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MICROCREDIT AND FOOD CROPS PRODUCTION IN SELECTED LOCAL GOVERNMENT AREAS OF OGUN STATE: A RESTRICTED NORMALISED PROFIT FUNCTION ANALYSIS

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ABSTRACT

This paper examined the effect of access to credit on the resource productivity of food crop producers in selected Local Government Areas of Ogun State. A multi-stage sampling technique was used to select 240 respondents from eight villages in four local government areas. Data collected were analysed using descriptive statistics and normalised profit function. The results revealed planting material, fertilizer and fixed input being positive for users and non-users of credit, though at different significant levels (1% and 5%) Labour wage was negatively significant at 1% α level for credit users' only. The implication is that there is significant difference in the groups' resource use/ allocation, indicating that with access to credit facilities, resource productivity of rural farmers in Ogun State, and Nigeria at large, can be enhanced.

Keywords: resource productivity, food crops, rural farmers, restricted normalised profit function.

INTRODUCTION

It is an established fact that there is food shortage problem (otherwise known as food crisis) in Nigeria, despite being an agrarian country. Bulk of food crops production in Nigeria still rest, with peasant farmers, who are constrained by a number of factors from rising to the task of meeting the country's food requirement. They practise subsistence system of farming, whose goal remain solely that of balancing family food needs and cash income needs, and is characterized by low farm income, low level production capacity arising from scattered small farm size that varies between ecological zones within the country, and use crude production technology.

Food problem in Nigeria has been exacerbated by low level of productivity of resources being used (by the farmers), which is a reflection of their low (production) efficiency level (Ogundari, 2006). Productivity performance in the agricultural sector, according to Fulginiti *et al.* (2004), is critical to improvement in overall economic well-being.

Government development policy that favours urban over and above rural sectors in terms of infrastructures and amenities, land tenure problem whose effect has not encouraged peasant farmers into medium scale farming, unstable inputs price, non-availability and inadequate supply of credit facilities, especially at the rural sector, for these farmers to access in time, as well as

efficient marketing, are some of the constraints identified as limiting the productive capacity of the peasant farmers (Olatunbosun, 1978; Agbato, 2000; Amaza and Olayemi, 2002).

Given the above constraints, the peasant farmers are being adjudged to be risk averse, yet need credit facility to boost their agricultural production and smooth family consumption need. This is against the backdrop that provision of credit facility is being adjudged globally as a veritable instrument for enhancing agricultural production (Aihonsu, 2001). The need, therefore, to study the effect access to credit by peasant farmers could have in enhancing their production ability is appropriate at this point in time, given government clarion call for massive production of food crops encapsulated in programme such as RTEP (Root Tuber Expansion Programme), with special emphasis on cassava, cocoyam, sweet potatoes and yam, because of the wide range of uses they could be subjected to.

This type of study engenders a number of policy implications. Firstly, an understanding of the broader role of rural finance for agricultural production would establish the relative importance of various factors that permit certain (peasant farmers) households in a given socio-economic environment to achieve greater benefit from access to credit than others. Secondly, on the long-run, it would assist policy makers in putting in place dynamic and enduring institutional innovation(s) that can transform the existing nascent micro-credit institutions in the country into efficient and full-fledged financial intermediaries, with different packages for these farmers and covering large geographical rural areas where majority of these peasant farmers reside.

THEORETICAL FRAMEWORK

Normalised profit function

Profit function, which was first introduced by McFadden (1978), is a flexible tool and is increasingly being employed for empirical study of production, and for addressing a broad range of developmental issues, an integral part of which is agricultural production (Yotopoulos and Lau, 1979). The flexibility of profit (function) model is based on duality theory (between production and profit/cost function), thus, making it a handy tool in the analysis of various economic problems. The use of duality in production theory dates back to 1953, while applications involving flexible forms have been available for almost two decades (Asche *et al.*, 2007). Cost function can be viewed as a restricted profit function with all outputs treated as fixed (Lau, 1976; McFadden, 1978).

