Impact of Credit on Income of Cassava-Based Crop Farmers Under the National Special Progammeon Food Security in Enugu State, Nigeria

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ABSTRACT

The study examined the impact of credit on income of cassava-based crop farmers under the National Special Programme on Food Security (NSPFS) in Enugu State, Nigeria. Purposive and multi-stage random sampling techniques were utilized in selecting three hundred and sixty respondents (comprised 180 NSPFS participants and 180 non-participants) used for the study. Data were obtained with the aid of structured interview schedule and Focus Group Discussion, and analyzed using descriptive and inferential statistics such as means, percentages, Z-test, ordinary least squares regression and chow's test. Results show that, for participants, farming experience (5%), farm size (1%) and household size (5%) were positive and significant determinants of income. For non-participants farming experience, farm size and household size were all significant determinants of income at 1% level. From the result, access to market significantly and positively influenced the income of NSPFS participants at 5% but significantly and negatively influenced the income of non-participants at 1%. Hired labour was significantly and negatively related to the income of participants and non- participants at 1%. Participants of NSPFS credit scheme, on average, earned higher incomes than non- participants. The income difference between participants and non- participants was due to access to credit under the programme. The NSPFS credit scheme positively influenced farmers' income. It was recommended that the programme should be sustained and extended to other areas of the state to economically empower more farmers.

Keywords: *Cassava, Income, Credit, Impact, National special programme on food security, Farmers.*

Highlights of this paper

- The paper examined the impact of credit on income of cassava-based crop farmers under the National Special Programme on Food Security (NSPFS) in Enugu State, Nigeria.
- The credit scheme positively influenced farmers' income. The participants earned higher incomes than non-participants. The income difference was due to access to credit under the programme.
- An increase in farm size, household size, and farming experience increased the income of NSPFS participants and non-participants. Similarly, an increase in access to market increased the income of participants.
- The National Special Programme on Food Security should be progressively scale up the more to other locations to enable more farmers' access credit in order to produce more and earn more income.

1. INTRODUCTION

Nigeria is gripped by low income, food insecurity, poverty, and poor access to means of supporting rural development (World Health Organization (WHO), 2012). Agriculture is the principal source of livelihood in the country, and the sector that employs nearly three-quarters of the nation's workforce (Philip *et al.*, 2008). The persistent failure of agricultural programmes in Nigeria have revealed the basic weakness of agricultural policies in Nigeria and the inability of the several administrations in the country to solve the basic and fundamental problems of agricultural development (Idachaba, 2006).

Past governments at various times have formulated and implemented various food security and agricultural extension programmes to enhance agriculture and rural development. The programmes include:National Accelerated Food Production Programme (NAFPP) in 1972; Agricultural Development Projects (ADP) in 1975; Operation Feed the Nation (OFN) in 1976; River Basin Development Authorities (RBDAs) in 1976; Green Revolution (GR) in 1980. Others are the Directorate for Food, Roads and Rural Infrastructures (DFRRI) in 1986; Better Life Programme (BLP) for Rural Women in 1987; National Agricultural Land Development Authority (NALDA) in 1992; National Fadama Development Project (NFDP) in early 1990s; National Economic Empowerment and Development Strategy (NEEDS) in 1999; and National Special Programme on Food Security (NSPFS) in 2002. These concerted efforts of government do not seem to have significantly enhanced food security in the country.

The Federal Government of Nigeria renewed its commitment to promoting growth in the agricultural sector, and with assistance from FAO, implemented the Special Programme for Food Security (SPFS) as a pilot programme in Kano State. SPFS is an integrated agricultural production programme seeking to increase household food security for poor farming communities in Nigeria. The programme's objectives include identifying, adapting, testing and promoting intervention packages that promote growth in the agricultural sector. According to United Nations Food and Agricultural Organization (FAO) (2012) the Special Programme on Food Security (NSPFS) began operations in Nigeria in 2002 following the Director-General's review of FAO priorities, programmes and strategies. This review concluded that there was an urgent need to focus on the following:

- Improving food security.
- Increasing food production.
- Improving stability of supplies.
- Generating rural employment.

