Determinants of Market Participation of Maize Farmers in Rural Osun State of Nigeria
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Abstract: The study investigated the levels of market participation of small-scale maize farmers in Osun State, Nigeria with objective of examining the determinants of their market participation. A multi-stage sampling technique was employed in the selection of the respondents. The first stage is the purposive selection of ten Local Government Areas from the six agricultural zones in the state. The second stage involved random selection of six villages from each Local Government Area (LGA). The third stage was random selection of 24 farmers from each village. Tobit model was used to analyse the factors affecting market participation while Regression model was used to analyse the volume of maize offered to the market for sale. The result of the Tobit model correctly predicted 67% of the observation with a significant chi square of 52.93 and it shows the overall significance of the model. All variables had positive coefficients significantly different from zero except years of education, transaction cost, marital status and household size. This means that a unit increase in the quantity of these variables will increase the proportion of maize offered for sale by the respondents. The result of the regression model also showed that R – Square and adjusted R-Square are respectively 91% and 90% with a significant overall fit. Volume of maize sold by individual respondents was used as the dependent variable. Total maize produced (p<0.01), age (p<0.05), years of education (p<0.10), ownership of cultivating equipment (p<0.01), access to non farm income (p<0.05), and belonging to farmers’ association (p<0.01), means of information (p<0.10), all had a significant and positive relationship with the volume of sales. This suggests that an increase in any of these variables will lead to an increase in the volume of maize offered for sale while marital status (p<0.05), and transportation cost (p<0.05), had a negative and significant relationship with the volume of maize sold and this is in line with the a priori expectation. The study recommends that effort should be made at establishing more points of sales in farming areas in order to lower transportation costs to promote market participation and youths should be encouraged to participate in agricultural production and consequently market participation so as to inject new blood into the system.

Key Words: Market Participation, Maize Farmers, Marketable surplus, Commercialization, Regression

INTRODUCTION
The bulk of Nigeria’s populace is poor scattered in the rural areas as farmers producing the largest portion of the nation’s food and exports (Oluwasola et al 2008). One would like to ask why this is still so despite several coordinated programmes and policies that has been formulated by the past and present Nigerian Government to reduce the level and incidence of poverty in the country and particularly among farming households. The problem of living below the poverty line attributed to Nigerians’ farmers could be traced to many factors: one of which is market related factors as most of the rural markets in Nigeria are still not developed. It is now evident that achieving and sustaining success in
productivity based agricultural growth critically depends not only on achieving agricultural productivity and household food consumption but also increasing better market access and expansion of market opportunities as the livelihoods of most African smallholder farmers are often restrained by poor access to markets and limited entrepreneurial skills for adding value to the products (Haggblade, 2004). The question of how to increase the market participation of smallholder is a major challenge facing many government and non-governmental organizations in developing countries. Holloway and Ehui (2002) opined that the inability to access markets is a major constraint to improving the welfare of smallholders. Enhancing the ability of poor smallholder farmers to reach the markets, and actively engage in them, is one of the most pressing development challenges.

In Sub-Saharan Africa, Asia and South and Central America, small scale agriculture remains the major source of rural employment but, confronted with changes in world trade and falling commodity prices (Junior, 2006). Although, previous studies attributed the low market participation to different challenges, there is seldom any framework for ranking the impediment at village level and as a result, privatization and adaptation of intervention becomes difficult. Consequently, there is duplication of efforts and resource wastage, leading to a rise in food insecurity and widespread poverty (Balint, 2003). Improvements in market participation are necessary to link smallholder farmers to markets in order to increase agricultural production as well as set opportunities for income generation (Pingali, 1997). Enhancing the ability of smallholder and resource- poor farmers to access market opportunities and diversify their links with markets is one of the most pressing developmental challenges facing both governments and non-governmental organizations (IFAD, 2002). Market orientation enhances consumers’ purchasing power for food, while enabling re-allocation of household income by producers to high value non-food agribusiness sectors and off farm enterprises (Davis, 2006). The rationale for enhancing participation in commercial agriculture also stem from the potentials to accelerate attainment of the Millennium Development Goal (MDG) on food security and poverty reduction through utilization of untapped opportunities in commodity value chains (John et al., 2007).

