Then, three of the cells in each selected of the block in stage three, were randomly picked, thus giving chance for 60 agricultural cells to be randomly selected across the selected agricultural blocks in the fourth stage. The fifth stage entailed purposive selection of two farming communities under each cell. Therefore, four residential buildings were randomly drawn in each farming community but with no more than one farm household purposively interviewed from each residential building. This process yielded 480 rural farm households spread across 120 farming communities in the three states. Out of the 480 questionnaires collected, 411 of them were found useful for subsequent analysis while 69

questionnaires were discarded because of incomplete information. From the process, the responses of the female headed farm households were exclusively and purposively extracted for the study. In all, 67 female headed farm households were found and used for the analysis.

Analytical Procedures

Both descriptive and regression analytical tools were employed for the analyses.

Participation of Rural Female Headed Farm Households in Non-Farm Employment

The determinant of non-farm resource allocation to various categories of non-farm activities by the individual farm household is a two-stage decision process: viz, decision to participate, and extent or level of participation.

Following the standard practice in related studies (e.g. Corral and Reardon, 2001; Lanjouw, 2001; Matshe and Young, 2004; Serra, et al., 2005), the decision to participate in non-farm activities was addressed by fitting a probit model while the level of participation was addressed by fitting a set of Tobit regression model separately to the data for only those households that claimed to participate in each of such activities. The Tobit model was considered the most appropriate for the level of participation because some households may not participate in an activity as a result of the prevailing relative wage rates, pressure from farm work and many other possible factors. Following Dougherty (2001), Lim-Applegate *et al.* (2002), Bharadwaj and Findeis (2003), and Kwon *et al.* (2003), the Probit model is defined as:

Probit model of Participation in Non-farm Activities

$$P_{ij}^{*} = \alpha X_i + \varepsilon_i$$

$$P_{ij} = 1 \qquad if P_{ij}^{*} \geq 0$$

$$P_{ij} = 0 \qquad if P_{ij}^{*} < 0 \tag{26}$$

where P_i* is a non-observed continuous latent variable and P_{ij} is an observed binary variable, equal to 1 if the household participates in the non-farm activity; X_i is a vector of the independent variables affecting participation; and ε_i *is* unobserved term following the standard cumulative normal with mean zero and variance one. $F\left(P_{ij}^{*}\right)$, the standardized cumulative normal distribution, gives the probability of the event occurring for any value of P_{ij}^{*}:

$$y_i = F\left(P_{ij}^{*}\right) \tag{27}$$

Maximum likelihood analysis is used to obtain estimates of the parameters. The marginal effect of X_i is $\partial y / \partial X_i$ which is best computed as

$$\frac{\partial y}{\partial X_i} = \frac{\partial y}{\partial P_{ij}^*} \cdot \frac{\partial P_{ij}^*}{\partial X_i} = f\left(P_{ij}^*\right)\beta_i \tag{28}$$

Now since $F\left(P_{ij}^*\right)$ is the cumulative standardized normal distribution, $f\left(P_{ij}^*\right)$ its derivative, is just the standardized normal distribution itself:

$$f\left(P_{ij}^*\right) = \frac{1}{\sqrt{2\pi}} e^{\frac{1}{2}Z^2} \tag{29}$$

Tobit model of Extent of Resource Allocated to Non-farm Activities

Following Goodwin and Mishra (2004) and El Osta et al. (2004), the Tobit model was used. According to Dougherty (2001) and Koop (2003), the Tobit model is defined as thus:

$$\begin{aligned} L_{ij}^* &= \beta' X + \varepsilon_i \; ; \qquad \varepsilon_i \sim N\left(o, \sigma^2\right) \\ L_{ij} &= L_{ij}^* \qquad for L_{ij}^* > L_l \\ L_{ij} &= L_l \qquad for L_{ij}^* \leq L_l \end{aligned} \tag{30}$$

Where:

P_{ij} is the vector of variables indicating the i^{th} household's participation or otherwise in the j^{th} non-farm activity (P_{ij} = 1, if household participates in any of the following non-farm activities: non-farm unskilled labour wage employment, non-farm skilled labour wage employment, non-farm self employment, and social / community service and P_{ij} = 0 if otherwise).

