

DETERMINANTS OF FARM INCOME GENERATING STRATEGIES AMONG THE RURAL FARM HOUSEHOLDS IN IMO STATE, NIGERIA

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ABSTRACT

The aim of the study was to ascertain the factors that determine farm income generating strategies of rural farm households in Imo State. The study adopted multistage sampling technique to select 90 households in 18 communities from the three agricultural zones of the state. Data were collected using questionnaire. Data were analysed using Three-stage Least Square (3SLS) model. The age (-3.543) and the gender (-3.114) of the household members significantly and negatively influenced the income generating strategies of the rural households. The education (2.3798), farm size (3.1366), crop production activities (4.3813), animal production activities, (3.5392), access to credit (3.7766), labour experience (4.7394), sales from forest products (2.3831), sales from palm wine and membership of social organizations of the rural farm households significantly and positively determined farm income generation in the rural farm households in Imo State, Nigeria.

INTRODUCTION

Livelihood strategies in agriculture are characterized by dualism between market oriented smallholder entrepreneurs and smallholders largely engaged in subsistence farming. There is a parallel dualism in the labour market between high – skill and low-skill jobs, and between transfers with high and low returns. Rural households design livelihood strategies to suit their asset endowments and these account for the constraints imposed by market failures, state failures, social norms and exposures to uninsured risks. They may not use those terms, but they certainly understand the constraints. Their strategies can reflect joint decision making by men and women in the household, or can be bargained outcomes when members pursue individual advantage. But their strategies compensate for only part of the

constraints they operate under, leaving important roles for improvements in their access to assets and in the contexts for using these assets as well as to mobilize public policy to maximize the likelihood of success for rural households to travel a pathway out of poverty, (Hazell and Roell, 1983).

In the 1960s, agriculture played a dominant role in the Nigerian economy. With the exploration and development of oil sector, agricultural production began to decline to the level of importing most of the staple foods. However, during the past decades, the Nigerian economy had experienced rapid aggregate economic growth largely through the expansion of oil production (CBN 1995). The rise in oil production has been accompanied by income disparity among the citizens. The World Bank (1996) reported that the Gini ratio for income distribution in Nigeria between 1985 and 1992 widened from 0.387 to 0.450. Nigeria thus presented a paradox. The country is rich but most of the people are poor. The impact of interpersonal differentials is substantiated by the gap between the rich and the poor. Far less effort has been directed to the measurement of income and determinants of income. Households often pursue more than one, sometimes several different non-agricultural activities simultaneously or at different points throughout the year. Most of the activities are highly opportunistic in nature, involving quick response to market demand and supply. More household members seem to enter non-agricultural production because, the dominant role of the household heads as family income earner is fast eroding (Olufemi, 1984).

Evidence in Nigeria reveals that, the number of those in poverty is on the increase. The number of those in poverty increased from 27% in 1980 to 46% in 1985. It declined slightly to 42% in 1992. In 1999, it was estimated that, more than 70% of Nigerians lived in poverty, (Ogwumike, 2007). Therefore, reducing rural poverty has been on the

agenda of international development agencies as well as governmental and non – governmental organizations for a long time. Since the 1980s, a common approach was through integrated rural development focused on the agricultural sector. The core instrument was the promotion of Green Revolution technologies aiming to increase productivity. Due to market failures the state had to contribute and often subsidize the delivery of new technologies for small holders. The integrated rural development approach had only limited success and often turned out to be not sustainable (de Janvry and Sadoulet, 2001). To succeed in rural development, there is the need to take a more holistic view on rural farm households. Among rural farm households there is a great degree of heterogeneity in asset position and income generating activities. Rural farm households are engaged in a wide variety of activities; they cultivate crops in their fields, work as wage labourers on other farms, or operate a small shop.

In recent years, there has been increasing emphasis within the rural development literature on what is referred to as rural livelihood and livelihood diversification. A key feature of the concept of livelihood is the link between assets, activities and income as well as the institutional role in determining the use of and returns to assets. Ellis (2000), defines a livelihood as comprising the assets (natural, physical, human, financial and social capital), the activities (which may include crop production, livestock production, self employment, farm labour, non-farm labour) and access to these mediated by institutions and social relations that together determine the living gained by an individual or farm household. Livelihood diversification for this study is then the process by which households construct a diverse portfolio of activities and assets to survive and improve their standard of living.

The livelihood approach has played an important role in highlighting the multiple activities undertaken by rural households, the importance of assets in determining the capacity to undertake different activities, the dynamic nature of the actions of rural households and the link between the diversification of assets and activities (Barrett and Reardon, 2000). Evidence from developing countries indicates that rural farm households rely on a number of assets and employ multiple activities to generate income. While recognizing the importance of assets in income generating activities, there is the need to consider the simultaneous nature of asset allocation and the selectivity bias created by the decision to participate in an activity.

