A Marginal Analysis of Agricultural Credit Allocation by Arable Crop Farmers in Benue State, Nigeria

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Abstract: The study employed the concept of marginal analysis to determine the allocation of agricultural credit by arable crop farmers in Benue State, Nigeria. Structured questionnaire was used to collect cross-sectional data from 300 randomly selected loan beneficiaries of the Nigeria Agricultural Cooperative and Rural Development Bank (NACRDB). Data were analyzed using frequencies, percentages, Average Budget Share (ABS), and the Linear Expenditure Model (LEM). Results showed that, on the average, farmers allocated about 56.1% of agricultural loans for farm activities while the balance (43.9%) was diverted as non-farm expenses. The adapted linear expenditure model estimated the marginal budget shares to be 0.555 and 0.445 (at 1% significant level) for the farm and the non-farm sectors respectively. This implies that for any marginal increase in credit availability to farmers, 55.5 and 44.5% would be allocated to the farm and non-farm sectors respectively. In all cases, the rate of loan diversion was observed to increase with decreasing loan size and vice-versa. In order to reduce the rate of loan diversion, the study recommended increased loan size, partial disbursement of loan in kind, and loan management training for qualified beneficiaries.

Keywords: Agricultural credit, farm and non-farm sectors, farmers, linear expenditure model, loan diversion, marginal budget share

INTRODUCTION

In most developing countries, agricultural credit is considered an important factor for increased agricultural production and rural development because it enhances productivity and promotes standard of living by breaking the vicious cycle of poverty of small scale farmers (Adebayo and Adeola, 2008). Credit or loanable fund is regarded as more than just another resource such as land, labor and equipment, because it determines access to most of the farm resources required by farmers. The explanation is that farmers’ adoption of new technologies necessarily requires the use of some improved inputs which may be purchased. Credit also acts as a catalyst for rural development by motivating latent potential or making under used capacities functional (Oladeebo and Oladeebo, 2008).

In Nigeria, one of the major problems confronting small scale farmers is poor access to adequate capital even though small scale farmers produce the bulk of domestic agricultural output (Eze and Ibeke, 2007). In response to this need, the government of Nigeria established amongst others, the Nigerian Agricultural and Cooperative Bank (NACB) in 1973 (now Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) to cater for the credit needs of the agricultural sector.

The usefulness of any agricultural credit programme does not only depend on its availability, accessibility and affordability, but also on its efficient allocation and utilization for intended purposes by beneficiaries (Oboh, 2008). In Nigeria, farmers face a lot of problems in the acquisition, management and repayment of agricultural loans. According to Awoke (2004), the sustainability and revolvability of most public agricultural credit schemes in Nigeria have been threatened by high rate of default arising mainly from poor management procedures, poor loan utilization (leading to loan diversion) and reluctance to repay loans.

Several studies that analyzed the use of credit among resource - poor rural dwellers concluded that credit was allocated mainly for agricultural and non-agricultural productive activities as well as for consumption purposes, though at varying allocative proportions (Oyatoye, 1983; Zeller 1993; Zeller et al., 1996; Berger, 1989; Schreider, 1995; Heidhues, 1992). The use of farm
production credit for consumptive purpose is still an issue of controversy. Institutional lenders usually insist that traditionally targeted production credit should be disbursed strictly for income-generating productive assets (such as fertilizer, seed or machinery). Any other use of farm credit for non-farm activities in this context is regarded as loan diversion. However, it has been argued that credit needs for production and consumption in poor households are intertwined and often inseparable (Zeller et al., 1997). Proponents of this view further maintained that some proportion of consumption expenses, if not directly utilized in the farm sector eventually finds its ways back into the sector with beneficial multiplier effects. Umeh and Adebisi (1998) illustrated this argument with a rural farmer who buys a bicycle with his credit facility to ease his transportation problem, source for farm inputs and deliver farm produce with ease thereby contributing to better farm performance.

It is also argued that the use of farm credit to finance festivities and funerals is capable of enhancing the farmers’ influence within the village setting. In some cases, village heads reward such influential farmers by allocating distant fertile farm lands to them thereby boosting their farm output. Furthermore, the use of farm credit for marrying more wives, raising children and educating them is often regarded as an investment and a form of savings for old age (Willis, 1980). In spite of these arguments in favor of the use of farm credit for non-farm activities, no study has been able to prove that such loan beneficiaries meet up with repayment schedules.

The poor performance of most public agricultural credit institutions and schemes arising largely from high default suggests the need for a detailed examination of the patterns of loan allocation and utilization by farmers. A better understanding of the farmers’ behavior in allocating credit at the household level may assist policy makers in designing sustainable financial systems that can serve resource poor farmers better.