L_{ij} is the vector of variables indicating the amount of resources devoted to the j^{th} non-farm activity by the i^{th} household. This is labour supply share for each non-farm activity equation. The explanatory variables include: age of the household head (years); age of the Household head squared; education level of the household head (number of years spent in school); experience in j^{th} non-farm activity (year); nativity of the household (native = 1; 0 otherwise); household size (number of person); dependency ratio (number of non-working members/ total household size); poverty status of the household (poor = 1; 0 otherwise); per capita landholding of the household, measured as the total area of land per economically active member of the farm household (Ha / worker). Per capita investment, measured as the total household asset income per economically active member of the farm household (₦/ worker); per capita animal wealth, measured as the total household worth of animal income per economically active member of the farm household (₦/ worker); amount of credit accessed during the production season (₦); wage rate in the j^{th} non-farm activity relative to

the implicit wage rate in agriculture (W_j/W_0). Others include, income diversification[3] index using Herfindahl index; connection to national electricity grid by the farming community (1 if connected and 0 if otherwise); and, distance to the nearest urban centre (km).

Rural Female Headed Farm Households' Wage Equation

Considering the fact that wage rates might be endogenous (Lass *et al*., 1991), the wage equation for the rural female headed farm households was estimated with Heckman two step models. The wage equation for female headed farm households was given as thus;

$$W_i = \gamma_0 + \gamma_i Z_i + U_i , \; U_i \sim N(0, \sigma_e) \quad (31)$$

W_i is observed if $P_{ij} = 1$

Using Heckman two step models, equation (31) can be rewritten as

First stage

$$P_{ij}^* = \alpha_1 + \sum_{j=2}^{m} \alpha_j X_{ij} + \varepsilon_i \quad (31)$$

Second stage

$$W_i^* = \gamma_1 \sum_{j=2}^{k} \gamma_j Z_{ij} + u_1 \quad \text{and} \quad \gamma_{i,k} = C_i' \theta_k + u_i \quad (32)$$

$$W_i = W_i^* \qquad for P_{ij}^* > 0$$

W_i is not observed $\qquad for P_{ij}^* \leq 0$

In the first stage, a probit regression was estimated in order to estimate the probability that a given households actually work. This regression gives the inverse Mills ratio (λ) for each household and the probability of participation in the j[th] non-farm work, which were used as an instrument in the second regression.

Following Dougherty (2001), the problem of selection bias arises because the expected value of *u* is nonzero for observations in the selected category if *u* and ε are correlated. It can be shown that for these observations,

$$E\left(u_i \mid \varepsilon_i > -\alpha_1 - \sum_{j=2}^{m} \alpha_j X_{ij} \right) = \frac{\sigma_{u\varepsilon}}{\sigma_\varepsilon} \lambda_i \quad (33)$$

[3] The various income diversification indexes were calculated using the inverse of Herfindahl index $D = \frac{1}{\sum_{j=1}^{n} S_j^2}$, where D is the diversity index and S_j is the share of income source j

where $\sigma_{u\varepsilon}$ is the population covariance of u and ε, σ_ε is the standard deviation of ε, and λ_i, described by Heckman (1976) as the inverse of Mill's ratio, is given by

$$\lambda_i = \frac{f(v_i)}{F(v_i)} \tag{34}$$

Where $$v_i = \frac{\varepsilon_i}{\sigma_\varepsilon} = \frac{-\alpha_1 - \sum_{j=2}^{m} \alpha_j X_{ij}}{\sigma_\varepsilon} \tag{35}$$

and the functions f and F are as defined in the section on probit analysis: $f(vi)$ is the density function for ε normalized by its standard deviation and $F(vi)$ is the probability of P_{ij}^{*} being positive.

It follows that

$$E\left(W_i \mid \varepsilon_i > -\alpha_1 - \sum_{j=2}^{m} \alpha_j X_{ij}\right) = E\left(\gamma_1 + \sum_{j=2}^{k} \gamma_j Z_{ij} + u_i \mid \varepsilon_i > -\alpha_1 - \sum_{j=2}^{m} \alpha_j X_{ij}\right) = \gamma_1 + \sum_{j=2}^{k} \gamma_j Z_{ij} + \frac{\sigma_{u\varepsilon}}{\sigma_\varepsilon} \lambda_i \tag{36}$$

Where:

W_{ij} = Wage rate in the j[th] non-farm activity: - non-farm unskilled labour wage employment, non-farm skilled labour wage employment, non-farm self employment, and social/community service

Z_i is the vector of the explanatory variables in the wage equation, which include age of the female household head that involved in the j[th] non-farm activity; education level (number of years spent in school); household size (number of person); nativity of the household (native = 1; 0 otherwise); poverty status of the farm household (poor = 1; 0 otherwise); dependency ratio (number of non-working members/ total household size); amount of credit accessed during the production season (₦); per capita animal wealth, measured as the total household worth of animal income per economically active member of the farm household (₦/ worker); experience of the female household head in the j[th] farm activity (years); labour supply to the j[th] non-farm activity (Hours of labour); distance to the nearest urban centre (km). Others include the inverse Mills ratio (λ) for each household and the probability of participation in the j[th] non-farm work (the two variables were both obtained from first stage model of the Heckman model through probit regression and used as instruments in the second regression).

