

Determinants of Marketable Surplus of Maize in Osun State, Nigeria

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Abstract

This study examines the marketable surplus of maize in Osun State, Nigeria. The study stemmed from the need to ensure food security in the country. Primary data obtained from 120 respondents selected through a three-stage sampling technique were used for the study. The data collected were analysed with descriptive statistics and regression analysis. The findings revealed that the major occupation of the farmer, use of modern technology and maize output were significant at $p < 0.1$, $p < 0.5$ and $p < 0.01$ respectively and positively affected marketable surplus of maize in the study area while cost of transportation was significant at $p < 0.1$ and negatively affected it. These findings suggest that market surplus of maize can be enhanced if appropriate measures are put in place. Therefore, the study calls for provision of improved agricultural technologies to farmers, implementation of measures to reduce transport cost as well as formulation of sound policies to encourage the farming as main occupation.

Key Words: Marketable surplus, Maize, Food security, Factors and Policies.

Introduction

Food insecurity, with regards to quantity and quality is one of the characteristics of developing countries, Nigeria inclusive (Benson, 2008). Globally over 900million people are said to be chronically hungry out of which 800million are from developing countries representing about 18% of the world's population and the number keeps on increasing at a rate of almost 4million per year since the second half of the 1990's (Braun, 2005 and Grember *et al*, 2009). The situation is more appalling in Nigeria where recent estimates show that at least 41% of the Nigerian population is food insecure with 16% being severely undernourished (FAO, 2005). This calls for the need to increase the level of residual produce of agrarian households to meet the food needs of the nation.

Marketable surplus can be defined as the residual production of agricultural produce with which the producer is left after his genuine requirements of family consumption, payments of wages in kind, feed and seed have been met. If the size of marketable surplus does not rise, it may constitute a fundamental limiting factor in the temporary development by reducing supplies available for urban consumption, industries and exports. This marketable surplus in the

agricultural sector of developing economies is a crucial question from economic and welfare perspectives as it contributes to capital formation in the non-agricultural sector, improvement of standard of living by generating income to households and provision of raw materials for industries (Awotide, 2004).

Maize is one of the most important staple food crops in Nigeria. It is the second most common cereal food crop after rice. Maize provides carbohydrate, vitamins, and relatively small amount of protein. It is consumed by human beings and livestock as well, with the Nigerian livestock consuming more than half of the total annual maize production (CBN, 2003). Thus, its marketable surplus would not only enhance food security but also facilitate the growth of agro-allied industries. Given the relevance of this crop to food security however, the marketable surplus of maize in Nigeria is faced with myrads of problems. These include: competition between output demand of maize as animal feed and as human food, high transportation cost and other marketing costs and also lack of coordination among credit agencies, extension services, the farmers' land tenure and malfunctioning of marketing system (Mkpado, 2010).

Marketable surplus is a very important but rather neglected aspect of agricultural development. More emphasis is usually placed, by government on policies to increase food production with little or no consideration on the residual production of agricultural produce left with the farmers after meeting their genuine requirements. In the light of this, this study examines the socio-economic characteristics of maize farmers and identifies the factors that determine the volume of maize sold to the market by the farmers, using Osun State as case study. The insights from this study would assist in design of development policies that can assist in the alleviation of food insecurity and malnutrition in Nigeria.

Methodology

The study was conducted in Osun State, Nigeria. The state is located in the south-western part of the country with a land mass of 8,602 square kilometres and a population of 3,423,535 (National Population Commission, 2006). It is bounded on the west by Oyo State, in the east by Ondo and Ekiti States, in the north by Kwara State and in the south by Ogun State. The state is made up of thirty Local Government Area (LGA) which are grouped into six zones. The annual rainfall is between 1000 and 1500 mm with high daily temperature of about 21.1°C – 31.1°C (Faride *et al.*, 2007). Farming is a prominent occupation of the people in the state. The major food crops produced in the state are maize, yam, cassava, beans and cocoyam while

the major cash crops are cashew, cocoa and oil palm (Faride *et al.*, 2007).

Both primary and secondary sources of information were used for the study. Primary data were generated by means of structured questionnaire. A three-stage sampling technique was employed in drawing sample for this study. Four Local Government Areas (LGAs), namely: Oriade, Ilesa, Ede and Ife-East were purposively selected from the thirty LGAs of the state. The choice of the area was based on the prior information obtained from the state's Agricultural Development Programme that maize farmers were more concentrated in the area than other parts of the state. Six villages were then selected randomly from each of the four LGAs based on village listing. This was followed by random selection of five maize farm households from each village, making a total of 120 farm households. Data collected include socio-economic characteristics of the respondents and their agricultural production data. Secondary information were also sourced from journals, theses, bulletins, statistical annual reports and grey literature.

