INTEREST RATE, FARM CREDIT DEMAND AND SUPPLY; THEIR DETERMINANTS AND IMPLICATIONS FOR RURAL CREDIT MARKETS IN IMO STATE OF NIGERIA

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ABSTRACT

The role of credit in sustainable rural production essentially dominated by agricultural production has been described as pivotal and pervasive. Unfortunately, the facilities provided by rural credit policies and programmes in Nigeria have remained highly concentrated and their activities do not sufficiently permeate the economy. This study was designed to examine the credit demand, credit supply and the interest rate functions and their implications for rural credit market development. Primary data from random samples of 47 rural lenders and 57 credit using arable crop farmers were used. The estimation of the credit demand and supply and the interest rate functions was by simultaneous equation analysis. Field results indicate that credit demand and supply were significantly determined by interest rate, which was signed negatively in the former and positively in the later according to a priori expectations. Other non-price determinants of credit demand include educational level of the borrower, amount borrowed previously, farm size and gross savings. Those for credit supply were gross income of the lender, total cost of lending, source of loan, worth of loan application and previous loan repayment. The interest rate elasticity of credit demand is 1.144 signifying that credit demand is elastic. That for credit supply is 0.131, which implies that credit supply is inelastic. Interest rate was significantly determined by experience in lending, credit supply and credit demand. It was recommended that interest rate policies be put in place in order to ensure sustainable credit market development in the rural economy of Imo State. Key words: Farm Credit Market, Imo State.

INTRODUCTION

Credit programmes were initiated in Nigeria as major steps towards farm development in view of the little or no market participation by the smallholder farmers and their poor financial condition. They have consistently been a major component of efforts to trigger off increased agricultural production in Nigeria. Emphasis on credit is based on the assumption that lack of ample access to it was a critical constraint to the adoption of improved inputs and modern technologies. Modernising agriculture in Nigeria requires optimal infusion of funds to finance the use of purchased inputs such as fertilizer, improved seeds, insecticides, additional labour, etc. Owing to the fact that the smallholder farmers have meager internal production resources, savings in traditional agriculture tend to be small especially at the initial stages of development. Therefore, increased demand for investment capital must largely come from an increased supply of credit.

Unfortunately, rural credit policies and programmes have not so much been able to achieve the aim of facilitating the flow of financial services created by financial intermediaries to the

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Volume 3, Number 2, Oct. 2005 pp.137-149   J. C Nwaru[1]; C. E. Onyenweaku[1] and E. C. Nwagbo[2]
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rural economy to enable farmers and other rural entrepreneurs employ efficient production techniques or adopt improved production technologies or practices designed to raise their physical output and incomes. According to Ukwu (1985), the facilities of the markets created by these policies are highly concentrated in location and their activities do not sufficiently permeate the economy. This explains why too many persons and too many areas lack access to services offered by these markets. For instance, Ijere (1986), Ejiogu, *et al*, (2002) and Nwaru (2004) observed that rural credit programmes have had limited effects because they have not been easily adaptable to the needs of rural smallholder farmers.

The real situation is that financial systems suffer weak resource mobilisation, high credit losses, high intermediation costs and excessive political interference (World Bank, 1994). Moreover, farmers sometimes choose to invest their scarce and hard earned resources in seemingly more profitable and less risky non-farm activities. The result is a steady flow of resources away from the farm. Under these circumstances, institutional credit avoids rural agricultural lending because of their perception of roles and risks caused by inadequate information and the absence of contract enforcement mechanism (Aryeetey, 1997). The resultant small and immature financial system has posed a great challenge to researchers, policy makers and development practitioners.

Therefore, the objective of this study was to examine the implications of interest rate and the credit supply and demand functions for rural credit market development in Imo State.