Results and Discussion

Socio- Economic Characteristics of the Sampled Rural Female Headed Farm Households

Table 1 shows the results of the socio-economic characteristics of the rural female headed farm households.

Table 1: Socio-economic Characteristics of Rural Female Headed Farm Households/Heads

Characteristics	Dominant Indicators	Mean Value
Age	67.2% between 41 – 60 years	47.2 years
Educational level	46.3 had secondary education	9.0 years
Household Size	92.5% between 4-9 persons	6.7
Household Working member	76.1% between 1 – 2 members	2.0
Dependency Ratio	68.7% between 0.61- 0.90	0.7
Farm Size	41.8% below 1 hectare	1.9 Ha
Farming Experience	38.8% having 11 – 20 years	18.1 years
Nativity of the Head	50.7% were non-native	-
Total Income Diversification Index	49.3% between 2.00 – 2.99 level	2.8
Farm Income Diversification Index	65.7% between 1.00 – 1.99 level	1.8
Non-farm Income Diversification Index	59.7% having 1.00 level	1.2

Source: Field Survey, 2009.

An average rural female headed farm household size in southwest Nigeria consists of almost seven members with dependency ratio of 0.7 and means working member of 2.0. Most (67.2%) of the household heads were between 41-60 years of age with average age of 47.2 years and their mean years of formal education was 9.0 years with as much as 46.3 percent of the household heads having secondary education. Fifty one percent of the rural female headed farm households were non-native of the farming communities while 41.8 percent cultivated less than one hectare of land but the average farm size was 1.9 hectare (this is comparable to the nation average of two hectares) with average of 18.1 years of farming experience. The mean income diversification level across the households was 2.8. This implies that an average rural female headed farm households in the study area had its members involved in almost three types of income generating activities simultaneously with at least two farming activities and one non-farm job.

Level of Participation of Rural Female Headed Farm Households in Non-farm Employment

Apart from activities and incomes from crops (tree and arable), livestock, natural resource collection, agro- processing, the non-farm sector in southwest Nigeria was identified with various income generating non-farm activities. Due to the long list of these activities, the identified non-farm activities were categorized into the following:

(a) Non-farm investment activities include such investments as land prospecting, investment in shares, equipment leasing, hire purchase and rental services, remittances,

pension etc.). It is also referred to as non-labour investment activities and the income accrue from such as non-labour income

(b) Non-farm wage employment, including full-time / part-time employment into daily, weekly or monthly paid jobs in the public or private sector. This was categorized into skilled and unskilled labour activities as follows.

(i) Non-farm unskilled labour employment (NFUL) including activities such as employment as night guards, messengers, cleaners as well as casual work in loading and off-loading, transport conducting.

(ii) Non-farm skilled labour employment (NFSL) including activities such as teaching, health services, construction work (masonry, carpentry, bricklaying) and other skilled work in public and private sector, for as long as the reward to efforts of the referenced participant is by payment of wages.

(c) Non-farm self employment (NFSE) comprises non-wage activities such as trading, transport services (vehicles or motorcycles), artisanship / craft work, mat weaving, handicrafts, making pottery.

(d) Social and Community Services (SCS) including participation in such social and community services as priesthood, community leadership, cooperative leadership, herbal and spiritual consulting, and other social services, which although are not strictly remunerated by payment of wages / salaries but are often associated with receipts of transfer payments (cash and non-cash income).

The non-farm activities highlighted above were further viewed from two perceptive viz the non-farm non-labour investment (this involves only the non-farm investment activities) and non-farm labour activities (this includes non-farm wage employment (skilled and unskilled labour employment), non-farm self employment and social and community services). Table 2 presents the percentage of the sampled rural farm households whose members participated in the various non-farm activities available in the area.

Table 2: Rural Female Headed Farm Households Participation in Non-farm Livelihood Activities

Activities/Employment	**Households engaged in Non-farm Activities (%)**
Farm Activities	
Total Percentage of Households Participating in various Farm Activities	
Arable Cropping	100.00
Tree Cropping	55.22
Livestock Production	19.40
Natural resource collection	16.42
Agro-processing	41.79
Non-Farm Activities	
Percentage of Total Households Participating in Each Non-Farm Activity	

Non-farm unskilled labour (NFUL)	28.36
Non-farm skilled labour (NFSL)	17.91
Non-farm Self Employment (NFSE)	77.61
Social and Community service (SCS)	10.45
Non-farm Non-labour Investment	89.55
Non-Involvement in Non-farm	4.48
Non-farm Involvement in General	95.52
Households' Participation in Non-Farm Activities' Combination	
Non-farm unskilled labour (NFUL) solely	8.96
Non-farm skilled labour (NFSL) solely	1.49
Non-farm Self Employment (NFSE) solely	44.77
Social and Community service (SCS) solely	4.48
NFUL and NFSL	0.00
NFUL and NFSE	17.91
NFUL and SCS	1.49
NFSL and NFSE	11.94
NFSL and SCS	1.49
NFSE and SCS	0.00
NFUL, NFSL and NFSE	0.00
NFUL, NFSL and SCS	0.00
NFSL, NFSE and SCS	2.99