A crucial feature of the profit function, according to Lau and Yotopoulos (1971), is that it assumes firms behave according to certain decision rules, which include profit maximization, given the price regime for output and variable inputs, and given the quantities of fixed factors of production. Its advantages, according to authors, include: serving dual purpose of both profit/cost and production, thus providing a richer specification of production relations than the traditional function; prevention of the problems of mis-specification noticed in traditional production function, and multi-collinearity; it yields statistically consistent estimates under standard assumptions and can conveniently measure the three components of efficiency (technical, allocative and economic), unlike traditional function (which can only measure technical efficiency), in the determination of relative economic efficiency, and; supply and demand functions can be derived from a (normalised) profit function directly, rather

than through solving the profit-maximising problem, thus avoiding the potential difficulties (sometimes impossibility) of obtaining closed form solutions.

A competitive firm's profit function is convex in price, while cost and expenditure functions are concave. For differentiable functions, these properties, with Hotelling's or Shephard's Lemmas, imply weak inequality own-price effects on net supplies or demands (Yotopoulos and Lau, 1979). Normalised profit function (NPF), which is considered to be a later development on (variable) profit function and sharing the same advantages itemised above with profit function, have other unique features that confer further advantages on it, and makes it handier than variable profit function. These include its ready ability to accommodate price difference between two identical firms facing different input and output prices, as well as its ability in employing the use of relative input price unlike traditional variable profit function which employs actual prices of both input and output. This allows for easy derivation of supply and demand functions. It proves more handy from theoretical and econometrics points of view, according to Sankhayan (1988), because it reduces the number of explanatory variables by one, thus, providing a wider choice of functional forms to use, meaning that it cannot be reduced to an homogenous function of degree one.

From the true implicit variable profits function specified by Coelli (1996); Battesse and Coelli (1995); Yotopoulos and Lau (1979):

$$\pi = P_y f(\sum X_i; Z_i) - \Sigma P_j X_j \quad \ldots 1$$

NPF can, however, be derived by dividing both sides of equation (1) with output price as:

$$\frac{\pi}{P_y} = \frac{P_y f(X_i; Z_i)}{P_y P_y} - \frac{\Sigma P_j X_j}{P_y P_y} \quad \ldots 2$$

Which becomes: $\pi^* = G(X_j^*; Z_i) - \Sigma r X_j^* \quad \ldots 3$

or simply written as:

$$\pi^* = G^*(X^*; Z) = G^*(r_j; Z_i) \quad \ldots 4$$

Where π^* = 'Unit-Output-Price' profit; r = Normalized price of the ith variable (X) input; Py = Output price; f /G = Functional symbol. the fixed costs of fixed input (Z) are ignored, since it is known that they do not affect the optimal combination of the variable inputs. The profit function gives the maximized value of the profit for each set of independent variable value. Homogeneity can be imposed on this identity/equation by dividing profit and price by (labour) wage rate (Abrar, 2004).

Yotopoulos and Lau (1979) specified the equivalent profit function of one output, multiple-input Cobb-Douglas production functional form, used in this study, as:

$$\pi^* = A_i^* \Sigma r_{ij}^{\alpha j^*} \Sigma Z_{ij}^{\beta j^*} \quad \ldots 5$$

This becomes linearised by taking its natural logarithm, to assume the expression below:

$$Ln\pi^* = LnA_i^* + \alpha_j^* \Sigma Lnr_{ij} + \beta_j^* \Sigma LnZ_{ij} \quad \ldots 6$$

Where, π^* = Normalised restricted 'Unit-Output-Price' Profit

A_i^* = Technological (Efficiency) parameter, higher value of which signify higher normalised profit for all possible normalised prices (i.e. $\delta\pi/\delta A_i^* > 0$)

$\alpha_j^* = \delta\pi/\delta r_j$ = Profit elasticity with respect to changes in (normalised) variable input price (Equivalent of marginal product of variable inputs in traditional production function)

$\beta_j^* = \delta\pi/\delta Z_i$ = Profit elasticity with respect to changes in fixed input quantity used (Equivalent of marginal product of fixed inputs in traditional production function)

r_i = Vector of normalised variable input price

Z_i = Vector of fixed input quantity
i = 1…m; j = 1…n
v = $\Sigma \alpha_j < 1$ = Rate of returns to scale. This condition is required under profit function approach since constant or increasing returns in the variable inputs are inconsistent with profit maximization.

Normalized 'unit-output-price' (UOP) profit (π*), according to Lau and Yotopoulos (1971), is easier to work with than un-normalized variable input profit function, as one can always find π given π*. The UOP profit function, continued the author, is decreasing and convex in the normalized prices of variable inputs, but increasing in quantities of fixed inputs and the price of output. It should be noted that for the Cobb-Douglas production function case, differences in technical efficiency and relative differences in price efficiency cannot be separately identified from the actual UOP profit function.