The data were analysed with descriptive statistics and regression analysis. Descriptive tools such as frequency distribution, percentages and mean were used to examine the socio-economic and demographic characteristics of the farmers. Regression analysis was used to identify factors affecting marketable surplus of maize by the farmers. The implicit model of the regression used is specified as:

$$Y = f(X_1, X_2, \dots X_7)$$

Where,

Y = Average maize sold per household (kg)

X₁ = Major occupation (Farming = 1, Others = 0)

X₂ = Price of maize (₦/kg)

X₃ = Cost of transport (₦)

X₄ = Use of modern technology (dummy)

X₅ = Distance from home to market (km)

X₆ = Maize output (kg)

X₇ = Education of household head (years of successful schooling)

X₈ = Access to extension services

Since economic theory does not indicate the precise mathematical form of the relationship among the variables, four different functional forms of regression models were fitted, namely: the linear, semi-logarithm, logarithm and exponential functions. The explicit forms of the functions are as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + U \quad (\text{Linear})$$

$$\ln Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + U \quad (\text{Exponential})$$

$$Y = a + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + b_8\ln X_8 + U \quad (\text{Semi-log})$$

$$\ln Y = a + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + b_8\ln X_8 + U \quad (\text{Double-log})$$

However, the lead equation was chosen on the bases of economic, statistical as well as econometric criteria. These criteria include the values coefficient of multiple determination (R^2), F-statistics, the signs of the coefficients of the explanatory variables which are in conformity with *a priori* expectations and observed level(s) of significance of the variables (Gujarati and Sangeetha, 2007; Koutsoyiannis, 2003; Olayemi, 1998).

Results and Discussion

Socio-economic characteristics are important human attributes that help to enhance the efficiency of farmers and marketers of agricultural produce in their business. Indeed, they help to shape the entrepreneurial abilities of farmers in rational decision making, especially those relating to agricultural enterprise system (Musa, 2003; Shu'aib, 2009). Based on this rationale, the relevant socio-economic characteristics of the respondents were investigated so as to ascertain their relevance to rational decisions that affect marketable surplus of the crop by the farmers.

The socio-economic and demographic profile of the respondents is presented in Table 1. The age of the respondents ranged from 20 – 58 with an average of 36 years. This indicates that they were in their active years. Majority (93.33%) of the respondents were married. The implication is that the farmers were much likely to have children to support them in their agricultural activities and enhance their ability to produce at market-oriented level. The mean household size of 8 persons obtained also shows that the farmers had a reasonable source of family labour as this is more common than hired labour in developing countries (Muhammad-Lawal *et al.*, 2009). About 62% of the respondents had no formal education. This is in line with the findings of Ndanitsa and Umar (2007) and Tsoho (2005) who in separate studies reported that Nigerian farmers are characterized by low level of literacy. The farmers had an average farming experience of 14 years. This indicates that farming is an age-long enterprise in the study area. Only 5% of the respondents were members of cooperatives. This is in line with the finding of Ibrahim *et al.* (2005) and Omolehin *et al.* (2007) who in separate studies revealed that farmers' participation in cooperatives is limited due to culture and religious beliefs. Sixty-five percent of the farmers engaged in farming as their major occupation. About 61.83% of the respondents

had no access to extension services. Majority (95%) of the respondents cultivated between 1.0 – 2.99 hectares of maize farm. Further analysis of the results shows that the mean farm size of the respondents was about 2.36 hectares. These results suggest that maize farming is practised on small scale by the farmers. This is similar to the findings by Olaniyi and Adewale (2012) who discovered that majority of maize producers in South-western part of Nigeria were small-scale farmers.

Table 2 shows that the double-log functional form gave the best fit for the regression result. The functional form was chosen based on the values of R^2 (coefficient of multiple determination), F-statistics, the signs of the coefficients of the regressors which are in conformity with *a priori* expectations and observed level(s) of significance of the variables. The coefficient of multiple determination (R^2) was 0.716 indicating that the explanatory variables in the model explain 71.6% of the total variations in marketable surplus of maize. The results indicate that the major occupation of the farmer, use of modern technology and maize output were significant at $p < 0.1$, $p < 0.5$ and $p < 0.01$ respectively and positively influence marketable surplus of maize. This implies that those who practised farming as their main occupation had more output for sale than their colleagues who had farming as their minor (part-time) occupation. This might be because farmers in the former category were likely to pay much attention to farming since it was their main source of livelihoods. Also, the positive relationship between maize output and marketable surplus by the farmers is logical, as farmers with more output are much likely to have more 'left-over' for sales after meeting the subsistence need of their households than their counterparts with low output. Moreover, modern agricultural technologies have the tendency of improving agricultural productivity thereby increasing the amount of output meant for the market (Mamudu *et al.*, 2012; Nin *et al.*, 2003).