Source: Author's computation based on data from field survey, 2009

Households' involvement in farm activities showed that all sampled female headed rural farm households had their members involved in arable cropping, followed by involvement in tree cropping (55.22%) while involvement in natural resources collection was least (16.42%) among the households; this supports Fall and Magnac, 2004 in showing the importance of farming in rural area. The low participation level that was experienced in NFSL (1.49%) among rural female headed farm households could be as a result of educational and professional qualification requirement in such non-farm job which could be lacking among the rural farmers.

As much as 95.52 percent of the rural female headed farm households in southwest Nigeria, had their members engaged in at least one non-farm livelihood activity or the other, with non-farm self employment activities (77.61%) being the dominant non-farm income activity, followed by NFUL. The result revealed that in addition to farming, 35.82% of the female headed households still have their members involving in at least two non-farm activities.

Rural Female Headed Farm Households' Income Composition

The income level and share of total income derived from various farm and non-farm activities by rural female headed farm household were shown in table 3, the mean gross income accrued to rural female headed farm household was N456324.58 per annum.

Table 3: Rural Farm Households Income Share

Activities/Employment	**Household Income (₦)**	**Household Income Share in Total Income**
Farm Activities		
Arable Cropping	50871.55	0.1115
Tree Cropping	70197.01	0.1538
Livestock Production	1461.19	0.0032
Natural resource collection	3247.56	0.0071
Agro-processing	46462.70	0.1018
Total Farm activities	**172240.01**	**0.3775**
Non-Farm Livelihood Activities		
Non-farm Unskilled Labour	24641.79	0.0540
Non-farm Skilled Labour	59070.90	0.1294
Non-farm Self Employment	112900.20	0.2474
Social & Community Service	8129.89	0.0178
Non-farm labour Activities	**204742.78**	**0.4486**
Non-farm Non-labour Income	79341.79	0.1739
Total Non-farm activities	**284084.57**	**0.6225**
All Income Sources	**456324.58**	**1.0000**

Source: Author's computation based on data from field survey, 2009

Income received from non-farm livelihood sources contributed an average of 62.25 percent of the total income while farm activities contributed 37.75 percent of the total income. Tree cropping produced the largest share of 15.38% among the farming activities. A sizeable chunk of the income from non-farm sources was derived from non-farm self employment activities (24.74%) while only 12.94% of the total rural female headed farm households' income was obtained from urban-type employment as a skilled labour.

The income share derived from labour oriented non-farm income diversification activities was 44.86% while the rural farm households derived 17.39% of the total household income from non-labour non-farm activities. The result shows that non-farm activities contributed substantially (62.25%) to the rural female farm households' income in Southwest Nigeria; and this is in agreement with the findings of Babatunde and Qaim, 2008.

Rural Female Headed Farm Households' Participation in Non-Farm Activities

Probit regressions explained the individual female headed farm household's participation in non-farm activities. The results revealed that experience in NFULWE, volume of credit, poverty status, and per capita livestock owned and distance to urban centre significantly determined the probability of the female headed households participating in non-farm unskilled labour activities.

Poverty status of households and volume of credit the household during the production season indicated negative likelihood effect on engagement in non-farm unskilled wage employment, that is, being poor significantly increased the probability of participating in non-farm unskilled wage employment. The results also revealed that less per capita livestock

owned significantly increased the probability of participating in non-farm unskilled labour activities, also, distance to urban centre in non-farm unskilled labour activities significantly increased the probability of participating in that job.

The results revealed that age squared, educational level, dependency ratio, per capital asset base of the household, wage rate received in the job and distance to urban centre were the factors that significantly determined the probability of the rural farm households participating in non-farm skilled labour activities. Education, distance to urban centre and wage received appeared to be the strengthening factors on the probability of participating in non-farm skilled labour activities, while less per capita investment significantly increased the probability of participating in NFSL.