Differentiation of the normalized equation (6) with respect to the normalized price of jth variable input, using Hotteling-Shephard and lemmas' approach, according to Jensen (2002), will yield the inputs' demand function for jth variable input, expressed thus:

$$\delta\pi/\delta r_{ij} = X_j^* \quad \ldots 7$$

while the output supply function can be derived by substituting equation (7) into equation (3), which can be specified as:

$$Y^* = G^*(r_j; Z_i) - \Sigma\delta\pi/\delta r_{j.}\, r_j \quad \ldots 8$$

where X_j^* and Y* represent maximum variable inputs to use and output to produce to have maximum profit. The first order condition for maximization of normalized profit is given by the usual rule that equates marginal product of an input to its opportunity cost (i.e. input price), expressed mathematically as:

$$dF/dX = r \quad \ldots 9$$

based on the assumption of profit maximization, thus:

$$-d\pi^*(r)/dr = D(r) \quad \ldots 10$$

In other words, the negative of the derivative of the normalized profit function is the demand function, which is sometimes referred to as the Hotelling-Shephard Lemma. Necessary conditions for the above assumption (in equation 9 or 10) to hold, according to Yotopoulos and Lau (1979) is that, first, D(r) must be positive, suggesting that as input price increases, profit would fall, implying that $d\pi^*/dr$ is negative. Secondly, for profit to be relatively insensitive to input price, that is, $d\pi^*/dr$ being small, it then means that input demand cannot be large. The conclusion here is applicable to multiple variable inputs case, in which the negative of the vector of the partial derivatives of the normalized profit function represent the vector of demand functions for the variable inputs.

The elasticity values of profit function are important for providing policy answers to the questions of price response (aims at assessing the responsiveness of the agricultural producers to changes in market prices of inputs), economies of scale, efficiency in the allocation of the variable factors of production, and shadow pricing of the fixed factors.

The naturalised logarithmic form of NPF, according to Lau and Yotopoulos (1971), can be estimated with the least squares estimator (OLS), as it turns to be minimum variance, linear and unbiased. However, for any function to qualify as a normalised profit function, it must be non-negative, monotonically decreasing and convex in the normalised price (Yotopoulos and Lau, 1979).

Two profit functions can be distinguished under stochastic frontier approach (SFA), depending on whether or not market forces are taken into consideration (Ogundari, 2006), namely:

(i) Standard profit function, which assumes that markets for outputs and inputs are perfectly competitive. It also assumes that the firm/farm maximises profits by adjusting the amount of inputs and output, given the input (W) and output (P) price vectors. In this case, the profit function can be expressed implicitly as:

$$\pi = f(P, W; V, U) \quad \ldots 11$$

whose logarithmic form is expressed as:

$$\ln(\pi + \theta) = \ln f((P, W)(V + U)$$

Where θ =A constant added to the profit of each firm in order to attain positive values, and enable it to be treated logarithmically; V = iid two sided random error (term), having normal N $(0,\sigma^2_v)$ distribution, independent of the U; U = Profit inefficiency term, assumed to be non-negative truncation of the half-normal distribution N (μ, σ^2_u).

The exogenous nature of prices, given the profit efficiency concept, assumes that there is no market power on the firms/farmers side. Meaning that rather than taking price as given, the firms/farmers assume the possibility of imperfect competition, given output vector and not that of price.

(ii) Alternative profit function, which has the quantity of output (Y) produce, replaces the output price (P) in the standard profit function. It is expressed as:

$$\pi = f(Y, W; V, U) \quad \ldots 12$$

whose logarithmic form is expressed as:
$$\ln(\pi + \theta) = \ln f((Y, W)(V + U)$$

V and U are relevant if stochastic frontier approach is used for analysis.

METHODOLOGY

The study area

The study was carried out in Ogun State which is endowed with extensive fertile soils suitable for agriculture and enjoys abundant rainfall almost all year round. The State has a number of rivers and streams, while principal employer in the rural parts of the state is small farm-holding agriculture involving the use of crude implements. The major farming practice in the rural parts of the State is mixed cropping, as a means towards conserving their soil fertility and as a traditional crop diversification strategy. Main crops grown in the rural settings within the State include both arable food and tree crops (OGADEP, 2000).

