Determinants of Off-Farm Labor Supply among Farming Households in Akwa Ibom State, Nigeria

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Abstract

The study analyzes the various determinants of off-farm labor choice decision in Akwa Ibom State, Nigeria. Primary data collected from 120 respondents were employed in the study and analyzed using the logistic regression model. Result of the socio-economic characteristics of respondents revealed the prevalence of female farmers (63.3%), majority which were married (50%) with average household size of eight persons. Majority were educated with average experience of eighteen years. The prevailing off-farm work typology and pattern in the study area were self-employment (50%) and part time engagement (63.3%). Result of the logistic regression revealed that farm size, household size, total annual off-farm income and educational attainment of respondents were the major determinants of off-farm labor choice decision in the study area. This informed the need to pursue policies that would enhance educational attainment in the study area, enhance and stabilize income in the off-farm sector as well as educating and enlightening rural households, especially women on the benefit of off-farm work and the creation of enabling environment in rural areas through infrastructure provision with view to reducing migration to urban areas in search of off-farm work as the way out.

Keywords: off-farm work; labor choice; farming households; Akwa Ibom State

1. Introduction

Farming households in developing countries is dominated by small scale farmers who produces the bulk of food we eat. In Nigeria, agriculture is characterized by small scale farming operators producing about 80% of the total food production for the increasing population and operates on fragmented farms of between 0.5-2 hectares (Salami, 1994). These small scale farmers belong to the poorest segment of Nigerian population and, therefore, cannot make meaningful investment in farming (Asogwa, Umeh, & Ater, 2006). This has resulted in severe food insecurity, rising incidence of poverty as well as low and variable returns from the respective enterprises that make up the farming sector. As a result, farmers are saddled with the task of coping with the low and fluctuating farm income. As a measure to curb declining farm and household incomes and to insure against agricultural production and marketing risks, farmers embrace various enterprise

diversification strategies (Reardon, 1997; Matsumoto, Kijima, & Yamamo, 2006). Apart from enterprise diversification, off-farm work offers an alternative approach towards reducing income variability (Mishra & Goodwin, 1997).

Off-farm income refers to that portion of household income that is generated outside the farm. It is classified into three categories; the agricultural wage employment involving labor supply to other farm, non- agricultural wage employment including formal and informal non-farm activities and self-employment such as own business (Babatunde, Olagunju, Fakayode, & Adejobi, 2010).

There has been a substantial growth in household participation in off-farm work in recent time. As a result, activities in the off-farm sector have witnessed a boom in the manufacturing, agro-based and service sectors (Ibekwe *et al.*, 2010). Some of the reasons adduced for the growth in off-farm engagement include; first, declining farm incomes and desire to insure against agricultural production risks (Lanjouw, 1999). Second, off-farm work has traditionally been viewed by operators and their spouses as an action necessary to save the farm by providing resources to pay farm bills or to repay debt (Ahearn & Lee Jr., 1991; Mishra, El-Osta, Morehart, Johnson, & Hopkins, 2002). Thirdly, the growth of off-farm income in the US over the last 40 years has reduced income inequality in agriculture and contributed to the catch-up of farmer's income with those of non-farm population. In Scotland, Phimister and Roberts (2002) found evidence of significant linkages between off-farm work and farm decisions. In Africa, Reardon (1997) documented that estimate of non-farm income as a share of total farm income ranges from 22-93% with an average of 45%. Fourthly, rural off-farm activities are important sources of local economic growth. It is important to the rural economy because of its production linkages and employment effects, while the income it provides to rural households could represent a substantial and sometimes growing share of farm capital (Davis, 2003). Also, since formal credit facilities are unreliable, it offers an alternative avenue of raising capital for farm investment (Alade, 2006; Adam & Agba, 2006; Ibekwe *et. al.*, 2010). Lastly, apart from boosting farm capital and investment, off-farm income offers a sure means of safeguarding against crop and market failures (Babatunde *et al.*, 2010). Therefore, since the economy is highly dependent on the performance of the agricultural sector, understanding the opportunities and constraints in rural off-farm sector as a veritable means of boosting farm capital and agricultural investment become imperative. Hence, for income variability in the farm sector to reduce and extra income to be adequately mobilized for farm investment, there is need for the examination of those factors that determine the choice of off-farm engagement. Against this backdrop, this study analyses the determinants of off-farm labor choice decision among farming households in Akwa Ibom State, Nigeria.

2. Methodology

2.1. Study Area
The study was conducted in Akwa Ibom State, which occupies part of the South- South region of Nigeria. It has a population of 3,920,208 and a total land mass of 6,900sq km (NPC, 2006). It is located between latitude 4^0 32^1 and 5^0 33^1 North and longitude 7^0 25^1 and 8^0 25^1 East of the Greenwich Meridian and comprises of 31 Local Government with Uyo as the State capital. The major occupation of the people is fishing, farming and trading.