Table 4: Probability of Female Headed Households' Participation in Non-Farm Activities

Probit Model	**Non-Farm Unskilled Labour (NFUL)**	**Non-farm Skilled Labour (NFSL)**	**Non-farm Self Employment (NFSE)**	**Social and Community Service (SCS)**
Variables	**Marginal Effect**	**Marginal Effect**	**Marginal Effect**	**Marginal Effect**
Age	0.0013 (0.0020)	-0.0025 (0.0074)	-0.0009 (0.0266)	-0.937E-05 (0.920E-04)
Age squared	0.942E-05 (0.164E-04)	-0.56E-04*** (0.18E-04)	-0.0001 (0.0002)	-0.659E-06 (0.347E-05)
Years of formal Education	-0.0049 (0.0066)	0.0116** (0.0056)	-0.0213** (0.0090)	-0.0002** (0.0001)
Experience in jth NF	0.0041** (0.0019)	0.0002 (0.0061)	0.0234 (0.1113)	0.263E-04* (0.153E-04)
Nativity (Native=1)	0.0073 (0.0303)	0.1849 (0.1086)	-0.0914 (0.1159)	0.0012 (0.0058)
Dependency ratio	0.1561** (0.0789)	0.0994** (0.0474)	-0.1177 (0.2882)	0.0002** (0.0001)
Volume of credit	-0.802E-06* (0,468E-06)	-0.352E-06 (0.106E-05)	0.146E-05 (0.114E-05)	-0.184E-07 (0.922E-07)
Household size	0.0065 (0.0088)	0.0095 (0.0220)	0.0538 (0.0991)	0.0003 (0.0015)
Poverty status (Poor=1)	-0.0899** (0.0425)	0.0875 (0.1747)	-0.3414** (0.1646)	0.0025 (0.0128)
Per capital investment	0.635E-07 (0.824E-07)	-0.124E-05** (0.604E-06)	-0.281E-07 (0.238E-06)	0.157E-08 (0.771E-08)
Per capital land	-0.0046 (0.0101)	-0.0104 (0.0287)	-0.0193 (0.0270)	0.0003 (0.0014)
Per capita Livestock owned	-1.3752*** (0.424)	0.3728 (0.2654)	-0.1075*** (0.0420)	0.0036 (0.0186)
Wage rate in specific Non-farm labour (W_f/W_a)	-0.0213 (0.504)	0.0380** (0.0179)	-0.0595 (0.0581)	0.0062** (0.0030)
Income Diversification level	-0.0287 (0.0282)	0.0125 (0.0532)	-0.0821 (0.0815)	-0.0012*** (0.0004)
Electricity Connection	0.0772 (0.1188)	0.0125 (0.1327)	-0.1258** (0.0510)	0.0125** (0.0057)
Distance to Urban centre	0.0904** (0.0407)	0.0649 ** (0.0319)	-0.0812*** (0.0235)	0.0006 (0.0032)
Constant	0.0081 (0.1158)	-0.4209 (0.3842)	0.3584 (1.6358)	-0.0017 (0.0101)
Log likelihood function	-25.615	-26.462	-32.5923	-11.797
Restricted log likelihood	-39.952	-31.491	-35.629	-22.432
Pseudo R^2	0.363	0.1641	0.1148	0.5089
Chi-squared	28.674**	22.7563**	8.1847	21.674**

,,*** indicate significant level at 10, 5, 1 % respectively. Figure in Parentheses are standard errors*

The results revealed that educational level, poverty status, per capita livestock owned, electricity, and distance to urban centre were the significant determinants of non-farm self employment in rural female headed farm households. The result revealed that at $p<0.05$, education, per capita livestock owned and distance to urban centre significantly reduced the probability of participating in non-farm self employment. Also, poverty status of households indicated negative likelihood effect on engagement in self employment, that is, being less poor significantly increased the probability of participating in non-farm self employment.

Non-connection to the national electricity grid significantly increased the likelihood of participation in non-farm self-employment; this implies that, lack of electricity supply could push rural farm households into petty trading, pottery, carving, crafts mats and weaving. Proximity of the household to urban centre significantly improved the likelihood that the family would engage in self-employment.

Educational level, experience in social community service, dependency ratio, wage rate, income diversification and electricity were the significant determinants of social and community service in rural female headed farm households. Increase in education and income diversification of the household significantly reduced the probability of participating in this kind of non-farm job. At $p<0.05$, the wage rate received, experience in SCS and dependency ratio significantly increased the probability of participating in this job.

Connection to the national electricity grid significantly increased the likelihood of rural farm households' participation in social and community service.

Resource Allocation to Non-Farm Activities in Rural Farm Households

Besides the estimation of the determinants of participation in non-farm activities in the study area, a Tobit model was used to determine the extent of labour supply to non-farm activities by rural female headed farm households. Table 5 summarizes the results of the estimation of the determinants of non-farm labour supply by the rural female headed farm households.

The results revealed that age, age squared, education status, nativity, wage rate received in non-farm unskilled labour activities were the main albeit significant factors that determine labour allocation to non-farm unskilled labour wage employment.