Data collection and sampling technique

Cross-sectional data were collected from 240 respondents from eight villages that were evenly distributed among four local government areas in Ogun State, namely Odeda, Yewa South, Ikenne and Ijebu North. A multi-stage sampling technique was used to select sample units within the State, while a well-structured questionnaire was used to collect information on the socio-economic characteristics of the farmers, in addition to the production cost and returns for crops such as cassava, maize, and yam. Respondents were categorised into two main groups, namely, users and non-users of microcredit based on their statement.

Data analysis

Descriptive statistics and normalised profit function (NPF) were employed for data analysis. Descriptive statistics involving the use of frequency table, percentages, and mean were used to describe respondents' socioeconomic characteristics, while

normalized profit function analysis was carried out to show the effects of inputs (both variable and fixed) used for production on profit, for each of the categories of farmer, using ordinary least square (OLS) techniques.

A hypothesis of no significant difference in the partial production slope parameters of the two categories of farmers (Ho: βicu = βincu) was tested.

Model specification

The Cobb-Douglas production functional form of restricted NPF, which specifies the production technology of the farmers with decreasing returns in the ith variable and fixed inputs, was chosen instead of translog model, which though more flexible, requires considerably greater number of parameters (Battese *et al.*, 1996). In addition, its (that is, Cobb-Douglas functional form) wide acceptance/use, theoretical fitness, manageability and suitability, when dealing with small farms/small farm holding farmers (Singh, 1975; Ajibefun and Daramola, 2000; Aihonsu, 2001), made it the choice for this study analysis. Its definition and specification is specified in equation (6), thus:

$$\pi_{i*} = f(P_j, \alpha_j ; Z_i, \beta_i) \quad \ldots 5$$

$$Ln\pi^* = LnA_i^* + \alpha_j^* \Sigma Lnr_{ij} + \beta_j^* \Sigma LnZ_{ij} \quad \ldots 6$$

Where j=1…4; i=1,2

The functional form chosen for the study analysis was estimated using ordinary least square (OLS) method.

RESULTS AND DISCUSSIONS

Socio-economic characteristics

Table 1 shows that the average age of the credit user and non-user farmer is about 47 and 50 years, respectively, while the mean educational years of these categories of farmers is not above five years, implying low literacy level among the farmers. The implication is that while the farming families are still agile, their low literacy level will impact negatively on their resource allocation (productivity) and production efficiency.

Furthermore, mean family size for the categories of farmers were 9 and 7, whereas mean experience in food crops cultivation ranges between 27 and 29 years. Family size suggests that family labour can easily substitute for hired labour in case of the scarcity or highcost of the latter, whereas farming experience is considered to enhance efficiency, hence amenable to policy formulation than age (Rougoor *et al.*, 1998; Rahji, 2005). The table further shows average cultivated land for the two categories of farmer to be 2.7 and 2.3 hectares, respectively, suggesting that the credit users are endowed with more farm land. The import is that with access to credit, credit users can afford to purchase more land or lease, thus affirming earlier findings that land expansion (and factors contributing to it) is the only guarantee for increased food crop production (Olomola, 1988; Kumar, 1994), as it results from increase in marginal productivity of labour (Zeller *et al.*, 2001).

Normalised profit function analysis

The F-value, as shown in Table 2, is positively significant at 1 percent for the two groups of farmers (credit users and non-users). The low R^2 value for the two categories of farmers shows that 48 and 46 percent variation in the equations were due to changes in the specified explanatory variables for those equations. The low value of R^2 is explained by the diversity of the units of variables used, which is peculiar to cross-sectional data (Gujarati and Sangeetha, 2007). The adjusted R^2 values for the two

categories of farmers were 0.45 and 0.43, respectively.

Four variables, namely the prices of planting materials, fertilizer, labour and fixed inputs used were found to significantly affect the realized profit made by the credit user farmers, whereas for non-credit users profit was affected by planting material, fertilizer and fixed inputs prices. Planting material and fertilizer are positively significant at 5% α - level for the two categories of farmers; labour is negatively signed for the categories but significant at 1% for credit user farmers only, while fixed input is positively significant at 1% for the two categories of farmers.