Cost of transportation was significant at $p < 0.1$ and negative, implying that an increase in this variable results in a decrease in marketable surplus of maize in the study area. This is interesting, as high cost of transportation of output can make farmers unwilling to take their produce to the market, especially those in the urban centres, where they could have good prices for their produce, since it might negatively affect their margin (Peter *et al.*, 2010).

Table 1: Socio-economic and Demographic Status of the Respondents (n = 120)

Variable	Frequency	Percentage
Age (years)		
≤ 20	3	2.50
21 – 30	56	46.67
31 – 40	37	30.83
41 – 50	20	16.67
> 50	4	3.33
Mean = 36		
Marital status		
Married	112	93.33
Single	8	6.67
Household size		
1 – 5	17	14.17
6 – 10	47	39.17
11 – 15	51	42.50
16 – 20	5	4.17
Mean = 8		
Educational Level		
No formal education	74	61.67
Primary	34	28.33
Secondary	8	6.67
Tertiary	4	3.33
Farming experience (years)		
1 -10	56	46.67
11 – 20	36	30.00
21 – 30	18	15.00
> 30	10	8.33
Mean = 14		
Membership of Cooperative		
Cooperative member	6	5
Non-member	114	95
Primary Occupation		
Farming	78	65.00
Formal	23	19.17
Non-formal	19	15.83
Access to Extension Services		
Access	47	39.17
No access	73	60.83
Farm Size (ha)		
1.0 – 1.99	48	40.00
2.0 – 2.99	54	45.00
3.0 – 3.99	7	5.83
4.0 – 4.99	6	5.00
≥ 5.0	5	4.17
Mean = 2.36		

Source: Field Survey, 2012

Table 2: Factors Influencing Marketable Surplus of Maize of the Respondents

Variables	Linear	Exponential	Semi-log	*Double-log
Constant	554.399 (0.308)	7.247*** (18.282)	-24419.91*** (-3.631)	2.344* (-1.872)
Major occupation	53.331 (1.264)	0.013 (1.349)	2221.152 (1.498)	0.474* (1.719)
Price of maize	-2.990 (-0.074)	0.009 (0.995)	-99.827 (-2.205)	0.121 (1.337)
Cost of transport	-51.913 (-0.251)	-0.031 (-0.686)	-581.915 (0.932)	-0.216* (-1.863)
Use of modern technology	12.566*** (6.154)	-0.002*** (-5.152)	3657.817*** (8.783)	0.783*** (10.107)
Distance from home to market	-0.026*** (-1.338)	-4.35E-006 (-1.000)	-194.501 (-0.662)	-0.025 (-0.448)
Maize output	0.236*** (2.738)	4.07E-005** (2.146)	525.284** (2.104)	0.118** (2.550)
Education of household head	0.234 (0.521)	0.102 (0.721)	0.210 (0.237)	0.341 (0.214)
Access to extension services	0.214 (0.431)	0.134 (0.231)	0.210 (0.364)	0.102 (0.257)
R ²	0.526	0.446	0.660	0.716
R ⁻²	0.448***	0.355***	0.605***	0.670***
F-ratio	6.808	4.937	11.946	15.512

Source: Field Data, 2012; Note: Figures in parenthesis are T-values; *** significance at $p < 0.01$, ** significance at $p < 0.05$, * significance at $p < 0.1$; + Lead equation.

Conclusion and Recommendations

It can be inferred from this study that maize farming is an age-long venture in the study area and the farmers are made up of active, married individual who are not members of cooperative societies and have low level of education. This study also reveals that marketable surplus of maize in the study area is positively affected by the major occupation of the farmer, use of modern agricultural technology and quantity of maize output but negatively related to cost of transportation incurred by the farmers. Therefore, it can be inferred from this study that there is room for increasing marketable surplus of maize by putting appropriate measures that will improve the activities of the farmers in place.

Based on the findings of this study, therefore, there is need for government, non-governmental organizations (NGO's) and private organizations to encourage increased maize output by farmers by making farming an attractive venture and through creation of

conducive environment for the farmers. This could be through formulation of suitable policies, provision of farm inputs and supply of credit facilities. These measures may also make farmers adopt farming as their major occupation. Besides, farmers should be provided with modern agricultural technologies. These may include high-yield varieties, early-maturing varieties, etc. In addition, in order to reduce cost of transportation, there should be provision of adequate transportation facilities. This could entail the construction, expansion and maintenance of urban-to-rural, rural-to-urban and rural-to-rural roads in the study area. In this regard, private vehicle owners should be encouraged to set up commercial transportation services. Also, duties on new vehicles and spare parts should be reduced to make them affordable to intending transporters. Moreover, farmers should form cooperative societies. These measures would not only improve marketable surplus of the crop but also enhance food security in the country.

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