ESTIMATION OF THE DEMAND AND SUPPLY FUNCTIONS FOR MICROCREDIT USE OF GINGER MARKETERS IN SOUTH EAST, NIGERIA.

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ABSTRACT
This studyanalysed the estimation of the demand and supply functions for microcredit use of ginger marketers in South-East Nigeria. A multi-stage sampling procedure was used in selecting one hundred twenty (120) respondents for the study. A well-structured questionnaire was used in collecting data from the respondents, and the data collected were analysed usingfrequency distribution and regression analyses. The simultaneous equation model was employed, and the estimation was done using two-stage least squares (2SLS) for ginger marketers. The result shows that most of the marketers were female and are married. They are still 31-50 years old, with the highest representatives (65.83%). The results ofginger marketers' estimated microcredit demand function and supply function were highly statistically significant at a 1% significance level. It has a coefficient of determination value as 0.9855 and 0.9955, respectively, implying that about 98.55% and 99.64% of the total variation in the quantity of micro-credit demanded and the independent variables explained microcredit supply. An increase in income would decrease the microcredit demanded, andthey do not demand microcredit when the interest rate is high. Therefore, it is recommended that male counterparts be encouraged since it is a source of income for household and livelihood. Education should be encouraged since it is an aid to management, and ginger marketers should be encouraged to engage in seminars that will provide information on easy access to micro-credit.
Keywords: Ginger, Marketers, Microcredit, Demand and Supply

INTRODUCTION

Ginger is grown in Nigeria in the Middle Belt States. The crop is one of the principal cash crops in Nigeria. Nigeria is one of the major producers, and it is an important export commodity of Nigeria (Ojiako*et al.,* 2007). The crop is existing in fresh, powder, and dryrhizomes (Brian, 2014). In Nigeria, 10% of the produce is consumed locally as fresh ginger, while the remaining 90% is dried for both local consumption and export. According to Ezeagu (2006), 20% of the dried ginger is consumed locally for various uses, and 80% is exported. The crop is an essential spice with real potential for employment creation and income generation. It is a low-volume, high-value tropical crop. In the foods and beverages industry, ginger is used as an additive for its aroma and spice. It is one of the oldest rhizomes widely domesticated with sauce. The crop is highly cherished in the international market because of its aroma pungency and high oil and oleoresin content called gingerin.

In the Nigerian market, ginger is well known, andit is highly demanded, though it is pretty expensive (Brian, 2014). This is because the principal aim of marketing is to maximise its profits and,at the same time, minimise cost. The world trade in ginger is estimated at $190 million per year. The main competitors in ginger export are China, Nigeria, and Thailand. In 2004, Nigeria's ginger export stood at 28323MT, valued over $21.8 million (FAOSTAT data, 2014).

Ginger is a seasonal crop and perishable (USAID 2017). It is an export crop because of its high demand in advanced medical and confectionery industries. However, due to the lack of storage facilities, traders are forced to sell the product immediately after collection from farmers. Similarly, there are limited collection Centres at production sites, so there are difficulties in handling the product correctly. There is also the absence of ginger washing facilities in Nigeria, which has resulted in low prices in the market due to its dirty appearance. However, in some instances in developing countries like Nigeria and others in African and Eastern Europe, efforts are made to lessen the challenges encountered by the farmers, marketers, and processors of ginger, such as lack of processing and storage facilities.

Microcreditis aimed at placing credit facilities at reasonable terms within easy reach of rural dwellers, increasing the productivity of the rural sector, promoting and expanding the rural economy in an orderly and efficient manner. (Sheremenko*et al.,* 2012).

There is a smooth flow of funds from surplus spending units to deficit spending units (Hoff and Stigliz, 1990; Von Pischke *et al.,* 1983). Therefore, microcredit is an ideal tool to tackle poverty and improve food security. Credit delivery is perhaps one of the most critical roles of microfinance banks. The extended loans are used to expand existing businesses and, in some cases, to start new ones. Modern microcredit is considered to have originated with the Grameen Baffnk founded in Bangladesh in 1983. Many traditional banks subsequently introduced microcredit despite initial misgivings. As a result, the United Nations declared 2005 the International Year of Microcredit. As of 2012, microcredit is widely used in developing countries

and is presented as having "enormous potential as a tool for poverty alleviation.