2.2. Sampling Procedure and Data Collection
The study made use of primary data that were collected through a multistage random sampling in 2014. First, three Agricultural Zones were selected from the existing six where intensive farming activities is carried out. They were Oron, Eket and Uyo. Next, two (2) Local government Areas were selected from each of the three Agricultural Zones making a total of six. The selected L.G.Areas were Esit Eket and Onna L.G.A from Eket Zone, Itu and Uyo L.G.A from Uyo Zone,

Mbo and Udung Uko L.G.A from Oron Zone. Beyond this, one (1) village was selected from each of the six Local Government Areas. Finally, 120 respondents were selected and administered with questionnaires in the ratio of fifteen (20) per village.

2.3. Data Analysis

Data collected were analyzed using both descriptive and inferential statistics. Apart from mean and simple percentages, the inferential statistics used was the logistic regression model. Household's decision to participate in off-farm work or not to participate can be viewed to occur in processes. First, is the initial decision to work solely as a farmer? The second is whether to combine farming with off-farm activities. The third is whether to work solely off-farm. Hence, the dichotomous nature of this categorization favors the use of binary models for the analysis. Consequently, this study adopts the logistic regression model for the analysis and follows the method of Rahji and Adeoti (2010).

2.3.1. *Model Specification*

The logit model was used to examine the determinants of choice of off-farm work decision by farming household in the study area. The farmers' decision to engage in off-farm work is characterized as a dichotomous choice between two mutually exclusive events i.e. whether to remain solely a farmer or be engage in off-farm work. The logit model states that the probability (P_1) that a farmer engaged in off-farm work is a function of an index (Z_1). This index is also the inverse of the standard logistic cumulative function of P_1. The dependent variable of the model is Y where Y=1 if the farmers engaged in off-farm work or 0 for otherwise.

$$P_1 (Y=1) = F(Z_i) \tag{1}$$

$$\text{And } Z_i = F^{-1} (Pi) \tag{2}$$

The index (Z_i) summarizes a set of the farmer's explanatory variables (X's).

It can also be presented in a linear function as shown in equation,

$$Z_i = bo + b1Xi\ldots\ldots\ldots\ldots b_nX_n \tag{3}$$

The probability that the respondent engages in off-farm work is

$$Pi (Y=1) = 1/1+ e^{-zi} \tag{4}$$

The probability that the respondent does not engage in off- farm work is

$$Pi (Y=0) = 1- Pi (Y=1) \tag{5}$$

Where $Pi (Y =1) + Pi(Y= 0) =1$

But

$$1-Pi (Y=1) = e^{-Zi} \tag{6}$$

Dividing equation (4) by (6) gives

$$Pi (Y=1)/ [1-Pi(Y=1)]= e^{-Zi} \tag{7}$$

Therefore,

$$Ln [Pi (Y=1)/ [1-Pi(Y=1] = Z_i \tag{8}$$

Where $Ln[Pi (Y=1)/ [1-Pi(Y=1]$ in equation (8) is the ratio of the probability that the farmer does not engage in off-farm work to the probability that he or she is engaged in off-farm activities.

In line with equation (8), equation (3) can be rewritten as

$$Ln\ [\ Pi(Y=1)/\ 1\text{-}Pi\ (Y=1)] = b_0\ \sum_{i=1}^{n} BiXi \qquad (9)$$

From equation (9), the logit model is specified thus:

$$Y = Ln\ (Pi/1\text{-}Pi) = bo + b1Xi + \ldots\ldots\ b_n Xn + ei \qquad (10)$$

Where Y is the dichotomous dependent variable which takes the value of 1 if the respondent partake in off-farm activities i.e [Pi (Y=1)] and 0 for otherwise i.e [Pi(Y=0)]

B_0 = the intercept

b_1 = the regression coefficients to be estimated

ei = the error term

Xi = the independent variables (i = 1,2,3 . . . . 8)

The explicit form of the model is given as;

$$Y= Ln\ (Pi/1\text{-}Pi) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \ldots\ldots\ldots \beta_8 X_8 + ei \qquad (11)$$

X1 = Farm size (hectares)

X2 = Marital status of respondents (married = 1, single = 0)

X3 = Household size (number of persons in a household)

X4 = Educational level of respondents (years of schooling)

X5 = Age of respondents (years)

X6 = Farming experience of respondents (years)

X7 = Total annual income from farming (naira)