The National Special Programme on Food Security was implemented in a stepwise fashion, starting with pilot activities initially at a few locations, which were progressively scaled up with the aim of gaining pilot experience in all major agro-ecological zones of the country. The pilot phase focused on household and community level food security and livelihood issues, while the first phase tackled these issues at national level so as to open the way for

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more scaling-up. The first phase was up-scaled into a five-year, nation-wide Special Programme for Food Security (SPFS) between 2002 and 2006, covering the 36 states of the country with a total programme cost of USD 45.2 million exclusively funded by the Federal Government of Nigeria. The nationwide SPFS programme was completed in June 2006 and has already demonstrated very positive impact (Daudu and Ajayi, 2009). Realizing the need to improve small-scale production and sustainable agriculture for food security to reduce hunger rapidly, the government expanded the programme to more sites in each of the 36 states and in Abuja, from 2007 to 2014. At this expansion phase, the programme was renamed National Special Programme on Food Security (NSPFS) in 2007. According to Project Coordinating Unit (2011) the broad objectives of the programme include:

- Increasing food production and eliminating rural poverty.
- Assisting farmers in increasing their output, productivity and income.
- Strengthening the effectiveness of research and extension service training.
- Educating farmers on farm management for effective utilization of resources.
- Supporting governments efforts in the promotion of simple technologies for self-sufficiency.
- Consolidating initial efforts of the programme on pilot areas for maximum output and ease of replication.
- Eonsolidating gains from the pilot phase of National Special Programme on Food Security for Eontinuity of the programme.
- Consequent termination of externally-assisted programmes and projects.

Setbacks associated with the programme were seen in the inability of majority of the beneficiaries to repay their loan on time, complexity and incompatibility of innovation and difficulty in integrating technology into existing production systems. Others included: insufficient knowledge of credit use, poor extension agent- farmer contact, unavailability of labour to carry out essential farming activities, lack of modern storage facilities and high cost of farm input (Iwuchukwu and Igbokwe, 2012). It was expected that the programme would improve national food security, reduce pressure on national resources and reliance on food aid, and stimulate wider economic development. National Special Programme on Food Security (NSPFS) is farmer-driven as all activities are based on farmers' demands. The farmers' demand can be summarized as follows:

- Timely provision of agricultural inputs.
- Access to credit to acquire inputs.

In Nigeria, lack of appropriate and adequate agricultural credit is one of the major constraints to agricultural production. Research has shown that the amount of credit given to farmers does not encourage significant increase in income of the farmers because such credit does not enable farmers adopt modern technologies needed to increase production and income. This study investigated the impact of credit on income of cassava-based crop farmers under the National Special Programme on Food Security in Enugu State, Nigeria. Specifically, the study determined whether NSPFS has increased farmers income from cassava production; identified the factors that determine the income of these farmers and determine the impact of credit on the income of the farmers.

2. METHODOLOGY

This study was conducted in Enugu State, Nigeria. Enugu state is located in the South Eastern region of Nigeria between latitude 5^0 $56'$ and 7^0 $06'$ N and longitude 6^0 $53'$ and 7^0 $55'$E. The state is bounded in the East by Ebonyi state, in the North by Benue and Kogi States, in the South by Abia State and in the West by Anambra State. Enugu State occupies an area of about 8,022,95km² and has a population of 3,257,298 (National Population Commission (NPC), 2010). There are two seasons, the rainy season (April – October) and the dry season (mid-

October – March). Farming is the predominant occupation of the people. The farming system of this area is essentially crop based. The major crops cultivated are cassava, yam, rice, cocoyam, oil palm, plantain/banana, beans and vegetables. The state has three agricultural zones namely Awgu, Enugu and Nsukka. Three communities were purposively selected from each of the sites where NSPFS programme is located. This gave a total of 9 communities. A random sample of 20 loan beneficiaries from each selected community was taken. Twenty non-beneficiaries were randomly selected from each selected community. This gave a total sample size of 360 respondents. A structured questionnaire was used to collect data for the study and data analysis was done using descriptive and inferential statistics such as means, percentages, Z-test, ordinary least squares regression and chow's test. Farmers' mean income from cassava production was computed and used to calculate the z-test by applying this formula:

$$Z = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\dfrac{\sigma_1{}^2}{n_1} + \dfrac{\sigma_2{}^2}{n_2}}}$$

Where Z = calculated value.

$\overline{x_1}$ = Mean income of cassava for NSPFS participants.

$\overline{x_2}$ = Mean income of cassava for non-participants.

n_1 = Sample size of NSPFS participants.

n_2 = Sample size of non-participants.

$\sigma_1{}^2$ = Standard error for NSPFS participants.

$\sigma_2{}^2$ = Standard error for non-participants.

Factors that determine the income of the farmers was realized using ordinary least square regression technique. The regression model was specified implicitly as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5) + e$$

Where:

Y = Farm income (value of output) (Naira).

X_1 = Farm size (hectare).

X_2 = Household Size (number).

X_3 = Farmers experience in cassava production (years of farming).

X_4 = Hired labour (mandays').

X_5 = Access to market (distance between major market and farm gate).

E = Error term.