Table 5: Tobit Model Results showing the Determinants of Extent of Resource Allocated to Non-farm Activities

Tobit Model	**Non-Farm Unskilled Labour (NFUL)**	**Non-farm Skilled Labour (NFSL)**	**Non-farm Self Employment (NFSE)**	**Social and Community Service (SCS)**
Variables	**Marginal Effect**	**Marginal Effect**	**Marginal Effect**	**Marginal Effect**
Age	0.008**	0.019	-0.001	0.501E-03

	(0.004)	(0.019)	(0.004)	(0.001)
Age squared	0.64E-04*	0.100E-03	0.110E-05	-0.361E-05
	(0.369E-04)	(0.201E-03)	(0.420E-05)	(0.908E-05)
Years of formal	-0.018**	0.110**	-0.012	0.197E-03
Education	(0.009)	(0.038)	(0.005)	(0.003)
Experience in jth NF	-0.002	0.0768**	-0.012**	-0.0015
	(0.007)	(0.034)	(0.004)	(0.001)
Nativity (Native=1)	-0.133**	-0.782	0.023	0.023
	(0.067)	(0.556)	(0.083)	(0.019)
Dependency ratio	0.528	2.654**	-0.438*	-0.012
	(0.411)	(1.234)	(0.224)	(0.052)
Volume of credit	0.688E-07	-0.880E-05	0.303E-06**	0.434E-08
	(0.307E-06)	(0.645E-05)	(0.150E-06)	(0.348E-07)
Household size	-0.016	-0.1025	-0.006	0.007**
	(0.020)	(0.098)	(0.019)	(0.003)
Poverty status	-0.054	3.471**	-0.204	-0.053**
(Poor=1)	(0.166)	(1.373)	(0.146)	(0.026)
Per capital investment	-0.308E-06	0.956E-07	-0.109E-06	0.132E-06
	(0.209E-06)	(0.585E-07)	(0.196E-06)	(0.444E-07)
Per capital land	-0.027	-0.219**	0.036**	0.007
	(0.031)	(0.103)	(0.018)	(0.005)
Per capita Livestock	-0.176	4.660**	-0.060	-0.017
owned	(0.659)	(1.855)	(0.268)	(0.057)
Wage rate in specific Non-	0.236***	0.701**	-0.144**	0.653***
farm labour (W_i/W_a)	(0.057)	(0.295)	(0.054)	(0.037)
Income Diversification	-0.123**	-1.058**	0.067	0.006
level	(0.060)	(0.499)	(0.064)	(0.014)
Electricity Connection	0.102	0.022	-0.138**	0.0221
	(0.101)	(0.104)	(0.061)	(0.0293)
Distance to Urban centre	-0.116**	0.319 **	-0.181**	0.020
	(0.059)	(0.149)	(0.083)	(0.019)
Constant	-0.549**	-4.006**	1.156***	-0.059
	(0.253)	(1.938)	(0.308)	(0.069)
Sigma	0.116***	0.301***	0.278***	0.065***
Log likelihood function	-3.582	-9.037	-20.030	84.807
Pseudo R^2	0.871	0.792	0.4097	0.012
LR Chi-squared	48.52***	68.95***	27.80**	127.17***

,,*** indicate significant level at 10, 5, 1 % respectively. Figure in Parentheses are standard errors*

Source: Data Analysis, 2009

Households' level of participation in non-farm unskilled labour wage employment (NFUL) significantly increased with age, non-nativity, wage received and proximity to urban centre.The response of the farm households' labour supply for NFUL to wage rate in non-farm unskilled labour was significantly positive; thus, confirming that households' labour supply to NFUL was driven by the wage rate so as to augment farm income. Also, the response of the farm households' labour supply for NFUL to level of income diversification was significantly negative; thus, signifying that households' labour supply to NFUL was significantly determined by the number of activities that household involved in; the more the workdays supply to other activities, the lesser the amount of labour supply to non-farm unskilled labour activities (Table 5). Increase in educational status of the household head and

the distance cover to the urban centre significantly decrease the household's level of participation in NFUL

Concerning non-farm skilled labour wage employment (NFSL), the results in table 5 revealed that education, experience in NFSL, dependency ratio, poverty status, per capita landholding, non-farm skilled labour wage rate, income diversification level and distance to urban centre significantly determined the households' extent of participation (labour supply). The results thus confirmed that labour supply by female headed farm households was driven significantly by level of education of the household head, the wage rate received in participating in non-farm skilled labour and experience in NFSL, all of which encouraged households to allocate more workdays to NFSL. These findings concur with theoretical expectations, and in line with Corral and Reardon, 2001.