It is well established that majority of the smallholder farmers are located in remote areas with poor road networks and market infrastructure, contributing to the high transaction costs, which has been seen to be one of the key reasons for smallholder farmers’ failure to participate in markets (Makhura et al., 2001). In addition, they lack reliable market information as well as information on potential exchange partners. National and international policy initiatives that aim at addressing this constraint have to address issues associated with reduction of transaction costs, which are often the embodiment of access barriers to market participation of smallholder farmers and market risks. Virtually, all Nigerian farmers depend on trading for some household needs and hence seek additional income generating activities. Improvements in market participation is therefore necessary to link smallholder farmers to markets in order to have better market for agricultural products as well as set opportunities for income generation.
Market participation is the integration of subsistence farmers into the inputs and output markets of agricultural products, with the aim of increasing their income level thereby reducing poverty (Holloway and Ehui, 2002). The concept of market orientation, commercialization or participation refers to the percentage of marketed output from total farm production. The research on market participation has been scanty, but the major issues that abound in the literatures are: the study of market participation based on whether farmers make market participation decision and the volumes of sales simultaneously or sequentially; the institutional factors that affects market participation and the effect of government policies on market participation decisions. Goetz 1992, Lapar et al 2003, Heltberg and Tarp (2001) and Holloway et al 2005 studied market participation based on the assumption that market participation and volume choices are made sequentially or simultaneously. That is, farmers initially decide whether or not to participate in the market, and then decide on the volume purchased or sold, conditional on having chosen market participation; farmers make market participation decision simultaneously with the decision as to volume purchased or sold. Heltberg and Tarp (2001) modelled market participation behaviour as a two step decision process. The first one is for the household to decide whether or not to participate in the market and secondly establish how much to sell. They found out that transaction cost, risk and other factors create barriers or thresholds to participate in crop markets. Goetz (1992) used a Probit model of households’ discrete decision to participate in the market (either as buyers or as sellers without distinction) followed by a second stage switching regression model of the continuous extent of market participation decision. Result suggest that options other than relative output price changes are available for stimulating market surpluses in Sub Sahara African. In particular, better information significantly raises the probability of market participation of selling households, while access to coarse grain processing technology significantly raises quantities sold by sellers.

In a similar view, farmers participation levels at various un-organized markets in Nigeria differs, some opt not to participate at all due to various limiting barriers. This is because some farmers have not yet seen the benefits of participating in the organized markets despite the envisaged benefits of market orientation as well as positive tendencies in drivers of commercialization. This has resulted into quite poor return on their investment in terms of money, time, energy and resources. Putting emphasis on this is to consider the activities of the middlemen whose share of the total marketing margin is usually higher compared with the farmer’s return which is usually low as a result of the exploitation. This exploitation directly or indirectly leads to loss of interest in farming and subsequently food insecurity in the country (Asemote, 2000). There is therefore need to encourage these poor farmers by integrating them into the markets; integration will only happen when smallholder farmers fully participate in the markets. In the past, studies on marketing in Nigeria have been particularly focused on market prices and margin and also on the organization and conduct of food marketing systems. This study distinguishes itself from the
past studies in Nigeria because it will go beyond the market place to identifying the market constraints the farmers are facing and also to integrate them into the markets so as to enable them to participate more in the markets.

The study therefore examines the determinants of market participation among maize producers in Osun State. The identification of ways to increase market participation by smallholder producers requires identification of variables that influences market access (Randala et al., 2008). Identification of farm level factors that influence or enhance market participation is important as this may offer information for policy alternatives that would promote and enhance better commercial orientation. It may further lead to improved income of rural dwellers. Addressing the determinants of commercial orientation of the individual farmers could shed more light on further steps to be taken by various commodity organizations, the governments and other role players in order to promote the rural market economy (Balint, 2003).

METHODOLOGY

Study Area

The study was carried out in Osun state in the South Western part of Nigeria. Osun State, covers an area (land mass) of approximately 14,875 square kilometers, lies between longitude 04 00E and 05 05” and latitude 05 558” and 08 07”. The estimated population for year 2004, based on the 1991 census is therefore 3.1 million. It is bounded by Ogun, Kwara, Oyo and Ondo States in the South, North, West and East respectively. Osun state is predominantly an agrarian society with about 70% of the population engaged directly or indirectly in agriculture and related activities. For administrative convenience, Osun State is divided into six agricultural zones by Agricultural Development Project (ADP). These zones include Osogbo, Ikirun, Ede, Iwo, Ilesha and Ife. Osun I is made up of Ede and Iwo zones; Osun II consists of Osogbo and Ikirun zones while Osun III comprising Ife and Ilesa zones.