LITERATURE REVIEW
Credit is a device for facilitating the temporary transfer of purchasing power from one individual or organisation to another (Mellor, 1966). It is the monetisation of promises and the exchanging of cash in the present for a promise of a future reciprocity (Von-Pischke, 1991). Ewuola, (1985) defined credit to involve the skill of person(s) to command the capital of another in return for a promise to repay at some specified time in the future. Credit involves a confidence element in the borrower, that he will be willing and that he has the capability to repay (Firth and Yamey, 1964). Nelson, *et al*, (1976) defined credit to embrace confidence in the future solvency of the borrower and in his repaying the loan as per agreement. Accordingly, agricultural credit could be defined as the present and temporary transfer of purchasing power from a person who owns it to a person who wants it, allowing him the opportunity to command another person's capital for agricultural purposes but with confidence in his willingness and ability to repay at a specified later date.

Credit is a commercial concept. Interest rates are related to the price of capital (Gonzalez-Vega, 1983). In the credit market, interest is paid by the borrower to the lender to encourage the creditor to forgo his potential command over current output and future investment possibilities (Nwachukwu, 1994) and to cover the costs he incurred in administering and

possibly supervising the loan. As such, interests may influence decisions concerning the choice of techniques, that is, the proportions in which factors of production are combined as well as the selection of investment projects. Generally, the size of the interest depends largely on how desperately the borrower needs the funds; the risk the lender takes in lending the money and the expected rate of inflation (Makeham and Malcolm, 1986). In other words, the actual cost of credit, administration cost, duration and collection costs should be reflected in the interest rate (German Foundation for International Development, 1986).

Reducing the transaction costs of lending to rural businesses is necessary to encourage rural financial service providers to finance more credit-worthy businesses (Milkove and Sullivan, 1988) in the rural economy. However, providing credit at cheaper than market rates is not usually the good thing it may seem. Cheap credit policies for agriculture can ration credit away from agriculture into more profitable use for the lender (Adams, 1983; Makeham and Malcolm, 1986). If credit is cheap there will be a rush for the "cheap money" by farmers who might not be able to make good use of it (Emereole, 1995) and by the opportunistic businessmen who take agricultural credit for non- agricultural uses. This resultant high demand may force the intermediate organisations to ration their credit portfolio. These non-market rationing decisions are highly vulnerable to various types of personal influence, political persuasion, and outright corruption. In addition, concessionary interest rates on credit force intermediate organisations to concentrate its loans in the hands of relatively few borrowers in order to minimise lending costs.

Hoff and Stiglitz (1993) and Lyon (1995) observed that interest rates take on the dual function of rationing credit and regulating the risk composition of the lender's portfolio. They believe that when there is an excess demand for loans at a given interest rate, classical economic analysis would suggest that this price (interest rate) would rise to choke off the excess demand. Higher interest rates would raise the lender's returns if they did not greatly increase his risk by increasing the probability of defaults. Hoff and Stiglitz (1993) stated that at some higher interest rates, the greater risk occasioned by the higher incidence of default would offset the increased interest income from the loan portfolio. In this case, the lender will choose to keep the interest rate low enough to obtain a favourable risk composition of projects and to ration the available loanable funds through other means (Hoff and Stiglitz, 1993). They concluded that loan demand might exceed supply with no tendency of the interest rate to rise contrary to the *a priori* expectations. Explaining further, Hoff and Stiglitz (1993) pointed out that if lenders fail to recognise the effect of interest rates on the risk of their portfolios, it might get to a stage whereby, at a given rate of interest, the default rate would be so high that returns to the lender would not cover the opportunity cost of the funds. The pressure on the interest rate will push it upwards and worsen the risk mix. This process could go on until interest rate becomes so high that only the riskiest projects would be undertaken.