X8 = Total annual off farm income

3. Result and Discussion

3.1. Demographic Characteristics of Respondents

Table 1 presents the socioeconomic characteristics of respondents. From the table, a greater percentage (50%) were married, 36.7% were single while 15 and 8.35 were widow and divorcee, respectively. The dominance of married respondents means abundant labour for both farm and off-farm activities in the study area. The dominant household size was 6-10 (45%), followed by less than 5 (34.2%) while 20.8% had a household size of greater than 10 persons. These household sizes were above the recommended average of 4 per family in the country. Okon and Enete (2009) reported a higher household size in the study area. Bassey, Akpaeti, and Udo (2014) also reported a large household size, with high years of experience and the dominance of women in farming in the study area. In terms of gender, majority of the respondents were female (76.3%) while 36.7% were male. Experience wise, farmers were quite experience with 44.2% having above 15 years' experience, 33.2% had 11-15 year experience while 14.2 and 8.3% had 6-10 and 1-5 years of experience, respectively. In terms of educational attainment, about 89.2% of respondents were educated. Of this, 39.2 and 37.5% attended secondary and primary schools, 12.5% attended tertiary institution while 10.85 did not have any formal education at all. The high level of education in the study area would impact positively on off-farm labor supply. Araujo (2003) reported that education has a significant impact on off-farm labor supply. With respect to age, Table 1 shows that the respondents' age ranged from less than 25 to above 50 years with majority in the age range of 41-50 (about 39.1%) and the least between the age range of less than 25. The dominant age bracket was

41-50 years (39.1%), followed by 31-40 years (25%) and above 50 years (19.3%). This shows that farmers were in their youthful ages with sound mental capacity for farming and off-farm work.

Table 1. Demographic information of respondents in the study area

Characteristics	Number N= 120	Percentage
Marital status		
Married	60	50.0
Single	32	26.7
Widow	18	15.0
Divorce	10	8.3
Household size		
1-5	41	34.2
6-10	54	45.0
>10	25	20.8
Gender		
Male	44	36.7
Female	76	63.3
Farming Experience		
1-5 years	10	8.3
6-10 years	17	14.2
11-15 years	40	33.3
Above 15 years	53	44.2
Educational Level		
No formal education	13	10.8
Primary School	45	37.5
Secondary school	47	39.2
Tertiary Institution	15	12.5
Age of Respondents		
< 25 years	4	3.3
25-30	16	13.3
31-40	30	25.0
41-50	47	39.1
Above 50	23	19.3

Source: Field survey data, 2014.

3.2. Prevailing Off-Farm Work Typology in the Study Area

As evidenced from Table 2 which presents the prevailing off-farm work types in the study area, numerous respondents (50%) were in self-employment category. This was followed by agricultural wage employment (32.5%) and non- agricultural wage employment (17.5%). The preference for

self-employment might be that in addition to not requiring technical competence, generate steady stream of income to participants. Given the low level of literacy in rural areas, there is a wide range of options to choose from in self-employment compared to others that requires specialized skills and technical competence. Babatunde *et al*. (2010) reported most Small Scale farmers were in this category.

Table 2. Off-farm work typology in the study area

Work typology	Frequency	Percentage
Agricultural wage employment	39	32.5
Non-agricultural wage employment	21	17.5
Self-employment	60	50.0
Total	**120**	**100**

Source: Field survey, 2014

3.3. Prevailing Off-Farm Pattern in the Study Area

Table 3 presents the prevailing off-farm work pattern in the study area. As evidence in the Table, majority (63.3%) of the off-farm participants were engaged on part time basis while 36.7% were engaged in full time basis. Of the part time participants, 55.2% were in self-employment category, 31.6% in agricultural wage category while 13.2% were in non-agricultural wage category. In terms of full time engagement, majority (45.5%) of participants were engaged in non-agricultural wage employment, followed by self-employment (36.4%). The plausible explanation for the high full time participants associated with agricultural wage employment might be that this seems to be the only age-long employment option available to farmers in rural areas. Also, the preference for self-employment pattern of full time employment is an indication of the increase abandonment of farm engagement.

Table 3. Off-farm work pattern in the study area

Work Pattern	Off-farm Work category			Total	Percent
	Agric. wage work	Non-agric. wage work	Self-employment		
Part time	24 (31.60%)	10 (13.2%)	42 (55.2%)	76	63.3
Full time	8 (18.1%)	20 (45.5%)	16 (36.4)	44	36.7

Source: Field survey data, 2014.

3.4. Determinants of Off-Farm Labor Choice Decision

Table 4 presents the result of the estimated logit model. The P value of 0.0744 and the Pseudo R^2 of 0.5957 for the model denote the goodness of fit of the model. The Wald Chi-square =38.26 was significant at the 1 and 5% significant levels, denoting the overall significance of the estimated model. The effect of each explanatory variable on the probability that a respondent engages in off farm work is shown by the parameter estimate. A positive (negative) sign on the parameter estimate of a variable indicates that higher values of the variable will increase (decrease) the likelihood of the respondent's engagement in off-farm work.