Being part of the cocoa belt, Osun State has been a major destination for migrant farmers from other parts of Nigeria. Some of the migrants work as hired labourers in cocoa, kola nut, tobacco and other cash crops farms while others settle down as crop farmers like yam, maize, cassava etc while a few others are traders.

Sources of Data

The data for this study were obtained mainly from primary sources. Data on household and respondents’ characteristics were collected for the study with the aid of structured questionnaires and interview schedules. Personal observation was further used to gather facts relevant to the study. Data were collected on the general living standard of the people which include household characteristics, household physical assets, social capital, transaction cost.

Sampling Procedure

A multi- stage sampling technique was employed in the selection of the respondents for this study. The first stage is the purposive selection of ten Local Government Areas from the six agricultural zones in the state. The selection was based on the intensity of maize production and markets, since the target was maize farmers. The second stage involved random selection of six villages from each Local Government Area (LGA) where maize is being grown in large quantity. The third stage was random selection of 24 farmers...
from each village. The reason behind equal number of questionnaires being allotted to each village is that the population size of the selected villages are not different except some like Ekosin, Okuku and Otan. In all, a total of 240 respondents were proposed for the study but only two hundred and twenty seven were valid for analysis.

**Analytical Techniques and Model.**

A combination of analytical tools was employed to analyze the stated objectives. These include descriptive statistics, and regression analysis (Tobit and Ordinary Least Square). Descriptive statistics such as frequency distribution table, percentages, means and standard deviation, were used to analyze respondents’ socio-economic, demographic characteristics and their level of market participation.

**Regression Model**

The aim of the study was to look at factors that increase the level of participation in the maize markets. Ideally, the ordinary least square (OLS) model is applicable when all households participate in the market but in reality not all households participate or at the same level in the markets. Some households may not prefer to participate in a particular market in favour of another, while others may be excluded by market conditions. If the OLS regression is estimated excluding the non-participants from the analysis, a sample selectivity bias is introduced into the model. Such a problem is overcome by following a two-stage procedure as suggested by Heckman (1979) or Tobit procedures. These procedures has been discussed broadly in Tobin (1958), Greene (1981, 1993), Maddala, (1988), and Gujarati (1995) and applied in several instances such as Adejobi et al (2006).

Both Heckit and Tobit procedures also addressed this concern. The Heckit procedure is a consistent but not an efficient way to control for selectivity bias, while Tobit procedure is efficient and consistent. Technically, if Heckit specification was run using Maximum likelihood Estimation (MLE) procedure without lambda, the results would be identical to Tobit-MLE selection models with iterations constrained to one. The results obtainable from the Tobit procedure are the MLE or maximum likelihood estimates, as well as the marginal effects. The marginal effects indicate the amount of the sales resulting from a unit change in the explanatory variables. The marginal effects account for the probability of the level of market participation. They have the same interpretation as the OLS coefficients. It is sometimes pertinent to compare the marginal effects and OLS coefficients, though the latter are distorted.

Data providing for market participation tend to be censored at the lower limit of zero. That is, the household may sell some of its produce, while another may not sell at all. If only probability of selling is to be analyzed, Probit or Logit models would be adequate techniques for addressing probability questions. Although it is interesting to know factors that influence the level of sales, at the same time, there is a need for a model that is a hybrid between the Logit or Probit and the OLS. The appropriate tool for such is the Tobit model that uses Maximum Likelihood Regression (MLE) estimation (Tobin, 1958, Gujarati, 1995). A Tobit model answers both of the following questions:

What factors influence the probability of selling? This question is answered by Logit and Probit. What factors determine the level or magnitude of
sales? This question is not answered by Logit and Probit models, but by OLS. Using this type of econometric model (Tobit) to determine the factors affecting market participation while controlling for other factors is expressed as:

\[ Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu, \]

\[ Y = 0 \text{ if } y \leq 0, \]

\[ y = Y^* \text{ if } y > 0. \]

\( Y^* \) = House Commercialization Index
\( \beta \) = estimated parameter or coefficient
\( X_i \) = the explanatory variables
\( \varepsilon_i \) = error term and is normally distributed with zero mean and constant variance.