The basis of a livelihood strategy is the asset position of the household at a given point in time. Household assets are defined broadly to include natural, physical, human, financial and social capital at the disposal of the households. These assets are stocks, which may depreciate over time or may be expanded through investment. Based on access to a particular set of assets for a given period, the household then decide which activities it will select and the intensity of involvement in that activity. Activities are action taken by the farm household to produce income. They involve the use of a simple asset or a set of assets. For example, agricultural production may use natural capital in form of land and water, human capital, physical capital such as tractors, financial capital for the purchase of inputs and social capital in the form of labour assistance by community members. Alternatively, non - farm wage employment may only use human capital. The intensity of an activity depends on the degree to which assets are used. A strategy of agricultural intensification is likely to involve a greater use of human capital and financial capital (for the purchase of inputs) than a strategy that focuses on other activities or in less intensive agricultural production. The decision on the set of activities a household will select and intensity of those activities is conditioned on the intensity in which the household operates. The intensity influences household decisions through natural forces, markets, state activity and societal institutions.

The mapping of assets to income through activities can be viewed as similar to a production process with assets corresponding to factors of production and income as the output of the process (Barrett and Reardon, 2000). The return to these assets depends on the parameters of the function, which are determined by the price of input and output as well as other characteristics of the intensity of the activity. The allocation of assets to each activity is expected to maximize households' income subject to a number of constraints. Households will allocate assets in a manner that equates the marginal value product across activities or will allocate assets entirely to one activity that has a superior return. Household activities can be divided into six categories such as Crop production, livestock production, and self-employment; non- agricultural wage employment, agricultural wage employment and investment in migrants' expenses. However, the relative contribution of the agricultural sector to the gross domestic product of Nigeria cannot be matched with the huge investment in it. Therefore, these programmes were regarded as failure. The failure of these programmes as poverty reduction

interventions has been because, the government and other developmental agencies had ignored the great diversity and heterogeneity in asset portfolios across rural households and the range of activities in which the rural areas are engaged in to generate income (Ellis and Freeman, 2007). There is no developed approach to estimate the great degree of heterogeneity in asset positions across households and the multiplicity of activities in which they are engaged to generate income. There also exists a gap in knowing the level of engagement in different activities by the rural farm households and the reasons for that. Could it be, because they lack access to sufficient land to make agriculture a viable income strategy or because of market failures for credit and insurance that push them into non-farm activities to diversify their risk and seek sources of liquidity to be used in agriculture?

While the livelihood approaches contribute to our understanding of the rural household behavior, there has been little empirical examination of the approach. A number of studies have recognized the role of a diverse set of assets in income generating activities. For instance, Lanjouw (1999, 2000) examined non-farm income in Ecuador and El Salvador using assets such as human capital (education, literacy), natural capital (land) and physical capital (electrification, water connection) as explanatory variables, and Winter et al (2001) explored the importance of natural, human, social and physical capital in the generation of income in Nicaragua and Mexico respectively. While recognizing the importance of assets in income generating activities, the study did not consider the simultaneous nature of the assets allocation and the selectivity bias created to participate in an activity.

Majority of the poor in Nigeria live in the rural area and derive their income primarily from agriculture (World Bank, 1996). Agriculture is the predominant occupation of the population in the state and is therefore the major source of their income. About 70% of the population lives in the rural areas. For many decades in Nigeria, there have been many initiatives from international development agencies as well as governmental and non-governmental organizations for agricultural development. The main objective of these initiatives was to promote sustainable agricultural development for improved standard of living through increased income generating activities. Most of these initiatives have been unsuccessful due to lack of understanding of social, economic, cultural and environmental factors that influence the decision making process of the rural farm households as well as lack of institutional capacity

to establish projects and programmes that are sustainable. This work is set to study the Nigerian situation using Imo State as the case study.

MATERIAL AND METHODS

A multistage random sampling technique was used to select three local government areas from each of the three agricultural zones in Imo State. A list of the communities in the selected nine local government areas was drawn with the assistance of community heads. Two communities were selected at random from each Local Government Areas. These are, Akokwa and Ohiauchu from Ideato North L.G.A. Umuduruekwe and Amandugba from Isu L.G.A. Amanato and Ntueke from Ideato South L.G.A in Orlu Agricultural Zone. From Owerri Agricultural Zone, Obiangwu and Umuohiagu in Ngor-Okpola L.G.A, Avu and Ihiagwa from Owerri-West L.G.A, Eziana and Ogbor from Ahiazu L.G.A. And in Obowo L.G.A Amuzi and Umuosochie. Umueleke and Umuese from Ehime Mbano L.G.A. And Umuderim and Amakohia from Ihitte/Uboma L.G.A. Also with the help of community leaders, lists of farm households were compiled in each of the randomly selected communities. Five households were randomly selected from each community. In all, 18 communities and 90 households were sampled.