Determinant of impact of credit on the income of the farmers involved the use of Chow's test. A multiple regression model specified implicitly as follows was used:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6) + e$$

Where Y, X_1, X_2, X_3, X_4, X_5 and e are as earlier defined and X_6 is amount of credit received by participants. The model was used to run two regressions – one for participants and one for non-participants. To test for equality between the coefficients from the two regressions, data for the two samples were pooled together and used to run a third regression. The residual sums of squares from the three regressions were used to compute Chow's F-statistics as follows:

$$F^* = \frac{(\sum e_3{}^2 - \sum e_4{}^2)/\ k_3 - k_4}{\sum e_4{}^2 /k_4}$$

Where:

$k_3 = n_3 - m$

$k_4 = n_4 - m$

n_3 = Sample size for the third regression.

n_4 = Sample size for the fourth regression.

m = Number of regression estimates.

including b_0

$\sum e_3{}^2$ = Residual sum of square for the third regression.

$\sum e_4{}^2$ = Residual sum of squares for the fourth regression.

F^* = Chow's F-statistic.

Chow's test was again used to verify changes in income between the participants and non- participants. Dummy variable D (value of 1 for participants and 0 for non- participants) was introduced into the model. Using the pooled data, the new model was used to run a fourth regression. The residual sum of squares from the third and fourth regressions were used to compute chow's F^*- statistic which was compared to the tabulated F^*-ratio. F^*-calculated is given as:

$$F^* = \frac{(\sum e_3{}^2 - \sum e_4{}^2)/\ k_3 - k_4}{\sum e_4{}^2 /k_4}$$

Where:

$k_3 = n_3 - m$

$k_4 = n_4 - m$

n_3 = Sample size for the third regression.

n_4 = Sample size for the fourth regression.

m = Sumber of regression estimates.

including b_0

$\sum e_3{}^2$ = Residual sum of squares for the third regression.

$\sum e_4{}^2$ = Residual sum of squares for the fourth regression.

F^* = Chow's F-statistic.

3. RESULTS AND DISCUSSION

3.1. Farmers' Income from Cassava Production

The data in Table 1 shows the mean income from cassava production. The results showed that the National Special Programme on Food Security increased farmers' income from cassava production in Enugu State, Nigeria. The NSPFS participants realized mean income of N230,556 per hectare from cassava production, while the non-participants made mean income of N103,444 per hectare from cassava production. Increase in farmers' income from cassava production is positively related to credit use.

Table-1. Z-test significant of difference between cassava incomes of participants and non-participants.

NSPFS	N	X	SD	T- Tabulated	T-calculated
Participants	180	230,556	34.23093	1.96	1787.21***
Non-participants	180	103,444	21.74823		

Source: Field survey, 2017.
***Significant at 1% level.

This implies that increase in credit use for cassava production leads to increase in income. This finding agrees with Agbarevo and Okwoche (2014) that increase in credit use and crop yield translates into increase in income of farmers that participated in programme.

3.2. Determinants of Income among NSPFS Participants

Table 2 shows the regression estimates of the determinants of income among NSPFS participants. Five variables were statistically significant in the determinants of income among NSPFS participants. The variables were farm size (1%), household size (5%), farming experience (5%), access to market (5%) and hired labour (1%). Four of these variables (farm size, household size, farming experience, access to market) were positive determinants of income while hired labour was a negative determinant of income. The findings indicated that the income of NSPFS participants increased as farm size, household size, farming experience and access to market increased, while income decreased as hired labour increased. Decreases in income will possible lead to repayment defaults on the part of the participants. Output is expected to increase as farm size increased. As output increases, farm income is expected to increase (Nwachukwu and Ibe, 2014). From the results, increased access to the market implies shorter distance between the major market and farm gate. This implies that participants can sell at the major markets and take advantage of the higher prices and earn more revenue and thus higher income with increased output.

Table-2. Regression estimates of the determinants of income among beneficiaries.

Variable	Double-log	Linear	Exponential	Semi-log+
Constant	10138	-1.156E5	12.142	-3.572E5
	(10.281)***	(-3.760)***	(24.421)***	(-4.241)***
Farm size	094	-13046.517	-.248	323224.731
	(1.1021)	(852)	(-2.443)**	(4.195)***
Household size	.412	103751.428	188	27775.23
	(1.132)	(3.826)***	(2.230)**	(2.474)**
Farming experience	237	7214.357	-.013	46256.713
	(2.341)**	(1.972)*	(-1.964)	(2.635)**
Hired labour	412	-1143122	178	-67125.31
	(3.587)***	(-628)	(2.215)**	(-3.486)***
Access to market	-539	35271.615	-.317	28581.331
	(-2.114)**	(.970)	(-5.424)***	(2.483)**
R²	76.6	76.7	69.7	70.7
R²	74.7	74.8	66.2	67.6
F-ratio	30.78***	27.66***	19.07***	23.35***

Source: Field survey, 2017. + = Lead equation. *significant at 10%, ** significant at 5% and *** significant at 1%. Values in parenthesis = t-ratio.