Higher educational level, dependency ratio, being poor, experience in NFSL and wage rate received in NFSL significantly encouraged more workdays of labour to be supplied to NFSL. Also, per capita landholding and income diversification response negatively to labour supplied by rural female headed farm household to NFSL, thus, the more the land owned and income sources, the lesser the amount of labour supply to non-farm skilled labour activities.

The labour supply and extent of work in non-farm self employment was significantly influenced by experience in NFSE, dependency ratio, volume of credit, per capita landholding, availability of electricity, wage received in NFSE and distance to urban centre. Households with higher volume of credit significantly tend to supply more labour to non-farm self employment (NFSE) while an increase in per capita landholding also significantly increased the supply of labour, this means that, more capital for investment are made more available by land asset. Availability of electricity and far distance to urban centre discouraged rural female headed farm households to supply more workdays to non-farm self employment.

The results further confirmed that household size, poverty status and wage received in social and service community were the major significant factors that determined labour allocation to Social and Community Service (SCS). The supply of labour for SCS responded significantly positive to its own wage rate, implying that the income from the activity was an attraction to the households. Labour allocation to SCS significantly increased with household size, implying that, labour supply to SCS by rural female headed farm household members was a response of meeting the needs of household members.

Estimates of Wage Functions in Non-farm Activities

Heckman two-step procedure was employed in estimating the non-farm wage equation and the estimated inverse Mills ratios along with the probability of participation which were

derived from the probit equations in the first stage of Heckman procedure in each non-farm activity were used as additional regressors in the wage offer equations (Koop, 2003; Greene, 2007) to correct for selectivity bias. Table 6 summarizes the results of the estimates of the wage offer equations of each non-farm activity.

Age, education, nativity and per capita livestock owned, as well as experience in NFUL, hour of labour supply to NFUL and probability of participation in NFUL were significantly associated with wage earning from NFUL. Age, education, per capita livestock owned and hour of labour supply to NFUL were positive and significantly different from zero at the 5% level. A year increase in education causes an increase in wage earning in NFUL, also, the more the livestock owned and labour supply to NFUL, the more the significant increase in non-farm earning in NFUL. The positivity and significance of per capita livestock owned indicate that more livestock owned is able to exert market power in obtaining higher NFUL in the non-farm sector. Age of the participating member of the rural female headed farm household significantly determined the wage rates for NFUL; and as the person got older, more wage rates were received in NFUL. This could be as a result of the physical strength needed for the NFUL activities.

Table 6: Results of Heckman 2-Step Estimates of Wage Equations for the Non-farm Activities by Rural Female Headed Households

Tobit Model	**Non-Farm Unskilled Labour (NFUL)**	**Non-farm Skilled Labour (NFSL)**	**Non-farm Self Employment (NFSE)**	**Social and Community Service (SCS)**
Variables	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
Household size	0.0497	0.006	0.055	-0.0059
	(0.046)	(0.026)	(0.039)	(0.0052)
Poverty status	0.143	-0.251	-0.575*	0.0901**
(Poor=1)	(0.375)	(0.213)	(0.318)	(0.0401)
Workday of Labour	2.459***	5.149***	-1.236***	1.519***
supplied to jth NF	(0.423)	(0.410)	(0.346)	(0.0873)
Age	0.035***	0.0074	0.0042	-0.0011
	(0.0118)	(0.0068)	(0.0104)	(0.0014)
Years of formal	0.0655**	0.0020**	-0.035*	-0.0019
Education	(0.0274)	(0.0009)	(0.019)	(0.0031)
Experience in jth NF	-0.0293***	0.0199***	-0.0164*	-0.104E-03
	(0.0107)	(0.007)	(0.009)	(0.125E-02)
Nativity (Native=1)	-0.815***	0.130**	-0.616	-0.0431*
	(0.308)	(0.066)	(0.187)	(0.0233)
Dependency ratio	-0.348	-0.202	-1.451***	0.0044
	(0.568)	(0.335)	(0.516)	(0.0626)
Volume of credit	-0.5635E-06	-0.1122E-06	0.129E-05***	-0.416E-08
	(0.3938E-06)	(0.2219E-06)	(0.351E-06)	(0.424E-07)
Per capita Livestock	1.521*	0.044	-0.734	0.0131
owned	(0.903)	(0.366)	(0.532)	(0.0725)
Distance to Urban centre	0.0237	0.256 **	-0.645***	-0.0554**
	(0.226)	(0.124)	(0.199)	(0.0239)
Probability of	-4.858***	-0.0674	-3.854***	0.2071***
Participation in jth NF	(1.319)	(0.271)	(0.841)	(0.0663)