The dependent variable \( y \) equals 0 if the latent variable \( y^* \) is below a certain threshold, usually 0. If the values of the latent variable are positive, the dependent variable is equal to the latent variable.

\[ y^* = \beta_0 + x \beta + \mu/x \text{ Normal } (0, \sigma^2) \] (1)

\[ y' = \max(0, y^*) \] (2)

The latent variable \( y^* \) satisfies the classical linear model assumptions; in particular, it has a normal, homoskedastic distribution with a linear conditional mean.

Equation (2) implies that the observed variable, \( y \), equals \( y^* \) when \( y^* \geq 0 \), but \( y = 0 \) when \( y^*<0 \). Because \( y^* \) is normally distributed, \( y \) has a continuous distribution over strictly positive values. In particular, the density of \( y \) given \( x \) is the same as the density of \( y^* \) given \( x \) for positive values. Further,

\[ P(y = 0/x) = P(y' < 0/x) = P(\mu < -x\beta) \] (3)

\[ = P(\mu/\sigma < -x\beta/\sigma) = \Phi(-x\beta/\sigma) = 1 - \Phi(x\beta/\sigma) \] (4)

Because \( \mu/\sigma \) has a standard normal distribution and is independent of \( x \), we have absorbed the intercept into \( x \) for notational simplicity. Therefore, if \( (x_i, y_i) \) is a random draw from the population, the density of \( y_i \) given \( x_i \) is

\[ \left(2\pi\sigma^2\right)^{-\frac{1}{2}} \exp\left(-\frac{(y_i-x_i\beta)^2}{2\sigma^2}\right) = 1/\sigma \Phi\left(y_i-x_i\beta/\sigma\right) \] (5)

\[ P(y_i = 0/x_i) = 1 - \Phi(x_i\beta/\sigma) \] (6)

Where \( \Phi \) is the standard normal density function.

From (5) and (6), the log-likelihood function for each observation \( i \) is then obtained

\[ l(\beta, \sigma) = \sum_{i=1}^{n} \left[ \log\left(1 - \Phi(x_i\beta/\sigma)\right) + \log\left(\Phi(y_i-x_i\beta/\sigma)\right) \right] \] (7)

The log-likelihood for a random sample of size \( n \) is obtained by summing equation (7) across all \( i \). The maximum likelihood estimates of \( \beta \) and \( \sigma \) are obtained by maximizing the log-likelihood which is easily executed in STATA.

Tobit regression was employed to analyze the determinants of market participation of maize farmers using all the data information acquired. The second stage which is to analyze the factors determining the volume of sales by the farmers, the Ordinary Least Square (OLS) model was used.

The full Tobit model is specified thus;

\[ Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu_i \]

Where \( Y^* \) is the latent variable (Proportion of maize sold), and \( x \) is a vector of independent factors, and \( \mu \) is the error term.

The dependent variable is the proportion of maize sold out of the total produced through sales to output formula while the explanatory variables are specified thus;

\( X_1 = \text{Quantity of maize sold (in Kg)} \)
\( X_2 = \text{Age of the farmer (in years)} \)
\( X_3 = \text{Level of Education (in years)} \)
\( X_4 = \text{Sex of the Household Head (male =1, Female =0)} \)
\( X_5 = \text{Marital Status (married =1, otherwise =0)} \)
OLS for Market Participation

The second stage involved OLS using observation in the regression model to be estimated. This OLS regression was used to analyze the factors determining the volume of sales. In this model, the volume of sales of the market participants made up the dependent variable.