Credit demand is distorted by cheap credit policies. Low interest rates in the face of high inflation could cause credit to have a negative real rate of interest (Von-Pischke, 1991). This occurs when the rate of inflation is higher than the interest rate, which is frequently the case of credit issued by official lenders to favoured sectors and when rates of inflation are high. Von-Pischke (1991) opined that credit demand is theoretically infinite when credit carries a negative real rate of interest. He further observed that the theoretical possibility of infinite credit demand is not realised because transaction costs are imposed by lenders on loan applicants seeking negatively priced funds. His explanation was that cheap funds create an incentive for false demand because loan applicants who can minimise transaction cost by virtue of the size of their resources or through their political influence see a special opportunity in cheap credit. This makes it difficult for the intermediate organizations to maintain, let alone expand, the real value of their loanable funds. This is a form of "capital erosion" which is exacerbated by inflation and undermines the ability of intermediate organisations to offer sufficient interest rate incentives to induce voluntary deposit of funds in the organisation.

Desai and Mellor (1993) reviewed 31 empirical studies on the response of rural loan demand to the interest rate. They indicated that 15 of the studies showed that rural loan demand is highly elastic to the real interest rate, 3 showed that it is moderately elastic, 4 showed that it is slightly elastic while only 9 cases indicated that they are inelastic. This review further indicated that the interest rate elasticity of demand for rural credit is highest in low-come countries (-0.25 to -1.98 with an average of -1.31) followed by medium–income countries (-0.43 to -1.83 with an average of -1.10) and high–income countries (0 to -2.29). The lower elasticity in low-income countries is for farmers with traditional technology. Using a risk-programming model on a cross-sectional data from a sample of farmers in Brazil, Peres (1976) showed that small farmers' demand for rural loans is more interest-elastic than the large farmers' demand for such loans. Moreover, he showed that this demand becomes even more interest-elastic for small farmers when family labour is rightly considered as a variable instead of as a fixed factor.

METHODOLOGY
Data Collection: Imo State was stratified into 3 according to the agricultural zones of the State namely Owerri, Okigwe and Orlu. From each zone, 2 blocks were selected by simple random sampling. The circles in each chosen block were listed to form the frame from which a circle was chosen per block by simple random sampling. In all, a total of 6 circles were chosen. With the assistance of the village heads and the extension agents of the Imo State Agricultural Development Programme in charge of the chosen circles the listing of arable crop farmers in the chosen circle was done.

A rapid appraisal was conducted in the study area to identify the arable crop farmers that used credit and their credit suppliers. Their lists formed separate frames from which the

samples of 57 credit using farmers and 47 credit suppliers were chosen by simple random sampling. Data collection on the socio-economic characteristics of the respondents and their credit operations commenced in November 2001 and ended in December 2002. Data collection instruments consisting of well-structured and pre- tested interview schedule were administered on the chosen samples

Data Analysis: The implicit functional forms for the credit supply, credit demand and interest rate functions were specified as

$$CSS = f(INT, WLA, EIL, GAI, TCL, PLR, SOL, e_i). \quad\quad\quad (1)$$

$$CDD = f(INT, ABP, EIF, EDU, SAV, LAC, LHA\ e_i.) \quad\quad\quad (2)$$

$$INT = f(CDD, CSS, EIL, TCL, SOL, e_i) \quad\quad\quad (3)$$

Where in equations 1 to 3, CSS =credit supply (₦). This was measured by the total amount of money the lender was willing to lend out at the prevailing lending conditions.

WLA = worth of loan applications (₦). This is the sum of money, which the lender was asked for. He may or may not have lent all.

EIL = Experience in lending. This is measured by the number of years the lender has been in the business of lending.

GAI = Gross annual income of lender in the previous year (₦).

TCL = Transaction costs including costs incurred in lending, supervision and recovery of loans (₦).

PLR = Proportion of previous loans recovered (₦).

SOL = Source of loan. This is a dummy variable defined as 1 for formal source and 0 otherwise.

CDD = credit demand (₦), measured by the total amount the farmer asked for from the lender whether or not he was given.

EDU = educational level of the farm household head. This was measured by the total number of years he spent in receiving formal education.

LAC = Loan application costs (₦). This is the total amount of money that the borrower spent on the processing of the loan e.g. on application forms, transportation, etc.