3.3. Determinants of Income among NSPFS Non-Participants

Table 3 shows the regression estimates of the determinants of income among NSPFS non- participants. From the result, three variables namely farm size (1%), household size (5%) and farming experience (1%) were positive determinants of income, while two variables namely hired labour and access to the market (1%) were negative determinants of income. This implies that income of NSPFS non-participants decreased as access to the market and hired labour increased. However, the non-participants income increased with increase in farm size, household size and farming experience. This is in line with the report of Nwachukwu and Ibe (2014) that the larger the household size the more the family labour available for farm production activities and this is expected to increase output and thus income. Increase in farming experience enables farmers set realistic production targets and cost implications, determine production risk and consequently take necessary measures to prevent such risk. As a result output will increase and thus income will also increase (Onyebinama and Onyejelem, 2010). For NSPFS non-participants, hired labour decreased their income. This implies that as more units of hired labour are added to the production process,

production cost increases thereby decreasing income. The result also shows that for non-participants income decreased as access to the market increased. This may be as a result of lower output which may have counterpoise the higher prices received at the major market.

Table-3. Regression estimates of determinants of income among non-participants.

Variables	Linear	Semi-log	Double-log	Exponential[+]
Constant	119241.013	-1.145E5	-4.610	14.143
	(.625)	(-.848)	(1.237)	(18.913)***
Farm size	168956.551	612066.421	.956	.616
	(9.132)***	(7.677)***	(4.432)***	(8.429)***
Household size	117612.129	308854.423	.722	.147
	(8.215)***	(3.205)***	(2.657)***	(2.547)**
Farming experience	-36251.243	-500246	1.013	.046
	(-5.211)***	(-1.673)*	(1.327)	(1.728)*
Hired labour	-5816.241	307253	.583	-.041
	(-3.682)***	(3.047)***	(2.379)**	(-6.841)***
Access to market	65623.721	247562.124	2.044	-.225
	(2.131)**	(1.225)	(3.679)***	(-1.744)*
R²	87.2	58.5	71.2	70.6
R²	85.7	54.5	61.7	67.3
F-ratio	64.67***	13.57***	23.57***	41.35***

Source: Field survey, 2017.+ Lead equation. *significant at 10%, ** significant at 5% and *** significant at 1%. Values in parenthesis = t-ratios.

3.4. Impact of Credit on the Income of the Farmers

Table 4 shows the regression results of the impact of credit on income of the farmers. The findings revealed that farm size, household size, hired labour, farming experience, access to market and credit were positive and significant determinants of the income of the cassava farmers. The result of the chow's test for the equality of the regression coefficients indicate that the coefficients from the regression results of the impact of credit on income of beneficiaries and non-beneficiaries were heterogeneous. From the findings the value of F-calculated was greater than F-tabulated at 1%. This implies that the income function differed significantly between the non-participants and participants. The result indicates that the difference in the income function between non-participants and participants was due to the use of credit. This agrees with the report of Onyenweku (2016) that credit use is essential to enhance farmers' income.

Table-4. Regression estimates of the impact of credit on the income of the farmers.

Variable	Linear	Semi-log[+]	Double-log	Exponential
Constant	-721761.211	-3.004E5	7.367	12.433
	(-4243)***	(-5.616)***	(6.121)***	(26.511)***
Farm size	23003.241	405527.321	384	037
	(1.842)*	(9.718)***	(4.175)***	(1.113)
Household size	95156.422	236405.142	1.065	177
	(6.232)***	(2.777)***	(5.591)***	(4.155)***
Farming experience	-303.312	131696.411	.654	.019
	(-.115)	(2.007)**	(4.430)***	(2.320)**
Hired labour	2196.935	178189.153	.261	-.001
	(3.794)***	(6.143)***	(3.920)***	(-.933)
Access to market	85386.311	552574.724	.572	-.233
	(3.031)***	(4.558)***	(2.077)**	(-2.961)***
Credit	-1541.412	308119.461	-.768	-1.720
	(-.028)	(2.819)***	(-3.120)***	(-10.783)***
R²	78.3	69.4	84.6	83.6
R²	77.1	67.5	83.7	82.5
F-ratio	63.191***	39.81***	95.93***	89.356***

Source: Field survey, 2017. + = Lead equation. *significant at 10%, ** significant at 5% and *** significant at 1%.Values in parenthesis = t-ratio.

4. CONCLUSION AND RECOMMENDATION

From the study, an increase in household size, farm size and farming experience increased the income of participants and non-participants. An increase in access to market increased the income of participants, but that of non- participants decreased. The income of both participants and non-participants decreased as hired labour increased. Participants had higher income than non-participants and the difference in income was due to credit use. Therefore the National Special Programme on Food Security should be progressively scale up the more to other locations to enable more farmers' access credit in order to produce more and earn more income.

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