Most previous studies that analyzed credit allocation by farmers used simple descriptive tools such as averages and percentages. Such a descriptive and casual approach is limited in determining the nature of credit allocation and for predicting the future allocative behavior of the farm household. Based on this premise, the study employed the concept of marginal analysis to determine the nature of the allocative behavior and investigate the likelihood that the farm sector may benefit significantly from future increase in credit availability to the farmer.

The main objective of the study is to conduct a marginal analysis of credit allocation by arable crop farmers in Benue State. The specific objectives are to:

- Determine the Marginal Budget Share (MBS) for the farm sector vis-a-vis the farmers’ total credit volume.

The expected benefit of the study involves a better understanding of the allocative behavior of farmers with reference to the competitive strength of the farm enterprise for intra-household allocation of funds. Findings from the study could be applied to other farming communities with characteristics similar to the study area.

**MATERIALS AND METHODS**

**Study area:** The study was conducted in Benue state. Benue State is located in the middle-belt region of Nigeria, approximately between latitude 6.3º to 8.1ºN and longitude 8º to 10ºE. The State has a population of 2,780,389 and occupies a landmass of 30,955 square kilometers (Benue State Government, 2002). Benue State experiences a typical tropical climate with two distinct seasons, the wet or rainy season and the dry season. The rainy season lasts from April to October with annual rainfall in the range of 1500-1800mm. The dry season begins in November and ends in March.

Most of the people in the State are farmers while inhabitants of the riverine areas engage in fishing as their primary or important secondary occupations. Benue State is acclaimed the Nigerian food basket because of its diverse rich agricultural produce which includes yams, rice, beans, cassava, soya beans, benniseed, maize, sorghum, millet, tomatoes and a lot of fruits. Poultry, goat, sheep, pigs and cattle are the major domestic animals kept.

**Data collection:** The population for the study was made up of all arable crop credit beneficiaries from the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) in Benue State. Data were collected in 2006 covering the 2005 cropping season. A total of 300 respondents were selected through a two-stage stratified sampling from the three agricultural and geopolitical zones of the state. The six branches of NACRDB (with two branches located in each of the three zones) formed the primary sampling strata. A simple random sampling technique was then used to select the 300 loan beneficiaries. Structured interview schedule was used to collect cross-sectional data from respondents. The distribution of sampled respondents according to bank branches in the zones is shown in Table 1.

**Data analysis:** Statistical tools used in data analysis include frequency distribution, percentages, Average Budget Share (ABS) and the Linear Expenditure Model (LEM). Frequency, percentages and the ABS were used to describe the socio-demographic characteristics of respondents and pattern of credit use, while the LEM was employed to determine the Marginal Budget Share (MBS) of credit for the farm sector.
Table 1: Distribution of sampled respondents

<table>
<thead>
<tr>
<th>Zones/Bank branches</th>
<th>No. of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone A</td>
<td></td>
</tr>
<tr>
<td>Vandeikya</td>
<td>42</td>
</tr>
<tr>
<td>Zaki-Biam</td>
<td>35</td>
</tr>
<tr>
<td>Zone B</td>
<td></td>
</tr>
<tr>
<td>Gboko</td>
<td>64</td>
</tr>
<tr>
<td>Makurdi</td>
<td>76</td>
</tr>
<tr>
<td>Zone C</td>
<td></td>
</tr>
<tr>
<td>Otukpo</td>
<td>52</td>
</tr>
<tr>
<td>Ugbokolo</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
</tr>
</tbody>
</table>

Survey data (2006)

The ABS shows the percentage of the total credit spent on each sector (Delgado et al., 1998).

Mathematically stated,

\[
\text{ABS} = \frac{\text{Amount of credit spent on sector } i}{\text{Total Credit Volume}} \times 100
\]

\[
(1)
\]

**Specification of the Linear Expenditure Model (LEM):**

The linear expenditure model arises from maximizing a special form of utility function subject to a budget constraint (Koutsoyiannis, 1983). According to Mansfield (1982), a constrained Stone-Geary utility function produced the linear expenditure functions as follows:

\[
p_1q_1 = p_1y_1 + \beta_1 (Y - p_1y_1 - p_2y_2)
\]

\[
p_2q_2 = p_2y_2 + \beta_2 (Y - p_1y_1 - p_2y_2)
\]

\[
(2)
\]

\[
(3)
\]

where,

\[p_1\] and \[p_2\] = Quantities demanded of first and second commodities respectively

\[P_1\] and \[P_2\] = Price indices of first and second commodities respectively

\[y_1\] and \[y_2\] = minimum quantities of first and second commodities respectively.

\[Y\] = consumers’ total income and

\[\beta_1\] and \[\beta_2\] = Marginal budget shares for the first and second commodities respectively.