ABP = amount of credit used in previous season (₦).

LHA = Farm size (in hectares). The total area of land the farmer has brought under arable crop production measures this.

EIF = Farming experience measured by the number of years the farmer has been in arable crop production.

SAV = Savings (₦) as a proxy to measure the influence of farm and non farm sources of incomes.

INT = Market interest rate (₦).

e_i = error term assumed to fulfill all the assumptions of the classical linear regression model.

Equations 1, 2 and 3 were subjected to simultaneous equation analysis. The identification conditions of this system of equations were considered using both order and rank conditions (koutsoyannis 1977; Spanos, 1986). They were found to be over identified and were estimated using the two stage least squares method.

RESULTS AND DISCUSSION

Estimated Credit Demand Function: The estimated credit demand function is summarised and presented in Table 1. The F-ratio of the estimated function is statistically significant at 1 percent. This implies that it is adequate for use in further analysis. About 97 percent of the variation in the amount of credit demanded by arable crop farmers in the study area are explained by level of education, interest rate, the loan application costs, amount borrowed previously, farm size, farming experience and savings. Except loan application costs and farming experience, the intercept and all these variables are statistically significant.

Amount borrowed previously is statistically significant and has the right *a priori* positive sign. A large amount borrowed previously would have placed the farmer on a very sound pedestal for higher realms of businesses that would warrant more credit currently. Moreover, the farmer's business ingenuity and the concomitant drive for innovativeness, which would warrant the need for additional investment funds, would have been steered up by the positive results of previous loans.

The level of education of the farmer is statistically significant and maintained the right *a priori* positive sign with the amount borrowed. Obviously, education increases the business acumen of the recipients. Educated farmers are more amenable to calculated risk taking than non-educated ones because they are better equipped to access, evaluate and understand improved production techniques. The implication is that as education is made more functional and accessible to a greater percentage of the rural population, policies and programmes for the growth or expansion of the rural credit markets on a sustainable basis should be put in place.

The coefficient for savings is statistically significant and maintained the right *a priori* positive sign with the amount borrowed. This implies that the more these farmers save, the more they are prepared to borrow. Economic theory teaches that investment and savings are positively related. Income is either spent on consumer goods and services or accumulated into savings, which is spent on the purchase of producer goods and services, otherwise called production resources. The positive coefficient of savings could imply that as the farmers save, they either conceive new projects or better ideas on how to expand their existing farm enterprises. In either way, this might warrant the augmentation of equity funds, which is expressed by way of increased loan demand.

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Table 1: Estimated interest rate, credit demand and credit supply functions

Variables	Credit demand	Credit supply	Interest rate
Intercept	-83521.000	-5171.602	4524.284
	(-7.94)***	(-0.24)	(4.93)***
Amount borrowed before	1.899		
	(9.40)***		
Experience in farming	-208.804		
	(-0.97)		
Level of education	3272.496		
	(6.07)***		
Savings	0.429		
	(15.57)***		
Loan application costs	-1.279		
	(-0.76)		
Farm size	-5664.394		
	(-2.28)**		
Interest (+)	-10.006	3.945	
	(-9.16)***	(2.76)**	
Worth of loan applications		0.125	
		(8.39)***	
Experience in lending		495.871	-79.544
		(0.47)	(-1.83)*
Income of lender		0.181	
		(5.71)***	
Lending costs		-0.530	0.001
		(-10.08)***	(0.43)
Previous loans recovered		135.156	
		(15.41)***	
Source of loan		56248.00	527.061
		(3.30)***	(0.66)
Credit demand (+)			-0.036
			(-12.59)***
Credit supply (+)			0.004
			(1.97)*
R^2	0.9717	0.9458	0.7276
R^{-2}	0.9688	0.9401	0.7078
F-ratio	29.17***	166.99***	36.86***

Source: Computed from field survey data, 2002.