Micro Credit is needed to ensure flexibility in resource allocation and reduce the impact of cash flow problems (Bigsten*et al.*, 2003). Firms with access to microcredit funding can build up inventories to avoid stocking out during crises. At the same time, the availability of credit increases the growth potential of the surviving firms during periods of macroeconomic instability (Atieno, 2009). Microcredit enables individuals to smooth out processing in the face of varying incomes, provides income for investment, and improves the ability to cope with unexpected expenditure shocks (Atieno, 2009). Microcredit helps the inadequateaccess capital and escape persistent poverty (Ayayi, 2012; Valadez and Buskirk, 2012).

Microcreditextendsminimalloans (microloans) to impoverished borrowers who typically lack collateral, steady employment, and verifiablecredit history. It is designed not only to support entrepreneurship and alleviate poverty but also, in many cases, to empower women and uplift entire communities by extension. In many communities, women lack the highly stable employment histories that traditional lenders tend to require. Many are illiterate, and therefore, unable to complete the paperworkneeded to get conventional loans. As of 2009, an estimated 74 million men and women held microloans that totalled US$38 billion. Grameen Bank reports that repayment success rates are between 95 and 98 percent. Microcredit markets play a significant role in capital formation (Wall, 1987). Thestudy's objectives are to determine the socio-economic characteristics of ginger marketers and estimate the demand and supply functions for microcredit use of ginger marketers in South-East Nigeria.

MATERIALS AND METHODS

The study was conducted in the South-East states of Abia, Ebonyi and Imo of Nigeria.Abia, state lie between Latitude 5.45270N and, Longitude 7.52480E,Ebonyi lie between Latitude 6.2649^0 N, Longitude 8.0137^0E, while Imo state lie Latitude 5.5720^0N, and Longitude7.0588^0E. The states have a total landmass of 10,952,400ha and over 16 million resident's populations (NPC, 2014). It also has a rural population density of 173 persons per square kilometre. About 60-70% of the inhabitants are mainly engaged in crop farming, animal rearing, food processing, and farm produce marketing. The climate can be described as tropical with two clear, identifiable seasons: the wet and dry seasons. Therefore, farming, processing, and marketing are the predominant occupations of the people.

A multi-stage sampling procedure was used in selecting the respondents for this study.The first stage involved a purposive selection of three states, namely Abia, Imo, and Ebonyi, out of the five states in the South-East geo-political zone. These states were chosen based on their high-level activities on ginger marketing.In the second stage, two agricultural zones were purposively selected from each of the selected states, giving a total of six agricultural zones.In the third stage, two LGAs were purposively chosen from each of the two agricultural zones, giving twelve LGAs.In the fourth stage, three communities were purposively selected.The selection was made from each LGA based on microcredit activities, providing a sample of 36communities.In the fifth stage, one market was purposively selected from each community to give a total of 36 markets waschosen from each of the selectedcommunities.In the sixth stage, the sample frame was obtained from the list of male and femaleginger marketers compiled with the aid of the community resident and extension agents. Thus, 120ginger marketers were randomly sampled. The financial institution used for this study is the First Bank of Nigeria PLC microcredit bank. The bank branches used was obtained from an interview with the selected ginger marketers that accessed the banks.Cross-sectional data were used for this study. Primary data were collected using well-structured questionnaires administered on ginger marketersthat use microcredit.

The ginger marketers' socio-economic characteristics were achieved using descriptive statistics and estimation of the demand and supply function of microcredit use by the ginger marketers, which was analysed usingregression analyses. The simultaneous equation model was employed, and the estimation was done using two-stage least squares (2SLS) for ginger marketers. The choice of two least squares (2SLS) is because of the structural coefficients of each equation in the system of the simultaneous equations, which cannot be estimated by ordinary least square (OLS). Therefore, the OLS gives bias and inconsistent estimates (Gujarati, 2003). Identifying the demand and supply equation depends on the exclusion of the exogenous variable from the particular equation under consideration. The order and rank condition for identification were used in the simultaneous equations. The demand and supply function each were precisely identified in the order condition since $K - M \geq G - 1$ as (6-5) > (2-1). Where K is the total number of variables in the model (endogenous and pre-determined), M is the number of variables, endogenous and pre-determined, in a particular equation, and G is the total number of the equation.