In the context of this study, the farm household is traditionally regarded as the major consumer of farm credit while part of the credit may also be spent on the non-farm sector. Therefore, the farm and the nonfarm sectors represent the first and second commodities respectively, while \[Q_1\] and \[Q_2\] are their respective credit expenditures, and \[K\] is the subsistent expenditure incurred by the household for home maintenance (food, health, clothing etc.). Also, \[Y\] represents the total credit volume while \[\beta_1\] and \[\beta_2\] are the marginal credit shares of the farm sector and non-farm sector respectively.

The assumptions are that:

- Since we are dealing with a valued product (credit) in monetary terms, the values of \[P_s\] (prices) become irrelevant and disappear in subsequent equations.

- The symbols in equations ii and iii are then redefined and interpreted contextually as follows:

\[p_1q_1 = Q_1\] representing total credit expenditure on the farm sector.

\[p_2q_2 = Q_2\] representing total credit expenditure on the non-farm sector.

\[p_1y_1 = p_2y_2 = K\] representing a common subsistent expenditure needed to keep the household alive while carrying out both farm and non-farm activities.

\[Y\] = The farmers’ total credit volume

\[\beta_1\] and \[\beta_2\] = Constants representing marginal budget shares of the individual sectors.

Since \(K\) is common to both \(Q_1\) and \(Q_2\), then:

\[Q_1 = K + \beta_1 X\]

\[Q_2 = K + \beta_2 X\]

Given the constraint that \(\beta_1 + \beta_2 = 1\); \(\beta_2 = 1 - \beta_1\); Therefore:

\[Q_1 = K + \beta_1 X\]

\[Q_2 = K + X - \beta_1 X\]

The two expenditure equations are solved simultaneously to produce the final linear expenditure system equation as:

\[Q_1/Q_2 = (K + \beta_1 X)/(K + X - \beta_1 X)\]

\[
(4)
\]

\[Q_1 = (Q_2K/K + X) + \beta_1 [(1/K + X) (Q_2X + Q_1X)]\]

\[
(5)
\]

Since \(X = Y-K\), then

\[Q_1 = [Q_2K/Y] + \beta_1 [(1/Y) (Q_1 + Q_2) (Y - K)]\]

\[
(6)
\]

The marginal budget share \(\beta\) in Eq. (4) shows by how much, credit expenditure on the farm sector would increase if the total credit available to the farmer increases by one naira. While the MBS for the farm sector represents a measure of preference shown by the farmer for the farm sector, the MBS for the non-farm sector indicates the marginal measure of loan diversion.

**RESULTS AND DISCUSSION**

**Socio-demographic profiles of respondents:** The socioeconomic and demographic profiles of respondents are shown in Table 2. Results indicate that majority of the farmers were males (77.7%) with an average age of 45.1 years. Farmers spent an average of 8.3 years in formal school, and had a mean household size of 8 persons. In general, their farm sizes averaged 2.2 hectares with a
Table 2: Selected socio-demographic profiles of respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>%</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>-</td>
<td>-</td>
<td>29</td>
<td>62</td>
<td>45.1</td>
</tr>
<tr>
<td>Education (years)</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>19</td>
<td>8.3</td>
</tr>
<tr>
<td>Farming Exp. (years)</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>52</td>
<td>22.2</td>
</tr>
<tr>
<td>Household size</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>24</td>
<td>8.0</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>8.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Annual Income (N)*</td>
<td>-</td>
<td>-</td>
<td>15300</td>
<td>84000</td>
<td>24380</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>233</td>
<td>77.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>67</td>
<td>22.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major arable crops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grown**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassava</td>
<td>292</td>
<td>97.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yam</td>
<td>231</td>
<td>77.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>187</td>
<td>62.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>101</td>
<td>33.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>97</td>
<td>32.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnut</td>
<td>68</td>
<td>22.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: Exchange rate in 2006 was averagely 134 Nigerian Naira (N) to 1 United States Dollar; **: Total percentage >100 due to multiple responses; Survey data (2006)