Data were collected using structured questionnaire. Accurate data on income and livelihood strategies and diversification were difficult to obtain in rural area surveys. This is due to the complexity of the income concept and income sources due to the fact that it is usually considered to be a highly sensitive and confidential data (Matlon, 1979). In order to overcome this problem and collect acceptable data, frequent monthly interviews were conducted and established good rapport with the participating households. This method reduced measurement errors, which could have arisen from poor memory recall. Data was collected for twelve months in order to capture all the income generating activities of the rural farm households.

To reflect the simultaneity of household member's decision between the different activities, the three-stage least squares (3SLS) estimation was used to determine the factors affecting total household income, farm income, and non-farm income. It is based on a mathematical model developed by Taylor and Yunez-Naude (2000).

The household is assumed to maximise total income subject to an investment constraint.

For clarity, we assumed that household participate in two types of activities. (a) Farm activities and (b) non-farm activities. Among the household characteristics, we distinguish human capital (education) and other household characteristics.

Net income (Y) of the activity (i) is a function of the investment (L) of the level of education (E), other household characteristics (D) and of price (P).

$$y^i = y^i(L^i; E; D^i; P^i) \quad i = a, b$$

The function characteristics of the equation above are influenced by the socio-economic and agro-ecological environment. Total household income (Y) is the given by

$$Y = y^a + y^b$$

Subject to an investment constraint.

$$L^a + L^b \leq L$$

Given the investment constraint, the optimal allocation of resources between two activities is given by the first order condition,

$$\frac{\partial Y}{\partial L^a} = y^a_{LL} [L^a; E; D^a; P^a] - y^b_{LL} [L^b; E; D^b; P^b] = 0$$

In order to achieve the maximum, the second order condition must also hold

$$Y^a_{LL}; Y^b_{LL}$$

After totally differentiating the previous equation with respect to E, the marginal effect of education on investment in farm and non-farm activity is

$$\frac{\partial L}{\partial E} = \frac{Y^b_{LE} - Y^a_{LE}}{Y^b_{LL} + Y^a_{LL}}$$

Using the investment constraint, the marginal effect of education on investment in farm activity is

$$\frac{\partial L^b}{\partial E} = \frac{Y^d_{LE} - Y^a_{LS}}{y^b_{LL} + y^a_{LL}}$$

If the marginal effect of education on net income in investment in farm activity (y^a_{LE}) is greater than in non-farm activity (y^b_{LE}), the numerator becomes negative. As the denominator is also negative, an increase in education level increases investment in farm activity. The reverse is obtained if the marginal effect is higher in non-farm activity than in farm activity: the effect of education on net incomes are given by

$$\frac{\partial y^a}{\partial E} = y^a_{LE} \cdot \frac{\partial L^a}{\partial E} + y^a_E$$

$$\frac{\partial y^b}{\partial E} = y^b_{LE} \cdot \frac{\partial L^b}{\partial E} + y^b_E$$

When the direct effect of education on the production is positive, the marginal productivity of investment also increases in both types of activities. However, in the activity that loses investment, education effect on production is unclear because of the reallocation effect. Solving the first order condition and using the optimal investment in the activity income equation obtains the reduced form of activity income equation.

$$y^i = y^i(E; D^i; P^i) \quad i = a, b.$$

The activity income equations are linked by the reallocation effect. Thus, income from one activity depends on the variables affecting both activities. Total income of the household is given by:

$$Y = \sum_i y^i(E; D^i; P^i) \quad i = a, b.$$

The above model is a simplification of the income generating strategies of the rural farm households. It explicitly shows the effect of one form of capital (human capital on farm activities). Other forms of capital are modelled implicitly through the investment constraint L. Explicit extension of the model to other forms of capital are possible but might become complex. However, the basic argument remain the same only that the marginal rates of return to different types of capital have to be equal in the optimal solution.

The linear models are of the form and expressed as:

$$FMI = HHI - NFMI = F$$

(AGE, GEN, EDU, FMS, CPA, APA, ATC, LAE, FSP, PWT, HGA, SOM) e.