However, the demand equation produced a (1)(1) matrix in the rank condition, showing that the demand function was precisely identified. Similarly, the supply function was identified since a (1)(1) matrix was produced for the rank condition for identification. Hence, the model as a whole was precisely identified as both supply and demand equations were exactly identified. Therefore, according to Gujarati (2003), a 2SLS can estimate a

system of simultaneous equations that are exactly placed.

However, to estimate the elasticity of supply and demand directly from the equations, the natural logarithmic form of the supply and demand equations were used. Assuming that the demand and supply curves are linear and adding the stochastic disturbance terms U_1 and U_2, the empirical demand and supply functions(ln natural log form) for microcredit use were specified thus (Gallagher, 2001; Katchova, 2005; Nwaru, 2004) in equation 1:

$$\ln Y = f \ln(X_1, X_2 \ldots X5) \quad (1)$$

The model is given as credit demand in equation 2

$$\ln Q_d = \alpha_0 + \alpha_1 \ln X_1 + \alpha_2 \ln X_2 + \alpha_3 \ln X_3 + \alpha_4 \ln X_4 + \alpha_5 \ln X_5 + u_1 \quad (2)$$

Where

Y = CRD (Q_d) = Credit Demand (₦) by maketers
$\ln$ = natural log
X_1 = cost of loan application by ginger marketers
X_2 = Income (₦) of ginger marketers
X_3 = Interest payment on borrowed money by Ginger marketer
X_4 = Household size measured by the number of people living with the Ginger marketers
X_5 = Educational level of the Ginger marketers
U_1 = Error term

Equation 3 represents the credit supply to the ginger marketers.

$$Y = (f X_1, X_2, \ldots \ldots \ldots X_5) \quad (3)$$

The model is given as credit supply in equation 4

$$\ln Q_S = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + u_1 \quad (4)$$

Where

Y = CRS (Q_s) = Credit Supply (₦) measured by the total amount of money the lender was willing to lend at the prevailing lending conditions.

$\ln$ = natural log
X_1 = Transaction cost including cost incurred in lending supervision and recovery of loans
X_2 = Annual gross income (₦) of the lender in the previous year
X_3 = interest receivable from the total amount of money lent out in (₦) Naira
X_4 = Household size measured by the number of people living with the Ginger processors
X_5 = Educational level of the Ginger marketers
U_2 = Error term

From equations 2 and 4, the endogenous variables are CRD, CRS, and X_3, while the

Pre-determined variables are $X_1, X_2, X_4,$ and X_5

Let CRD = CRS

The endogenous variables were expressed as a function of the pre-determined variables to obtain the reduced form of the equations 5 to 6.

$$X_3 = \ln Q_S = \pi_{10} + \pi_{11} \ln X_{11} + \pi_{12} \ln X_{12} + \pi_{14} \ln X_{14} + \pi_{15} \ln X_{15} + u_1 \quad (5)$$

$$CRD = \pi_{20} + \pi_{21} \ln X_{21} + \pi_{22} \ln X_{22} + \pi_{23} \ln X_{23} + \pi_{24} \ln X_{24} + \pi_{25} \ln X_{25} + u_2 \quad (6)$$

$$CRS = \pi_{30} + \pi_{31} \ln X_{31} + \pi_{32} \ln X_{32} + \pi_{33} \ln X_{33} + \pi_{34} \ln X_{34} + \pi_{35} \ln X_{35} + u_3 \quad (7)$$

Apply ordinary least squares (OLS) to the reduced form equations to generate the estimated parameter, X_3 (stage one). This estimated interest X_3 replaces the original X_3 in the structural equations 8 and 9 to obtain consistent and unbiased estimates (stage two).

$$CRD = f(X_3, X_1, X_2, X_4, X_5, e_1) \quad (8)$$
$$CRS = f(X_3, X_1, X_2, X_4, X_5, e_2)$$

RESULT ANDDISCUSSIONS

Table: 1   **Socio-economic characteristic of ginger marketers for microcredit users**