The model is

\[ Y = \beta_0 + \beta_1 X_1 + \ldots + \beta_{13} X_{13} + U_i \]

Y is the variable representing volume of maize sold, \( X_i \) is a vector of farmers’ characteristics relevant in explaining the level of market participation, and \( \beta_i \) is the independent variables as specified thus:

- \( X_1 = \) Quantity of maize produce sold (in Kg)
- \( X_2 = \) Age of the farmer (in years)
- \( X_3 = \) Level of Education (in years)
- \( X_4 = \) Sex of the Household Head (male = 1, Female = 0)
- \( X_5 = \) Marital Status (married = 1, otherwise = 0)
- \( X_6 = \) Household Size (in numbers)
- \( X_7 = \) Farming experience (If yes = 1, No = 0)
- \( X_8 = \) Ownership of farming equipment (If yes = 1, No = 0)
- \( X_9 = \) Land size (in ha)
- \( X_{10} = \) Access to non-farm income (If yes = 1, No = 0)
- \( X_{11} = \) Farmers’ association (If yes = 1, No = 0)
- \( X_{12} = \) Means of information (If yes = 1, No = 0)
- \( X_{13} = \) Transport cost (in Naira)

Results

The socioeconomic factors considered in this study include gender, age, educational status, household size and farming experience as shown in table 1.

The gender distribution of the respondents in the study area shows that 75 percent were male while the remaining 25 percent were female. This signifies a typical Nigerian farming system especially in the western region where men are predominantly farmers. The farmers’ ages range between 32 and 67 years. About 54.63 percent of the farmers are at most 50 years while the mean age is 49 years with the standard deviation of 7. The average age of the farmers in the study area shows that they are already ageing which might contribute negatively to productivity consequently low volume of sales or market participation. According to Randela et al., 2008, older farmers view farming as a way of life rather than as a business and have a strong emotional or almost biological connection with farming, land and little or no contact with the outside world.

Table 1: Socioeconomic Characteristics of the Respondents

<table>
<thead>
<tr>
<th>A. Gender Distribution of Respondents</th>
<th>B. Age Distribution of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Frequency</td>
</tr>
<tr>
<td>Male</td>
<td>170</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
</tr>
</tbody>
</table>

http://www.ijaerd.lautchaee-edu.com
C. Educational Status of Maize Farmers

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Formal</td>
<td>24</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Formal</td>
<td>67</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>112</td>
<td>48.5</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>24</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Household Size of Respondents

<table>
<thead>
<tr>
<th>Household Size</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>&gt;30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>149</td>
<td>75</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Years of Farming Experience

<table>
<thead>
<tr>
<th>Years of Farming</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>&gt;40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>54</td>
<td>109</td>
<td>61</td>
<td>14</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Field survey, 2010

Only 10.0 percent had no formal education. They spent an average of 9 years in school which correspond to junior secondary school education in Nigeria with standard deviation of 4.5. This is a reasonable level of literacy among a typical Nigerian rural area but higher education is important as this is likely to lead to the reduction of search, screening information costs and transaction cost in both factor and product market (Matungul et al., 2001). The result of the analysis shows that 98.68 percent of the respondents have their household size ranging between 1-20 members with an average of 10 members, standard deviation of 3.7. Larger household with more dependents are likely to have a lower level of commercialization as confirmed by Laper et al., (2003) that propensity to participate in the market economy declines with number of household members. The respondents also have an average of 18 years of marketing experience with standard deviation of 8. Participation in the market is a function of marketing experience. Hence, it is expected that individual with higher marketing experience will have higher commercialization index, thus farmers should be encouraged to participate in the markets.