(+) from the reduced equation (.) = t statistic computed;

***, **, * = Statistic significant at 1, 5 and 10 percent.

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The coefficient for farm size is statistically significant. Contrary to *a priori* expectations it is negatively signed. *Ceteris paribus*, increase in the size of farm holdings is expected to lead to increase in the financial requirements for farm activities. Scholars such as Nwaru (1993) have posited that farm holdings are largely small in size and scattered over large areas, a condition which has opposed innovativeness and mechanization in Nigerian agriculture. This could be an explanation to the fact that credit markets have most times remained an unknown world to the rural farmers, who benefit incidentally, if at all, from existing credit designs. On this note, the inability of the existing land redistribution and consolidation policies and programmes to achieve the desired results comes into focus. The need for all stakeholders in socio-economic engineering in Nigeria to put appropriate policies and programmes to address this problem is imperative.

Of particular interest here is the negative sign for the interest rate. This constitutes the most important cost item in borrowing. It is the price of borrowing. As price increases, the demand for credit decreases and vice versa. This is in agreement with theory, *a priori* expectations and earlier findings by Desai and Mellor (1993). The elasticity of demand for credit for interest was derived as -1.144. This agrees with the report of Desai and Mellor (1993) that interest rate elasticity of demand for credit in developing countries ranges from -0.25 to -1.98 with an average of -1.31. This coefficient of elasticity implies that credit demand in the rural credit markets is fairly elastic. A change of ₦1 in interest rate would lead to a change of ₦1.14 in credit demand in the opposite direction.

Estimated Credit Supply Function The estimated credit supply function is summarised and presented in Table 1. The F-ratio is statistically significant at 1 percent, which implies that it is adequate for use in further analysis. The value for R^2 indicates that the worth of loan applications, years of experience in lending activities, gross income of the lender, interest rate, previous loan recovered, expenses in lending and source of loan explained about 95 percent of the variation in credit supply. Except that for experience in lending, the estimated coefficients are statistically significant.

In conformity with *a priori* expectations, the worth of loan applications is positively signed implying that as the volume of loan requests increases, supply of credit to the market increases. That is lenders would respond to higher levels of loan requests by adjusting upwards their supply. Amount of previous loan recovered has a coefficient that is highly significant and positive. *Ceteris paribus*, this implies that as the lender recovers more and more of the loan facilities he earlier on extended, he makes available more loan facilities. This is in conformity with *a priori* expectations. The discouragement and the demoralisation that go with a lender encountering high rates of loan defaults has been documented in

literature (Beets, 1990; Okorie, 1986). In deed, lenders count much more on the safety of the money lent out than on the amount of interest earned.

In conformity with *a priori* expectations, interest rate has a significant and positive relationship with credit supply. Interest is the price tag on money lent. Rural lenders offer credit because they make profit from the interest earned. That is, in the credit market, interest is paid by the borrower to encourage the creditor forgo his potential command over current output and future investment possibilities (Nwachukwu, 1994) and to cover the cost he incurred in administering and possibly supervising the loan. Hence, Youngjohns (1983) stated that if a case for helping small farmers over and above what is commercially sensible is necessary, grants and subsides and not cheap credit should be used. The underpinning idea is that cheap credit will keep reducing the loan portfolio of lenders until such a time when loan prices (in other words, interest changeable on money lent) becomes discouragingly low and begins to choke off the supply of credit to the credit market. The interest rate elasticity of supply is 0.131. This implies that an increase in interest by N1.00 would result to an increase in credit supply by N0.13. This is a case of inelastic supply.

Gross annual income of the lender is significant and has a positive relationship with the supply of credit. This agrees with *a priori* expectations. This implies that government efforts towards the alleviation of urban and rural poverty in Nigeria via employment generation have great potentials for rural credit market development in Imo State. The role of transaction costs in rural credit markets is well documented in literature (Cuevas and Graham, 1986). Increasing transaction costs constitute a drawback on credit market operations because they curtail earnings from lending. The coefficient for transaction costs is highly significant and negative in conformity with *a priori* expectations. *Ceteris paribus*, efforts towards rural credit market development would involve policies that could reduce costs lenders incur in lending, supervision and recovery of loans.