The sum of profit elasticity of variable inputs (i.e. demand function) was found positive for the two categories of farmers, though that of the non-credit user farmers is marginally lower (0.24) than that of credit user farmer (0.25), meaning that use of additional unit of this variable would result in smaller increase in profit for the two categories of farmers with consequence on their economic efficiency (Olarinde and Kuponiyi, 2004). For the fixed inputs, credit user's farmers recorded a higher elasticity value (0.57) than non-credit user's farmers (0.37), indicating a decreasing returns to scale ($\sum\beta<1$) exist among rural peasant farmers in Ogun State, which agrees with production economic postulates that increasing returns to scale are not very common in agriculture, while the positivity of the values suggest room for increasing returns to scale (Olayide and Heady, 1982). Overall profit elasticity of 0.82 for credit users and 0.61 for non-user farmers implies that use of additional unit of any of these inputs will result in increase in output and profit equivalent to the values. The sum elasticity for all the inputs, being less than unity, for the two categories of farmers, indicate that the farmers are in rational stage

Table 1: Summary of socio-demographic characteristics of respondents

Variables/Mean	Credit users	Non-credit users
Age (years)	50.00	47.00
Educational level (years)	5.00	4.00
Family size	9.00	7.00
Farming experience (years)	29.00	27.00
Farm size cultivated (ha)	2.70	2.30

Source: Field Survey, 2010

Table 2: OLS estimates of normalized profit function parameters

Variables	Credit Users		Non-credit Users	
	Coefficient	t-value	Coefficient	t-value
Planting material (₦)	0.18**	2.18	0.22**	2.57
Fertilizer (₦)	0.22**	2.32	0.16**	2.13
Agro-chemical (₦)	0.08	0.31	0.02	0.93
Labour wage (₦)	-0.22***	-2.86	-0.15	-0.61
Farm fee (₦)	-0.03	-0.38	-0.09	-1.34
Fixed inputs (₦)	0.60***	7.08	0.46***	6.28
R^2	0.48		0.46	
R^2 Adj	0.45		0.43	
F-value	14.83***		18.12***	
N	105		135	

***, **, * represent 1%, 5% and 10% significant levels
Source: Field Survey, 2010

of production (stage II) and that the commodities produced by the farmers are price/demand inelastic.

CONCLUSIONS AND RECOMMENDATIONS

From the results above, it is concluded that most of the rural farmers in Ogun State are moving towards old age as revealed by the mean age of 50 and 47 years (for credit and non-credit users, respectively), suggesting high migration of able bodied young men from rural areas to major cities, thus denying agriculture the contributions of these people to agricultural growth and development. It is also concluded, from the results, that there is problem of land constraint in Nigeria, a situation that will have serious effect on the ability of the rural peasant farmers to go beyond subsistence farming, and for Nigeria to be self-sufficient in food crop production. Access to credit has been revealed by the results to have strong relationship with inputs used in food crop production.

The implications of these results are that Ogun State Government needs to look into the issue of high price of necessary agricultural inputs and come up with a policy that will make them affordable to the rural peasant farmers. The issue of infrastructure development and social amenities provision at the rural level, needs to be urgently tackled by the State Government, with a view to discouraging out-migration of able bodies from rural areas to major cities. Government also needs to readdress land tenure system law, such that rural farmers, who still constitute the bulk producers of food crops in the country, can have access to large expanse of land for farming, while interested large scale investors in agriculture will not be denied access to requisite land for large scale commercial farming. Above all, there is need for policy that will ensure timely availability and supply of credit facility to the rural farmers in order for them to be able to acquire requisite inputs and necessary technology that can raise their productivity, and production efficiency. In essence, well integrated pro-poor policies that can facilitate access to basic physical capital and credit are urgently called for.

REFERENCES

Abrar, S. 2004. Smallholder Supply Response and Gender in Ethopia: A Profit Function Analysis. *Sheffield Economic Research Paper Series,* SERP NO: 2004007.

Agbato, A. O. 2000. Financing Medium and Long gestation Agricultural Enterprises in Nigeria: Problems and Prospects - Borrowers' view point. A paper delivered at a CBN organised workshop.

Aihonsu, J. O. Y. 2001. Bank Loaan Default by Small-scale farmers in Ogun state, Nigeria. *The Ogun state Journal of Agricultural Sciences,* 1: 11-21.

Ajibefun, I. A. and Daramola, A. G. 2000. Measurement and Sources of Technical in Poultry Egg Production in Ondo State, Nigeria. *Journal of Rural Economics*, 10 (1): 85-93.

Amaza, P. S. and Olayemi, J. K., 2002. Analysis of Technical Inefficiency in Food Crop Production in Gombe State, Nigeria. *Applied Economics Letter*, 9: 51-54.