Table 2: Factors determining market participation of maize farmers

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>Probability</th>
<th>Marginal effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.1684</td>
<td>0.1368</td>
<td>0.241</td>
<td></td>
</tr>
<tr>
<td>Quantity of maize produced</td>
<td>0.0004</td>
<td>0.0002</td>
<td>0.022***</td>
<td>0.0004</td>
</tr>
<tr>
<td>Age</td>
<td>0.0075</td>
<td>0.0022</td>
<td>0.001***</td>
<td>0.0075</td>
</tr>
<tr>
<td>Years of Education</td>
<td>-0.0006</td>
<td>0.0033</td>
<td>0.863</td>
<td>-0.0006</td>
</tr>
<tr>
<td>Sex of the head</td>
<td>0.0529</td>
<td>0.0325</td>
<td>0.100</td>
<td>0.0529</td>
</tr>
<tr>
<td>Marital status</td>
<td>-0.0166</td>
<td>0.0308</td>
<td>0.589</td>
<td>0.0075</td>
</tr>
<tr>
<td>Household size</td>
<td>-0.0076</td>
<td>0.0042</td>
<td>0.045**</td>
<td>-0.0006</td>
</tr>
<tr>
<td>Farming experience</td>
<td>0.0046</td>
<td>0.0022</td>
<td>0.027**</td>
<td>0.0529</td>
</tr>
<tr>
<td>Ownership of farming equip.</td>
<td>0.1944</td>
<td>0.0476</td>
<td>0.000***</td>
<td>0.0075</td>
</tr>
<tr>
<td>Land size in hectare</td>
<td>0.0067</td>
<td>0.0111</td>
<td>0.544</td>
<td>-0.0006</td>
</tr>
<tr>
<td>Access to non farm income</td>
<td>0.1029</td>
<td>0.0325</td>
<td>0.027**</td>
<td>0.0529</td>
</tr>
<tr>
<td>Farmers’ association</td>
<td>0.1497</td>
<td>0.0386</td>
<td>0.000***</td>
<td>0.0075</td>
</tr>
<tr>
<td>Means of information</td>
<td>0.1429</td>
<td>0.0472</td>
<td>0.002**</td>
<td>-0.0006</td>
</tr>
<tr>
<td>Transportation cost</td>
<td>-0.0002</td>
<td>8.54x10^-6</td>
<td>0.000***</td>
<td>0.0529</td>
</tr>
</tbody>
</table>

Source: Computer Analysis 2010.

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

No of observation 227
Log likelihood function 67.01
Chi squared 52.93

% of correct prediction = 67
The model correctly predicted 67% of the observation with a significant chi square of 52.93 and it shows the overall significance of the model. Nine out of the 13 variables had coefficients significantly different from zero. There is a positively significant relationship (p<0.05), between the proportion of maize sold and total quantity produced, that is, a unit increase in the total quantity produced will increase the proportion offered for sale by 0.0004.

A positive and significant relationship (p<0.01), exist between the proportion sold and age of the respondents as against the a priori expectation, though supported by Randela et al., 2008. This means that as farmers grow old, their physical energy reduces, hence they will take their produce to the market to supplement for their inability to produce other crop and have better income. This relationship implies that, a unit increase in age will increase the proportion of maize offered for sale by 0.008. Older and more experienced farmers tend to have more personal contacts, allowing discovery of trading opportunities at low cost (Matungul et al., 2001). Moreover Makhura (2001) opined that older farmers are able to overcome fixed transaction costs since some experiences about the market have been accumulated overtime. A significant (p<0.05) and negative relationship exists between the proportion of maize sold and household size and this is in accordance with the a priori expectation. That is, an increase in household size will reduce the proportion of maize offered for sale by margin of 0.0076. This implies that household members tend to consume more than what is sold. Generally, households decide to sell when they cannot consume all they have produced i.e. the decision to sell is preceded by the decision to consume, the more members the household has, the more likely that most of the produce will be consumed. A significant (p<0.05), and positive relationship exists between the proportion of maize sold and farming experience of the respondents. Thus, a unit increase in the years of experience of the farmers will increase proportion of maize offered for sale by 0.0046. Ownership of cultivating equipment has a positive and significant (p<0.01), relationship and will have a marginal increase of 0.1944 on level of maize sold which goes with the a priori expectation. This means that household that owns cultivating equipment will produce more and are likely to offer more for the market than those without. Access to information has a positive and significant relationship (p<0.05). The more information the farmers has on the market location, products’ prices, the demand and supply situations about the produce, the lesser the transaction cost they will incur which will improve their level of market participation by 0.1429. Access to non farm income has a positive significant (p<0.05), relationship and will increase the proportion of maize sold by 0.1029. Farmers with an additional source of income will be willing to take risk in producing more for the market. Being a member of farmers’ association shows a positively significant relationship at (p<0.01), level with proportion of maize sold and it will bring about 0.1497 increase in the proportion of maize offered for sale. It further strengthens farmers’ bargaining and lobbying power and also serves as source of information to the farmers, increasing their propensity to participate in the market. There is a negatively significant relationship (p<0.01), between the proportion sold and transportation
cost. A unit increase in transportation cost will reduce proportion of maize sold by 0.0002. Higher transportation costs to market, increases transaction costs, thereby affecting market participation: that is, the higher the transportation cost, the more difficult and costly it would be to get the produce to the market thereby reducing the quantity taken to the market by the farmers.