Where FMI = farm income (₦)

HHI = total household income (₦)

NFMI = non farm income (₦)

AGE = age of the respondent (Yrs)

GEN = gender (dummy, male = 1, female = 0)

EDU = level of education (Yrs)

FMS = farm size

CPA = income from crop production activities (₦)

APA = income from livestock production activities (₦)

ATC = access to credit (dummy, 1 = formal, 0 = informal)

LAE = years of experience in income generating activities (Yrs)

FSP = income from sale of forest products (₦)

PWT = income from palm wine tapping (₦)

HGA = income from hunting and gathering activity (₦)

SOM = membership of social organizations (No)

e = error terms

RESULTS AND DISCUSSION DETERMINANTS OF FARM INCOME GENERATING STRATEGIES

The results of the econometric analysis of three stage least squares (3SLS) estimation that reflects the simultaneity of the households members decision between different activities on overall household activities is presented below. Although, several activities of the rural farm households were reflected in the analysis, emphases were on the key activities of the farm households.

FMI = Age -21.6892(-3.534)*+, Gen -16.0882 (-3.114)**+ Edu 14.3012(2.3798)**+ Fms

22.0042(3.1366)**+ Cpa 16.1286(4.3813)**+ Apa
 18.0943(3.5392)**+ Atc 14.3942(3.7766)**+
 Labexp 15.098(4.7394)**+ Fsp
 14.3029(2.3831)**+ Pwt 185206(2.5784)**+ Hta
 14.0842(1.0678)+ Som 16.39123(3.9182)**+ Hhi
 23.4203(3.2563)**+ 19.1229(3.1741)**.
 Constant = 18035.1042
 T-value = ()
 $R^2 = 90.07\%$
 F value = 48.591990
 Standard error = 28.4625
 Source: Field Survey Data 2010

The F-value (48.591) was statistically significant at 5 percent which indicated that there is a significant relationship between the estimated farm income and the independent variables tested. The R^2 value is 0.9007 implied that 90.07 percent of the variation in farm income is explained by the independent variables captured in the analysis.

The main activities that generate farm income are the crop production; animal production, forest products, palm wine tapping and hunting which were all positively related to farm income. With the exception to hunting activities, all other variables are statistically significant.

Farm size (FMS) was significant and have positive relationship. This implied that, the employment of more land resources would lead to higher income from arable crops. Also the cultivation of more areas would increase the farm income. Animal production was significant at 5 percent and positively related to the farm income. Involvement of the farm household in this activity will increase the income and thus significantly increase the farm income.

Income from forest products (FSP) was significant at 5% and positively related to the farm income. This suggests that growing of such tree crops will influence the amount realized from it by the farm households.

Palm wine (PWT) tapping was significant at 5% and positively related to the farm income. This suggests that, the activity is an important aspect of the rural livelihoods; its substance will increase the rural farm income.

However, there are other factors that complement activities of the rural farm household to generate farm income. The age of the household members has consistently been negatively related to the farm household income and significant at 5 percent. This implies that as long as there are many dependents of the household head, income

generated from the farm activity of this household will continue to be negatively influenced by the independent variable.

The coefficient for gender (GEN) was significant at 5 percent but is negatively related to the farm household income. The male gender headed households were however observed to generate farm income more than the female-headed farm household given the same conditions.. This must have been predicated on cultural beliefs and norms as well as the pattern of land ownership and inheritance in form of resource mobilization and use in the study area.

Education (EDU) of the household members was significant at 5% and positively related to the farm income. This result confirms the a priori expectation of the study. Education enhances the farmers' ability to understand and evaluate new production techniques. This in turn translates into higher farm productivity and income. Therefore, policies and programmes for tackling deficiency of education amongst farm entrepreneurs through enhanced formal and informal educational programmes will positively impact on farm income.

Access to credit (ATC) by the rural farm households was significant at 5 percent and positively related to farm income of the rural farm households. This agrees with a priori expectation that stipulates a positive effect on the farm income if the farm has access to the credit. This will enable the farmer to do more of farm activities that will translate to higher productivity and income.

Membership of social organizations (SOM) was significant at 5 percent and positively related to the farm income. This implied that associations or organizations present healthy platforms for the farmer to interact with fellow farmers and other entrepreneurs in his locality. These are good sources of quality inputs, information on economic activities in that locality and beyond as well as sources of information for organized marketing of products. This then translates into higher efficiency of farm resources use, a condition that favours the release of more resources to other activities of the household.

Non-farm income and total household income were both significant at 5 percent. This is because there are higher wage differentials in which non-farm wage is higher than farm wage. Farmers are likely to favour other self-employment that give them higher financial returns and pull them to diversify into those activities that generate more income for the rural livelihood.

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