Variables	Freq	Percentage
Gender		
Male	30	25.0
Female	90	75
Total	120	100
Age (years)		
21-30	20	16.67
31-40	48	40
41-50	31	25.83
51-60	17	14.17
61-70	4	3.33
Total	120	100
Mean		43.71
Marital status		
Married	75	62.5
Single	17	14.16
Divorced	8	6.67
Widow	20	16.67
Total	120	100
Education level (years)		
No formal Education	6	5

Primary Education	30	25
Secondary Education	50	41.67
Tertiary Education	34	28.33
Total	120	100
Experience (Years)		
1-5	23	19.17
6-10	27	22.5
11-15	20	16.67
16-20	18	15.00
21-25	17	14.16
26-30	15	12.5
Total	120	100
Mean		12.14
Household size		
1-3	25	20.83
4-6	38	31.67
7-9	36	30
10-12	21	17.5
Total	120	100
Mean		
Total	120	100

Source: Field Survey Data, 2018

The result of ginger marketers' socio-economic characteristics, as shown in Table 1, shows that (25.0%) of the marketers are male and(75.0%) female. Thus, the result shows that the majority of marketers are females. This could be that the marketing of ginger requires less effort and not bulk and requires less energy for women to engage. This is in line with Ezra et al. (2017) findings, which indicated that the domination of women in ginger marketing is due to low demands of time and efforts required to work in the enterprise.

The results show that the mean age is43.71;it was observed that those between the age brackets of 31-50 had the highest representatives (65.83%). This implies that ginger marketers are within the active working bracket. They are young people who can withstand the stress involved in the marketing of ginger, and they are matured to take credit for decisions that sustain the business. The results obtained are in line with Kantiok (2007) findings, who opined that the majority of the agricultural enterprise actors are in their working age. Also, this is in line with the results of Udoh and Nyienakuma (2008). They opined that agriculturists within the active age groups would withstand stress and put more time in various agricultural operations.

The result of the marital status shows that the majority (62.5%) of ginger marketers were married. This implies that ginger marketing is a source of income for families to meet their basic needs. This result agrees with Ojo and Jibowo (2008) that reported that married people being responsible, their views are likely to be respected within the rural communities as they decide on agricultural inputs.

The result shows that the majority of the ginger marketers (95%) had one form of formal education or the other. The result indicates that literacy levels are high among them and could enhance marketing technology. This could improve the management of the ginger business in the study area. In marketing, formal education allows ginger marketing to understand the proper administration of resources. This finding agrees that a high literacy level, western education facilitates the adoption of modern technologies and improved practices (Shehu *et al.*, 2014 and Offor and Nse-Nelson, 2015).

Experience is expected to have a significant positive impact on the managerial ability of marketers. Therefore the more experienced a marketer is, the more efficient the business. The result in table 1 also shows the years of experience the marketers had acquired over the years. The result indicatesthat ginger marketers have a mean of 12.14 years of experience. This implies that the marketers are aware of the merits and demerits of the business because of the long years of experience and know-how to invest in making a profit. In addition, the experience gathered would assist and serve as a guide for marketers in their decision-making processes.

The study also shows that most of the marketers in the study area have a household size of between 4-6 persons. This means that the marketers in the study area have a large household size. This implies that marketers have the advantage of family labour. A larger household size is advantageous to the trade as the members of the household aid in the marketing activities. There is a division of labour; this household member could help bring in funds for household welfare. But this does not agree with the findings of Effiong, 2005 and Idiong, 2005; and Ogundele and Okoruwa, 2006. They reported, larger family size does not necessarily translate to higher

use of family labour because some of the able young men may prefer other jobs.

The estimated microcredit demand function for ginger marketers

In Table 2, the estimated microcredit demand function of ginger marketers was evaluated using the 2SLS procedure. The R^2 value of 0.9855 implies that 98.6% of the variation in the amount of microcredit demanded by ginger marketers was explained by household size, marketer's income, interest rate, and loan application cost.