Result of the analysis shows that farm size had a significant negative relationship with off farm work at 1 percent level. Its coefficient shows that a unit increase in farm size will decrease participation in off farm work by 7.863 units. This is expected because more hands, time and energy

would be expended in farm work with little left for off farm activities. This result corroborates that of Mishra and Goodwin (1997); Ahituv and Kimhi (2002); Serra, Goodwin, and Featherstone (2005) and Benjamin and Kimhi (2006).

The coefficient for household size also had a significant negative relationship with off farm employment at the 5 % level of probability. This is in line with a priori expectation because the presence of children in the farm household would have a negative effect on off- farm activities of farmers and their spouses. For instance a household dominated by children who are minors would imply lesser time for off farm activities because most time would be dedicated to taking care of the children. This finding support earlier findings like Mishra and Goodwin (1997) and Goodwin and Mishra (2004). Elsewhere, Ahituv and Kimhi (2006) reported that the presence of children did not significantly affect the supply of off-farm labor.

The variable for education coefficient was positive and significant at the 5 % level of probability. This is in line with theoretical literature because highly educated people would prefer to work off farm. Studies such as Summer (1982), Araujo (2003) and Serra *et al.* (2005) reported a positive significant relationship between education and off-farm employment. De Janvry, Sadoulet, and Zhu (2005) also found that earnings in the non-farm sector depend on education and experience. In Pakistan, Arif, Nazli, & Haq (2000) reported that non-farm income increases with increase in educational level.

The coefficient for total annual off- farm income exhibited a positive significant impact on off farm labour supply b at 1 % significant level. From its coefficient, a one percent increase in annual total off farm income would increase the supply of off farm labour by 7.532 percent. Increase in farm income implies that off farm work is financially favorable and lucrative. Therefore, a rational farmer would prefer to allocate more time to off farm activities. This result is consistent with Mishra and Holthausen (2002) and Huffman (1980).

Table 4. The estimated logit model of determinants of off-farm labor supply

Variable	Coefficient	Z	P> Z
Constant	-27.604	1.5401	0.132
Farm size	-0.7863***	-3.0571	0.026
Household size	-0.3564**	-2.0512	0.040
Marital status	0.5310	1.1288	0.268
Total Annual off-farm income	0.7532***	3.7792	0.000
Age of farmer	0.2147	1.5216	0.614
Educational level	0.4452**	2.6421	0.008
Farming Experience	-0.2681	-1.2137	0.276
Total annual farm income	-0.1424	-0.6704	0.517
Wald Chi-square =38.26			
Prob > chi2 = 0.0744	Number of observation = 120		Pseudo R^2 = 0.5957

, * Significant at 5 and 1 percent respectively
Source: Field Survey, 2014

4. Conclusion

The study analyzed the determinants of off-farm labor choice decision using the logistic regression model. Result revealed that the prevailing off-farm work typology and pattern in the study area were self-employment (50%) and part time engagement (63.3%), respectively. Findings further revealed that among the factors hypothesized as the determinants of off-farm labor choice decision, farm size, household size, total annual off-farm income and educational attainment of respondents were considered of policy relevant because they impacted significantly on off-farm labor supply in the study area. The study conclude that, apart from mobilizing capital for farm investment, off-farm work double as a risk mitigating strategy that is capable of stabilizing farmer's return in an uncertain and risky environment such the one where agriculture operates and should be encouraged.

5. Recommendations

Based on the findings of the study, the following recommendations are offered:

(i) To enhance off-farm labor choice decision, there is need to pursue policies that would enhance educational attainment in the study area. Such policies should be tailored towards the establishment of schools, skill acquisition and training centers as well as strengthening and upgrading the available educational institutions. Also, there is need for periodic training and retraining of people.

(ii) Also, policies that would enhance the remunerations in the off-farm sector should be pursued. This can be achieved through staff motivation e.g prompt payment of salaries and allowances to employees.

(iii) Education and enlightenment of rural household especially women who constitute majority of the farming population on the benefit of off-farm work would be of tremendous benefit. Meetings and interactive sessions can often be held with them. Extension agents can be a veritable tool here. If possible, the Unified Agricultural Extension Service (UAES) can be utilized effectively in disseminating off-farm information.

(iv) Above all, while encouraging off-farm work, government should strive to create an enabling environment in the rural areas through the provision of basic amenities like portable water, electricity, heath services etc. This would improve rural livelihood and discourage migration to urban centres in search of better paid off-farm work.

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