LAMBDA (Inverse Mill Ratio)	-0.580 (0.420)	-0.0763 (0.302)	0.6915*** (0.230)	-0.1391*** (0.2892)
Constant	-0.769 (0.700)	0.0624 (0.381)	6.334*** (1.0178)	0.1008 (0.0776)
Adjusted R^2	0.482	0.7434	0.3002	0.8489
SE corrected for selection	0.693	0.4055	0.7119	0.1048
Rho	-0.837	-0.1882	0.9714	-1.000
Log likelihood function	-482.790	-26.679	-54.996	81.494
Restricted Log Likelihood	-508.304	-87.446	-82.153	2.984

,,*** indicate significant level at 10, 5, 1 % respectively. Figure in Parentheses are standard errors*

Source: Data Analysis, 2009

Education, nativity, experience in NFSL, hour of labour supply to NFSL and distance to the nearest urban centre were the variables that were significantly associated with wage earning from NFSL. A year increase in education causes an increase in wage earning in NFSL, also, the more the hours of labour supplied to NFSL, the more the wage rate received. The positive and significant effect of the household nativity implied that native members of the rural farming community who participated in NFSL received higher wages in NFUL than the non-native. Nearness of farming community to the urban centre accords the participating members of rural female headed households higher wage in NFSL, this could be as a result of enabling environment provided by the city for the NFSL jobs.

Poverty status, education, experience in NFSE, dependency ratio, volume of credit, nearness to urban centre, probability of participating in NFSE, IMR and hour of labour supply to NFSE. The poverty status, education, experience in NFSE, dependency ratio, nearness to urban centre, probability of participating in NFSE, and hour of labour supply to NFSE were negative and significant. Participating members of the less poor rural female headed households received more earning from NFSE than their poor counterpart, this could be as a result of more capital investment ability by the non-poor households. Level of education and year of experience in NFSE have negative effect on NFSE's earning, implying that wages from NFSE significantly require less level of education and year of experience. This was against apiori expectation; though this may also imply that the nature of NFSE in the study area was predominantly manual. An increase in the household's dependency ratio of the participating members of the rural female headed farm households significantly had negative effect in the earning from NFSE; thus, implying that increase in dependency ratio would decrease the level of participation in NFSE, and bring less return to labour in NFSE.

The positive and significant effect of the IMR in NFSE wage equation implied that members of those rural female headed farm households who participated in NFSE received higher wages than those who did not participate. The significance of inverse Mills ratio (Lambda) indicates that sample selection bias would have resulted if the wage equation had

been estimated without taking into account the decision to participate in self-employment nonfarm work. The more the volume of credit obtained by the participating members of the households for NFSE, the more the earning received from the NFSE

Poverty status, nativity, hour of labour supply to SCS, nearness to urban centre, IMR in SCS and probability of participation in SCS were significantly associated with wage earning from SCS. Participating members of the poor rural female headed households received more earning from SCS than their non-poor counterpart. The more the hours of labour supplied to SCS, the more the wage rate received. The negative and significant effect of the household nativity implied that non-native members of rural farming community who participated in SCS received higher wages in SCS than the native. Nearness of farming community to the urban centre results in the participating members of rural female headed households' receiving lower wage in SCS; indicating that there was higher tendency for participating rural female headed farm households' members to leave for urban centres in search for alternative income generating activities rather than involving in SCS. This confirms that rural female headed farm households' members involved in SCS when there was no alternative but they were in need of means of survival. This was supported by the negative and significant effect of the IMR in SCS wage equation, which implies that members of those rural female headed farm households who participated in NFSE received lower wages than those who did not participate.

Conclusion

This study focused on the rural female headed farm households' participation in non-farm activities and the determinants of wages received in participating in such non-farm activities. There were four major categories of non-farm labour activities available in the southwest rural communities in addition to farming and two-fifth of the rural female headed farm households have their members involving in combination of at least two of these non-farm activities simultaneously. Non-farm skilled labour wage employment experienced low participation with all non-farm activities contributed 62 percent of the total rural female headed farm households' income.

Generally, level of education, households' dependency ratio and the nearness of the farming communities to the urban centres were the major determinants of household participation in most of the non-farm activities available in southwest Nigeria, whereas the level of participation (extent of labour supplied) in these non-farm activities mostly depend wage rate in the specific non-farm job, distance to urban centre, per capita landholding and level of education. Overall, wage receives from specific non-farm employment by the rural

female headed farm households mostly depend on hour of labour supplied to such non-farm job, distance of the rural community to the urban centres, probability of participating in the specific non-farm job, participating member's level of education, experience in such non-farm job and the nativity of the household.

The study, therefore, recommended that enabling environment should be provided for rural female headed farm household members' participation in non-farm work, as these activities contributed the higher share of total household income. Likewise, attention should be focused on an integrated approach that can promote higher education among the households' members for their involvement in non-farm activities and means of receiving higher wage for their participation.

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