The coefficient of household size was positive and significant ata 1% level of probability. This implies that as the household size increases, the demand for microcredit would increase and more people would be available to market the ginger product. The result agrees with the findings of Usman *et al.* (2005), who stated that the larger the household size, the larger the drive for making a profit for the family. The result indicates that increasing household size motivates participation as a marketer and generates income for household needs. The result contrasts the findings of Shepherd *et al.* (2011), who had a negative coefficient for household size and attributed it to the failure of the large household to provide marketable surplus due to the high-frequency ratio (consumption)

Table 2: Estimated Microcredit Demand function for ginger marketers: 2SLS procedure

Variables	Coefficient	Standard Error	t-value
Constant	4.9566	0.8357	5.93***
Cost of loan application	-0.5573	0.0846	-6.59***
Marketers income	-0.7720	0.03471	-22.24***
Estimated interest	-0.9018	0.0155	-58.08***
Household size	0.0373	0.01146	3.25***
Educational level	-0.0111	0.0145	-0.77
R^2	0.9855		
F-Ratio	1364.06***		

Source: Field Survey Data, 2018
NB ***, **, * is statistically significant at 1.0%, 5.0% and 10% level respectively

The coefficient of marketer's income and cost of loan application were significant at 1% and negatively associated with the microcredit demand of the ginger marketers. This indicates that an increase in the variables would decrease the amount of microcredit demanded by the marketers. The amount the marketers pay as interest in the credit demanded had a negative sign and was significant at the 1%. This is in line with *apriori* expectations. Marketers do not demand microcredit when the interest rate is high. The marketers would source an alternative to the credit for their marketing business. This agrees with the results from Essien (2009),who opined that, as the interest rate increases, the demand for credit decreases and vice versa (*Ceteris paribus*).

Estimated microcredit supply function for ginger marketers

The result in Table 3 shows ginger marketers' estimated microcredit supply function using the 2SLS analytical procedure. The estimated F-Statistic for the model was highly significant at a 1% probability level with a goodness of fit R^2 = 0.9964. The high goodness of fit value indicates that the given explanatory variables well-explained the variations in quantity supplied. Among the five explanatory variables included in the supply function, four had coefficient estimates that were significant at the 10 % probability level.

The coefficient of interest payment was positive and significant at a 1% level of probability. This shows that the higher the interest rate, the more the financial institutions would lend the ginger marketers funds. This is consistent with *apriori* expectations. Ginger marketers would not like to borrow credit at this increased interest rate.

The coefficient of transaction cost was positive and significant at a 1% level of probability. This implies that as the transaction cost increases, the amount of microcredit supplied increases, in line with *apriori expectations.*

The coefficient of the lenders' annual gross income was positive and significant at a 1% probability level. This shows that the higher the revenues of the lender, the more funds are available for the borrowers to borrow to the marketing of ginger.

Table 3: Estimated Microcredit Supply function for ginger marketers: 2SLS procedure

Variables	Coefficient	Standard Error	t-value
Constant	-5.6799	0.3147	-8.05***
Transaction cost	0.6002	0.0318	18.84***
Annual Gross income	0.9695	0.0131	74.16***
Estimated interest	0.0144	0.0058	2.48***
Household size	-0.0003	0.0043	-0.06
Educational level	0.0096	0.0055	1.75*
R^2	0.9964		
F-Ratio	5533.63***		

Source: Field Survey Data, 2018

NB ***, **, * is statistically significant at 1.0%, 5.0% and 10% level respectively

The educational level attained was significant at 10 % level and is positively related to the supply of microcredit to ginger marketers. This implies that an increase in education would lead to a corresponding increase in the supply of microcredit to ginger marketers. Furthermore, it means that as marketers acquire more formal education, their abilities to adapt to modern marketing techniques would increase (Usman *et al.,* 2005). This implies that when the level of education is high, marketers become more enlightened, promoting the ability to evaluate new market techniques.This enables marketers to utilise the microcredit supplied to them better.

CONCLUSIONS
The studyhas estimated the demand and supply functions for microcredit use of ginger marketers in south-east Nigeria.As a result of the socio-economic characteristics of ginger marketers, the majority of marketers are females and (62.5%) are married. The literacy levels are high among them and could enhance marketing technology. The microcredit demand function for ginger marketersshows that an increase in income would decrease the amount of microcredit demanded by the marketers. Marketers do not demand microcredit when the interest rate is high. The educational level attained was significant and is positively related to the supply of microcredit to ginger marketers; their abilities to adapt to modern marketing techniques would increase due to a high level of literacy.Therefore, it is recommended that male counterparts be encouraged since it is a source of income for household and livelihood. Education should be encouraged since it is an aid to management, and ginger marketers should be encouraged to engage in seminars that will provide information on easy access to micro-credit.

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