Factors that affect the volume of sales using OLS

Table 3: Determinants of Volume of Maize Offered for Sale

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-8.8614</td>
<td>8.542</td>
<td>-0.361</td>
</tr>
<tr>
<td>Quantity of maize produced</td>
<td>0.5395</td>
<td>0.0159</td>
<td>0.000***</td>
</tr>
<tr>
<td>Age</td>
<td>0.2759</td>
<td>0.1322</td>
<td>0.038**</td>
</tr>
<tr>
<td>Years of Education</td>
<td>0.2959</td>
<td>0.1712</td>
<td>0.088*</td>
</tr>
<tr>
<td>Sex of the head</td>
<td>0.6141</td>
<td>1.8228</td>
<td>0.737</td>
</tr>
<tr>
<td>Marital status</td>
<td>-3.7937</td>
<td>1.8799</td>
<td>0.045**</td>
</tr>
<tr>
<td>Household size</td>
<td>-0.1507</td>
<td>0.2024</td>
<td>0.457</td>
</tr>
<tr>
<td>Farming experience</td>
<td>0.1266</td>
<td>0.1057</td>
<td>0.232</td>
</tr>
<tr>
<td>Ownership of farming equip.</td>
<td>8.0289</td>
<td>2.4182</td>
<td>0.001***</td>
</tr>
<tr>
<td>Land size in hectare</td>
<td>0.3106</td>
<td>0.5211</td>
<td>0.588</td>
</tr>
<tr>
<td>Access to non farm income</td>
<td>7.1113</td>
<td>1.6548</td>
<td>0.000***</td>
</tr>
<tr>
<td>Farmers’ association</td>
<td>4.6102</td>
<td>2.2669</td>
<td>0.0043**</td>
</tr>
<tr>
<td>Means of information</td>
<td>5.1919</td>
<td>3.009</td>
<td>0.0086*</td>
</tr>
<tr>
<td>Transportation cost</td>
<td>-0.0005</td>
<td>0.0002</td>
<td>0.0041**</td>
</tr>
</tbody>
</table>

Source: Computer Analysis 2010

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Prob>F 0.000  Adjusted R Squared 0.891
R Squared 0.8982  Root MSE 10.866

The model R –Square and adjusted R-Square are respectively 91% and 90% with a significant overall fit. Volume of maize sold in kg by individual respondents was used as the dependent variable. Nine out of the 13 variables are significantly different from zero. Total maize produced (p<0.01), age (p<0.05), years of education (p<0.10), ownership of cultivating equipment (p<0.01), access to non farm income (p<0.05), and belonging to farmers’ association (p<0.01), means of information (p<0.10), all had a significant and positive relationship with the volume of sales. This suggests that an increase in any of these variables will lead to an increase in the volume of maize offered for sale while marital status (p<0.05), and transportation cost (p<0.05), had a negative and significant relationship with the volume of maize sold and this is in line with the a priori expectation.

CONCLUSION AND RECOMMENDATIONS

Farmers in the study area are already ageing and this can contribute negatively to productivity consequently low volume of sales or market participation. Majority of the farmers are still into subsistence farming as they will only go to market to sell the excess after consuming enough by the households. They preferred selling at the farm gate or village market due to lack of good roads and information which resulted into high transportation cost and lower farmers’ return as a result of middlemen’s exploitation. Positive and negative significant relationships in the models inferred that a unit increase/decrease in the variables will reduce/add to the proportion of maize sold. Higher transportation costs to market, increases transaction costs, thereby affecting market participation: that is, the higher the transportation cost, the more difficult and costly it would be to get the produce to the market thereby reducing the quantity taken to the market by the farmers.

The major problems faced by the respondents in the study area were problem of high cost of...
transportation; lack of credit facilities which is the major constraint facing the farmers in Sub-Sahara Africa and problem of bad road network from their farms to the various markets. Following this, the study recommends that effort should be made at upgrading roads and support establishment of more points of sales in farming areas in order to lower transportation costs to promote market participation. Also youths should be encouraged to participate in agricultural production and consequently market participation so as to inject new blood into the system.

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