Asche, F., Kumbhakar, S. C. and Tveteras, R., 2007. A dynamic profit function with adjustment costs for outputs. *Empirical Economics*, 15 pp; Springer Verlag.

Battesse, G. E., Malik, S. J. and Gil, M. A. 1996. An Investigation of Technical Inefficiencies of Production of Wheat Farmers in Four District of Pakistan. *Journal of Agricultural Economics*, 47: 37-49.

Battesse, G. and Coelli, T. 1995. A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data. *Empirical Economics*, 20: 325 – 332.

Coelli, T. 1996. *Frontier Version 4.1: A Computer Programme for Stochastic Frontier Production and Cost Function Estimation*. Department of Econometrics, University of New England, Armidale, NSW.

Fulginiti, L. E., Perrin, R. K. and Yu, B. 2004. Institution and agricultural productivity in Sub-Saharan Africa. *Agricultural Economics*, 31: 169 – 180.

Gujarati, D. N. and Sangeetha, 2007 (4th Special Indian Edition). *Basic Econometrics*. Tata McGraw-Hill Publishing Company Ltd., New-Delhi.

Jensen, C. L. 2002. Application of the Dual Theory in Fisheries: A Survey. *Marine Resource Economics*, 17: 309 – 334.

Kumar, S. K. 1994. Adoption of Hybrid Maize in Zambia: Effects on Gender Roles, Food Consumption and Nutrition. *Research Report* 100. IFPRI, Washington, D.C.

Lau, L. J. and Yotopoulos, P. A. 1971. A Test for Relative Efficiency: An Application to Indian Agriculture. *American Economic Review*, 61(1): 94-109.

Lau, L. J. 1976. A characterisation of the normalised restricted profit function. *J. Econs. Theory*, 12: 131-163.

McFadden, D. 1978. Cost, revenue and profit functions. In *The Econometric Approach to Production Theory* (McFadden, eds.). North-Holland, Amsterderm.

Ogundari, K. 2006. Determinants of Profit Efficiency among Small-scale Rice Farmers in Nigeria: A profit function approach. Poster paper prepared for presentation at the International Association of Agricultural Economics Conference, Gold Coast, Australia, August 12- 18, 2006.

Ogun State Agricultural Development Project (OGADEP). 2000. Annual Report. Ogun Printing Corp., Abeokuta, Nigeria.

Olarinde, L. O. and Kuponiyi, F. A., 2004. Resource productivity among poultry farmers in Oyo State, Nigeria. *Journal of Sustainable Development*, 1(1): 20 – 26.

Olatunbosun, D. 1978 (Reprint). *Nigeria's Neglected Rural Majority*. Oxford University Press, Nigeria.

Olayide, S. O. and Heady, E. O. 1982. *Introduction to Agricultural Production Economics*. Ibadan University Press, Nigeria.

Olomola, A. S. 1988. *Agricultural Credit and Production Efficiency: A case study*. NISER Monograph, Series No.4, Ibadan, Nigeria.

Rahji, M. A. Y. 2005. Determinants of Efficiency Differentials in Lowland Rice Production Systems in Niger State, Nigeria. *Ibadan Journal of Agricultural Research*, 1(1): 7 – 17.

Rougoor, C. W., Trip, G., Huirne, R. B. M. and Renkema, J. A. 1998. How to define and study farmers' management capacity: Theory and use in Agricultural Economics. *Agricultural Economics*, 18: 261 – 272.

Sankhayan, P. L. 1988. The Profit Functions: In *Introduction to the Economics of Agricultural Production*. Prentice-Hall of India, Private Limited, New Delhi, p. 84-92.

Singh, J. P. 1975. Resource Use Efficiency and Returns to Scale in a Backward Agriculture. *Ind. J. Agri. Eco.*, 30: 33-46.

Yotopoulos, P. A. and Lau, L. J. 1979. Resource use in agriculture: Application of the profit function to selected countries. *Food Research Institute Studies*, XVII(1): 1-22.

Zeller, M. and Sharma, M. 2001. Rural Financial Services for Poverty Alleviation: The Role of Public. In *The Unfinished Agenda: Perspectives on Overcoming Hunger, Poverty and Environmental Degradation* (Pinstrup-Andersen and Pandaya-Lorch, Eds.), p. 191-196.