The coefficient for source of loan is highly significant and positive. Given that this variable is a dummy specified as unity for the formal credit sources and zero the informal credit sources, it is concluded that the former performed better than the later in the provision of credit services. It can be deduced that more credit funds were supplied by the formal credit sources. Therefore, repositioning the existing formal credit policies and programmes to make them more appropriate has positive roles in resolving the problems paucity of funds pose to agricultural production.

Estimated Interest Rate Function   The estimated interest rate function is summarised and presented in Table 1. The F-ratio is statistically significant at 1 percent, which implies that it is adequate for use in further analysis. Experience in lending, lending costs, source of loan, credit demand and credit supply explain 73 percent of the variation in interest rate. Of all

these, experience in lending, credit demand and credit supply are statistically significant. Coefficient of credit demand is highly significant and has the *a priori* negative sign. However, the interest rate elasticity of credit demand is -0.315. This is a case of inelasticity. It implies that a change of 100 percent in credit demand would cause a change, in the opposite direction, of 32 percent in interest rate. Coefficient for credit supply is significant and positively signed according to *a priori* expectations. The interest rate elasticity of credit supply is 0.120 implying it is inelastic. A 100 percent change in credit supply would cause a change of 12 percent in the interest rate in the same direction. Experience in lending is statistically significant and negatively signed according to *a priori* expectations. *Ceteris paribus*, more experienced lenders would have developed more skills and better tactics on how to beat down the costs associated with loan processing, monitoring and recovery, leading to the lowering of the interest rate.

CONCLUSION

In this study, the credit demand, credit supply and the interest rate functions were estimated and their implications for rural credit market development examined. Primary data from random samples of 47 rural lenders and 57 credit using arable crop farmers were used. The estimation of the credit demand and supply and the interest rate functions was by simultaneous equation analysis. Results of data analysis show that credit demand and supply were significantly determined by interest rate which was signed negatively in the former and positively in the later according to *a priori* expectations. Other non-price determinants of credit demand include educational level of the borrower, amount borrowed previously, farm size and gross savings. Important determinants of credit supply were gross income of the lender, total cost of lending, source of loan, worth of loan application and previous loan repayment. The interest rate elasticity of credit demand is 1.144 signifying that credit demand is elastic. That for credit supply is 0.131, which implies that credit supply is inelastic. Interest rate was significantly determined by experience in lending, credit supply and credit demand. It was recommended that interest rate policies be put in place in order to ensure sustainable credit market development in the rural economy of Imo State.

Interest rate is the most important factor in the credit market. Lenders who raise interest rates will attract mostly riskier businesses and at some very high interest rates, the default rate would be so high that returns to the lender would not cover the opportunity cost of his funds. Field results indicate that interest rate elasticity of credit demand is fairly elastic and that for credit supply is inelastic. Therefore, to ensure a sustainable rural credit market development, interest rate polices that make for optimal credit provisioning and at the same time, minimise the risk composition of the lenders' portfolio should be put in place.

Education and enlightenment have great potentials for rural credit market development. It can reposition borrowers in credit programmes by abridging the psychological distance

between them and the credit programmes. Therefore, appropriate policies on farmer targeted educational programmes such as revised and re invigorated adult education, periodic workshops and seminars should be pursued. Savings and gross annual income respectively had positive relationship with credit demand and supply. This implies that the current efforts by the government on the alleviation of urban and rural poverty through gainful employment generation have a lot of positive potentials for rural credit market development and should be pursued more vigorously. The formal credit sources performed better than the informal sources. Much as appropriate measures should be taken to nurse both credit sources to maturity, economic policies should not be tailored more to the informal sources.

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