Table 3: Marginal budget shares for the farm sector based on size of loan

<table>
<thead>
<tr>
<th>Size of loan (N)</th>
<th>Coefficient</th>
<th>t-value</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤20,000</td>
<td>0.17</td>
<td>0.98NS</td>
<td>0.35</td>
</tr>
<tr>
<td>21,000-40,000</td>
<td>0.33</td>
<td>4.16**</td>
<td>0.17</td>
</tr>
<tr>
<td>41,000-60,000</td>
<td>0.40</td>
<td>1.72NS</td>
<td>0.21</td>
</tr>
<tr>
<td>61,000-80,000</td>
<td>0.35</td>
<td>3.90**</td>
<td>0.29</td>
</tr>
<tr>
<td>81,000-100,000</td>
<td>0.27</td>
<td>5.40NS</td>
<td>0.31</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>0.45</td>
<td>1.48NS</td>
<td>0.39</td>
</tr>
</tbody>
</table>

NS: denotes not significant; **: denotes significance at 5%; Survey data (2006)

mean annual income of N24, 380. Farmers’ average farming experience was 22.2 years while the three major arable crops grown in the State include cassava, yam and rice.

It can be inferred from the results in Table 2 that the sampled farmers were generally within the active farming age, with long years of farming experience. However, their low level of education, small farm size, low annual income, and large household size may constrain them from allocating and utilizing farm credit efficiently.

Allocation of loan by respondents between the farm and the non-farm sectors: Figure 1 showed the percentage of loan allocated to the farm and the non-farm sectors based on size of loan received. On the average, about 56.1% of the loan was allocated to the farm, leaving the balance of 43.9% for non-farm activities. This is called the Average Budget Share (ABS) and it measures the percentage of total credit spent on each sector. However, the ABS value of 56.1% for the farm sector suggests a reasonable level of loan diversion.

Comparatively, percentage loan allocation to farm activities increases with increasing loan size. The likely explanation is that small loan sizes disbursed to resource poor farmers have high tendency for diversion to settle minor non-farm expenses. According to Eze and Ibeke (2007), if an approved loan is larger than the farmer can manage, there is high tendency for the loan to be diverted. By inference, there is likelihood of small loan size that is inadequate for meaningful farm investment to be diverted to solve petty family nonfarm needs.

Results from the adapted linear expenditure model showing the Marginal Budget Share (MBS) for the farm (and by implication, for the non farm sector) are presented in Table 3 and 4. Table 3 disaggregated the marginal budget shares for the farm sector across the six loan size categories. Expressed in percentages, the result showed the marginal propensity of farmers in each loan size category to allocate a portion of the loan to the farm sector. For instance, the MBS coefficient of 0.17 for category of ≤N20000 means that for every marginal
Table 4: Aggregate marginal Budget Share of loan for the farm sector

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm sector (b)</td>
<td>0.555</td>
</tr>
<tr>
<td>t-value</td>
<td>0.813*</td>
</tr>
<tr>
<td>Constant</td>
<td>988.063</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.682</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.603</td>
</tr>
</tbody>
</table>

*: Denote significance at 1%; Survey data (2006)

An increase in credit availability, farmers within the category will tend to allocate 17% to the farm sector. By implication, the non farm sector would share the balance of 83% of the loan. An interesting trend in Table 3 is that, averagely, the MBS for the farm sector tend to increase with increasing loan size. Again, the likely explanation is that loan sizes that are intangible for farm investment may have been spent on non-farm needs.

The aggregate MBS for the farm sector in Table 4 showed that the farm sector would share 55.5% out of any marginal increase in public loan available to the farmers, and by implication, the non-farm sector would share the balance of 44.5%.

This result means that for any marginal increase in loan availability, a relatively large proportion of the loan will be diverted to the non farm sector. By inference it implies that the non farm sector stands to benefit more from a marginal increase in the volume of agricultural loan. It is possible that farmers may have been using the diverted share of the loan either for subsistent needs (such as food, health care, education) or for non productive expenses (such as festivals, litigations, burials) or for productive activities (such as petty trading, craft making pottery and others). With reduced credit allocation to the farm sector, less capital will be available for financing technology adoption and other farm investments which might lead to low productivity.

CONCLUSION

This study employed the concept of marginal analysis to determine the allocative behavior of farmers in credit utilization. Findings from the study revealed a reasonable level (43.9%) of loan diversion for non-farm activities. Estimates from the adapted linear expenditure model showed that for any marginal increase in credit availability, the farm will be allocated 55.5% and the nonfarm sector, 44.5%. The rate of diversion increases with decreasing loan size.

Based on these findings, it is recommended that the size of approved loan for farmers should be increased to a manageable level as a way of reducing loan diversion. Also, successful applicants should be trained on effective management of agricultural loans prior to disbursement while some portion of the loan should be disbursed in kind to check the rate of diversion. Finally, additional research is required to explore the details of how the diverted loan is spent within the non farm sector.

REFERENCES


